Urban Landscape in Modern Conditions

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Abstract. In ancient times, the city was a closed space, the main function of which was to protect the inhabitants. Cities in the early stages were isolated and autonomous, including economically. Regardless of the location, the layout included a central square and a market - the trade and economic center of the city, where goods were exchanged. The city remained a closed space until the advent of roads and transport capable of connecting settlements with each other, regardless of weather conditions. The emergence and development of transport has significantly accelerated the pace of life and economic processes. Thanks to transport, an economic space between cities has appeared. The development of economic relations strengthened relations between cities and reduced the need for defense. Gradually, the need for the protective walls of cities came to naught. Today, the defensive walls are for the most part a historical legacy of the past. The modern city has turned into an integral system aimed at meeting the needs of people as soon as possible. Human needs are the main engine of transformations taking place in the modern urban landscape. At present, the urban landscape and architecture are not rigidly tied to either architectural styles or national traditions of urban planning. The modern urban landscape meets the needs of people in comfort, convenience, environmental friendliness and aesthetics. The increase in urban population density, the need for mobility and convenience, as well as the modern demand for the environmental friendliness of the city as a system are the main reasons for the change in the modern urban landscape.

1 Introduction

In the last century, due to active urbanization, the population density in cities has increased dramatically and continues to grow to this day, but less rapidly. The UN estimates that the world's urban population reached 4.2 billion in 2018, or 55% of the world's total population [1]. Compared to 1950, the world's urban population increased by 5.6 times by 2018. It is expected that by 2030 the share of the urban population will increase to 60.4%, and by 2050 - up to 68.4%. Currently, there are two states in Asia where 100% of the population is urban residents - Hong Kong and Singapore. The population density of Hong Kong is 6,819 people per square kilometer, Singapore - 8,566 per km². In Europe, the leaders in urbanization are Denmark and Sweden, where the percentage of the urban population exceeds 80%. The population density in Denmark is 135.3 per km², Sweden -25 people per km² [2]. The increase in population density in cities inevitably led to the

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compaction of buildings. The lack of space, first for infrastructure facilities, and then for residential buildings, forced us to go beyond the ground level of urban space. A multi-level city should grow and expand evenly both upwards in the form of skyscrapers and downwards - underground. This is necessary to stabilize the load, since the construction of high-rise buildings is limited by the physical strength of the soils on which the urban space is located. Considering the tendencies of modern cities to grow upwards, it is necessary to mention the wide distribution of residential high-rise buildings, skyscrapers, in which hotels and business centers are located [3]. On the roofs and upper floors of buildings there are social and entertainment facilities that have ceased to have enough space in the above-ground urban space. Terraces on the roofs of buildings where cafes, bars and swimming pools are located are common in New York, Barcelona, Singapore, Moscow [4]. Thus, infrastructure facilities remain as close as possible to the place of residence and work of urban residents. With a general trend towards the concentration of the population in cities and the rise of cities, comfort objects - swimming pools, cafes, bars naturally occupied the upper floors of buildings. Another trend in the development of the modern city is “green roofs”. Green areas are often placed on the roofs of buildings. This is due to the displacement of nature from the modern city. Green areas serve as a place for people to relax, natural environment reduces stress levels. Some plants emit phytoncides that disinfect the air, maintaining human health. From an ecological point of view, plants are an integral part of the urban landscape, as they are able to absorb some of the harmful urban emissions. China, the US and India were the top three countries in terms of CO2 emissions in the past year, according to BP data [5]. Projects for the integration of green areas into modern architecture are diverse: from parks on the roofs of skyscrapers (“City in the Sky” designed by Tsvetana Toshkova) and vertical gardens (designed by French architect Patrick Blanc) to incorporating buildings and infrastructure into natural landscapes without disturbing the ecosystem (the city of the future Gwanggyo, project for South Korea). To date, there are also large-scale implemented projects. These include Gardens by the Bay, a 101-hectare park located next to the Marina Reservoir and consisting of three waterfront gardens, Bay South Garden, East Bay Garden and Bay Central Garden. The uniqueness of the park lies in the giant sculptures - trees, which illuminate the park at night due to the energy of solar panels, and in the crowns of some of them there are small restaurants and shops. [6] The construction of a “green” city is also planned in southern China. The Liuzhou project by architect Stefano Boeri is a 175-hectare area built using vertical forest technology [7]. Consider another trend: downward expansion of cities and the use of underground spaces. At present, underground spaces are used almost to the same extent as those above ground. In Canada, the city of Montreal, there is a whole underground city that successfully functions and is popular with both tourists and local residents. It is a 30 km pedestrian network linking several metro stations and two skyscrapers. There are more than one and a half thousand shops, about two hundred restaurants, 35 cinemas and more than one and a half thousand apartments [8]. Today, such infrastructure facilities as transport (metro), parking lots, shops, and museums are located underground. The Olympic Museum (Barcelona), the Drenthe Museum (Netherlands), the Kulikovo Field Museum (Tula Region, Russia) have completely or partially gone into the underground space [9]. Thus, offices and business infrastructure are predominantly located on the upper floors, while the service sector - hotels, shopping centers and shops tend to be located below. The increase in population density in cities has led to an increase in the load on the transport network. City traffic jams are an urgent problem that takes up a significant amount of time from residents of megacities. Reduced individual mobility within the city. To solve this problem, various solutions are being created that can become the basis of a new urban landscape in the future. In Asia, where the problem of population density is especially acute, multi-level roads are being built. Japan has been successfully developing this direction since the 60s of

the last century. Multi-level interchanges harmoniously fit into the landscape of modern Tokyo, and together with many sensors on the roads, the Tokyo Transportation Control Center successfully copes with traffic jams every day. We can judge the level of success indirectly by looking at the statistics of traffic accidents and the number of deaths in them. The National Police Agency of Japan published statistics on traffic incidents for 2020 [4]. According to these data, over the past five years, the number of road accidents has decreased by more than 200,000 cases [10]. However, futurists agree that the most convenient and safe city is a pedestrian-oriented city. First of all, we are talking about the withdrawal of the transport infrastructure of individual and freight transport outside the cities, about creating conditions for expanding the use of public transport, including the refusal of car owners from using individual vehicles to move around the city in favor of public or small-sized and environmentally friendly transport [8-9]. An example of a successfully launched environmentally friendly transport can be seen in Sweden. Transport in Hammarby Höstad and Stockholm operates on biogas, which comes from wastewater treatment plants [7]. The example of Sweden can be used both in other countries and for the planning of completely new cities in the future.

2 Research Methodology

Greening the economy is increasingly becoming a strategic priority for governments around the world. As part of efforts to promote a green economy in the pan-European region, the Committee on Environmental Policy (CEP) of the United Nations Economic Commission for Europe (UNECE), with the support of UNECE and the United Nations Environment Program (UNEP), and in collaboration with other key actors such as the Organization for Economic Co-operation and Development (OECD) and the European Environment Agency (EEA) have developed a pan-European strategic framework for greening the economy [8]. This strategic framework is the basis for an integrated regional vision, goals and results to promote a green economy. The Batumi Green Economy Initiative is an implementation mechanism proposed for the framework program for the period 2016-2030 through voluntary commitments by interested countries and organizations, both public and private, in the form of green economy actions [9]. To date, 28 countries have made 87 commitments and participating organizations 37 commitments. Sustainable infrastructure plays an important role in the transition to a green economy as it is central to the Sustainable Development Goals (SDGs), covering all 17 goals and impacting 92% of the 169 targets. The fourth session of the United Nations Environment Assembly, held in March 2019, focused on innovative solutions to environmental challenges, sustainable consumption and production. In this context, UNEA Resolution 4/5 on sustainable infrastructure focuses on sustainable infrastructure, recognizing its importance and calling for various actions aimed at sustainable consumption and production patterns, sustainable investment, capacity building, infrastructure development and maintenance within a sustainable framework [12]. In addition, UNECE is also making efforts to green the economy and improve the sustainability of infrastructure through the Protocol on Strategic Environmental Assessment (SEA) and Environmental Impact Assessment (EIA) [10]. Both tools are strategic in gathering data on the environmental and social impacts of planned policies and actions that are critical to progress in a green economy and therefore relevant to sustainable infrastructure planning. Well-designed SEA processes are especially important because they can help address sustainability issues early in the process, when there is still more opportunity to make more sustainable planning choices. The Working Group on SEA and EIA was established as a mechanism to facilitate their implementation in ECE countries. Both EIA and SEA are relevant to the work envisaged in the context of the Pan-European Strategic Framework for Greening the Economy, especially in relation to the extreme

impacts of climate change. The need to invest in greening infrastructure is becoming increasingly urgent due to the ongoing climate crisis and the COVID-19 pandemic [9]. These challenges are forcing governments in the region to work harder to achieve collective, tangible progress in a green economy beyond individual action, especially with regard to sustainable infrastructure development, due to current economic changes, market dynamics and shocks affecting infrastructure systems. In addition, limited resources and the need to build resilience are forcing governments to act quickly and make strategic decisions that help them recover from the new reality. According to the Global Recovery Observatory's report Are we recovering better than we were?, the fifty largest economies announced $14.6 trillion in fiscal spending in 2020, of which $1.9 trillion (13.0%) was for long-term economic recovery; less than 20% of these recovery spending went to sustainable investments. Even if this sense of urgency forces us to abandon sustainability considerations in the interest of spurring rapid economic growth and job creation, investing in sustainable infrastructure is actually one of the best ways to recover.

3 Results and Discussions

The current pandemic has shown how important it is to consider sustainability factors when developing infrastructure assets and services, and especially how sectors and systems are interconnected [8]. Health systems have come under pressure from the pandemic, and consequently all infrastructure industries have been hit by unsustainable development paths. In particular, sectors with assets correlated with GDP, such as airports, ports and toll roads, are the most affected by the economic shock. Social infrastructure, renewable energy and electricity generation were less impacted but still affected. On the contrary, the telecommunications infrastructure showed positive results due to strong demand for mobile networks and communication networks. Therefore, there is a growing need to develop infrastructure that is sustainable, but at the same time intelligent in terms of connecting with other infrastructure assets and planning networks from different regions [10]. The following three factors highlight the breadth of issues that infrastructure planners need to consider. Given the long life span of infrastructure, failure to invest in clean, resilient and resilient infrastructure results in long-term greenhouse development paths with irreversible risks of environmental damage. Pollution (of air, water, soil, noise, etc.), emissions of carbon and other greenhouse gases, land use change, damage to biodiversity and ecosystems, use of scarce raw materials and resources are some of the negative environmental impacts. These negative outcomes, in turn, can threaten the viability and sustainability of the infrastructure systems themselves (for example, forest fires, floods, landslides can damage roads, dams, buildings, and other types of infrastructure). For example, natural (hurricanes, pests) and human-induced disturbances (forest fires, infrastructure and tourism) pose a threat to forests in the pan-European region. Climate change is also expected to lead to more frequent and intense natural disasters, such as loss of biodiversity due to forest fragmentation. Therefore, the infrastructure in the region should strive for restoration, zero negative impacts and the protection of biodiversity, while applying the principles of circularity in the development of infrastructure systems. Investing in low-carbon properties is critical to offset the risk of a resurgence of carbon emissions after the pandemic [12].

While infrastructure programs are designed to meet social needs and provide basic services, they sometimes fall short of that goal. On the contrary, if infrastructure programs and projects are not properly planned and implemented with social considerations in mind, negative social pressures (eg population change, unemployment, gender inequality, etc.) may arise. For example, the pandemic has shown how socio-demographic problems can affect infrastructure systems in various regions of Europe [11]. Population aging, depopulation in remote, rural and/or border regions, and migration of the economically

active population to cities are some of the main challenges. Therefore, it is essential to take into account these changes from the very beginning, as well as the opinion of beneficiaries and key stakeholders, when conducting a social impact assessment. If more inclusive and resilient infrastructure is designed, this can lead to significant monetary benefits for citizens, especially those with lower incomes. In addition, in addition to direct monetary benefits from economic infrastructure, social public infrastructure can also help develop human capital, especially youth and the workforce, while introducing innovations to better serve an increasingly large aging population. According to the International Monetary Fund, by 2050 the agri-food sector will account for half of global greenhouse gas emissions. The successful operation of the agri-food industry also requires energy, transport and other types of infrastructure assets and industries. According to the EEA, sectors such as energy supply, industry and transport have had the biggest impact on emissions in the European Union in recent years [12].

Economic infrastructure also accounts for the majority of CO2 emissions in other Eurozone and Central Asian countries, especially from electricity and heat generation. In addition to air pollution, infrastructure facilities can cause environmental fragmentation, loss of biodiversity, water and soil pollution, etc. For this reason, technology and innovation are critical in the region to achieve zero emissions or low carbon impacts on energy systems, land use, industry and others. economic activities related to infrastructure development. This is essential for environmental, economic, social and financial sustainability and for the achievement of the SDGs in the medium and long term. The transition from traditional rigid infrastructure to solutions that adapt to natural conditions is a challenge for governments. “Brown” or “unsustainable” infrastructure includes projects that often damage or destroy natural habitats and negatively impact biodiversity. It may also cover facilities where expansion, redevelopment or reuse may be difficult due to the presence of a hazardous substance, contaminant or contaminant. Increasing the resilience of brown infrastructure comes with certain risks and responsibilities that can lead to increased costs, new technology requirements, cross-sectoral linkages (eg clean energy needed to green other sectors), etc [13]. Moreover, the complexity of natural systems makes it difficult to assess the interactions between “grey” or “built” and “green” or “natural” infrastructure. Initially, this can be time-consuming, costly, and require new skills. However, efficiency gains from greening brown or gray infrastructure and deploying green infrastructure have long-term positive impacts rather than relying on the short-term economic benefits of past infrastructure practices.

4 Conclusions

Good infrastructure management requires systematic and integrated planning, financing, prioritization, design, construction, maintenance, operation and evaluation to maintain public infrastructure assets. Sustainability principles, management and evaluation strategies need to be integrated at every stage of the infrastructure life cycle.

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