

The Integrity of the Artistic Image of the City Based on Symbolization (the Case of Modern Architecture of Dnipro, Ukraine)

Irina Bulakh^{1,*}, Tetyana Kashchenko², Maryna Harbar¹, Valentyna Praslova¹, Yuliia Riabets¹, Viktor Divak²

¹Department of Design Architectural Environment, Faculty of Architecture, Kyiv National University of Construction and Architecture, Kyiv, Ukraine

²Department of Architectural Design of Civil Buildings and Structures, Faculty of Architecture, Kyiv National University of Construction and Architecture, Kyiv, Ukraine

Received January 11, 2022; Revised February 11, 2022; Accepted March 15, 2022

Cite This Paper in the following Citation Styles

(a): [1] Irina Bulakh, Tetyana Kashchenko, Maryna Harbar, Valentyna Praslova, Yuliia Riabets, Viktor Divak, "The Integrity of the Artistic Image of the City Based on Symbolization (the Case of Modern Architecture of Dnipro, Ukraine)," *Civil Engineering and Architecture*, Vol. 10, No. 3, pp. 874-887, 2022. DOI: 10.13189/cea.2022.100310.

(b): Irina Bulakh, Tetyana Kashchenko, Maryna Harbar, Valentyna Praslova, Yuliia Riabets, Viktor Divak (2022). *The Integrity of the Artistic Image of the City Based on Symbolization (the Case of Modern Architecture of Dnipro, Ukraine)*. *Civil Engineering and Architecture*, 10(3), 874-887. DOI: 10.13189/cea.2022.100310.

Copyright©2022 by authors, all rights reserved. Authors agree that this article remains permanently open access under the terms of the Creative Commons Attribution License 4.0 International License

Abstract This article is a continuation of the study on the problems of forming an artistic image of the urban environment. The article proposes the author's original concept of constructing an artistic image based on symbolization, which is based on the fundamental works of famous philosophers. The purpose of the article is to determine the general provisions and principles of symbolization as the basis for the formation of a holistic artistic image of the urban environment, which has the potential for the philosophical content of architecture and allows you to design modern architecture, taking into account the historical context and heritage. Methodology: the study consists of a systematic, integrated and comprehensive analysis of the artistic image and symbolization of architecture and urban planning. The study used the analysis of literature, regulatory, information sources, graphic-analytical methods, photographs, and field research. The theoretical basis for the study was the works of outstanding philosophers and art historians (Plato, Plotinus, Aristotle, Hegel, Areopagite, Kant, Schelling, Goethe, etc.). The research was influenced by the symbolic trend in the visual arts, which was developed by Aurier, Gauguin, Moreau, Redon, Malevich, Kandinsky, etc. The views of the Symbolist poets were

investigated (Mallarme, Rimbaud, Ivanov, Blok, Mandelstam, etc.). Studies of artistic imagery and symbolization in the theory of urban planning and architecture have been carried out in the works of Alberti, Ledoux, Bull, Lynch, Venturi, Jenks, Tange, Alexander, etc. The main components of the symbolization processes (analogy, scheme, allegory, symbol) are stated and characterized, as well as the principles of symbolization (communication, transformation, commutation, and metamorphism). All the proposed principles of symbolization are illustrated by the example of the formation of a holistic artistic image of the urban environment in Dnipro, one of the largest cities in Ukraine. The modern architecture of the city was studied and analyzed from the point of view of the use of symbolization in the creation of large urban ensembles. Conclusions: the proposed principles for creating an architectural and artistic image of the urban environment have a hierarchical essence of their generality, as well as the continuity of construction in relation to the general processes of architectural and urban symbolization. Their application will allow the architect to form new design solutions, which, on the one hand, are aimed at preserving culture, heritage, and history, but at the same time allow generating

something new – the architecture of the future.

Keywords Symbolization, Semantic Image, Artistic Image, Contemporary Architecture, Philosophy in Architecture, Urban Context

1. Introduction

Architecture, as a system of artificial objects ordered in space that protect a person from the environment, is not only an expression and solution of people's vital needs but also a means of reproducing cultural heritage and the philosophical content of life [1-3]. Any society necessarily forms and develops a system of cultural and architectural-spatial symbols (from historical monuments and temple complexes to typical national and regional buildings and landscapes), organizing and transmitting emotionally significant experience in the form of symbols [4-6]. As a result, world architecture today reflects no less the amount of life and history of society than the ideas and concepts of history, philosophy and other sciences. Implicitly and continuously influencing us, the architectural environment carries the emotionally significant experience of our ancestors, previous generations, develops our consciousness and identity in their multidimensional understanding, forms a worldview and attitude towards it [7-9]. Mutual recognition of scientific and symbolic approaches is a condition for modern perception of the world and rational knowledge. The analytical approach, which dominated the public consciousness for many years, has now given way to a more integrative method of cognition, the main task of which is to use the experience of the theory and history of architecture, cultural studies, psychology and philosophy, to address the problem of symbolism of architecture, i.e., the highest level of the hierarchy of human subjective ideas about the artistic image of the urban environment [10-13].

The problem of increasing the architectural and artistic level of urban planning solutions becomes of paramount importance in the context of intensive urbanization and chaotic growth of cities, which leads to a violation of the uniqueness of the image of the urban environment, deepens the crisis in understanding the spirit of the place. This problem is relevant not only for Ukraine, but also for all world countries. In this sense, symbolism, as one of the most advanced forms of transferring content through non-textual information, from the time of the ethnic origin of cultures and today is relevant in creating a context of the unconditional value of objects of fine art, architecture and urban planning [14-16].

Unfortunately, modern urban planning regulations and rules are usually aimed exclusively at the practical and technical characteristics of the formation of the urban environment [17-20]. At the same time, the issues of preserving and improving the aesthetically artistic level of

the architectural and urban environment are important; its imagery is solved intuitively, without proper justification. More often, the search for a symbolic-figurative solution is replaced by standard-typical proposals that are not consistent with the existing historical context and the promising development of the city in the future. And, as a result, a modern city is increasingly acquiring the features of a properly designed technical system [21-23]. In these conditions, there is an urgent need to improve existing and develop new principles and methods for the formation of innovative architecture, which includes and reflects an artistic image with elements of symbolization, which together will contribute to the aesthetics of the urban environment [24-25]. Only an understanding and perception of the versatility and dynamism of the city's development will induce architects to search for artistic images of modern architecture, taking into account the artistic and aesthetic layers of the urban context [26-31]. A successful example of such an integrated approach to the creation of objects of modern architecture is a number of projects by one of the famous Ukrainian architects of modern Ukraine – Alexander Dolnik, built in Dnipro, Ukraine [32-38].

2. Purpose of the Article

The purpose of the article is to determine the general provisions and principles of symbolization as the basis for the formation of a holistic artistic image of the urban environment, which has the potential for the philosophical content of architecture and allows you to design modern architecture, taking into account the historical context and heritage.

3. Materials and Methods

The theoretical basis for the study was the works of outstanding philosophers and art historians, including Plato, Plotinus, Aristotle, Proclus, Hegel, Areopagite, Kant, Schiller, Schlegel, Schelling, Goethe, Spengler, Nietzsche, Bachofen, Fischer, Schopenhauer, Spencer, Simmel, Semper, Jung, Fromm, Florensky, Kassirer, Eco, Losev, Gutnov, Glazychev, etc. The research was influenced by the symbolic trend in the visual arts, which was developed by Aurier, Gauguin, Moreau, Redon, Malevich, Kandinsky, Vrubel, Borisov-Musatov, etc. The views of the Symbolist poets were investigated, in particular, Moreas, Baudelaire, Mallarme, Rimbaud, Verlaine, Ivanov, Bely, Blok, Mandelstam, etc. Studies of artistic imagery and symbolization in the theory of urban planning and architecture have been carried out in the works of Alberti, Ledoux, Bull, Lynch, Venturi, Jenks, Tange, Alexander, etc. The study consists of a systematic, integrated and comprehensive analysis of the artistic image and symbolization of architecture and urban planning. The study used the analysis of literature,

regulatory, information sources, graphic-analytical methods, photographs, field research.

4. General Provisions of Symbolization of Architectural and Artistic Images

Preliminary studies allow us to assert that the greatest theoretical development of symbol and symbolization in science and art has acquired in philosophy. Based on Aristotle's explanation of four reasons for the formation and development of any object, phenomenon or being, among which are material and formal, acting and final reasons, it is possible to bring them into conformity with mutual dependence in the construction of an architectural and artistic image: analogy (responsible for the material basis), scheme (abstracting and distracting from this basis, it becomes the driving reason for the development of the image), allegory (which, giving corporeality to the idea, is responsible for the form of the image), finally, the symbol (the ultimate cause, which is responsible for the integrity of the image). It should be noted that from the standpoint of generalization and composition of the image, this relationship is hierarchical, since the increase in the degree of complexity of building the image occurs gradually, starting from analogy, where an architectural object is compared with another and their similarities are identified. This process then continues by abstractly expressing similarities in the image schema. If this process ends at this stage, then the artistic image acquires signs of incompleteness and schematism. Further development of the process of building an image is associated with the deepening of abstraction and giving the scheme the status of a form, that is, the idea of a future image in the process of its conceptualization. The highest stage and level of abstraction is associated with the process of symbolization, which becomes the ultimate cause or goal of creating an artistic image, giving corporeality and new content to the sum of abstracted ideas. Thus, the formation of an artistic image should go through four stages and stages, corresponding to four levels of gradual abstraction and materialization of analogies and schemes, allegories and symbols.

The innovative development of architecture gives rise to the emergence of new images and symbols in the architectural and subject environment. From the standpoint of structuralist philosophy (Levi-Strauss, Derrida, Foucault, Barthes, etc.), which investigates the structure of objects and phenomena, it is natural to pose the question of revealing the substantial novelty of the modern architectural-object environment. Formalization of the general patterns of development of the architectural-subject environment, its components, and their interrelationships allows expanding the concept of "image", "content" of an object of architecture and at a new level, explore the semantics of the architectural-subject environment.

Today, there is an active expansion of the studied factors of shaping in architecture, including those of a physical nature, a rational direction, a pragmatic basis, such as, for example, the factor of rationalizing the shape of an architectural object on the basis of energy efficiency. The formation of energy-efficient architectural objects can also be presented as a process of achieving target indicators of the energy balance at different hierarchical levels by artistic and expressive, architectural and planning means with engineering and structural constraints. The semantics of the image of energy-efficient houses consists of semantic features inherent in the volumetric-spatial and architectural-planning solution, covering the general characteristics of the volume, plastics, texture, and color of the facade planes, elements, and details of decorative and engineering-functional purposes. The peculiarities of the semantic structure inherent in energy-efficient buildings are manifested as a result of designing buildings with the detection of priority methods for achieving their energy efficiency, thus creating a neo-vernacular, modern regional, high-tech, sustainable, green building image, respectively.

4.1. Analogy

The analogy is the similarity of generally different and, at first glance, incompatible objects, phenomena in terms of certain properties, attributes, or relationships. The Analogy is the "matter" of a person's accumulated life experience; it is "that from which" the mosaic of impressions from the object of perception is formed; it is a variety of things that exist objectively. The "matter" of analogy exists everywhere and always, surrounding a person with architectural diversity, as well as objective, natural and abstract-spiritual worlds. The use of analogy in architecture and urban planning is one of the common methods, which is divided into two main groups, where the use of organic samples and samples of inanimate nature becomes the main one. In turn, organic samples are divided into anthropomorphic (analogy with the forms of the human body or its parts), zoomorphic (analogy with the forms of animals or their parts), floromorphic (analogy with the plant world). Samples of inanimate nature include: space and geoplastics (analogy with the forms of relief, landscape), geometric and mathematical analogies (proportionality, the special meaning of shapes and numbers) and artificial analogies (analogy with artificial forms created by man, including works of art).

Thus, analogy as a primary "matter" and as a process of architectural symbolization became the first link as a result of its emotional and logical intelligibility in the creation and perception of an artistic image, without requiring general and special knowledge. Examples of the use of analogy can be observed in modern science, namely, in modeling in the theory of similarity, philosophy, quantum physics, mathematics, biology,

theology, linguistics, and at the stages of borrowing and mutual use of industry knowledge.

4.2. Scheme

The scheme, as the starting moment and the acting force, is the driving impulse of the symbolization of the artistic image. In contrast to analogy, the scheme, in the course of abstraction, transforms and changes the imitation model and prototype, emphasizing the main features in it, thereby maintaining a fairly clear reference to it. Schematism is a simplified display and image of a sample of analogy, as a material basis in the formation of artistic images of an urban or architectural object. Schematization occurs by isolating and generalizing a figurative analogy from the sphere of existing knowledge and ideas in a form that allows increasing the level of architectural and artistic expressiveness. In the case when the formation of an architectural and artistic image was completed at the level of schematization, the resulting image, in comparison with its full-fledged expression, is inferior to a private or individual conceptual idea, thereby it identifies in itself already become, rhetorical, well-known design schemes, solutions.

Schematism, due to its generalized abstractness, conveys the main features, structure characteristic of the project prototype, while significantly getting rid of possible individuality and the most accurate delivery of the architectural and artistic image to the consciousness of the perceiving person. Schematization is "where" the object of the architectural image comes from, i.e., it is the impetus and driving force behind the transformation of analogy into a scheme of connections between the components of the image in the process of full-fledged formation of the image.

4.3. Allegory

Allegory is a method of two-dimensional artistic depiction based on the veiling of real persons, phenomena, and objects under specific artistic images with appropriate associations, with the characteristic features of what is deliberately hidden. Allegorical images are mainly the embodiment of abstract concepts that can always be revealed and substantiated analytically. The content of an allegory, in contrast to a polysemic symbol, is unambiguous, and the form of an allegory is established by connections between meaning and image by similarity. Architectural allegory is "calling by another name" in architecture, another design approach to the well-established, already familiar rhetoric of the general architectural form, which together imply the introduction of symbolic content that is unusual for an object. This is the creation of a new, more complex, and layered content of an architectural form capable of embodying and transmitting emotions, images into the environment on the basis of "where" is the process of symbolization goes.

Unlike architectural schematism, allegorization

presupposes the dominance of the individual, personal idea of the architect about the directions and paths of artistic image and symbolization. At the same time, the object and its artistic image are endowed with a primary symbolic meaning, which is an allegorical form that expresses something different, that is, what this object is not really. Thus, duality arises: internal (functional) and external (symbolic-emotional). It should be noted that the architectural allegory is associated with concrete and bodily, borrowed images, which allows the observer to quite easily perceive the dual and primary symbolic content inherent in it.

4.4. Symbol

Symbolization is a conscious purposeful action of shaping an image with the help of analogies, schemes, and allegories, aimed at the ultimate goal – the creation of a multi-layered and multi-content conceptually-accentuated artistic image of architectural and urban planning art. From these positions, the architectural and urban planning symbol integrates the causes-processes of education, among which: material causes-analogies, driving causes-schemes, as well as formal causes-allegories. Of course, the process of symbolization is complicated by the fact that it is sometimes difficult to fully understand and identify the symbolic content of an architectural and artistic image without special knowledge and experience. But in any case, the deep mystery of the symbol does not leave the observer passive and uninterested – he seems to adjust, transforms, and reincarnates, thanks to this secret and hidden in the depths of the potential while awakening those multilayered associations and artistic images that are available to everyone. This property of an architectural and town-planning symbol requires from it signs of multi-content, multi-layered and multifaceted features.

An architectural and town-planning symbol is, in a peculiar form, the "soul" and "body" of an object, that is, a multifaceted logical and emotional complex capable of evoking a wide and deep range of feelings-images and transmitting them to the environment. Unlike allegory, a symbol is "what it is for" – it is a polysemantic and organic image capable of changing its meaning, influence, and content depending on the concept-goal, spatio-temporal representations, and conditions of perception.

The architectural and urban planning symbol, at least, has a superficial and deep level. The superficial level relies on the primary visual familiarity and the personal level of experience of the observer's culture. In this case, the symbol may include schematism or allegory, emphasizing the power of its action on the environment. The deep level, as a rule, requires additional information content regarding the symbolic concept and its interpretation on the part of the designer, as well as the possible simplification of the complex multilayer content structure of the goal form.

Thus, by symbolization we mean the process of

creating a perfect architectural or town-planning form, its artistic image, embodying the highest degree and level of materialization and abstraction of analogies in the processes of schematization, allegorization, which at the stage of symbolization become the ultimate cause and goal of creating an artistic image on the way of acquiring visualization and expressiveness of the totality of concrete and abstracted forms and ideas.

Unlike allegorization, the process of symbolization is a multi-layered and diverse structure containing different levels of creation and perception of an artistic image (superficial, structural, substantial, deep) and is the result of a systemic combination of processes of analogization, schematization, and allegorization. Symbolization is notable for its polysemy, complexity of the hierarchical structure, and variability of interpretation of a doubly abstracted artistic image.

5. Principles of Symbolization

The systematization of the principles was based on taking into account the provisions of Aristotle about four reasons for development in German classical and modern philosophy and methodology. Based on these provisions, the essence of the formation of the principles of the architectural and artistic image is to recognize the natural and gradual development of symbolization of the architectural and urban planning environment by determining the order of interaction of the initial (driving), material, formal and target (final) causes (forces) responsible for the harmonious formation meaningful and symbolic artistic image of the planning structure of the city and its architectural elements.

It should be noted that these principles are hierarchically subordinate to each other, as a result of which the highest level of symbolization integrates the lower links of the principles of building an image. As a result, the hierarchical structure is initially based on the idea of the material reasons for the symbolization of the forms of the architectural and artistic image in the processes of analogization. At the same time, driving causes determined the processes of schematization, and formal causes influenced the organizational form and content of symbolization, and, finally, target causes determined the final systemic result of symbolization. Thus, the hierarchical structure of symbolization of architectural and urban planning artistic images turned vertically and obeyed the general processes of shaping and analogization, structuring and schematization, organization and allegorization, content and systematization of the symbolic image.

5.1. The Principle of Communication and Its Implementation

The principle of communication is based on the material reasons for the symbolic construction of an

artistic image. Communication is the simplest and most accessible form of information transfer. Based on this, the principle of communication is to search for and develop the form of an architectural and artistic image by drawing analogies. Taking into account the possible negative consequence of the action of the analogization process in the form of reductionism, that is, an almost straightforward reproduction of an image in an urban planning or architectural object, it is recommended to use the principle of communication as an analogy between the spatio-temporal organization of various natural and artificial forms.

Philosophical ideas about the material as a spatio-temporal form of expression of reality made it possible to substantiate the process of analogization and, as a consequence, the principle of communication from the standpoint of cosmic spatio-temporal models and ideas about the relationship between the external form and the evolution of development. All models – linear, cyclical, branching, etc., can serve as an impetus, analogue and prototype, form the basis for primary communication – depicted in the artistic image of the symbolic expression of the spatial and temporal structure.



Figure 1. Ekaterinoslavsky Boulevard residential complex, Dnipro, Ukraine

The concept of the continuity of space-time, its multidimensionality and curvature manifested itself in search projects, utopias of new and modern architecture, reflecting on the form, multilayer structure, and planning organization of urban formations, as well as in their architectural and artistic images. New images of search projects in allegorical and symbolic form generalized the views of architects on the artistic image, form, structure, and development of the Universe and the terrestrial space of the urban environment. At the same time, given the ability of the hierarchical construction of the principles of symbolization with each step hereditarily involve all the patterns of the previous constituent links-elements, the concept of time and space received further transformation and natural evolutionary development, with a gradual movement towards the final goal – obtaining a symbol. The further development of these views in the principle of

communication found its expression in the corresponding models and methods of constructing an artistic image, which separately, sequentially or in parallel place an emphasis on the spatial and temporal, spatio-temporal, and temporal-spatial characteristics of the form of the architectural and artistic image. In urban planning practice, the principle of communication can be observed in the architectural ensemble "Ekaterinoslavsky Boulevard", designed in the city of Dnipro by the Ukrainian architect Alexander Dolnik (Figure 1).

This urban development ensemble consists of a pedestrian passageway and adjacent new buildings. It should be noted that when forming the general concept, and then determining the number of stories of the new development, A. Dolnik applied the proportional system of the golden section, which, together with the mutual coordination of the facing materials of nearby buildings, made it possible to create a harmonious and regular form of the artistic image of an integral system of buildings and streets.



Figure 2. Ekaterinoslavsky Boulevard residential complex, Dnipro, Ukraine



Figure 3. Ekaterinoslavsky Boulevard residential complex, Dnipro, Ukraine



Figure 4. Ekaterinoslavsky Boulevard residential complex, Dnipro, Ukraine

The principle of communication in the town-planning ensemble "Ekaterinoslavsky Boulevard" manifested itself in the author's idea of the intimate scale of Italian streets and the transformation of a public pedestrian space into a symbolic artistic image of a cozy European urban space (Figure 2, Figure 3, Figure 4).

An architectural example of the application of the principle of communication is the Titanic entertainment center in Dnipro, built by architect A. Dolnik (Figure 5). This entertainment center, fully consistent with its name, embodied and figuratively reproduced the form of direct analogy, as a manifestation of reductionism, based on the author's idea of the appearance of a sea liner.



Figure 5. Titanic entertainment center project, Dnipro, Ukraine

Summing up the above, in the context of the implementation of the principle of communication to establish logically grounded information links between the primary analogy and the final image of the designed architectural object, we can assume the existence of several types and types of time, such as times of organic and inorganic matter, irreversible and cyclic, external and

internal, general and proper, accelerated and decelerated times, etc.

Taking into account their incommensurability, such as its absence between a line, plane, and volume in geometry, these dimensions, and types of time can be represented as separate independent dimensions, i.e., space can receive conventional names constructed by analogy – "continuation" (linearity), "course" (flatness) and "flow" (volumetric) of time. It is this perception that largely corresponded to many philosophical and scientific doctrines and ideas about the multidimensionality of the space-time of the Universe, as well as its embodiment in various archetypes, patterns, images of architectural and urban planning structures.

5.2. Transformation Principle

The next principle of symbolizing the architectural and artistic images of the urban environment was the principle of transformation. Transformation is based on the process of schematization and is responsible for the structure of the construction of an artistic image by primary generalization and abstraction of the form obtained as a result of analogization, transforming the main features and structure of the prototype without emphasizing its individuality. Thus, the principle of transformation is a further transformation of the material form of the originally obtained artistic image, the purpose of which is to schematically depict and express the idea-content at the level of the structural organization of the architectural and artistic image. An example of using the principle of transformation at the town-planning level of symbolization is the town-planning ensemble "Gate", built by the architectural firm Dolnik & Co as part of the renovation of the historical center of Dnipro (Figure 6, Figure 7).



Figure 6. Town-planning ensemble "Gate", Dnipro, Ukraine



Figure 7. Town-planning ensemble "Gate", Dnipro, Ukraine

In the design work on the specified ensemble, there was a certain peculiarity and complexity in the form of the existing urban planning situation, namely, the presence of a road bridge, previously erected at a random angle to the architectural environment. The architect used this "drawback" as the basis for the formation of the artistic image, as well as the structural rethinking of the ensemble, with the introduction and accentuation of the pedestrian path. As a consequence of the operation of the transformation principle, the result was an emphatically symbolic artistic image of a street-bridge for pedestrians, dialectically opposed to the existing road bridge, which also made it possible to significantly expand the boundaries of the town-planning ensemble and connect it with the city embankment (Figure 8, Figure 9).

The principle of transformation in the urban planning ensemble "Gate" also manifested itself in the structural rethinking of the artistic image of the modern high-rise buildings in Dnipro, as a symbol of the vertical development of the city in the form of a sum of volumes with different parameters, including planning schemes and typology.



Figure 8. Town-planning ensemble "Gate", Dnipro, Ukraine



Figure 9. Town-planning ensemble "Gate", Dnipro, Ukraine

In its symbolic aspect, this ensemble embodied the image of a compositional hinge connecting the axes of adjacent streets, as well as with the help of the hypertrophied scale of the "super-staircase" of the pedestrian street (the image of the "Trestle"), which in turn connected the "Gate" ensemble with the embankment and the passenger transport hub ("Terminal" image). The center of the ensemble is the eponymous 50-story skyscraper, which, in the process of schematization and using the principle of transformation, reflected the concept of an "entrance arch" for the whole city, as well as the idea of the form, artistic image, and appearance of the modern city "Gate". It should be noted that the same symbolically imaginative approach was used in his time by K. Tange during the reconstruction of Skopje, which found acceptance and support among the residents of the city.



Figure 10. Residential complex "Flora", Dnipro, Ukraine

At the architectural level of symbolization, the operation of the principle of transformation can be illustrated with the help of another work by A. Dolnik, namely the residential complex "Flora" (Figure 10). The artistic image of a residential building was formed due to the transformation of the primary pleomorphic analogy into a structurally schematic representation of a group of trees. The "botanical" form and structure of buildings, with a gradual increase in the floor area vertically,

figuratively, and expressively symbolized the artistic image of the city grove. The tree-like structured and generalized form of the "Flora" residential complex is successfully supported by the color range of movable sunscreens made of patinated copper, which together were perceived as green leaves of a spreading crown.

5.3. Commutation Principle

The next principle of the formation of the architectural and artistic image was the principle of commutation. Commutation, as a more complex and progressive way of transmitting and establishing a connection between the primary cause of symbolization and the end result – the image-symbol, is responsible for the organizational component of the construction of a symbolic image. This principle, against the background of allegorization processes, reflects the formal reason and, through further generalization and abstraction of the results of transformational transformations, saturates the artistic image with individualization. Considering the definition of the concept of switching, borrowed from the sphere of computer technologies, as "the process of connecting subscribers of a communication network through transit nodes" and applying an analogy, we characterize the principle of switching as an action-transformation aimed at obtaining a meaningful and informational "transit node" on the way to the final result of symbolization.

The urban ensemble "Krutogorny", designed by the architect A. Dolnik in Dnipro, can serve as an example of the use of the commutation principle (Figure 11, Figure 12). The location of the town-planning ensemble in close proximity to the Dnieper River allowed A. Dolnik to choose the main spatial idea for "Krutogorny" the artistic image of propylaea, which connected the city with the river. The ensemble consists of a set of mainly residential complexes, which are compositionally, harmoniously, and meaningfully interconnected and at the same time emphasize the importance of each other.



Figure 11. Urban ensemble "Krutogorny", Dnipro, Ukraine

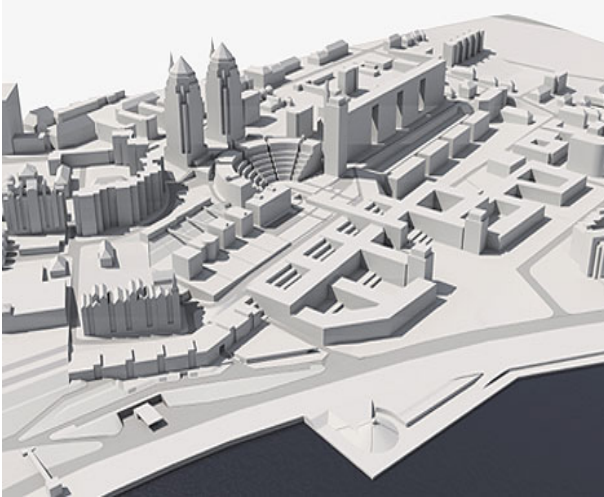


Figure 12. Urban ensemble "Krutogorny", Dnipro, Ukraine

The main element of the "Propylaea" was the residential complex "Towers", the terraced complex "Ladder", the residential building "Amphitheater", the group of buildings "Western" and "Eastern walls", residential complexes "Amsterdam", "Ocular", "Stones" and office building "Terrace".

It should be noted the special attitude of A. Dolnik to the proper names of the projected buildings, complexes, and ensembles – this is always an accurate hit in the content and idea of creating an artistic image, which clearly emphasized the philosophical and aesthetic, harmonious and cultural significance of buildings. Also, in the urban planning ensemble "Krutogorny", thanks to the architectural and artistic image-fan of the building "Amphitheater", one can trace a paraphrase to the circular squares of ideal cities of the Renaissance, as well as an example of urban symbolization - the city of Sho, designed by Ledoux in the image of a circle "drawn by the sun".

Thus, the principle of commutation in the urban-planning ensemble "Krutogorny" was revealed by the general metaphor of the "Water Gates" of the city, which united the Dnieper embankment with the historical center of the city. Such a symbolic organization of the artistic image of "Krutogorny" became possible, among other things, due to the territorial location of the ensemble – on an undeveloped slope between the river and the existing urban development.

The principle of commutation at the architectural level of symbolization was demonstrated by the "Duet" housing complex by architect A. Dolnik in Dnipro (Figure 13). This complex consists of two residential blocks of a variable number of stories, interconnected by a square platform-stylobate, which prompted the architect to the final idea of the name of the building. It should be noted that the artistic image of the volumetric-spatial composition "Duet" is also associated with the rigid verticals of the buildings of the University of Pennsylvania by architect L. Kahn and resembles the

image of the "Romeo and Juliet" complex by architect G. Sharun.



Figure 13. "Duet" housing complex, Dnipro, Ukraine

The compositional organization of both blocks of the "Duet" is divided into narrow vertical elements, which differ from each other at the height of the nuance, and this "randomness" is emphasized by the stochastic arrangement of the balconies. The indicated compositional-spatial organization emphasizes the metaphor of dense historical buildings, which closely adjoined the complex and formed an allusion to the "historical city". Thus, the principle of commutation turned the historical character of the area into a symbolic artistic image of the complex, harmoniously fitting into the existing situational context.

5.4. Principle of Metamorphism

The last and key link in the system of principles is the highest level – the principle of metamorphism. Metamorphism (modification, rebirth), in the context of symbolizing an artistic image, is the principle of symbolization that has combined and integrated the gradual layering of the consequences of shaping and analogization, structuring and schematization, organization and allegorization, as a result of which the "transit node" is reborn into the final symbolic image. At the same time, the final result of symbolization is endowed with high artistic functions in the form of an expressive and pictorial form of representing the inner philosophical content.

The action of the principle of metamorphism can be illustrated by the project of the Royal Saltworks at Arc-et-Senans, designed by the architect C. Ledoux, an outstanding master of aesthetic architectural and urban planning forms and the founder of symbolization in architecture. The project of the city, called "Architecture, which is an expression of art, customs, and law", reflected the idea of the curvature of space-time, its

multidimensionality in the form of a complicated ellipsoidal shape of the plan. This plan, as if reflecting the influence of macrocosmic, microcosmic, and dynamic factors, acquired a round shape, which is slightly flattened at its poles and is similar in configuration to a torus cut, which symbolized the artistic image of the multidimensionality and dynamics of space-time. At the same time, the toroidal shape of the proud Shaw determined a double and interconnected planning and organizational composition of the building (radial and axial), which had a single-center – the main square of the city, from which organizational and vital city functions (management, production, housing, service, rest, nature).

Together with the allegorical-symbolic system of artistic images of the architectural development of the city, this double planning-symbolic organization captured and emphasized the idea of temporary space, while forming the complex geometry of a multilayer structure. Summarizing the above, we note that the architectural and planning form, which reflected the artistic image of the Royal Saltworks at Arc-et-Senans, was both a cut and a projection of a multidimensional non-Euclidean model of space that illustrated the operation of the principle of communication.

The operation of the transformation principle is reflected by the imposition of a double planning structure and the transformation of the originally circular form of the city plan into an elliptical one. The operation of the principle of commutation manifested itself in the organization of the city's vital functions, where the central square was designated as a pulsating culmination point, from which the rhythm of vital forces-tensions gradually weakened dissolving in the last circle – the natural environment. And, finally, the generalizing action of the principle of metamorphism, uniting and filtering, saturating and concentrating the previous achievements of the artistic image, transformed it into an integral and harmonious system of individual and artistic design solutions.

The concept of constructing an architectural and artistic image, proposed by C. Ledoux, was further developed and introduced as an idea of the multidimensionality of the model of spatio-temporal representations, with its further transformation into a three-dimensional image-volume of the architectural and urban planning environment. Undoubtedly, the multidimensionality of architectural and artistic images reflected the idea of determining the objective and real number of dimensions of time (one-, two- or three-dimensional time, similar to three-dimensional space) and was associated with the formation of both visual geometrical-pictorial structures and the creation of expressive forms, in which the dynamics of changes and the passage of time were hidden in the three-dimensional plane of the images of a multilayer planning structure.

The manifestation of the principle of metamorphism in architecture can be illustrated by the example of the

complex "Towers" by A. Dolnik, which serves as a symbol and dominant in the development of the previously considered urban ensemble "Krutogorny" (Figure 14).



Figure 14. "Towers" housing complex, Dnipro, Ukraine

The multi-story twin towers are a symbol in the form of "gates" of this ensemble, which open a cascade of laconic and expressive architectural volumes and organize panoramic disclosure and compositionally holistic descent to the river. The "Towers" are distinguished by a large scale for the historical center of the city and an emphasized strict centrally symmetric compositional solution. The pipes of the boiler room, which are visible on the main facade, apart from their purely technical function, received a symbolic interpretation in the spirit of the classical statements of C. Ledoux - special pylons in the form of podiums and a pyramidal metal chimney structure created an image-symbol of human habitation – a home fireplace.



Figure 15. The business complex "Enigma", Dnipro, Ukraine

An example is also the Enigma business complex, built in Dnipro by the architect A. Dolnik as part of the Ekaterinoslavsky Boulevard ensemble (Figure 15). The dynamics of the "timelines" consist in "shifts" and special mixing of the building volumes. The central architectonic element of the complex is designed in the form of a console with a stained-glass screen, artistically symbolizing the "observing eye" and the "finger-pointing" to the dominant of the boulevard, namely to the symbol-bell tower of the "Bosphorus" complex. With a similar design technique, the architect created a symbolic and artistic relationship and succession of several buildings, which thereby formed a semantic connection of the urban environment.

In architecture, both the development of space and the movement of time are figuratively and expressively illustrated in the "Cliff" residential complex, built by the architect A. Dolnik, Dnipro (Figure 16).



Figure 16. "Cliff" residential complex, Dnipro, Ukraine

The volume of the complex is a 23-story building located on difficult terrain with a five-meter drop. As conceived by the author, with its active and dynamically directed plastics, the building of the complex embodies the artistic image of a cliff that naturally formed from a cascade of tectonic layers. At the same time, the expressive development of the silhouette from the four-story foot to the top of the building made a fairly large structure commensurate with the surrounding historical buildings. It should be noted that the way of action of movement in space was realized by the presence of vertical links (high-speed elevators) and movable sunscreens (sliders), encircling the perimeter of the complex, which played an aesthetic role and reflected the manufacturability of modern architecture.

Another example is the Citadel-2 business complex by the architect A. Dolnik in Dnipro (Figure 17).

The volumetric-spatial cubic form of the building is solved in the spirit of the postmodern manifesto – with the hypertrophied scale of the keystone, which serves as a kind of expressive means of broadcasting the importance

and inevitability of temporal-spatial updates among the sustainable historical buildings of the urban environment. The applicative pediment and decorative colonnade, emphasizing the traditional tectonic tiers of the structure, minimalist perforation of windows, and hypertrophied "iconic" architectural elements, made up an almost complete list of the postmodern thesaurus, reflecting the temporal-spatial transformations that turned to the past in search of an analogy-matter of forms for rethinking, generalization, and abstractness in the form of an allegory. This effect is emphasized by the metaphorical "Messenger" on the chariot - a bronze Pegasus that has only a front-drive part.



Figure 17. Citadel-2 business complex, Dnipro, Ukraine

The high-rise complex "Dream" by architect A. Dolnik in the city of Dnipro is a 25-story modern residential building integrated into the urban context from the nine-story buildings of the Soviet era (Figure 18). The hypertrophied and "inhuman" scale of the building was compensated by the provision of order tectonics to the general volumetric-spatial solution. So, the podium from the common areas symbolizes the artistic image of the classic stylobate. Penthouses, highlighted by window-screens and three canopies-cornices, denote the artistic image of the entablature. Upon close observation, one can see that in the multi-story residential complex "Dream", elements from the environment (the volumes of nine-story box houses) were used as a matter-analogy, which were replicated to create an artistic image of a column-building. Thus, the artistic image of the building

is created and decorated with a structured interpretation of the modern understanding of the tectonics of the archetype of the order system.



Figure 18. "Dream" residential complex, Dnipro, Ukraine

An interesting example is also the residential complex "Amphitheater" by architect A. Dolnik, Dnipro (Figure 19, Figure 20, Figure 21). The archetype of the amphitheater as an idea for the formation of the architectural and artistic image of a residential building firstly reflected the author's idea of the city forum. Secondly, this idea was based on the previous function of the building area: in pre-war times, this place was used as a tribune of the city stadium.



Figure 19. Residential complex "Amphitheater", Dnipro, Ukraine

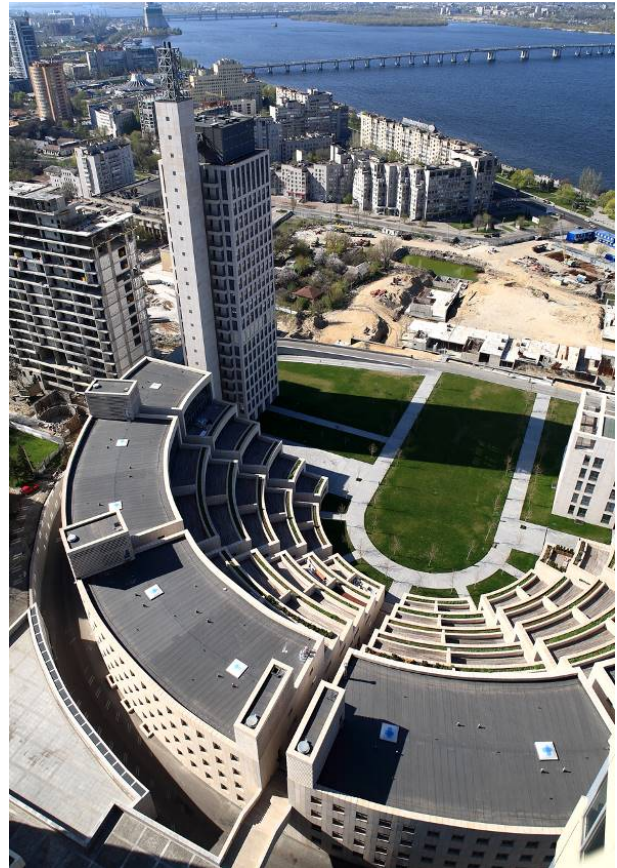


Figure 20. Residential complex "Amphitheater", Dnipro, Ukraine



Figure 21. Residential complex "Amphitheater", Dnipro, Ukraine

Thus, Bofill's method of transferring a large historical form into the artistic image of a modern residential complex acquired an expressive and pictorial character, emphasizing the historicity and "genius loci".

6. Conclusions

Summarizing the content of the proposed principles for creating an architectural and artistic image of the urban environment, we note the hierarchical essence of their commonality, as well as the continuity of their

construction in relation to the general processes of architectural and urban planning symbolization. The first and simplest link in this community was the principle of communication, the main task of which is to find temporal and spatial expressions from the original-analogue and to establish connections between it and the form of the future artistic image. The next element of generality is the principle of transformation, which, through generalization and abstraction in the process of schematization, transforms and structures the result of "communication", giving the form of a future artistic image a structural component. The third link in the system was the principle of commutation, which is associated with the process of allegorization and is responsible for the holistic organization of the form and structure of the artistic image. The last and generalizing step is the principle of metamorphism, which corresponds to the process of symbolization, the result of which is the final transformation of the sum of previous actions into a target symbolic image.

All the proposed principles of symbolization are presented in the example of modern architecture in the central part of the Dnipro city, Ukraine. Ukrainian architect Alexander Dolnik has completed a series of large-scale architectural and urban planning projects that completely renewed the historical environment of one of the largest cities in Ukraine. It is important in these architectural objects that in each of them the architect laid an internal philosophical meaning and idea, which became the basis for the formation of an artistic image with a symbolic meaning. This design approach is proposed to be used by architects when designing the development of modern cities, especially their central part, where the layering of urban spatio-temporal contexts occurs. Only deliberate and balanced decisions will allow us to preserve our culture, heritage, and history, while creating something new – creating the architecture of today and tomorrow.

REFERENCES

- [1] Bulakh. "Artistic and Aesthetic Formation and Evolution of Architectural and Urban Planning Space," *Science and Innovation*, Vol. 15(5), pp. 47–56, 2019. <https://doi.org/10.15407/scine15.05.057>
- [2] M. A. Amen, H. A. Nia. "The Effect of Centrality Values in Urban Gentrification Development: A Case Study of Erbil City," *Civil Engineering and Architecture*, Vol. 8(5), pp. 916–928, 2020. <https://doi.org/10.13189/cea.2020.080519>
- [3] H. A. Nia, F. Olugbenga. "A Quest on the Role of Aesthetics in Enhancing Functionality of Urban Planning," *Civil Engineering and Architecture*, Vol. 8(5), pp. 873–879, 2020. <https://doi.org/10.13189/cea.2020.080514>
- [4] R. Rahbarianyazd, H. A. Nia. "Aesthetic cognition in architectural education: a methodological approach to develop learning process in design studios," *International Journal of Cognitive Research in Science, Engineering and Education*, Vol. 7(3), pp. 61–69, 2019. <https://doi.org/10.5937/IJRSEE1903061R>
- [5] M. Aziz Amen, H. Nia. "The dichotomy of society and urban space configuration in producing the semiotic structure of the modernism urban fabric," *Semiotica*, Vol. 222, pp. 203–223, 2018. <https://doi.org/10.1515/sem-2016-0141>
- [6] Bulakh, L. Kozakova, M. Didichenko, O. Chala. "Sustainable futures in the context of architectural design of hospitals," *E3S Web of Conferences*, Vol. 166, pp. 08001, 2020. <https://doi.org/10.1051/e3sconf/202016608001>
- [7] H. A. Nia, R. Rahbarianyazd. "Aesthetics of Modern Architecture: A Semiological Survey on the Aesthetic Contribution of Modern Architecture," *Civil Engineering and Architecture*, Vol. 8(2), pp. 66–76, 2020. <https://doi.org/10.13189/cea.2020.080204>
- [8] Bulakh, O. Chala, V. Divak. "Dynamics of Architectural and Urban Planning Hospital Systems Evolution," *Civil Engineering and Architecture*, Vol. 8(4), pp. 586–598, 2020. <https://doi.org/10.13189/cea.2020.080423>
- [9] H. A. Nia, R. A. Atun. "Aesthetic design thinking model for urban environments: A survey based on a review of the literature," *Urban Design International*, Vol. 21, pp. 195–212, 2016. <https://doi.org/10.1057/UDI.2015.25>
- [10] S. S. M. Al-Din, H. A. Nia. "'Beauty' Based on the Functionality of Smart Skin in Buildings," *Open House International*, Vol. 42(4), pp. 60–69, 2017. <https://doi.org/10.1108/OHI-04-2017-B0008>
- [11] U. A. Nassar. "Urban Acupuncture in Large Cities: Filtering Framework to Select Sensitive Urban Spots in Riyadh for Effective Urban Renewal," *Journal of Contemporary Urban Affairs*, Vol. 5(1), pp. 1–18, 2021. <https://doi.org/10.25034/ijcua.2021.v5n1-1>
- [12] Bulakh, L. Kozakova, M. Didichenko, O. Chala, G. Kovalska. "Is the hospital-park future of the sustainable hospital architecture?," *E3S Web of Conferences*, Vol. 280, pp. 04014, 2021. <https://doi.org/10.1051/e3sconf/202128004014>
- [13] Yavuz, N. Ataoğlu, H. Acar. "The Identification of The City on The Legibility and Wayfinding Concepts: A Case of Trabzon," *Journal of Contemporary Urban Affairs*, Vol. 4(2), pp. 1-12, 2020. <https://doi.org/10.25034/ijcua.2020.v4n2-1>
- [14] Bulakh, L. Kozakova, M. Didichenko. "The innovative trends in architecture and urban planning of health care institutions," *International Journal of Innovative Technology and Exploring Engineering*, Vol. 9(1), pp. 317-323, 2019. <https://doi.org/10.35940/ijitee.A4111.119119>
- [15] S. Ureel, R. Skaggs, K. Cato. "Analysis and Solution for Fallout Repair and Tunneling in Sandy Soil Conditions for a Wine Cave in Southern California," *Civil Engineering and Architecture*, Vol. 6(5), pp. 242–251, 2018. <https://doi.org/10.13189/cea.2018.060503>
- [16] L. Osuská, R. Hela. "The Impact of Different Aggregate Types and Its Composition on Resulting Concrete Properties Representing the Water Impermeability Level of

- Concrete for the Construction of White Boxes," *Civil Engineering and Architecture*, Vol. 8(2), pp. 39–45, 2020. <https://doi.org/10.13189/cea.2020.080201>
- [17] S. Semerikov, S. Chukharev, S. Sakhno, A. Striuk, V. Osadchyi, V. Solovieva & H. Danylchuk. "Our sustainable coronavirus future," *E3SWC*, Vol. 166, pp. 00001, 2020. <https://doi.org/10.1051/e3sconf/202016600001>
- [18] Bulakh, I. Merylova. "Sustainable Hospital Architecture - Potential of Underground Spaces," *Civil Engineering and Architecture*, Vol. 8(5), pp. 1127–1135, 2020. <https://doi.org/10.13189/cea.2020.080539>
- [19] H.A. Nia, R. A. Atun, R. Rahbarianyazd. "Perception Based Method for Measuring the Aesthetic Quality of the Urban Environment: The Case of Famagusta," *Journal of open House international*, Vol. 42(2), pp. 11–19, 2017. <https://doi.org/10.1108/OHI-02-2017-B0003>
- [20] Bulakh. "Urban Planning Organization and Development of Children's Medical Institutions in Ukraine," *Journal of Regional and City Planning*, Vol. 31(1), pp. 82–96, 2020. <https://doi.org/10.5614/jpwk.2020.31.1.6>
- [21] G. Kovalska, I. Merylova, I. Bulakh. "Urban improvement of comprehensive schools and out of school educational establishments in Ukraine," *International Journal of Innovative Technology and Exploring Engineering*, Vol. 8(12), pp. 1765-1770, 2019. <https://doi.org/10.35940/ijitee.L3229.1081219>
- [22] G. Kovalska, I. Bulakh, M. Didichenko, O. Kozakova, O. Chala. "Higher education institutions energy efficient methods of functional planning solution," *E3S Web of Conferences*, Vol. 280, pp. 04013, 2021. <https://doi.org/10.1051/e3sconf/202128004013>
- [23] V. Smilka. "The Role of Monitoring in Sustainable Development," *Baltic Journal of Real Estate Economics and Construction Management*, Vol. 7(1), pp. 245–254, 2019.
- [24] K. Attarian, B. Safar Ali Najar. "Vernacular and historic underground urban facilities and sustainability of cities case study: Infrastructures of Dezful," *Journal of Cultural Heritage Management and Sustainable Development*, Vol. 9(1), pp. 2–23, 2018.
- [25] N. Shebek, V. Timokhin, Y. Tretiak, I. Kolmakov and O. Olkhovets. "Sustainable development and harmonization of the architectural environment of cities," *E3S Web of Conferences*, Vol. 166, pp. 09001, 2020.
- [26] Pleshkanovska. "The problems of forming a system of green areas as an ecological framework of a large city (on the example of Kyiv)," *E3S Web of Conferences*, Vol. 280, pp. 04012, 2021.
- [27] N. Shebek, V. Timokhin, Y. Tretiak, I. Kolmakov and O. Olkhovets. "Sustainable development and tolerance in the socializing and resocializing of the architectural environment of cities," *E3S Web of Conferences*, Vol. 280, pp. 04009, 2021.
- [28] Irina Bulakh, Olena Kozakova, Margaryta Didichenko, Olena Chala. "Systematization of Features and Recommendations Regarding Architectural and Urban Planning and Placement of University Hospitals," *Civil Engineering and Architecture*, Vol. 9(7), pp. 2476–2491, 2021. <https://doi.org/10.13189/cea.2021.090732>
- [29] Pleshkanovska, S. Biriuk. "'Outdated housing stock' as an object of complex reconstruction programs and projects: challenges for Ukraine," *Journal of Urban and Regional Analysis*, Vol. 13(2), pp. 257–280, 2021.
- [30] Pleshkanovska. "Assessing the level of greening in a major city: Subjective and objective evaluation on the example of the city of Kyiv," *Bulletin of Geography. Socio-economic Series*, Vol. 48(48), pp. 155–164, 2020.
- [31] P. Krivenko, O. Petropavlovskiy, O. Kovalchuk, I. Rudenko, O. Konstantynovskiy. "Enhancement of alkali-activated slag cement concretes crack resistance for mitigation of steel reinforcement corrosion," *E3S Web of Conferences*, Vol. 166, pp. 06001, 2020.
- [32] G. Kochetov, O. Kovalchuk, D. Samchenko. "Development Of Technology of Utilization of Products of Ferritization Processing of Galvanic Waste in The Composition of Alkaline Cements," *Eastern-European Journal of Enterprise Technologies*, Vol. 5(10-107), pp. 6–13, 2020.
- [33] Kovalchuk, G. Kochetov, D. Samchenko. "Study of service properties of alkali-activated cement using wastewater treatment residues," *IOP Conference Series: Materials Science and Engineering*, Vol. 708(1), pp. 012087, 2019.
- [34] P. Krivenko, O. Kovalchuk, O. Boiko. "Practical experience of construction of concrete pavement using non-conditional aggregates," *IOP Conference Series: Materials Science and Engineering*, Vol. 708(1), pp. 012089, 2019.
- [35] Rita Laksmisari Rahayu, Sugeng Triyadi S, Lily Tambunan. "Relationship of Damage Causes and Ceiling Damage Levels in Indonesia Hospital," *Civil Engineering and Architecture*, Vol. 10(1), pp. 163–174, 2022. <https://doi.org/10.13189/cea.2022.100115>
- [36] Erkin Boronbaev, Berikbay Unaspekov, Aigul Abyldaeva, Elmira Tohlukova, Kamoliddin Holmatov, Nurbubu Zhyrgalbaeva. "Full-Fledged Use of Semi-Basement Space by Building Seismic-Resistance, Energy-Efficiency, Microclimate and Preventing Influences of Thermal Bridges and Mold Growth," *Civil Engineering and Architecture*, Vol. 10(1), pp. 131–143, 2022. <https://doi.org/10.13189/cea.2022.100112>
- [37] Kashchenko, G. Kovalska, L. Gnatiuk. "Revitalization of the urban environment and contemporary trends of its humanization via the means of art," *Wiadomosci Konserwatorskie*, Vol. 2020(61), pp. 31–34, 2020.
- [38] G. Kovalska, V. Smilka. "Construction management in Ukraine," *International Journal of Innovative Technology and Exploring Engineering*, Vol. 9(1), pp. 1593–1600, 2019