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Sustainable Architecture - from Principles to the Development Strategy

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Abstract: *The article considers the concept of sustainability in the work of modern architects and urban planners, engineers and technologists. The detailed content of the principles makes it possible to apply them in research, design and experimental, scientific and educational activities. Approaches to the formation of a sustainable architecture development strategy are outlined.*

Keywords: *high technologies, sustainable architecture, modeling, development strategy, environmental friendliness.*

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Introduction. The concept of sustainability is becoming increasingly important in the work of modern architects and urban planners, engineers and technologists working in various areas of design and construction activities, the creation and production of new materials, structures and technologies [1]. Every year, the number of projects and buildings that are called sustainable, "green", eco-sustainable, environmentally friendly, energy efficient and other similar terms is growing [2].

Each time gives the role of architecture in the life of man and nature its modern interpretation. Philosophical ideas and teachings, design concepts and technologies, construction practices, materials and structures, various components of both the architecture itself and the process of its creation influence, to one degree or another, the understanding of architecture and increase the terminological family of its interpretations. At all stages of human history, architecture, which has become an “artificial environment for life”, “second nature”, absorbs more and more new meanings into its being, acquiring the character of a universal component of human existence [3, 4].

The adoption by the world community of the concept of sustainable development determined the appeal of mankind to the search for opportunities to implement its principles in various fields of activity [5, 6].

The paradoxical-sounding phrase "sustainable architecture" (until humanity knew "unsustainable" architecture) is more of a guideline for the design process than architecture itself, not its possible temporal or stylistic name [7, 8]. This is not a trend or direction in architecture, but a development vector, a system of principles, a design paradigm. Following a development strategy, sustainable architecture is designed to meet the needs of living people at a high quality level, without depriving future generations of the same opportunities [9]. The future is impossible without taking into account the already existing numerous scientific and design developments - the “past” of sustainable architecture, the history of all architecture, taking into account the experience of traditional folk architecture.

Of exceptional importance for the development of architecture is the analysis of ongoing global processes and the search for new concepts for creating a spatial environment from the standpoint of affirming universal human values.

It is the way of thinking of an architect, urban planner, builder that is an important component in the formation of the future architectural and spatial environment [6].

Trends in the application of certain principles and methods of design and construction, technologies and engineering systems are manifested in different names for architecture itself: “sustainable”, “low-cost”, “emerald”, “environmentally friendly”, “green”.

The design of "green buildings" and "green building" on the principles of sustainable development are increasingly focused on analytical pre-design procedures and the search for an architectural solution in collaboration with engineers - specialists in various fields.

The search for something new in architecture is carried out against the backdrop of global structural processes in culture caused by the advent of the information age, the formation of a post-industrial society, and planetary natural and climatic changes.

What is the role of technology and what technologies are used to create a sustainable architecture? These technologies are called "green" and are defined as economically safe innovative technologies that reduce resource consumption and negative impact on the environment while maintaining their economic efficiency.

And one more definition linking the characteristics of technologies with sustainable development: "Green technologies are innovations based on the principles of sustainable development and reuse of resources".

As a derivative of the use of "green technologies", "green construction" itself is also defined. “Green building” is an industry that includes the construction and operation of buildings with minimal impact on the environment. The main objective of "green building" is to reduce the level of consumption of resources (energy and material) throughout the entire life cycle of a building: site selection, design, construction, operation and demolition.

There are other definitions of "green building" and "green buildings", but they are close in essence.

An analysis of the practice of "green building" and sustainable architecture gives grounds to single out two main features of sustainable architecture: environmental friendliness and the use of high technologies. Therefore, a new, more concise definition of sustainable architecture can be proposed: “Sustainable (green) architecture is environmentally oriented high-tech architecture”. At the same time, the ecological component takes into account the general ecology and the ecology of culture.

In a practical sense, rating systems have become criteria for the compliance of objects with sustainability requirements. The most widespread are three international rating systems: American LEED, British BREEAM and German DGNB.

An architectural form is understood as a structurally and functionally organized, symbolically significant, aesthetic and everyday (everyday) perception-oriented material substance.

What determines the architectural form as an integrator of the manifestation and implementation of the principles of sustainable development? We denote the spheres of the birth of sustainable architecture:

- Scientific research;
- experimental design;
- regulatory support - regulation;

- educational activities;
- design and construction;
- Life cycle monitoring.

It is in the diversity of these areas of activity of various specialists that the process of the birth and existence of sustainable architecture is carried out.

Each of the areas has its own methodology for implementing the goals of activities and the tasks of creating a sustainable architecture. Note that the sequence of spheres is conditional.

Based on the experience and trends in creating sustainable architectural solutions, the following principles for the formation of sustainable architecture were proposed, the application of which can be considered in each of the above areas:

- harmonization of social, economic, ecological, territorial and spatial factors of development of settlements;
- identification of the optimal combination of "stable" and "changeable" in the program for designing objects;
- natural conformity and biomimetics;
- adaptability to challenges and risks of natural-climatic and technogenic character;
- Modeling of the spatial and mathematical form of the building, depending on the factors that determine the life cycle.

Conclusions. The definitions of sustainable architecture proposed by the author and the five principles of its formation can be used in the development of a strategy for the development of sustainable architecture in the Republic of Uzbekistan.

The detailed content of the principles of sustainable architecture formation determines the possibility of their application in research, design and experimental and scientific and educational activities at different stages of work according to the “from general to particular” scheme.

The selection of "natural conformity" and "biomimetics" as the principle will ensure their inclusion in the design program as a component of the analysis of the interaction and mutual influence of natural and artificial systems at all stages of the life cycle of the artificial environment.

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