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FOREIGN EXPERIENCE IN THE DEVELOPMENT OF NEW URBAN TERRITORIES BASED ON SUSTAINABLE, ECOLOGICAL, AND HUMAN-CENTRIC PRINCIPLES

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Annotation: This article examines the critical adaptation of global sustainable urbanism concepts to Uzbekistan's specific geographic and cultural contexts. Rather than blindly duplicating foreign planning templates, the study evaluates the underlying regularities of models like the compact city, transit-oriented development (TOD), the 15-minute city, and green infrastructure. The author emphasizes localizing these approaches based on local climate conditions, water supply limits, and the traditional morphological structures of the mahalla. Ultimately, the research highlights that sustainable development in Uzbekistan is achieved through a balanced, integrated network of land use, transport, and microclimate regulation to create resilient, human-centric environments.

The acceleration of global urbanization processes has fundamentally transformed approaches toward the formation of new urban territories. Previously, urban growth was primarily characterized by the expansion of construction areas, the extension of transport routes, and an increase in housing stock. In the contemporary era, however, the quality of territorial development is evaluated based on criteria such as the rational utilization of resources, climate change adaptation, equitable access to daily services, preservation of ecological connectivity, and the creation of a favorable environment for human health. Consequently, a new residential development area is no longer viewed as an isolated project site, but rather as a complex territorial organism intrinsically integrated into the city's transport, social, economic, and landscape systems [6, 8].

The purpose of analyzing foreign experience is not to directly transplant ready-made planning templates developed in a specific country or city into the context of Uzbekistan. Diverse socio-economic systems, climates, land-use traditions, and management mechanisms demonstrate that the same spatial solution can yield varying results. Therefore, this article examines not the external forms, but rather the internal regularities that ensure the practical effectiveness of concepts such as the compact city, transit-oriented development (TOD), the 15-minute city, green infrastructure, water-sensitive design, nature-based solutions, and universal design.

In modern sustainable urbanism, the primary focus is not on limiting the quantitative growth of a city, but on managing this growth rationally. Compactness is not equated with excessive density,

walkability is not defined solely by the presence of sidewalks, and greening is not measured merely by the percentage of green space. A sustainable outcome is achieved through a coordinated system of diverse components: mixed land use reduces transport demand; proximity to public transit decreases automobile dependency; tree and water elements enhance the usability of open spaces during hot seasons; and universal design ensures that these opportunities are accessible to various groups of the population.

Climatic differences are of particular importance when selecting foreign approaches for Uzbekistan's cities. An open green space that is effective in a temperate and humid climate may lose its functional value in hot and dry conditions without shade and irrigation. A TOD model relying on a major subway network will not fully function in a medium-sized city with an underdeveloped public transport system. Therefore, localizing foreign experience requires reinterpreting each concept in accordance with city size, transport capacity, water supply, soil conditions, population density, and mahalla relationships.

The compact city concept emerged as an alternative approach to urban sprawl, long-distance daily commutes, and the inefficient expansion of infrastructure. Its primary essence lies in the rational utilization of the existing urban fabric, coordinating construction and population density with the capacity of transport and social infrastructure, co-locating functions, and integrating open spaces into a continuous system. In UN-Habitat materials, compactness is considered in conjunction with mixed land use and a high level of connectivity; thus, densification alone does not yield a sustainable city [6].

In the context of Uzbekistan, the compact city principle can be applied, first and foremost, by transforming mono-functional residential areas on the peripheries of large cities into mixed-use districts, rationally infilling vacant urban spaces, and linking new construction to routes with existing public transport and engineering capacities. Here, the standards of compactness must be determined by the city's climatic type: in hot-dry areas, air circulation, tree shade, and the proportion of courtyards are essential factors that limit density.

In localizing the compact city concept, there is an opportunity to utilize traditional mahalla morphology. The relatively compact structure of the mahalla, proximity of daily services, human-scale inner streets, and courtyard environment can be interpreted as functional regularities of contemporary mixed-use development rather than being directly copied. In this approach, enclosure and restricted automobile access are integrated with a safe pedestrian environment, while the guzar (neighborhood center) is aligned with a modern local community center.

Transit-Oriented Development (TOD) is based on coordinating land use, development density, and the mobility network around high-quality public transportation. In the ITDP standard, this approach is expressed through eight interconnected principles [7].

The primary object of TOD is not the station or stop itself, but rather the area within walking distance of it. The TOD model requires simultaneous planning of transport and urban planning investments. Instead of random densification around a public transport route after its construction, the hierarchy of stations, passenger flows, land values, social housing needs, and open space systems must be coordinated in advance.

In Uzbekistan's cities, linking TOD exclusively to subway systems would represent a limited approach. While full TOD zones can be formed around metro, rapid bus transit, and railway stations in Tashkent, a local-scale TOD model can be implemented in Samarkand, Namangan, Andijan, Bukhara, and other cities based on high-quality bus corridors, tramways, or suburban railway nodes.

The 15-minute city concept aims to create opportunities for residents to reach their main daily needs—education, food, medical services, recreation, sports, public transport, and certain employment functions—within a short time on foot or by bicycle. Its essence is not to divide the entire city into circles of equal radius, but to ensure a balance of functions that support daily life within each neighborhood [8, 9].

This concept transforms time into a metric of spatial quality. Distance is evaluated not in kilometers, but in terms of safe and convenient travel time. An identical distance of 800 meters can be covered in 10–12 minutes with a straight street network, shade, and safe crossings; however, in the presence of obstacles, large blocks, and highways, this time is practically extended. Therefore, service radii must be calculated based on the actual pedestrian network rather than straight-line air distance.

The 15-minute city organizes functional mixing at the mahalla level. When small-scale retail and services, local community centers, schools, kindergartens, minor workplaces, and recreational areas are located on the ground floors of residential buildings, a portion of daily movement can be conducted without automobiles.

In Uzbekistan, the 15-minute city concept is conceptually harmonized with the institution of the mahalla. In the traditional mahalla, the guzar, mosque, shops, teahouse, and social interactions developed within close proximity. In contemporary conditions, this system can be enriched with schools, clinics, digital services, co-working spaces, sports, and public transport. However, it is necessary to study the boundaries of the mahalla not as an administrative unit, but based on actual pedestrian movement and the geography of service accessibility.

Green infrastructure views parks, gardens, alleys, groves, waterfronts, green streets, courtyards, roofs, and ecological corridors not as isolated objects, but as an interconnected network. It differs from traditional greening through its systematic and multi-functional nature. A green element simultaneously performs the functions of recreation, air purification, shading, water retention, biodiversity support, and spatial identity [10].

The primary condition of green infrastructure is continuity. The existence of a large park does not guarantee the ecological sustainability of the entire territory if it cannot be reached through pedestrian and ecological connections. When small alleys, street trees, canal-side corridors, courtyards, and school grounds are unified, they form a cool and biologically active network across the city. This network must align with the daily routes of the population.

Green infrastructure cooperates with building morphology in regulating the microclimate. Tree shade enhances thermal comfort on lower floors, but it should not block wind corridors. Green roofs and facades create additional ecological space in high-density areas, but they must be evaluated based on irrigation, structural load, and maintenance capacities. In the local climate, shade-providing trees at the ground level are in most cases more effective than decorative vertical greening.

In evaluating green infrastructure, merely measuring the total area percentage is insufficient. Indicators such as tree canopy cover, shaded pedestrian paths, travel time to green space, continuity of biological connections, proportion of native species, irrigation water consumption, and maintenance sustainability must be applied. This approach transforms greening from the decoration of residual spaces into the primary infrastructure of the territory.

Nature-based solutions entail addressing urban challenges by utilizing ecosystem processes. They can simultaneously resolve tasks such as air pollution, heat, flooding, erosion, biodiversity loss, and recreational deficits. European Commission documents emphasize that such solutions create social and economic benefits alongside ecological functions [10]. In choosing nature-based

solutions, compatibility with the local ecosystem is paramount. A plant species or wet landscape type popular abroad may require significant resources in the water-scarce and salinized regions of Uzbekistan.

For Uzbekistan, the concept of nature-based solutions can be enriched through a modern reinterpretation of traditional gardens (baghs), chorbaghs, irrigation channels (ariqs), courtyard trees, and oasis landscapes. This does not mean the decorative replication of historical images, but rather the integration of their water distribution, shade, microclimate, and social usage regularities with new technologies.

The localization potential of foreign experience is manifested in the functional similarity between modern concepts and the existing systems of mahallas, ariqs, canals, tree shade, courtyards, and mixed small-scale services in Uzbekistan's cities. In utilizing foreign concepts, the "one solution fits all cities" approach is rejected. The priority principles and their weight may differ for each type of city. While transit-oriented densification is critical in Tashkent, the water efficiency of green infrastructure takes precedence in water-scarce plains cities, and preserving topography and natural flows is paramount in foothill cities.

Foreign experience in sustainable urbanism demonstrates that the quality of a new urban territory is defined not by individual objects, but by sustainable connections among land use, mobility, open space, water, and green systems. In the context of Uzbekistan, the compact city concept must be interpreted not as a mechanical increase in density, but as a balance of mixed functions, infrastructure capacity, ventilation, shade, and open spaces. The TOD model should not be limited to subway stations, but must require the formation of pedestrian-friendly, mixed-use, and socially inclusive territories around high-quality bus, tramway, and railway corridors.

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