Micropolis as a new morphotype in the urban planning of a sustainable city

Micropolis como nuevo morfotipo en la planificación urbana de una ciudad sostenible

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ABSTRACT

This article reveals the possibilities of combining the urban environment and natural component, with the aim of improving the quality of the city, where innovative technological methods act as the connecting element. Modern approaches to control urban processes through media technologies have been studied. Considered a number of projects adopted principles of the sustainable urban environment and based on the analysis of the prototype of approved algorithms for the creation and/or regeneration of the city's territory, as well as the optimal size of the informative space of the city. The potential of using high technologies for the implementation of a smart city and computerization of the urban environment was studied to simplify control for the purpose of safety and reduce the harmful effects of standard urban processes. On the basis of the conducted research, the concept of the so-called micro-policy was developed and a catalog-regulation on the characterization of the morphotype was compiled.

Keywords: Microcity**,** sustainable development**,** smart city**,** eco-city**,** urban planning.

RESUMEN

Este artículo revela las posibilidades de combinar el entorno urbano y el componente natural, con el objetivo de mejorar la calidad de la ciudad, donde los métodos tecnológicos innovadores actúan como el elemento de conexión. Se han estudiado enfoques modernos para controlar procesos urbanos a través de tecnologías de medios. Consideró una serie de proyectos que adoptaron principios del entorno urbano sostenible y se basaron en el análisis del prototipo de algoritmos aprobados para la creación y / o regeneración del territorio de la ciudad, así como el tamaño óptimo del espacio informativo de la ciudad. Se estudió el potencial del uso de altas tecnologías para la implementación de una ciudad inteligente y la informatización del entorno urbano para simplificar el control con fines de seguridad y reducir los efectos nocivos de los procesos urbanos estándar. Sobre la base de la investigación realizada, se desarrolló el concepto de la llamada micropolítica y se compiló una regulación de catálogo sobre la caracterización del morfotipo.

Palabras clave: microciudad, desarrollo sostenible, ciudad inteligente, ecociudad, planificación urbana.

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Introduction

The creation of a micro-city as a new type of urban environment raises the problem of urban growth and the interconnection the size of the city and its quality of life. While cities continue to grow, the professional community tries to influence the growth trend by introducing such concepts as "compact city" and "sustainable development" (Rogers, Jalal, Boyd, 2007), mainly in an effort to limit the development of urbanization and stop the sprawl of cities.

Two models of urban development in the world can be distinguished: one model follows the principle of urbanization (with agglomeration growth, the "seizure" of territories and, consequently, an increase in population) and the second model corresponds to urbanization (Haidukov, Tasalov, 2015) (rural urbanization, where rural- rustic), the concept of "new urbanism" and a compact city, striving to create a network of small, well-developed cities, united by a developed network of roads (Susan, 2000).

New morphotype of sustainable urban planning

Continuous growth of cities in agglomeration type entails a complex of problems related to ecology, lack of natural resources, social sphere, growth of crime and social tension, disappearance of cultural and historical heritage. It is not possible to monitor emerging problems on the scale of large cities-the size of the city determines the nature of its problems.

This fact is proved by the American scientist, physicist Jeffrey West, introducing such a notion as "city metabolism" (fig.1) (West, 2014). The main threat to the big city is the danger, the difficult control and the intersection of flows of people and cars moving at different speeds.

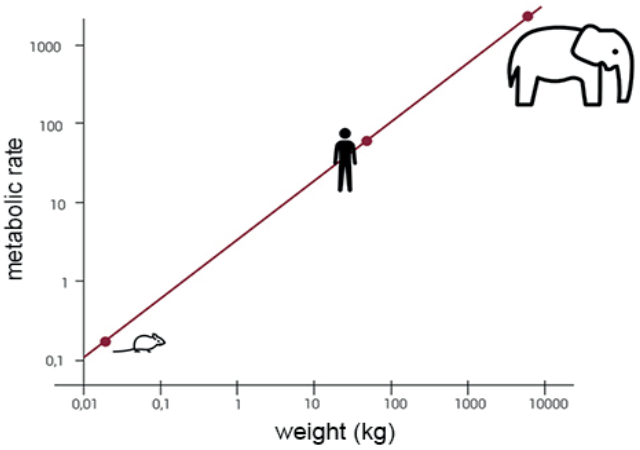

Figure 1. Metabolism of Cities

The size of cities is often determined by the size of the population, according to which cities are classified as small, medium, large, with a population of 10,000 people (for small towns) and over one million people (largest cities). The term "micro-polis" was proposed by us in opposition to the existing definition of a metropolis and the characteristics of a micro-city are respectively opposite to a large city.

The spontaneous character of agglomeration processes can increase territorial disproportions, create certain risks for development. Therefore, the format of a small city in a city with a population of 5 to 10 thousand people can become an optimal model. Inclusion of this type of urban space allows to improve the comfort of the habitat, allows to control urban processes, in accordance with the concept of a smart city and a smart home, which also becomes part of the concepts of sustainable development and new urbanism (Scott, 1966).

The desire to escape from the urban rhythm caused the appearance of the effect of "pendulum migration" (fig.3), directed movement between the core of the agglomeration and new elite settlements and dachas, which can be attributed to the number of small settlements (Meadows, Randers, Meadows; W.W Behrens, 1972).

These settlements do not have sufficient development and residents of such structures are forced to return to the big city every day. The lack of a natural component in "stone" and "glass" cities should be compensated by parks, green areas and boulevards, however, it is hardly feasible in the fabric of the established city.

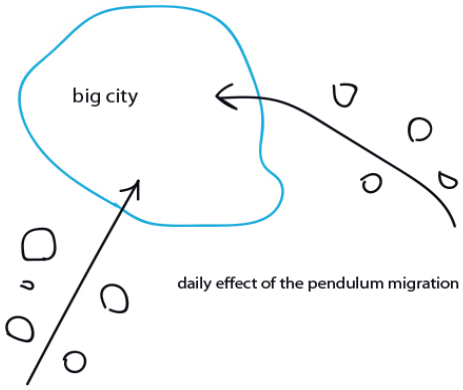

Figure 3. The pendulum migration effect

The micro-polis is a territory comparable in size to the city quarter, but different from the quarter in the usual sense of its relative autonomy in the field of resource provision. Also, the distinctive difference between a quarter and a micro-city is the functional fullness of the developed territory. The micropolis combines both residential functions, and workers, and places of rest and leisure, educational functions, trade and services. (Fig.4)

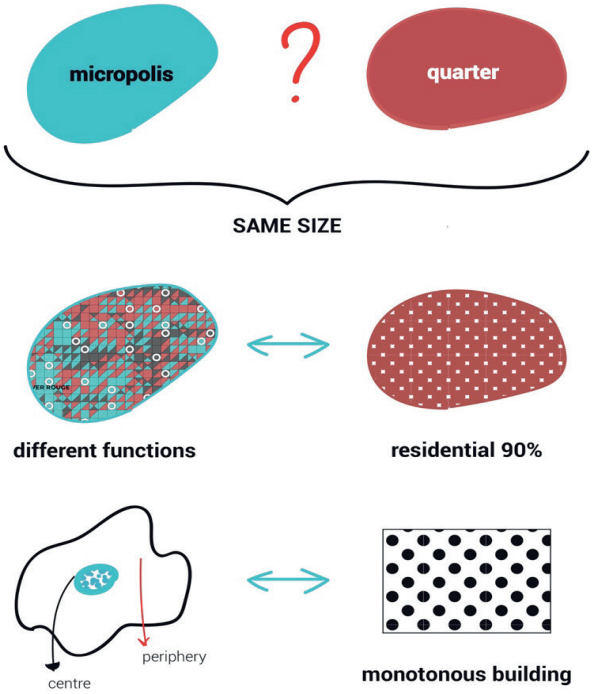

Figure 4. difference between micropolis and urban quarter

In terms of spatial organization, a micropolis like the present city should consist of a center and periphery, corresponding to the principles of a compact city, so that the network of micro-cities on a large city scale would make a comfortable urban environment with features of suburban life and more landscaped territories. In addition, on the territory of the micropolis can be traced such components of the city as the area-street-park-lane-boulevard, etc. The territory of the micropolis has both a zone of action and a zone of influence on the outer city (fig.5), gradually transferring useful properties to the surrounding territories. so, surpluses of electricity will be transferred to neighboring quarters, and then the distribution of such territories will become more global.

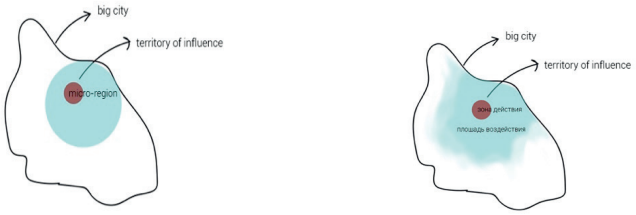

Figure 5. two stages of micropolis: zone of action and a zone of influence on the outer city

In the process of research and sociological survey the comfort factor of the urban environment, we encountered some stereotyped ideas about the city. The most popular of them were the location of the city factor in natural and geographical conditions, the presence of such morphotypes as: square, park, street, etc. And this is not a negative fact, we can designate it as a stereotype.

About stereotype in urban planning

"Stereotype" does not mean negative meaning. The etymological meaning of the word "stereotype" explains to us the nature of the perception of cities. (Scott, 201) Any city has its own identity, is different from thousands of other cities, but a set of stereotyped things makes it understandable. This fact can be noted by people who often visit different cities of the world. In each city there is a center, there is a periphery. The central part focuses on a variety of functions that "subside" to the outskirts of the city, where the monotonous measured life of local residents is conducted. These "stamps" allow us to "read" any new city. We can without a guide try to understand its history from the foundation (the historical center) to new residential areas, trying to build the logic of the city's growth, reading the styles of buildings for temporary epochs. Orient in the city will help familiar stamps - the city square, square, church (hill), street, intersection, bridge-river, etc.

Town-planning concepts in the search for new solutions still do not neglect the basic stereotyped components. Remembering the town-planning concepts of the ideal cities of the Middle Ages or the present, we can just as well "read" the center and the outskirts of the city, the square, the street and the main transport arteries while introducing new town-planning concepts. However, new design trends follow the so-called third industrial revolution (Rifkin,2011).

In the process of studying the stereotyped urban solutions, a so-called impression template was developed, which can be applied to almost any existing city or city project, possibly with minor deviations. This template can be translated into a text description: "City, with a population of X, area Y; the main city square is in the historical center, near the square there is a church, a park (with a fountain) and a square. Low-rise buildings of the center adjoin to high buildings, on the outskirts prevails private development, the percentage of landscaping is also developing towards the periphery. On the main street (it's the longest and widest) is the trade and institutions serving residents and tourists, secondary streets and alleys (possibly pedestrian) that form quarters are adjacent to the main street. The picture of the quarter is more precise and fractional in the center. On the outskirts of the city, the quarter division is blurred, less pronounced or not expressed at all. There are traces of city walls-fortifications with observation towers. This is a tourist attraction, which today has only historical significance.

Thus, every city project, like the project of any object, is a stereotype, an impression of time. At different times, stereotypes were manifested under the influence of a historical period related to the military situation (fortress cities), nomadic tribes, travel times and the development of maritime trade stimulated the development of cities at the intersection of transport routes and near the water. Modern urban stereotypes arise under the influence of rapid technological development of the world and world trends in improving the quality of the environment, which accordingly will subject city planners to adjust solutions to the requirements of sustainable development.

The stereotyped design of new cities draws us to the experience of the past, where we can identify already proven universal solutions and, on the basis of them, offer innovative concepts, including new town planning techniques and new morphotypes.

So, it is the stereotype that will become the basis for creating a micro-city resemblance for a micro-city, the emphasis on micro-technology will allow maximum elaboration of existing ideas in the sphere of technological development of the city.

Results and Discussion

The analysis of modern cities with energy efficiency indicators use the same methods for introducing alternative energy, but the most important experimental sites are technology parks, for example Walga Technology Park (Sarenet, 2017), which fully provide themselves with locally generated electricity. Transition to a carbon-free environment is best reflected by the Tesla project, where an ideal environment of an eco-village is created in the microware, integrated into a single system using media technologies.

The natural course of world technological progress leads to the erasure of the boundaries of the virtual and physical world. It has long been no surprise that you can pay for a plane ticket in a mobile application or order any service without leaving your home. Online courses, distance learning, video calls in different parts of the globe, would seem to humanity long ago dreams of a far future.

Developing technologies and total computerization will sooner or later fill the space of the city (Innes, 1998), creating parallel to the physical meaning of the city, an adaptive space that is able to respond to changes and monitor the qualitative characteristics of its own state. Media technologies are being introduced gradually, and are

already becoming part of the city space. For example, in the center of São Paulo, the facade sensors react to the changing air composition and display the result on the color screen, thus creating both the city's information space and transforming the architectural appearance.

Figure 6. Sao Paolo, media façade

Conclusions

Information resources provide the basis for new areas of human activity and require a reciprocal response between a person and an information space. The information space becomes a separate category of the architectural environment, based on the analytic systematization of factors and the optimal use of the ever-increasing capabilities of modern digital technologies.

A small urban scale offers residents more comfortable conditions, which are deprived of large cities (Jacobs, 1961). This is pedestrian accessibility, a small expenditure of time on the road, proximity to nature and, as a rule, good environmental indicators. Accordingly, the micro-city will be able to occupy a new niche in urban planning and such a morphotype will be used in many cities of the world, becoming a useful inclusion in the fabric of a large city.

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