

"INDUSTRIAL PARKS AND THEIR ROLE IN THE SUSTAINABLE DEVELOPMENT OF CITIES IN UZBEKISTAN"

<https://doi.org/10.5281/zenodo.15475310>

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Abstract

In the context of active urbanization and industrialization in Uzbekistan, industrial parks are becoming a key tool for the sustainable development of cities. This article examines the role of industrial parks in promoting economic growth, creating jobs, and introducing environmentally friendly technologies. Special attention is given to government initiatives aimed at developing infrastructure and attracting investments, as well as to the analysis of their impact on the socio-economic and environmental aspects of the urban environment.

Keywords

Industrial park, sustainable development, cities, economic growth, investment, innovation, ecology, "green" technologies.

Introduction. In the context of accelerating globalization and urbanization, the sustainable development of cities has become a key priority of state policy in many countries, including Uzbekistan. Efficient land use within urban areas, the creation of new jobs, and the reduction of environmental burdens all require the implementation of innovative approaches to industrial development. One such approach is the establishment of industrial parks – specialized industrial zones that provide favorable infrastructure, legal support, and incentives for the placement of manufacturing enterprises.

Since the early 2010s, Uzbekistan has witnessed the active formation and development of industrial parks as one of the mechanisms for industrialization and regional development. These structures play a significant role not only in attracting investments and enhancing the competitiveness of the national economy, but also in ensuring the sustainability of urban agglomerations through the rational placement of production, the development of "green" technologies, and the increase of employment levels.

Despite the growing importance of industrial parks in the national sustainable development strategy, scientific research dedicated to their impact on urban



Figure 1. Suzhou China-Singapore Industrial Park.

sustainability—particularly in the context of Uzbekistan—is still emerging. This study aims to fill that gap by providing a comprehensive analysis of the role of industrial parks in ensuring the sustainable development of Uzbek cities. The focus lies on aspects such as economic impact, social integration, and the environmental efficiency of industrial clusters.

Results.The "Uzbekistan – 2030" strategy, approved by Presidential Decree No. PF-158 of the Republic of Uzbekistan on September 11, 2023, is an important program aimed at ensuring long-term sustainable development in the country. One of the main directions of this strategy is defined as “Fundamentally improving the environmental situation in the country and eliminating environmental problems that affect human life.” In achieving these goals, the formation of environmentally sustainable industrial infrastructure plays a crucial role. In this regard, the role of industrial parks is particularly emphasized.

Industrial parks are special economic zones established in accordance with defined norms and regulations, where production facilities that meet environmental standards are located. These parks are equipped with modern logistics, infrastructure, resource-saving technologies, and waste recycling systems, making industrial activities within them less harmful to cities and the surrounding environment. At the same time, industrial parks contribute to the systematic resolution of environmental problems arising from the urbanization process.

Within the framework of industrial parks, the implementation of "green economy" and "low-carbon production" models enables the improvement of the urban environmental situation by reducing harmful emissions into the atmosphere and utilizing renewable energy sources. This fully aligns with the principles of environmental sustainability outlined in the "Uzbekistan – 2030" strategy.

Over the past two decades, especially in the context of global threats related to climate change, urbanization, and the depletion of natural resources, the concept of

industrial parks has gained particular relevance from the perspective of sustainable development. Research in this field is being conducted both at the theoretical level—justifying the concept of sustainable (ecological) industrial parks—and through practical analysis of their operational effectiveness.

Industrial parks, as a means of industrialization and sustainable development, have been studied by many local and international researchers. According to Choin's research, industrial parks can become sustainable industrial platforms by ensuring the concentration of production while reducing environmental risks. UNIDO (2020) emphasizes the importance of transitioning from traditional industrial zones to environmentally sustainable industrial parks (Eco-Industrial Parks).

Looking at foreign experience, the China-Singapore Suzhou Industrial Park, located in Suzhou city, Jiangsu province, was established in February 1994. It is the first government cooperation project between China and Singapore, covering an administrative area of 278 square kilometers. By the end of 2022, the SIP had a permanent population of 1,134,000, of whom 940,000 were employed. SIP is one of the sectors in China with the highest level of openness, best quality and efficiency of development, strongest innovation activity, and the most environmentally friendly business environment.

Since its establishment, SIP has conscientiously implemented reforms and openness as key state policies. Drawing on the successful experiences of Singapore and other developed countries and regions, it has adopted a range of strategies that contribute to innovative industrial development, economic globalization, and the modernization of cities.

Singapore and several other countries are developing a number of strategies aimed at innovative industrial development, economic globalization, and the

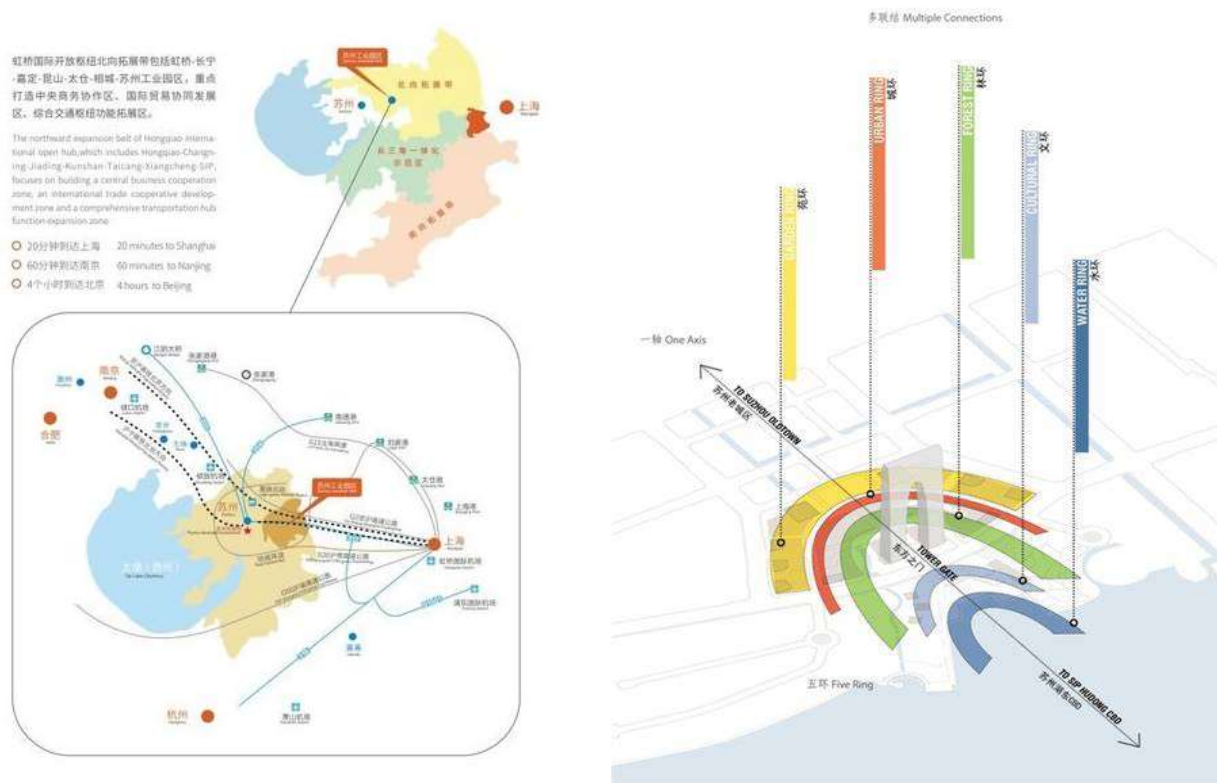


Figure 2. Functional Areas of the China-Singapore Industrial Park.

modernization of cities.

The master plan of the China-Singapore Industrial Park envisions a balanced allocation of industrial, service, residential, green areas, and infrastructure. The park covers an area of 288 km² and includes the following main functional zones:

1. **Industrial Zone:** specialized in high-tech manufacturing, biotechnology, electronics, and information technology.
2. **Research and Innovation Zone:** spaces for universities, research centers, and startups.
3. **Commercial and Administrative Zone:** shopping centers, banks, hotels, and government offices.
4. **Residential Zone:** multi-story buildings and modern residential complexes.
5. **Green Areas and Lakes:** parks and reservoirs (Jinji Lake and Dujian Lake) that ensure ecological balance.

The master plan places great emphasis on public transportation, pedestrian pathways, and bicycle infrastructure. This supports the implementation of the "15-

minute city" concept—meaning that residents can reach work, education, leisure, and shopping facilities within 15 minutes.

The master plan of the Suzhou China-Singapore Industrial Park is aimed not only at economic growth but also at sustainable urban development, improving the environmental situation, and technological advancement. This park is one of the most successful examples in China's industrial city planning and development. Its experience will serve as a model for other regions in the future.

In the Central Asian region, industrial parks are being studied and their potential analyzed. Alimov and Safarov (2022), analyzing the "Angren" industrial zone in Uzbekistan, emphasize its positive impact on employment and the development of production cooperation but identify insufficient infrastructure and a low level of digitalization as the main challenges. Boboev and Yunusova (2023), focusing on the social structural component, highlight the role of industrial parks in shaping new growth points for small and medium-sized cities, especially in the post-COVID-19 period.

Moreover, recent studies, such as Zhang & Wang (2019), emphasize the necessity of a comprehensive approach to evaluating industrial parks that includes not only economic but also socio-environmental parameters. This interdisciplinary approach forms the basis of the present research.

Scientific approaches to assessing the effectiveness of industrial parks vary. Some studies use quantitative methods such as gross regional product, employment levels, and export evaluation, while others apply qualitative methods by analyzing social and institutional factors of development. Several works highlight the need to integrate the United Nations Sustainable Development Indicators (SDGs) into the planning and evaluation of industrial zones.

The "Angren" Free Industrial Economic Zone, established in 2012 by the decree of the President of the Republic of Uzbekistan, is an important element of the national strategy for industrial modernization and regional development. Located in the Tashkent region, this zone holds a strategic position in the densely populated and industrialized Ferghana Valley of our country. Its establishment aims to activate processing industries, reduce dependence on raw material exports, and promote investment activity.

The "Angren" Free Industrial Economic Zone is a unique example of integrating industrial growth into the existing urban area structure. From an urban planning perspective, the development of this zone reflects trends of transitioning from a mono-industrial city to a multifunctional urban system based on principles of sustainability, economic diversification, and spatial integration.

Historically, Angren developed as a coal-mining city characterized by a distinct industrial hierarchy and linear layout typical of Soviet industrial centers. The establishment of the Free Industrial Economic Zone (FIEZ) in 2012 prompted the spatial reorganization of the city territory, including the expansion of industrial zones, modernization of transport infrastructure, and the creation of new business hubs (Kurbonov, 2021).

From an urban planning perspective, the Angren FIEZ is developing as a peripheral industrial area located directly adjacent to residential and communal zones, which requires a special approach to zoning, ecological buffering, and logistical planning. The strategy for phased development of the area takes into account several key principles:

- Functional separation of industrial, logistics, and residential areas to minimize the impact of harmful emissions and noise on the population;
- Development of the transport system, including the reconstruction of roads and railways, which promotes both mobility within the city and regional connectivity;
- Modernization of engineering infrastructure, including water and electricity supply, sewage systems, and telecommunications, providing a foundation for the sustainable growth of urban and industrial functions.

At the same time, the development of the "Angren" Free Industrial Economic Zone has a multi-level impact on urbanization:

- On one hand, the revival of industrial activity and the creation of new jobs contribute to reducing migration flows and enhancing social stability.



Figure 03. Functional area of the city of Angren.

• On the other hand, due to the demand for housing among the workforce in the area, the growth of rural settlements around the city is observed, which creates the need for comprehensive planning of the urban agglomeration.

The main urban planning issues include the following:

- Insufficient coordination between municipal authorities and the Free Industrial Economic Zone administration on spatial planning matters;
- Limited connection of new industrial facilities with social infrastructure (schools, medical institutions, public transport);
- Low level of implementation of "green" and energy-efficient architectural and urban planning solutions.

At the same time, the potential of the "Angren" Free Industrial Economic Zone as an element of sustainable urbanization remains significantly preserved. With an integrated development strategy for the area, it is possible to create an innovative industrial-urban complex based on the principles of "smart" zoning, ecosystem design, and social inclusiveness. From this perspective, it is advisable to utilize international experience in designing environmentally sustainable industrial zones and "smart cities" that harmonize industrial development with the quality of the urban environment (UN-Habitat, 2020).

Moreover, the "Angren" Free Industrial Economic Zone should be viewed not only as a point of economic growth but also as a laboratory for the spatial transformation of a post-industrial city that opens new horizons for sustainable urban development in Uzbekistan.

The relationship between industry (industrial parks) and urban planning in Uzbekistan.

1. Promoting the economic development of cities.

- Industrial parks help create new jobs and support the growth of the urban economy.

- The inflow of investments into industrial zones assists the development of small and medium-sized enterprises in cities.

Examples: The Navoi, Angren, and Jizzakh free economic zones have become centers of industrial development.

2. Urban infrastructure planning.

- The development of industrial parks requires the creation of appropriate infrastructure: roads, transport hubs, and utility networks.

- Urban planning includes zones for industry, warehouse complexes, and logistics.

Example: In Angren, the transport network was developed to connect with the industrial park.

3. Environmental aspect.

- Industrial enterprises affect the environmental situation in cities.

- Urban planning takes into account sanitary protection zones around industrial facilities.

Example: Waste and wastewater treatment technologies are applied in the Jizzakh Industrial Park.

4. Social infrastructure and housing.

- Establishing industrial parks requires the development of social infrastructure: housing, schools, and medical facilities for workers.

- The development of cities around industrial parks creates multifunctional areas where people can both work and live.

Example: In the city of Navoi, housing and social facilities were provided for employees of the Free Economic Zone.

5. Innovative Solutions and Technologies.

- Industrial parks are becoming centers for implementing new technologies and sustainable development.

- Energy-efficient buildings, renewable energy sources, and waste management systems are utilized.

Example: Solar energy projects have been introduced in the Angren industrial park.

6. Urban Spatial Development.

- Industrial parks influence the distribution of functions within the city (production, housing, public spaces).

- Industrial clusters that support the specialization of cities are formed.

Example: Navoi became a center for the chemical and mining industries, while Angren became a center for the energy industry.

Economically, industrial parks help optimize resource sharing, reduce costs, and save scale by providing a common area for several industrial sectors. This enables enterprises to streamline their operations and compete effectively in the market.

Conclusion. Industrial parks are strategically important territorial and economic organizational structures that ensure the sustainable development of cities. By centralizing production, efficiently utilizing resources, introducing new technologies, and providing stable employment, they make a significant contribution to the socio-economic development of the region.

The development of industrial zones and free economic zones in Uzbekistan leads to the transformation of the urban periphery into an active economic entity. This process improves urban infrastructure, expands the scope of services for the population, and attracts not only domestic but also international investors.

In this regard, the experience of the Suzhou China-Singapore Industrial Park (CSIP) holds great importance as a globally recognized successful model. This park was formed based on the combination of Singapore's effective urban planning experience and China's regional development policy, incorporating functional zoning, ecological balance, digitalization, and the concept of a "smart city." CSIP is recognized not only as an industrial center but also as a comprehensive urban development project that equally integrates living, education, innovation, and commercial opportunities.

Implementing this model in Uzbek cities, adapted to local conditions, will contribute to the development of high-tech industry, ensure economic diversification, strengthen environmental sustainability, and enhance social well-being. In particular, Suzhou's experience serves as a valuable resource in areas such as functional zoning, green infrastructure, digital governance, and transport logistics within urban territories.

Industrial parks act as a "driver" of urban development. As demonstrated by the Suzhou China-Singapore Industrial Park, strategic planning and implementation of such projects based on state and international cooperation lead to sustainable, inclusive, and innovative urban growth. Uzbekistan has great potential in this direction, and by wisely utilizing existing conditions and resources, successful outcomes can be achieved.

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