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METHODOLOGICAL BASES OF THE STUDY OF MORPHOLOGICAL CHARACTERISTICS OF THE CITY

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ABSTRACT

The aim of the study is to formulate the basic theoretical positions and to substantiate the methodological approaches to the study of morphological characteristics of the city. They are connected with the process of studying of the form and structure of the city with the help of morphology as a science. The methodological basis of the study is the philosophical-ideological, axiomatic, systemic and interdisciplinary approaches.

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Introduction. The current state of development of the urban planning theory is characterized by intensive enrichment of new ways of solving problems associated with the formation of the material and spatial environment of the city. Special attention was paid to the study of morphological problems in the structure of urbanism. They are caused by:

- intensive accumulation of knowledge about the structural organization and formation of urban development objects under the influence of social, economic, historical and environmental factors;
- development and implementation of an integrated system of measures for sustainable urban development.

Alongside with this, there is a need to clarify and improve the existing methods and to involve new interdisciplinary knowledge for urban theory and methodological approaches for urban planning. They will help to identify new relationships between the original disciplines, expand the traditional disciplinary methodology and deepen the specialization [1] in urban planning.

Fundamental works that make up the theoretical basis of the research and concern such *issues as philosophy and methodology of the science* (V. Budanov, V. Kasyan, B. Nicolescu, A. and D. Novikov, G. Ruzavin, A. Tararoyev, U. Urmantsev, A. Fomin, A. Tsophnas, V. Yudin, etc.); *fundamental positions in the theory of urban development* (M. Bevz, M. Gabrel, I. Groza, A. Timochin, A. Fomin, Z. Yargina, K. Lynch, B. Cherkes, etc.); *the study of architectural and individual aspects related to their functional and planning aspects, compositional, structural and hierarchical organization of the objects in city planning* (S. Linda, O. Rybchinsky, Yu. Rochnyak, G. Curdes, K. Zitte, L. Krier, A. Rappaport, N. Shebeck, G. Osychenko, etc.); *Essential characteristics of the conceptual and categorical apparatus*

[1] In the general system of scientific knowledge, the deepening of specialization is considered negatively (Kolot, 2014, p. 19), however, in order to achieve the integrity and systematicity in research on urban development, this approach remains relevant.

in urban development (Y. Vermenih, M. Gabrel, M. Demin, A. Marder, Yu. Pelech, G. Osichenko, O. Timochin, A. Fomin, etc.); *theoretical and applied aspects of the study of the morphological characteristics of architectural and urban objects* (G. Osichenko, A. Timochin, G. Curdes (Germany), E. Raith (Austria), S. Muratori (Italy), MRG Conzen (Great Britain), G Caniggia (Italy), etc.). There is a clear need to develop new approaches for expanding and deepening knowledge about the formation of the material and spatial environment of the city despite the thorough and comprehensive study of the formation, development and functioning of urban planning.

The aim of the study is to formulate the basic theoretical positions and to substantiate the methodological approaches to the study of morphological characteristics of the city.

The methodological basis for the study are the philosophical and ideological [1, 2, 3], axiomatic [4], systemic [5, 6] and interdisciplinary [7] approaches. The *philosophical* approach formed the scientific position concerning the subject of the study. *Axiomatic* approach enabled to determine the main formal properties, features of the city and consistent knowledge of its morphology. *Systemic* approach played a special role as a general scientific methodological method. It has its relation to the definition system of parameters of the city (concept, structure and substrate) and logical ordering of information and forming a holistic view of the object being studied. *Interdisciplinary* approach allowed to determine the theoretical facts and applied morphology aspects in the natural and humanitarian fields of knowledge.

Research results.

Morphological studies can be considered as the basic level of studying the properties of the city and its elements. They consist of identifying of formal features and their justification by the means being formulated in morphology – form (or shape) and structure. Studies of similar content are also presented in the study of compositional patterns, functional and planning organization of urban development objects etc. Nevertheless, the morphological studies contain the necessary basis for expanding the traditional disciplinary of methodology.

The study of morphological characteristics of the city is associated with the process of studying the form and structure of the city within the limits of morphology as the science [8, 9]. The study of the city form is aimed to determine the features of the material manifestations of the city and its components as an object of design and is characterized by physical integrity. Its structure is identified with the notion of structure – the internal form (structure). Structure is a plurality of parts that are in the interaction and specific order on a proper area. Three starting points are formulated to prove the aforementioned.

The morphology of the city can be regarded as such one that have an ontological and epistemological basis of philosophical comprehension of reality and is an integral part of it in the context of general theoretical discourse. The questions of ontological principles are related to the components of the morphology of the city (methods, principles and means), which serve as a tool for morphological research. Epistemological principles show the morphology of the city as a sphere of scientific knowledge. It means the doctrine of form and structure [8]. Taking this into account, the morphology of the city can solve the tasks of the methodological (for example, identifying structural organization features) and theoretical (for example, revealing the form of the city as morphological) aspects and generalizing objects (but not phenomena) according to characteristic morphological features.

The starting point for justifying the study of morphological characteristics of the city is the first assumption that the city can be considered as artificial (created by a person), closed (characterized by a high degree of independence from the environment) and a static system. Such system maintains the unchanging features and relationships with a certain moment of time with the system properties inherent to it, which can be related to the structure: integrity, additivity, structure and hierarchy.

This is so due to the fact that objects of morphological research can be objects that do not change their traits during a certain period of time and are determined without the involvement of functional, historical, compositional and other features [10].

A. System as a general feature of the city. The description of the morphological characteristics of the city as a static system is the basis for the formulation of theoretical positions. It is made for the purpose of further analysis and synthesis of knowledge about the structure of the city. If the morphological structure of the city is analyzed as passing from one state to another in a proper period of time – so in this case it will have signs of dynamism. The subject of the research will already be the process, not the signs (or characteristics).

A static system can turn into a dynamic only for a deeper understanding of it. Then it is considered in accordance with those historical processes that influence the formation of various types of systems and its elements. The static system becomes a developing system at this stage of research.

The city is studied as a relatively independent system not only due to the presence of properties, but also its own characteristics: structural, functional, morphological, compositional, and others in the system approach. So, the property is the internal content of the system, which is externally manifested in the form of an appropriate sign – the external manifestation of the properties of the system [11].

If several cities are characterized by the presence of all the properties at the same time (having difference only by the degree of their detection), then a set of features, in each individual case, is individual. This causes the difference or similarity of the cities between them.

Hence we have the second assumption. The city has a material structure - a plurality of parts or forms. They are in interaction and specific order and exhibit properties that are supplemented by essential formal features.

The material structure is part of the substantive level of the city-planning system and consists of two interrelated phenomena – "territory" and "structures" [12, p.12]. The allocation of material structure is concerned as the subject area of the object of knowledge. It is defined as part of the territory of a city that does not possess the properties of dynamic and open systems.

The term "material structure of the city" is associated with the purpose of expanding knowledge of the city as a shape of territorial organization. It is described by the notion of "structure" and specified by the expression of one of the phenomena of identifying the essence of things in relation to other things: the planning structure, compositional structure, functional structure etc.

Morphology studies integral material objects which inherent divisibility on a structural basis. Determination of the material structure of the city for the study of morphological characteristics is stemmed from this fact. Separation, as a property, means the division into separate isolated and simultaneously interconnected elements that form a certain unity on the structural and functional levels.

B. Properties of the material structure of the city. In the study, the city is described as a well-planned and built-up area with well-defined boundaries, with a common planning structure, a spatial manifistation, an engineering and transport infrastructure, and a complex of construction objects [13].

The presence of the previously mentioned properties allows us to consider the city taking into account the system approach as a holistic entity, conditioned by orderliness and organization. Structure is the main feature of the organization of the city. The theory of urban planning does not have a clear definition of the concept of city structure. Therefore, in the study, it corresponds to the definition of the structure as a general-purpose and scientific concept. As a rule, it means "internal structure".

The structure of the system is one of the main categories of system analysis, which characterizes the stable ordering of system elements and their relationships in space and time [15]. The notion of structure is quite close to the concept of form in system studies, but they are not identical [11, p. 36].

The structure is realized on the substrate [5, p. 55]. A sequential decomposition is necessary for its determination. It means that a subsystem of all levels that are available for analysis should be selected in it. According to the research tasks, their elements are not divided into constituent parts. [16, p. 75].

In the structure (composition) of the city as a system one can distinguish qualitatively different from each other components: element → component → subsystem. They are relatively constant, determined by subordination, differentiation and individuality in relation to each other. The discovery of the structure, the internal structure and connections between the constituent parts of the city, takes place by decomposition and dismemberment on the basis of planning.

The presence of the previous mentioned components is a reflection of the special property of the material structure in the city – discreteness (divisibility) (fig. 1). This feature means that the material structure of the city (at different levels of its organization) consists of separate but interdependent and interacting parts that form structural and functional unity: *city → fragment (due to the planning framework) → district → land.*

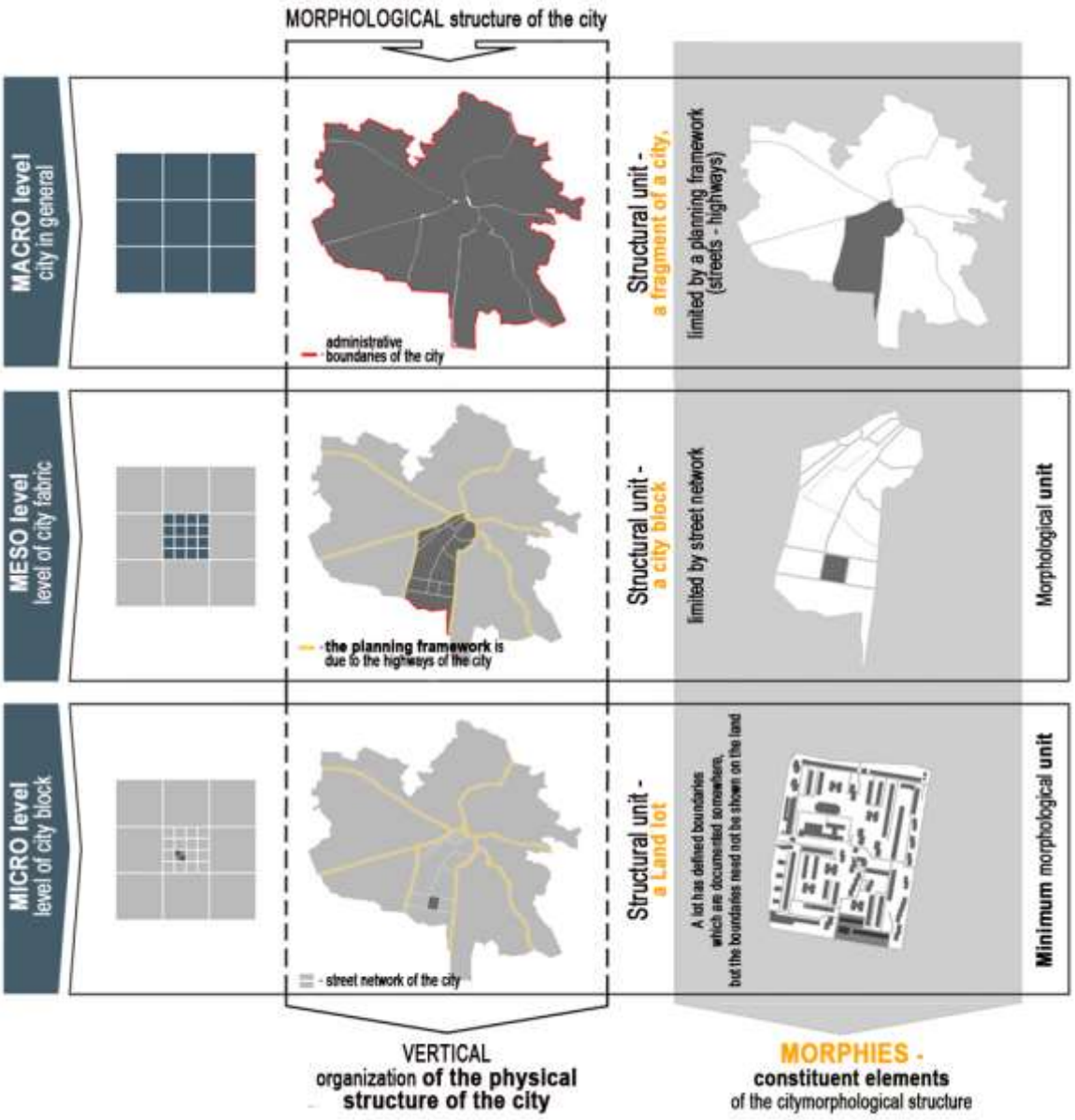

Fig. 1. The features of the physical structure of the city

The material structure of the city is characterized by different levels of organization. There is a complex subordination of its structures. The main structural levels should include: macro-, meso- and micro-levels. The basic element of all levels is urban canvas. The urban fabric is characterized by the physical structure of the city. It reflects the objective reality through the prism of the subjective world, serving as its fixation.

Macro level covers the territory of the city in general It unites adjacent fragments in a group, which collectively appear as a physical essence, that is, urban canvas. The city at the macro level can possess all the features that are inherent in system objects.

The boundary between the object (the figure) and the surrounding environment (background) is located at the macro level. The most informative feature of the physical structure of the city at this level is the location, size and contour that coincide with the administrative boundaries.

The meso level is a fragment of the city's territory, which has all the features that are inherent in subsystems. At this level, urban canvas has a high degree of structural organization, forming various types of morphological features.

Micro level is the level of the district of the city. The district is the structural unit of the city, as well as the unit of its development.

The individuality of the constituent parts of the city at different levels of its organization is determined by the following properties: compositional (harmonious and regular organization of constituent elements), geometricity (spatial arrangement (architectonics), typology (commonality of signs), morphology, functionality (designation of territory), interconnection of the main functional zones and systems of connections between them (planning) [1]. They make it possible to consider the structure of the city not only as a certainly organized territory, but also for construction material (the physical structure of the city), which has distinctive features.

All these properties are complementary and interconnected. So, morphological can complementary composites (definition of the morphological structure is a necessary condition for determining compositional) and functional, and composite - interrelated with the planning, etc. The morphological characteristics of the material structure of the city should be taken into account while studying. They are directly related to them: planning and hierarchical (fig. 2).

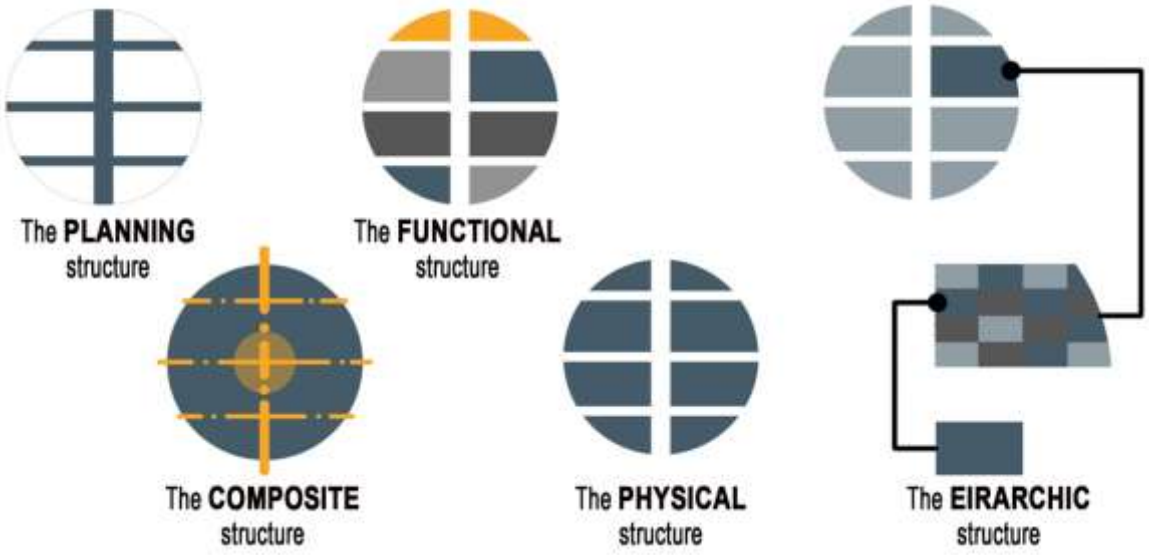

Fig. 2. The properties of the physical structure of the city

The study of compositional characteristics is due to the definition of methods of organization and patterns of development of the material structure of the city. In other words, a well-organized form (in the context of this study is correlated with the material structure) is a way of placing and combining elements and parts of the composition into a holistic formal structure. Planning characteristics determine the mutual arrangement of the main functional zones and communication systems between them. In a nutshell, it is the basis of the city, which defines the transport scheme, the appearance of the city and reflected in its masterplan. Hierarchical characteristics determine the differentiation of the material structure of the city, which arises in the process of territorial development and consolidation of the territory of the building.

Here we have the third assumption about morphology of the material structure of the city. It is a set of morphological features. They were formed in the process of historical development and under the influence of geographical, natural and social factors.

Taking into account that it is complementary compositional properties, it is directly interconnected with functional-planning and hierarchical characteristics.

C. Informativeness of the material structure of the city. The material structure of a city can contain information on many aspects related to its operation and development. The main of them include semantic, compositional, morphological, functional and historical aspects.

The semantic aspect is related to the general outlines of the material structure of the city and the content they express. In most cases, semantics are observed at the city level in general and in the district as the smallest structural unit. This is due to the purposeful expression of the idea. The city is regarded as a certain world. It is possible to distinguish different parts in its integrity. There we can

[1] The structure of the city as well as matter in philosophy has many properties. Taking into account the object and subject of the study, only those studied within the boundaries of morphology in the natural sciences are taken into account.

distinguish simply not only objects, but semantic units, where the real space of human existence is formed [17]. Symbolic content of the city at the micro level is connected with the configuration of buildings in the district. It is aimed to ease the perception of the architectural form and recognition of its figurative content.

The semantic approach always existed in the formation of the material structure of the city. A striking example of this approach is the development of the theory and practice of "ideal cities" in the context of modern Europe and the usage of the right geometric forms when designing the cities of the Ancient World.

The compositional aspect is reflected in the interconnection of various composite elements, in the ratio of architectural and urban objects of varying size and their rhythmic alternation etc.

The historical aspect is connected with the discovery in the material structure of the city of the various features of the city, which are distinguished by morphological features and are historically predetermined.

The diversity of the material structure of the city in many respects also depends on the functional aspect. The functional aspect, like historical, is associated with the discovery in the material structure of the city layers of undeveloped territories.

Conclusions. The study determines the initial positions and assumptions that serve as the basis for formulating the scientific concept of studying the morphological characteristics of the material structure of the city within the meaningful limits of the "morphology". The starting point for justification is the first assumption. It states that the city is artificial (created by a person), closed (characterized by a high degree of independence from the environment) and a static system that fixes immutable morphological signs (and relationships) at a certain point in time. The second assumption is that the city has a material structure. It consists of a certain number of constituent parts which are interconnected. There can be revealed properties that are supplemented by essential features. The third assumption is about the morphology of the material structure (filling) of the city, which, besides being complementary to the compositional properties. It is directly interconnected with the functional, planning and hierarchical characteristics. Functional and planning characteristics specify the decomposition of the material structure of the city. Hierarchical ones are related to the complexity of its structural organization. We need them for a clear and simple description, which is also an important feature in the study of morphology.

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