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Scientific Approaches for Planning the Architecture for Urban Economic Space

Petro Gudz, Maryna Gudz, Olga Vdovichena, and Oksana Tkalenko

Abstract The basic scientific approaches to the planning of urban economic space architecture based on the methods of structural and logical analysis, generalization, and comparative analysis are investigated as the purpose of the work. An analysis of urban planning methods and interests of residents of territorial communities has been carried out, and successful practices of urban and space revitalization have been investigated. The novelty of the work is formulated—the methodical approach to the choice of methods of planning the architecture of urban economic space has been further developed, which allows to integrate landscape, architectural-construction, financial-economic, marketing-logistical, digital tools of their realization in the triangle of urban entities "power—business—the public." In urban planning, the methods of solving the problems of planning the architecture of urban economic space are distinguished: rational planning of development, limiting the growth of large cities, segregative distribution in urban areas into functional zones (residential, industrial, communal-warehouse, external transport, suburban), and digitalization of urban space management. Cities compete for development resources, specialists, etc., and are forced to move to master plans for urban development, development strategies, plans for the revitalization of industrial territories, harmonization of urban planning, and the architectural environment of settlements. It is established that effective methods of planning the urban economic space are such methods as: strategy, modernization, reconstruction, revitalization, digitization, social activities, technological innovations, green economy, and logistics.

Keywords Urban planning · Master plan of the city · Economic space · City · Territorial community · Revitalization

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1 Introduction

Contemporary urban environment is evolving along with its subsystems: construction, housing, communal, economic, social, digital, management, etc. Ukrainian cities lack state-of-the-art construction technologies and new machines; on the other side, they fail local government leaders, innovations, and activity. Only under these conditions, the prospects of investment development within urban spatial systems and subsystems are open.

Specialists in urban science and architecture, design and management, economics and marketing, sociology and ecology, as well as regional economics define the city as their subject matter. Currently, urban planners state the accumulation of problems of architectural and construction character, which include unplanned, accumulated construction, poor sanitary provision, noise, and air pollution.

Experts on regional economics highlight the need to address the issues of quality planning of urban space architecture, such as defining planning criteria and choosing urban development strategies, and developing mechanisms for their implementation. There is a large number of additional problems in the development of urban space such as high level of entropy in digitalization of construction. That is manifested in lack of structured information on engineering and construction communications in industrial zones and housing construction, terms of their exploitation, modernization, low level of digitization of economy, especially in old industrial territories, use of big industrial fields provision of social services, and administration of sustainable development of territories.

There are various approaches for planning the architecture of the urban economic space among foreign and domestic scientists. Thus, diverse tools are used in the planning of urban economic space: strategizing [1], modernization [2], reconstruction [3], revitalization [4], digitization [5, 6], social activities [7], technological innovations [8], green economy [9, 10], and logistics [11, 12]. Scientists, applying sustainable approaches, cannot still offer effective tools for providing an innovative leap for the development of urban communities. Therefore, further interdisciplinary research is needed for the development of an ecological-based SMART-cities planning methodology and the revitalization of industrial sites to socialize urban space.

The purpose of the work is to determine the basic scientific approaches for planning the architecture for urban economic space.

Method. The methodological basis of the study lies in understanding of competitive advantages of urban space, which in the process of regulatory influences should maintain and increase attractiveness for residents, investors, and tourists. Methods of structural and logical analysis, generalization, and comparative analysis are used as the basis of the research methodology.

Results 1 Harmonization of planning methods and interests of residents of territorial communities.

Paul R. Krugman defines “second nature factors” in his classification. They are benefits that are created by activities of people and society, i.e., agglomeration effect

(high population density in cities, which saves economies of scale); human capital (education, health, work motivation, mobility, and adaptability of the population); institutional capital, which contributes to improving the investment climate, mobility of the population, diffusion of innovations, etc. He also outlines development of infrastructure as a factor that reduces economic distances [13].

Urban planning is a complex multifaceted activity of society aimed at creating material and spatial environment of human activity in urban locality and settlement areas. A specific branch of science and technology devoted to research on engineering, social, and economic as well as ecological problems of living environment formation. It includes construction of settlement areas infrastructure, their planning, and construction in tandem with combination of hierarchies of objects and levels. Urban planning activity covers research, design, and management of the processes of implementation of measures that determine the formation and development of functional and architectural and planning structure of settlements and districts in accordance with demographic, social, economic requirements, and natural and environmental conditions; development of engineering and transport infrastructure; preservation and enrichment of the environment. The resources for solving urban planning problems are rational and systematic organization of the territory planning and coordinated location of residential areas, industrial complexes, recreational zones, community centers, etc.

The results of urban development should help to ensure the managerial processes of settlements and territories development, construction planning, reconstruction and operation of settlements, and regions in accordance with the needs of the population and production.

Planning methods in urban planning include:

scientific definition of territorial and urban development objects and systems of urban economy, their functional, planning parameters and evaluation criteria, developing their typology basics;
theory, methodology, techniques of engineering-planning and space-spatial formation, and reconstruction of urban-planning objects of different types;
engineering and technological, social and economic, environmental, and technological factors that influence the formation of the environment;
optimization methods of architectural and engineering-planning decisions of settlements and regions taking into account peculiarities of social and demographic, economic, ecological processes, and natural conditions on the basis of modern information technologies;
technology of complex design and planning works technology, process management of functioning and development of regions, cities and villages with the use of methods and tools of applied information technology, and heuristic methods of creativity in urban planning;
methods of multifactor assessment of the qualities of urban planning decisions at different phases and stages of design;
methods of creating and maintaining urban register of settlements, urban planning databases, and other territorial information systems (TIS);

regularities and tendencies of settlement, organization of production activity, functioning of urban economy objects, social sphere, urban transport systems, street-track network and their elements, systems of engineering equipment and engineering preparation of the territory, provision of urban amenities, and landscape architecture;
urban ecology and resource conservation;
economics of urban planning and evaluation of the territory.

Taking into consideration existing types of landscaping for the residential area, the best one in real estate development is a residential neighborhood. This form of organization helps to organize water supply, sewerage, a network of institutions of medical, consumer, and sport services for the population in the most appropriate way. It is necessary to take into account the distances to the place of work, residence, and ways of transportation.

Among the objects of the urban hierarchy, the master plan is the leading and most important document for the development of the city for the next 15–20 years: "Master plan of a settlement - urban planning documentation, which defines the basic decisions of development, planning, construction and other use of the territory of a settlement." [14]. The legal and organizational principles of the development, approval, registration, and application of construction codes are regulated in detail by a special Law of Ukraine "On Building Rules" [15].

The analytical part of the master plan contains a comprehensive assessment of the current state of the territory of the settlement and the actual problems of its urban development. Among the tasks of the justifications and proposals of the master plan, the following ones are specified: specification of principled decisions of district planning projects in accordance with local conditions and state and public interests; ensuring the health and epidemic well-being of the population; forecasting the need for housing, public services, manufacturing, recreational and wellness facilities, transport and communications, engineering equipment, landscaping and public works, utilities, environmental protection, cultural heritage and identifying the means to meet those needs; determination of priority and permissible types of use and development of the territory and their location; setting restrictions on certain uses of the territory in accordance with the requirements of legislation, construction, sanitary, environmental, and other state standards.

Thus, the master plan in its content is a document that contains information of public interest and is important for the society. It divulges such aspects as determination of permissible types of territorial development, environmental protection insurance, cultural heritage preservation, selection of territories for housing, etc. Above-mentioned issues are priorities for the life of the community of any settlement.

Master plan should be transparent for governing bodies and public representatives to determine the effectiveness of relevant authorities and/or local governments in catering to the needs of local community. Any planning decision is information about the disposal of land owned by the territorial community. Therefore, the master plans should be open and cannot be considered as confidential information that is owned

by the state, because it is the property of the territorial community, and therefore, so it must be relevant information for the public.

Every citizen has the right to know whether his or her home is in the vicinity of radiation hazard, chemical, or noise pollution. The cost of housing and the convenience of living are directly related to the master plan of the settlement. In order to find out where to buy a new apartment or house, you should get acquainted with the general plan of the city. It uncovers neighborhood infrastructure, as well as construction plans for the next 15–20 years. In 10 years time, maybe, there will be an airport or train station, or, a multi-stored office buildings will grow right in front of the windows.

Expropriation of real estate for public use. Often people living primarily in the old part of the city do not suspect that their private property may be subjected to expropriation. The master plan may involve reconstruction of certain areas of the city, which is usually accompanied by the resettlement of residents of the reconstruction areas. In such cases, the owners of the expropriated property must get amends. The master plan section "Phase One of the Construction Project" reveals the reconstruction plans and conditions. Expropriation of real estate can affect not only the residents of the old districts but also the owners of suburban areas and towns, farmers who own land in close proximity to the city limits.

In the theory and practice of urban planning, this issue is connected to spatial planning that is an integral part of urban planning. The competitiveness of a modern city, as noted in the research of R. Giffinger and Mariana Stallbohm, is directly related to its ability to fulfill the specific functions of the metropolis, and includes the following:

spatial "expansion" of the city, which involves the creation of social and economic sub-centers, intensive creation of workplaces on the basis of polycentric model;
intensive development of a knowledge-based economy both in the manufacturing sector and in the services sector, in the center and in the periphery of agglomeration;
decision-making centers concentration, such as international and interregional production and service business structures, political, civic, and cultural organizations [1].

2 Urban Economics: Successful Practices in Urban and Space Revitalization

Modern city is an adaptive, open for interactions, organized, and structured economic system, which consists of interdependent and interacting participants. Common purpose and economic interests unite them. It is designed to optimize the use of resources in economic flows within subsystems, where residential space subsystem takes first place in architectural and construction subsystems. Subsystem reflects its

system-forming influence in the city [16, pp. 36–37]. Scientists also define the central office space subsystem; industrial-production spatial subsystem; transport spatial subsystem; as well as the landscape and recreational spatial subsystem.

Urban scientific research has been actively aimed at energy-saving technologies in construction and science of materials. Therefore, 75% of residential areas need to be reconstructed in order to reduce energy costs. EU countries arrange ambitious plans, for example, by 2020, Denmark will have reduced energy costs by 75% in comparison with old buildings. Norway, the Netherlands, and Germany rely on internal-heating of buildings. The UK and Hungary are based on home systems of non-carbon dioxide gas. France relies on energy-generating structures [5].

The implementation of logistical approaches to urban planning has allowed overcoming a number of functional traffic problems to local authorities. The authorities have taken the following measures in order to overcome these problems in cities [17, pp. 163–164]:

Copenhagen (Sweden) has a clear list of zones and points where commercial freight transport is allowed to be unloaded;
Stockholm (Sweden) established city-distribution centers and resource points, located outside the city. Being transported by heavy transport, they are redirected on trucks with a capacity of up to 3.5 tons across the city. The routes of movement, based on the orders of the final recipients, are considered in such a way, that the truck will be overloaded from the center of the city;
In Stockholm, Gothenburg, Malmö, and Lundi (Sweden), the movement of trucks of more than 8-year exploitation is restricted in certain areas of the city;

Barcelona (Spain) proposed to transport material resources to cities at night. In particular, to operate two runs from 23.00 p.m. to 5.00 a.m., which will be equivalent to seven runs, performed during rush hours.

Rotterdam (the Netherlands) and Osaka (Japan) are encouraging transport companies to expand the practice of using hybrid and electric vehicles in truck designs, allowing them to operate in areas where it is forbidden to work with internal combustion engines.

Zurich (Switzerland) started operation of existing electric transport networks (tram) for garbage disposal transport.

Analysis of foreign and domestic scientific sources shows that one of the most effective forms of general implementation and strategic plans for urban development is the planning of a complex of measures for the transformation of individual urban territories, localities, and industrial infrastructure out of decline state into transformed renewed life cycle activities. It is so according to the theory of the life cycle of organizations. The purpose of revitalization is the removal of urban areas out of crisis and the modernization or provision of new functional purpose for them, e.g., for recreation, industrial tourism, cultural space [18, pp. 71–76, 19–21].

The peculiarity of urban planning is its participatory nature. The guiding principle of participatory planning is to enable stakeholders to participate actively in city planning. Social technologies of participation are of great importance. They are the following: the user group identification, social studies, workshops, aimed at

strengthening the idea of mutual decision-making, and building overall responsibility for its adoption, because the city is being built and reconstructed for people. Local government's initiative and citizen activity can lead to comfortable and rational use of urban spaces.

According to foreign thought-leaders, 1% of the active community population is enough to initiate and launch change projects, including revitalization of social orientation [7, p. 131]. Thus, in Lodz the "bottom-up" initiative is being implemented by more than 80 social cooperatives and more than 120 non-governmental organizations. Bicycle infrastructure is modernized; regional cultural palaces and centers appear; projects for the protection of architectural monuments are launched; and discussions about the problems of the city are held thanks to their efforts. This is an important ally in revitalization projects, though it is often undervalued.

Successful practices of revitalization in Polish industrial cities have been effectively implemented in Silesia. It has gradually become clear that these are useful objects. Thousands of private owners of small objects have also changed their thoughts. They began to repair, adapt, and preserve them from destruction. It became even fashionable to live in a loft of the former factory. Such lofts appeared in Bytom, Gliwice, Gyrardow, Krakow, Lodz.

Polish city Lodz became the place of a huge urban experiment such as revitalization and reconstruction of entire neighborhoods. In the historical district of Old Polissia, reconstructions are subject to the streets. There are "Wuerfers" some pedestrian slow-motion zones, so-called (Dutch. *Woonerf* means "street for life") green islands. The project also includes a program to support local residents. It includes the organization of cultural and leisure centers for pedestrian accessibility, integration centers that will help to cope with addictions, and educational programs. The peculiarity of revitalization is their socialization; otherwise, the revitalization will be just next repair. For example, such transformation of the territories as the former power plant into the "New Business Center of Lodz" [19, p. 152].

In the Czech Republic during the industrial era, the city of Ostrava and its suburbs Bartowice were distinguished for the developed industrial complex. They were called "steel heart of the republic" with their mines, metallurgical, and coke plants. In order to avoid the collapse of the city's development and social tension, the concept of a cultural city was proposed as a concept of revitalization. Vitkovice Metallurgical Works, being the largest and the only full-cycle enterprise in Czechoslovakia, had mine in the territory, coke production, workshops for the production of iron, steel, rolled ferrous and non-ferrous metals, pipes, equipment for the metallurgical and chemical industries, employed 40 thousand employees. Further, it changed the concept of development from an industrial age monument into a space of tourist and investment development [20].

Thus, examples of urban architecture planning of foreign settlements indicate the adaptability to changes, the process of information and digitization, and the segregate nature of different functional zones planning.

The novelty of the work is the further development of a methodical approach to the planning methods way of the architecture of urban economic space, which

allows integrating landscape, architectural and construction, financial and economic, marketing and logistics, and digital tools for their implementation.

3 Conclusions

In urban planning, the methods of solving the problems of architecture planning of urban economic space are the following: rational planning of development, limiting the growth of large cities, segregate distribution of urban areas into functional zones (residential, industrial, communal-warehouse, external transport, and suburban), and digitalization of urban space management.

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