THE ROLE OF WORLD EXPERIENCE IN THE ORGANIZATION OF ARCHITECTURAL AND PLANNING SOLUTIONS FOR TECHNOPARKS IN UZBEKISTAN

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ABSTRACT

The article discusses the world experience in the design of technology parks. Its general requirements and models have been studied. Recommendations were made on the organizational model of the architectural and planning solution of techno parks of Uzbekistan. A number of innovative technology parks have been created in Uzbekistan since 2017, which creates great opportunities for them. Currently, there is a need for the correct organization of techno parks in each region, for the improvement of architectural and planning solutions. For example, in Russia, 13% of general techno parks operate according to the university model, 11% according to the infrastructure model, 32% according to the innovation model and 44% according to the partnership model.

KEYWORDS: *Techno Park, Design, Model, Science, Innovative Technologies, Development.*

I. INTRODUCTION

Long-term world scientific and industrial experience has shown that techno parks are the main means of implementing scientific ideas and promising innovations that have practical and material value in the shortest possible time. A number of innovative technology parks have been created in Uzbekistan since 2017, which creates great opportunities for them. Currently, there is a need for the correct organization of techno parks in each region, for the improvement of architectural and planning solutions. In search of an effective solution to this problem it is

important to analyze the world experience of creation of modern technology parks and define the features of their formation.

II. MAIN PART

The goal of techno parks is to unite high-tech companies in their field and create prototypes of innovative products, as well as provide a full range of development services. Modern techno parks include three main components that are inextricably linked and form a single complex: a) research objects; b) production facilities; c) administrative and public facilities.

The main objects of techno parks: buildings and structures of the technopark; living space; Industrial zone; green areas; main streets [1].

The International Association of Science Parks (IASP) emphasizes the equivalence of concepts such as "techno park", "technopolis", "technology zone", "research park" and "science park". The term "science park" is commonly used in the UK, "research park" in the US and "techno park" in the CIS [2].

Techno parks can belong to three organizational models: America, Asia and Europe [4].

The American model is described as a functional planning structure with a unified service system for innovative enterprises. The level of development of the structure, the level of service and territorial boundaries are determined by the capabilities of the technical base of the technopark, the quality and density of building.

The first techno park was the result of the interaction of several economic, social and regional conditions, for example:

- society's need for technological innovation;
- high land prices in central areas, where the campus, and low in the suburbs;
- The University conducts research funded by the state.

As a result, the university began leasing vacant land to partially innovative companies at low prices. The environment created in this way has facilitated the active growth of new and existing high-tech companies. The territorial proximity and social ties between companies and university employees (many teachers and students worked in innovative companies) contributed to the formation of a unique environment called the "techno park" [3]. It was on the basis of these factors that the American model of techno parks was formed (Figure 2).

There are three types of science parks in the United States: 1) science parks; 2) research parks (new developments will develop only at the level of technical prototypes); 3) business incubators [5].

Figure 2. The first technopark in the USA - Stanford Research Park.

This is how the first technopark in the United States appeared - Stanford Industrial Park. It is now called Stanford Research Park and is home to over 150 companies.

This technopark is located on the campus of Stanford University. The Techno Park has administrative buildings, offices and shopping and entertainment facilities. This techno park, located in a free zone, is the city's premier innovative real estate.

There is no single model for European technology parks. Incubator-type technology parks, called innovation centers, are common in most countries, but they vary considerably in size, the composition of client firms, and the degree of dependence on research centers. The purpose of creating a techno park here is to accelerate scientific development, revive economic activity, and create new jobs [6].

Most European technology parks are located on the territory of universities with a long history, and their architecture contains buildings of historical value.

The generally accepted requirements for the creation of technology parks and innovation centers were developed by the European Association of Techno parks:

- the presence of large green areas;
- high quality of architectural solutions of buildings and complexes of techno parks;
- Developed infrastructure.

Figure 3. Skolkovo Innovation Center in Russia

The European experience has completed the formation of the general idea of techno parks, complementing the American experience with a high culture of organizing places for the application of intellectual labor, more advanced models for combining science, education and business and their architectural complexes. The Techno Park acquired a number of new functional elements, and thus became a unique architectural object with a specially organized environment, and not a conditional area is given for chaotic development [3].

Techno parks in Russia appeared in the 80s of the last century. Techno parks in Russia are formed on the basis of 4 different functional models. For example, in Russia, 13% of general techno parks operate according to the university model, 11% according to the infrastructure

model, 32% according to the innovation model and 44% according to the partnership model. The experience of creating techno parks based on industrial enterprises in Russia has become more successful. By 2020, the number of techno parks in Russia was 179. One of the largest technopark projects in Europe is the project of the Skolkovo innovation center - a modern innovative city with unique and high-quality architecture (Figure 3). It consists of quarters, each of which has its own structural and functional elements. Each area has everything you need to live and work.

The master plan of the Skolkovo innovation center pursues the following main goals:

•   surround the center with a green zone;

•   creating opportunities for effective interaction of human, scientific, research and business institutions that form the basis of the innovation environment;

•   ensuring a high quality of life based on the principles of sustainable development and, thereby, increasing the attractiveness of the territory.

The Skolkovo Innovation Center is located on an area of 400 hectares. The technopark building with a total area of just under 100,000 square meters has a small office, laboratory, coworking center, cafe, shop, congress hall and public areas. 15,000 employees live and work at Skolkovo. The Technopark is located 3 km from the highway. From Technopark to the center of Moscow 20 minutes drive. Skolkovo conducts research in 5 specialties: biomedical technologies, energy-saving technologies, information and computer technologies, space technologies and nuclear technologies.

The Asian model plays an important role in the creation of technoparks in most countries of the Eastern Hemisphere. In the Asian model of technoparks, Japanese technoparks play an important role. The Japanese model of research areas laid the foundation for entirely new "technopolis" cities. They combine scientific research in advanced industries, ensure the constant repetition of innovations, the integration of fundamental research and applied developments, their application in practice, thereby establishing themselves as a rapidly developing form of integration of science and production. The word technopolis itself originated in Japan in the 1980s and refers to the synthesis of two important ideas based on Japan's industrial strategy. To obtain the status of a technopolis, the city had to meet such requirements as the presence of a university, high convenience of transport, and a well-developed infrastructure. In contrast to the US Silicon Valley, Japanese Technopole concept requires a more balanced approach to the development of high technologies. This suggested not only focusing on technology, but also creating entirely new science cities with research and technology centers, new universities, residential buildings, parks and cultural institutions.

These technopolises are composed of three interrelated areas:

•   scientific corps of universities, state research institutes and corporate research laboratories;

•   industrial zone with factories, logistics centers and offices;

•   Living quarters for researchers and their families.

In the Asian region, the idea of techno parks reached a new level, which led to the emergence of technopolises. Techno polis is, in fact, a translation of the idea of creating a techno park for the

entire city. Although technopolises were created earlier, France has succeeded in this regard, but it is the Japanese state program that has mandatory requirements for technopolises, for example:

- population of no more than 200,000 people;
- natural areas;
- Access to half-hour transport from a major regional center.

Later, the ideas of technopolises became popular in Asian countries. Currently, large technology parks are built in China, India, Malaysia and Singapore [3].

Tsukuba Science City- This is the largest project in Japan (Figure 4). Tsukuba Science City actually covers the whole territory of Tsukuba and is divided into two main areas: "Research and Education District" is the territory of research and educational institutions, which includes residential and public spaces (about 2.7 hectares), but also has an area of about 25.7 hectares suitable for construction. In August 2008, the population of Tsukuba was 209,000, of whom 78,000 lived in the science and education area and 131,000 in the neighboring areas. Further growth in population and construction will soon transform the science city of Tsukuba into a large technology city in Tokyo, according to an analysis by the ministries of land, infrastructure, transport and tourism.

Figure 4. Tsukuba Science City in Japan

According to research by Japanese scientists, in the process of their evolution there are three main functional types of technopolis - industrial park, incubation center and science park. There are also three conceptual zones - a park, an incubator and a research institute.

Currently, there are 4 models of technoparks in the CIS countries: university model, infrastructure model, innovation model and cooperation model.

Since 2017, Uzbekistan has also begun to pay more attention to the construction of techno parks. IT-PARK in Tashkent and Yashnabad techno parks are among the existing techno parks. Technological park of software products and information technologies - "IT-PARK" - one of the first technoparks in the Republic of Uzbekistan [7] (Figure 5). IT-Park is a complex of premises, buildings and structures for IT companies that provide launch and marketing of promising start-up projects in the foreign economic zone, including integration with scientific and educational organizations. Its construction began in 2019. There will be gradually built 17 buildings, including a 20-25-storey office building, 22-storey hotel, a university, a conference room, a coworking center and other facilities. Currently, 2 buildings of the complex have been built. Its construction began in 2019. There will be gradually built 17 buildings, including a 20-25-storey office building, 22-storey hotel, a university, a conference room, a coworking center and other facilities. Currently, 2 buildings of the complex have been built. This will allow talented young people to find decent jobs with high salaries. Now the number of its residents has reached 411

Figure 5. IT-PARK Technopark in Tashkent

people. In addition, by 2023, it is planned to create branches of the IT park in Nukus, Bukhara, Namangan, Samarkand, Gulistan, Urgench and other cities.

The Yashnabad Innovation Technopark was created with the aim of creating favorable conditions for the development of high technologies, ensuring sustainable development of scientific, technical and innovative entrepreneurship, creating small innovative enterprises, producing and supplying competitive, high-tech products to the domestic and foreign markets. markets. The Technopark was established in 2020. At the moment, 32 projects have received the status of a resident of the Yashnabad Innovation Technopark. They work in the following areas: chemical technology, biotechnology, pharmaceuticals and medical biotechnology, plant protection products, agriculture, building materials, information and communication technologies, etc. The building of the Yashnabad innovative technopark is located in the Yashnabad district of Tashkent. Its area is 7.5 hectares [8].

The experience of India and Russia in organizing these technoparks has been thoroughly studied. 51% of the world's technoparks are parks with a total area of up to 20 hectares. According to the International Association of Science Parks (IASP), they are considered small technology parks. These technoparks are urban-type technoparks. In the Republic of Uzbekistan, a "complex model" is used in the spatial organization of the architecture of technoparks. The advantage of this is that the technoparks are located within the city and are in close proximity to it. However, due to its urban location, it may not have large green recreation areas such as European technology parks. In addition, it is planned to build an Uzbek-Turkish Technopark, Sergeli Technopark and Tashkent State Technical University in Uzbekistan. Design work is currently underway.

Despite the diversity of research areas of technoparks, this is, first of all, a territory that combines research activities, industrial facilities, exhibition areas, educational institutions and infrastructure to promote innovative projects. The formation process of each technopark is individual. This requires deep planning in advance.

II. CONCLUSION

1. The International Association of Science Parks (IASP) emphasizes the equivalence of concepts such as "technopark", "technopolis", "technology zone", "research park" and "science park". In Great Britain the term "science park" is usually used, in the USA - "research park", in the CIS countries - "technopark".

2. In the world experience, the main features of the formation of technoparks are: the correct choice of location; well-organized management; developing relationships with business and educational institutions; appropriate organizational and legal form and infrastructure; marketing, financing.

3. The definition of a technopark in the scientific literature is very variable and depends on the field of study. Technoparks (science parks) are territories that combine research activities, industrial facilities, exhibition areas, educational institutions and infrastructure to promote innovative projects.

4. Modern technoparks include three main components, which are inextricably linked and form a single complex: a) research complexes; b) production facilities; c) administrative and public facilities. The main objects of technoparks: buildings and structures of the technopark; living space; Industrial zone; green areas; main streets; highways in the area of the technopark.

5. The similarity of the American and European models: in both models, large areas are built up with low-rise buildings and structures, which ensures a low density of land use. The difference between the two is environmental protection. In American technology parks, industrial complexes are located in a very chaotic manner, with no restrictions on environmental protection and ecological considerations. As a result, the ecological situation here has worsened. From the very beginning, great attention was paid to improving the natural and ecological situation in European technology parks.

6. In the Asian region, the idea of technoparks reached a new level, which led to the emergence of technopolises. Technopolis is, in fact, a translation of the idea of creating a technopark for the entire city. Technopolises were created earlier, France has succeeded in this regard, but it is the Japanese state program that sets the mandatory requirements for technopolises, for example: population of no more than 200,000 people; picturesque natural areas; access to half-hour transport from a major regional center. The Japanese model of research areas laid the foundation for entirely new "technopolis" cities. Unlike the American Silicon Valley, the concept of Japanese technopoles requires a more balanced approach to the development of high technologies. He proposed not only focusing on technology, but also creating entirely new science cities with research and technology centers, new universities, residential buildings, parks and cultural institutions. The zones of these technopolises consist of three interconnected areas: the scientific corps of universities, public research institutes and corporate research laboratories; industrial zone with factories, distribution centers and offices; living quarters for researchers and their families.

7. According to the International Association of Science Parks (IASP) classification, technology parks with a total area of up to 20 hectares are considered small technology parks. Technoparks built to date in the Republic of Uzbekistan are urban-type technoparks.

8. Based on the experience of Europe and Asia, it is recommended to design technology parks in the Republic of Uzbekistan according to the "integrated model". This model has a very loose fit over an area much larger than the point model. It is located within the city limits and is in close contact with it. This allows placing additional buildings and structures with their own functional capabilities on the territory of the technopark, as well as creating a full-fledged green zone. Based on world experience, the construction of technoparks in the spatial solution "Integrated Model" can be divided into several stages. First of all, the main part of the technopark will be created. It covers the following areas: scientific, educational, laboratory, industrial and business incubator. Some time after the launch of its main part, it will be necessary to create appropriate conditions for existing companies and expand new

directions. One of the advantages of this model is the ability, if necessary, to increase the area of any area. At the same time, the region can develop as business and science-oriented companies grow and create new directions: commercial, exhibition, entertainment and others.

9. Although the scope of research for technology parks differs, it is primarily an area that brings together research, industrial facilities, exhibition space, educational institutions and infrastructure to promote innovative projects. The formation process of each technopark is individual. This requires deep planning in advance.

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