Significant and Basic Innovations in Urban Planning

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Abstract. The article considers the development features of the innovative urban planning in the USSR and Russia in XVIII – XX centuries. Innovative urban planning is defined as an activity on innovations creation and their implementation to obtain a socio-economic, political, environmental or other effect. In the course of urban development history this activity represents a cyclic wave process in which there are phases of rise and fall. The study of cyclic waves in the development of innovative urban planning uses the concept of basic and epochal innovations selection. This concept was developed by scientists for the study of cyclic wave processes in economics. Its adaptation to the conditions of innovative urban planning development allows one to introduce the concept of "basic innovation" and "significant innovation" in the theory and practice of settlement formation and their systems as well as to identify opportunities to highlight these innovations in the history of Russian urban planning. From these positions, six innovation waves committed to the urban development over the past 300 years are being investigated. The observed basic innovations in the domestic urban area show that urban development is a vital area for ensuring the country’s geopolitical security. Basic innovations are translated in time and modernized under new conditions of urban planning development. In this regard, we can predict the development of four basic innovations in post-Soviet Russia.

1. Introduction

In the Development Strategy of Russia for the period up to 2020 the goal is innovative transformation of economy of the country. One of the main tasks associated with achieving this goal is transition to a new model of spatial organization of socio-oriented economy. Development and implementation of this model are connected, firstly, with modernization of settlement systems, settlements and urban infrastructures; secondly, with formation of innovative architectural and spatial environment conducive to preservation and development of human potential; thirdly, with implementation of scientific-research and design works to ensure the economic development strategies of the territories of various levels of urban planning documentation, architectural and engineering resources. Wherein urban development may implement innovative potential of scientific, technical and creative activities; also develop as an independent direction for the creation of innovations and their implementation in practice to obtain a certain effect [1].

2. Body

To determine the main directions of development and introduction of new solutions in a crisis in urban planning, it is possible to adapt to these conditions the concept of selection of basic and significant
innovations, which has developed in economics. In short, this concept is represented in the work of the Doctor of Geographical Sciences, Professor E. G. Animitsa "The Phenomenon of Kondratieff waves and cycles in development of industry of the Ural macro-region" [2]. The researcher defines basic innovation as innovation in creating new industries and activities, forms of organization of production and resettlement. Formation and development of the basic innovation has a wave nature. Waves of basic innovations occur in about every 50 years. Basic innovation is a necessary condition of overcoming depression in economy (G. Mensh, 1975). In his work E. G. Animitsa cites the definition of "significant innovation" that he gave in 2004, Yu. V. Yakovets [3]. Significant innovations are innovations that lead to revolutionary changes, provide a transition to the next world civilization, a new economic mode of production. Based on these interpretations the concept of "basic innovation" in urban planning should be understood as innovations embedded in urban planning practice that provide updating of main spheres of urban activity (scientific, technical, art, design, managerial, legal, educational, investment and construction). They have a significant impact on the implementation of strategic interests of the country, creation of favorable living environment of people, development of economy and culture.

Significant innovations in urban planning are embedded in practice scientific discoveries, advanced technical and creative achievements in the field of formation and development of the environment. These innovations determine long-term prospects of spatial organization (or architectural planning) of settlements and settlement systems. Scientific, technical and artistic achievements are documented in the form of principles, rules, norms and models that can be widely and successfully used in design and construction of urban objects. We should consider formation and development of waves of basic and significant innovations from the moment of their conscious and purposeful appearance in urban development of Russia. This is Petrine and post-Petrine periods. Since that time, innovative urban waves begin. There have been observed six of them until now.

The first wave (1695-1762) was connected with foreign policy of Peter I, with reform of the army and navy, which had a strong influence on development of town planning in Russia. At the beginning of the eighteenth century the transition of ancient urban planning to a regular Russian town planning started. This transition was embodied not only in the practice of building new cities and development of system of settlements of Russia, but also in development of first theoretical positions of Russian urban development. Principles of regular planning and development of cities were stable over time: their use can be observed nowadays.

Development of theoretical thought and practical activity in the period of the first wave of innovative urban development determined the formation of basic innovations connected with understanding of towns and settlement system as a geostrategic, geopolitical and geo-economic space. This is evidenced by the following results of urban development: 1) creation of a strategic axis of the spatial development of the settlement "Moscow – Baltic Sea" and founding the new capital of St. Petersburg in 1703; 2) development of a settlement system along the Volga and Don rivers with access to the sea of Azov and founding of Taganrog and Azov (1698); 3) development of the direction "Moscow – Baku – Resht - Astrabad" (1723), creating conditions for transformation of the Caspian settlement system and development of southern direction of the Maritime export and import; 4) architectural and planning organization of areas in the direction "Moscow - Ekaterinburg" and beginning of industrial development of the Urals and Siberia, constructing plant-cities in these regions; 5) formation of fortified lines and settlements (Samara – Menzelinsk, Samara – Orenburg – Troitsk etc.).

In 1740-ies the Commission on St. Petersburg construction published the first theoretical treatise-code "The duty of the architectural expedition" (by authors: I. I. Eropkin, D. A. Trezini, I. D. Schumacher, I. K. Korobov). It determined the legal position of architects, it has established the design order (fixation plan – project-plan of the city), examined methods and techniques of residential and public buildings, organization of public spaces and urban development [4]. This treatise-the code can be considered as a peculiar starting point of formation of basic innovations of "the city is a work of architecture". This innovation showed up in the second wave.
The second wave (1762-1817) was developing in the context of foreign policy and reforms of Catherine the Great and Alexander I. During the second wave we observe, firstly, a massive redevelopment of cities on the basis of their regular build; secondly, the ongoing urban development of new territories as a geostrategic, geopolitical and geo-economical space; thirdly, development and implementation in practice of theoretical basis for creating a city as a work of architecture.

A major role in the implementation of urban innovations in practice the Commission on the stone building of St. Petersburg and Moscow (1762-1769.) played. In 1763 a member of the Commission I. I. Betsky published the book "Notes on the restoration of Tver". In this book theoretical bases of formation of the city as a work of architecture were presented in the form of the following principles [4]: 1) regularity of planning and development; 2) compactness and geometrical accuracy of the overall shape of the plan; 3) selection of the center of administrative and commercial buildings; 4) division of the territory by belonging to a particular caste and wealth of the residents; 5) completeness of the composition of the city (stability of boundaries, hierarchy of streets, spaces and buildings); 6) radical redevelopment of existing cities with preservation of monumental buildings and complexes (Kremlins, monasteries, fortresses and cathedrals), as well as considering planning and development with natural landscape; 7) use of "exemplary" projects of houses and public buildings. Theoretical principles of the innovative concept "the city is a work of architecture" have been implemented in design and implementation of the new general plans of the capitals and 382 plans for the redevelopment of provincial and district centers of the country. The scope of work on creating "new type cities" in Russia have no analogues in the world practice [4]. Successful holding of these work in a relatively short time secured such prominent architects as I. Starov, A. Kvasov, I. Lame, A. Nikitin and M. Kazakov.

Geospatial innovation in urban planning of the second wave became the basis, firstly, of strengthening the southern strategic direction of settlement system of Russia with an exit to the Black sea, constructing of new cities and ports (Sevastopol, 1784; Odessa, 1795) and reconstruction of existing cities of the Northern Black sea (Bakhchisaray, Izyum etc.); secondly, establishment of the Southern and South-Eastern system of fortified frontier lines, and walled cities from Georgievsk and Kizlyar to Ust-Kamenogorsk and Kuznetsk, providing geopolitical and geo-economic interests of Russia in the Caspian territories in Siberia and the Far East; thirdly, development of the network of plant-cities of the Central and Ural regions as large arsenals of the country. Research for resources of the South of Russia, Siberia, Arctic, Far East and Alaska contributed to the urban development of new territories. They were conducted by the expeditions of Russian travelers under the leadership of V. I. Bering and A. I. Chirikov, V. I. Laptev and H. P. Lapteva, E. G. Laksman, P. S. Pallas, etc.

The second half of the XVIII – beginning of XIX century is time of the emergence of the innovations related to the architectural and spatial organization of roads. Large tracts were treated as the object of architecture and urban planning. In rural areas, which were in the zone of influence of tracts, new architectural complexes appeared [4].

The third wave (1817-1891), is characterized by increased attention to solving internal problems of urban upgrading of settlement systems and settlements of Russia with the development of it as an integrated Eurasian economic space. Today, few people know that the recovery phase of innovation in urban planning of this period is connected with the beginning of the creation of domestic theory of settlement and cities on the basis of methodological principles of a systematic approach to town planning, implementation of these principles into practical activities of the Statistical Department of the Ministry of internal Affairs of Russia in conducting research of 485 cities in the country, determining location of new cities and approval of their General plans. Within the emerging theory, separate areas, settlements and cities were seen as space of economic activities, having a certain form and a specific manner, as well as industrial, agricultural and cultural development. For the first time at the decision of problems of resettlement it was suggested to be guided by the principles of integrity of space – of region, of connectivity of settlements into a unified system of land and waterways, separation of static and dynamic elements of the urban environment, considering unique appearance of the settlements [4]. A great contribution to the development of these principles Russian statistician K.
I. Arsenyev has made. He divided territory of Russia at a number of spaces: the North, the Oka, the Volga, the Ural, etc. Special attention was paid to the riverine settlement systems, typical at that time for Russia.

Principles of formation of urban object as a system has been developed in preparation of the new edition of the Construction regulation (1843-1849.). The Committee for the compilation of the Construction regulation (V. P. Stasov, K. A. Ton, A. P. Bruhl, etc.) has formulated a number of principles that became the basis for the formation of the Russian urban-planning science: universality and comprehensiveness of phenomena; unity of architectural and urban planning issues, engineering and artistic solutions. Also, in its work the Committee relied on the theoretical positions of Professor of the Institute of engineering lines of communication, M. S. Volkov. Three new for that time principles should be distinguished [4]: 1) construction activity is a purposeful process of transformation of the landscape in order to create an artificial environment for a human and society; objects of the construction activities are settlement systems, cities, and architecture; 2) a city is a work of urban art and a body, growing in unity with the surrounding natural and artificial environment; 3) the task of resettlement is associated with economic, social and cultural transformation of Russia, siting on the territory of industrial enterprises, educational institutions and transport facilities, as well as preparation of relevant maps, made on a large scale. From the history of urban planning of XX century, today we know that these principles anticipated the development of regional planning and environmental approach to urban planning. The innovative concept of development of the European settlement system based on railways is worth mentioning. It was proposed by M. S. Volkov in the 1840-ies and received its implementation in urban planning of Russia in the second half of XIX – early XX century. In 1851 a railway was built from Moscow to St. Petersburg, in 1859-1861 – from Saint-Petersburg through Pskov to Dinaburg, and in 1891 began construction of the Siberian road.

The fourth wave (1891-1917 gg.) was formed under the influence of urban policy aimed at the solution of problems of industrialization and transport development of the deep territories of the Eurasian continent in connection with the regrouping of the global centers of economic gravity, under the change of the leading transporting technologies and under the development of useful feature of the geographical space. Construction of the TRANS-Siberian railway solved the problem of the relations of Russia with the Eastern suburbs for the first time and formed a true strategic "axis" of the unification of Eurasia into a single economic and geopolitical unit. Laying of Orenburg – Tashkent railway and construction of the Turkestan-Siberian railway testified about the formation of new centers of economic activity of the country, and opening of the Chinese Eastern railway testified about the establishment of infrastructure for economic cooperation and geostrategic cooperation of the major powers of Eurasia – Russia and China [5]. Essentially, these processes have identified basic innovations in urban planning associated with architectural and planning organization of national and transnational communication space.

The basic innovation of the fourth wave can be considered as formation of a socio-aesthetic approach to urban planning aimed at the transformation of cities and settlement systems in industrial development of cities, rapid increase of population and worsening of social problems. This basic innovation is evident in the writings of the English social activist and artist William Morris (the leitmotif of his work was the idea of "art for people") [6]. Social orientation of activities in transforming of settlement systems and settlements of Russia is reflected in theoretical works of the architect V. N. Semenov and engineer F. E. Yenakiev. They were published in 1912. The book of V. N. Semenov, "the Improvement of cities" [7] considered the problem of construction and urban development, the "ideal" city, the requirements for planning and architectural and spatial organization of streets, squares and parks. It told about the need to combat land speculation and the need of elaboration of rules of urban planning and development, and about the creation of the city as a holistic and harmonious body. A number of progressive ideas presented in the book, V.N. Semenov implemented into the project of a garden city for the employees of the Moscow-Kazan railway station Prozorovskaya. The book of F.E. Yenakiev "The tasks of transformation of St.-Petersburg" [4] outlined a program of reconstruction of the capital, which was based on the following principles: 1)
communication of workers dwelling with transport routes, places of leisure and sports activities; 2) accomplishment of residential territories; 3) creation of garden-cities close to industrial enterprises; 4) punching new roads and construction of public facilities; 5) development of tram and formation of a railway transportation hub station.

The fifth wave (1917-1955) originated and developed in the context of fundamental changes in the socio-political and socio-economic structure of the country. State land ownership, centralized and planned management of the development of the national economy allowed for a short time to overcome the devastation of the country and expand a large-scale architectural and town-planning activity of industrialization. This wave consisted of two interrelated trends – innovative and traditional. Innovative trend dominated in 1917-1935, and traditional – till 1955 [8]. Despite the stylistic architectural difference of these movements the unity of the fifth wave was manifested in the basic innovation. The first such innovation should be considered as the emergence of regional planning as a scientific and practical sphere of urban development, providing spatial development of the country by infrastructure, labour and other resources. A great contribution to establishment of a district plan was made by representatives of the Commission on the study of natural productive forces (by the leadership of V. I. Verdansky), employees and consultants of the State planning Commission, the staff of design organizations and many famous architects, urban planners and engineers.

In the process of formation of regional planning the following main results have been achieved: 1) the diagram of the settlement system of the Central districts of the RSFSR and of the Moscow Metropolitan area (B. Sakulin, 1918-1922); 2) the plan of the country's electrification (1920, completed); 3) the scheme of economic zoning of the country (Gospol, 1921); 4) the project "new Moscow" - a metropolis with a system of satellites (L. V. Zholtovsky and A. V. Shchusev, 1919-1923) and the project "the Big Moscow" (Shestakov S., 1921-1924); 5) map of location of objects of capital construction on the five-year plan (1928/29-1932/33); 6) General plan of the strip of settlements and the scheme of networks maintenance (Gosplan of the RSFSR, section of socialistic settlement, 1927-1932); 7) the scheme of the settlement system within the Absheron Peninsula with the development projects of villages and reconstruction of Baku (A. P. Ivanitsky, 1924-1928); 8) the scheme of regional planning of the resort area of the Caucasian mineral waters (V. N. Semenov, 1934); 9) the project "the Big Perm" (V. N. Semenov, 1928-1929) and the planning project of the Perm industrial area (L. A. Ilyin, and H. Meyer, 1931); 10) the scheme of regional planning of Magnitogorsk (team OSA, 1930).

The next basic innovation of the fifth wave is the development and introduction of methodology and theory of an integrated social approach to urban planning. Formation of this approach was made within the active participation of such representatives of innovative and traditional currents, as M. Y. Ginzburg, N. Milyutin, N. A. Ladovsky, N.V. Semenov, A. P. Ivanitsky, L. A. Ilyin, etc. The principles of an integrated approach have been developed further and were used in projects of complex planning and development of cities throughout the period of development of Soviet urban planning, and from 1960-ies became the basis for the establishment of a comprehensive regional planning [9]. It should be noted that Soviet architecture and urban planning avant-garde of 1920-1930-ies received worldwide recognition and is currently the subject of research in foreign universities.

The sixth wave (1955-1991) was associated with a wide industrialization and standardization in construction, the typical design and efficiency solutions in architecture. From a wide variety of innovative achievements, it is possible to highlight three basic innovations. The first basic innovation is the scientific development and introduction of the methodology of system approach to the urban planning practice. Methodology led to creation of the system of the basic theory of urban planning and urban design [10,11], which was implemented in practice, regional planning, preparation of a new generation of general plans of settlements and projects of detailed planning and development of public centers, residential and industrial areas. The most important results of such implementation we should consider the establishment having no analogues in the world practice in its scale and novelty of the General scheme of settlement of the USSR and covering most of the country schemes of regional planning; the development and implementation of general plans for numerous new cities; formation of
a network of "closed" military and industrial cities, high-tech regions and agglomerations, industrial and research centers [12,13].

The second basic innovation should be called the formation of theory, technology and practice of "transnational urbanism" covering the scope of knowledge about the role of urban development in Russia and in the USSR in global urban culture, international cooperation in urban science, urban education, the development of transport, industrial and social infrastructure. Scientific basis of this innovative direction of urban development was made up of fundamental works on the history of urban art world (A. V. Bunin, T. F. Savarenskaya, etc.), geography of world urbanization (E. N. Percik, Y. V. Kositsky, etc.), urban culture of socialist European countries (E. A. Goldzamt, O. A. Shvidkovsky), as well as a joint Soviet-Polish and Soviet-Czecholovakian, Soviet-American etc. studies [14,15]. Domestic techniques of architectural and urban design have been widely used in training for various countries in the world in the field of education. Soviet and foreign experts were partners in design and construction of many objects of urban infrastructure.

The third basic innovation is creation and introduction of scientific bases of environmental and ecological approaches to urban planning. In the mid 1980-ies environmental and ecological approaches were covering all types of urban activities, the object of which was the environment and the subject were the laws and principles of its urban-planning organization [16-18]. Environmental and ecological models of places were developed and put into practice in reconstruction of existing and design of new towns. Also, environmental and ecological approaches became the basis of leading urban knowledge related to the development of noosphere and sustainable development of settlements and their systems [18-20]. The research of Soviet scientists in this field not only had socio-economic and socio-environmental benefits but also had a significant influence on the formation of the legislative and regulatory framework of post-Soviet Russia. For example, in 1992 the law "On fundamentals of urban development in the Russian Federation" the list of urban development activities contained sustainable development of cities and other settlements and of their social, engineering and transport infrastructure, considering environmental situation.

Finally, in the period of mass industrial construction the fourth basic innovation was formed, which is characterized by development and introduction into practice of the theory of urban composition as a system of harmonization of the environment [21]. Standard architecture, devoid of traditional means of expression and stylistic solutions, lost its leading role to urban planning in formation of the artistic image of the space. Style as an essential component of urban art has received a detailed scientific justification as the ability to develop and use principles, methods and tools of planned and volumetric-spatial composition, and ability to create ensembles based on the synthesis of urban planning, architecture, landscape architecture, art and technology considering systemic patterns of planning and development [22].

The task of creating a style as a system of compositional principles and methods of organization of the living environment by the end of 1980-ies has been basically resolved. Applied to an industrial urban development this style can be called "composite rationalism" or, considering ideological orientation of urban development of the USSR – "composite social realism". However, the main importance of the development of compositional ideas in urban planning was not in search of a new style, but in approval of urban development as a special type of art that shapes spiritual atmosphere of the environment. In 1987, as a direction of creative activity urban development has received official and the appropriate policy and regulatory design.

3. Conclusion
1. The observed basic innovations in domestic urban planning in XVIII-XX centuries show that urban development is a vital area of ensuring geopolitical security of the country, dynamic development of its economy and creation of a favourable environment to people's livelihoods.
2. Basic innovations are translated in time and modernize considering new conditions of development of urban planning. In this regard, we can predict development of four basic innovations in post-Soviet
Russia, which could be called as "urban unit – geospace, a work of art, space for communications, the living environment of people."

3. If the first significant innovation can be considered as transition from ancient architecture to regular planning, then the second one is formation and development of Soviet urban planning.

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