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Practice Thinking on Promoting Regional Industrial Upgrading and Innovation Development through Science and Technology Park - Taking Beijing-Tianjin Zhongguancun Tech Town as an Example

BREAKOUT SESSION 1 – ROLE OF INNOVATION SPACES IN THE DEVELOPMENT OF TECHNOLOGY, INDUSTRY, AND FINANCE

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EXECUTIVE SUMMARY:

As a key driver for regional economic development and industrial transformation, Science and Technology parks are increasingly being applied in underdeveloped areas. The Beijing-Tianjin Zhongguancun Tech Town, a typical "ZGC-like" high-tech park, serves as a primary platform for implementing the coordinated development strategy of the Beijing-Tianjin-Hebei region. This paper begins with an exploration of relevant theories and mechanisms of science and technology parks. It uses the Beijing-Tianjin Zhongguancun Tech Town as a case study to analyze its construction model, policy innovations, and industrial collaboration mechanisms.. It summarizes the successful experiences of promoting industrial upgrading and innovative development in Baodi District and explores how science and technology parks can drive high-quality regional economic growth through innovation and industrial agglomeration. The findings reveal that the practices of the Beijing-Tianjin Zhongguancun Tech Town provide a systematic solution: top-level design leadership, innovation empowerment, regional cooperation breakthrough, and industry-city integration upgrade. This solution effectively addresses challenges such as resource scarcity and industrial backwardness in underdeveloped areas. This model can serve as a valuable reference for other underdeveloped regions aiming to promote industrial upgrading and innovative development through science and technology parks.

KEY WORDS:

science and technology park; regional industrial upgrading; regional innovation and development; regional coordination; experience reference

I. INTRODUCTION

1. Research background and significance

Amid intensifying global competition in technological innovation, science and technology parks have emerged as a core engine for nations and regions to seize technological leadership and drive regional economic development. As an exemplary model of China's science and technology parks, Zhongguancun(Abbreviated as ZGC) has explored the path of "innovation-driven development." Addressing the challenge of imbalanced regional development nationwide, ZGC has actively responded to national strategies by initiating extensive cross-regional industrial collaborations. It leverages science and technology parks as key platforms to support high-quality development in partner regions.The Beijing-Tianjin ZGC Tech Town (referred to as "Tech Town"), a flagship project of ZGC's collaboration with underdeveloped areas, serves as a critical platform to implement ZGC's demonstrative leadership and harmonize the "Beijing-Tianjin Twin Cities Initiative." A thorough analysis of the Tech Town's development model provides valuable insights for underdeveloped regions to overcome bottlenecks through cross-regional resource integration and institutional innovation, fostering innovation ecosystems and accelerating industrial upgrading.

2.Theoretical basis and mechanism of action

Science and technology parks emerged in the mid-to-late stages of industrialization, originating in Europe and America. The theoretical foundations of science and technology parks can be traced back to Marshall's theory of industrial agglomeration, Perroux's growth pole theory, Gottmann's urban agglomeration theory, and Ricardo's comparative advantage theory. Since the introduction of the concept of science and technology parks, scholars domestically and internationally have conducted extensive research on various aspects, including development models, stages of development (Table 1), driving forces, and development paths[1].

Table 1 Summary of the evolution of development stage form of science and technology parks

	First-Generation Science Park	Second-Generation Science Park	Third-Generation Science Park	Fourth-Generation Science Park
Economic Background	Industrial Economy	Information Economy	Knowledge Economy	Sharing Economy
Epochal Features	Technology-Driven Economy as Key Feature	Economy-Technology Integration as Key Feature	Knowledge-Based Community as Key Feature	Knowledge/Creative-Oriented Urban Area as Key Feature
Innovative Models	Linear Innovation	Chain Innovation	Network Innovation	Open Innovation
Development Impetus	Policy-Driven	Policy and Investment Drive	Investment and Innovation-Driven Development	Interactive Innovation Drive
Key Objective	Technology Commercialization Facilitation	Industrial Cluster/Chain Acceleration	Innovation-Driven Efficiency Enhancement	Sustainable Economic Growth Realization
Representative Case	Stanford Research Park, USA Cambridge Science Park, UK	One-North, Singapore Bangalore Software Technology Park, India	High Tech Campus Eindhoven,Netherlands Montreal Innovation Park, Canada	Kendall Square, Boston, USA East London Tech City, UK

Based on theories related to economic development and summaries from domestic and international research, I believe that science and technology parks can drive the aggregation of enterprises and population through locational, policy, and environmental endowments. This promotes industrial structure optimization, enhances innovation capabilities, and ultimately forms a virtuous cycle of high-quality regional development (Figure 1). The introduction of external quality management experience, technology, and enterprises will significantly accelerate this process. It is essential to effectively balance government guidance with market mechanisms, achieve complementary advantages through cross-regional cooperation, and leverage the agglomeration and spillover effects of modern science and technology parks to promote the formation of unique regional competitive advantages.

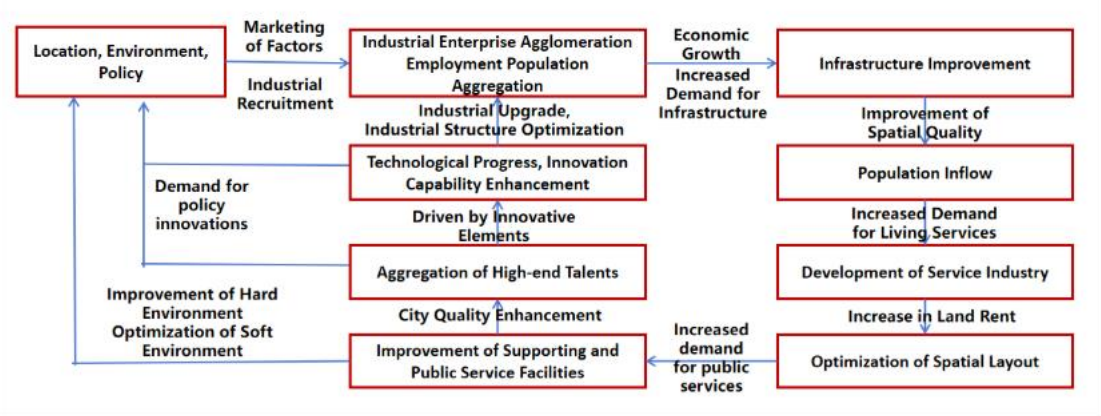

Figure 2 The transmission mechanism of science and technology park to drive urban industrial upgrading and innovation development

II.EMPIRICAL STUDY ON THE PROMOTION OF REGIONAL INDUSTRIAL UPGRADING AND INNOVATION DEVELOPMENT BY TECH TOWN

The ZGC Tech Town in Beijing-Tianjin is located in Baodi District, Tianjin City. It is a significant industrial project to implement the dual national strategies of coordinated development of the Beijing-Tianjin-Hebei region and innovation-driven development. After seven years of development, the Tech Town has transformed from a village with narrow, underdeveloped roads into a new technological hub that embodies the 'ZGC' gene. This transformation is driven by regional coordinated development within the Tech Town, elevating Baodi District's strategic importance to unprecedented levels. By attracting innovative resources and projects from ZGC, the Tech Town has spurred high-quality economic development in the region.

1. Development status and achievements

The total planned area of the Beijing-Tianjin ZGC Tech Town is approximately 14.5 square kilometers, with the first phase covering 4.2 square kilometers. By 2024, a total of 1,682 market entities have been registered, generating nearly 2 billion yuan in output value and attracting numerous high-end industries and top-tier talents. SSince its launch in 2017, the project has focused on four major industrial sectors: next-generation information technology, biomedicine and medical devices, new energy and materials, and advanced equipment manufacturing. It has gathered 24 high-tech enterprises, including HuanGuang New Network, Tianze Power, Hezhong Huineng, Boyu (Tianjin), Siasun Robotics, and Sinobio, forming an initial innovative ecosystem.

Table 2 Changes of key indicators since the establishment of Tech Town

Year	*2017*	*2020*	*2024*
Output value (100 million yuan)	*0*	*9.8*	*16.2*

Registered entity (household)	*0*	*327*	*1682*
High-tech enterprises (households)	*0*	*4*	*27*

Benefiting from the technological innovation drive of the Tech Town, key economic indicators in Baodi District, including fixed asset investment, total industrial output value, and the proportion of value-added from strategic emerging industries, have maintained double-digit growth for three consecutive years2. In 2024, the districts fixed asset investment is expected to grow by 16.7%, with the added value of strategic emerging industries accounting for 32.4%. The concentration of numerous high-tech enterprises in the Tech Town has enhanced Baodis regional innovation capabilities. The integration of cutting-edge scientific achievements with local advantages has collectively driven the economic transformation and upgrading of Baodi District. Additionally, the Tech Town continues to focus on creating a livable and business-friendly environment3. The first phase of infrastructure development covering 4.2 square kilometers has been completed to high standards, with significantly increased recreational spaces like scenic parks and kilometers-long waterfront walkways. Facilities such as the Kejingxuan Talent Community and Nankai High Tech Town Campus are gradually being perfected. The ecological environment of Baodi District has improved, and the well-being of its residents has been significantly enhanced, accelerating the pace of modernization.

2. Development experience

In the past seven years, Tech Town project has made rapid progress. As a typical case of cooperation with underdeveloped areas, the Tech Town has relied on the innovation advantages of ZGC to carry out comprehensive mode innovation and construction and operation, promote the comprehensive development of "industry, city, people, scenery and culture", and accumulated rich experience.

Cross-regional Cooperation: Pioneering a New Model of Regional Cooperation in ZGC through Market Mechanisms. The ZGC and the Baodi District Government of Tianjin jointly established a joint venture as the investment and operation entity for the park, building a market-oriented cooperation and distribution mechanism. The local government grants ZGC comprehensive operational management rights, including systematic planning, infrastructure construction, industrial organization operations, and enterprise services. The Tech Town has gathered various forces and elements, fully initiating a new model of cooperation between ZGC and local governments, managed comprehensively according to ZGCs philosophy, with full support from the local government in terms of policy and public services.

Top-level Design: Under the framework of ZGCs "Seven-in-One" planning, systematically plan matters such as the industry, ecology, space, and investment and financing of the Tech Town. The Tech Town will follow ZGCs "Seven-in-One" development philosophy to outline key tasks for different stages—short-term, medium-term, and long-term—to ensure the systematicness and implementability of the plan. Guided by industrial planning, it will combine Baodi Districts industrial foundation and resource advantages to determine the industrial positioning and development path of the Tech Town; based on ecological planning, it will maintain the existing ecological environment in Baodi District and achieve ecological conservation and resource recycling; with population planning as the core, it will study the introduction of industrial population and formulate talent attraction policies; using spatial planning as a vehicle, it will develop park spatial structure and functional layout according to industrial planning; ensuring the support of investment and financing planning, it will formulate development and construction investment and financing plans and innovate investment and financing models; taking the development model planning as the central strategy, it will develop project construction and operation strategies and operational plans; employing digital and intelligent park planning as a means, it will leverage technology to empower industrial parks and use digital and intelligent methods to safeguard the stable development of the parks industrial chain and supply chain.

Institutional Innovation: Based on the experience of ZGCs policy pilot programs, create a relaxed policy environment for enterprises. The Tech Town draws on ZGCs experience in piloting policies, focusing on the needs of enterprise development, actively seeking strong support from the Tianjin municipal government, continuously innovating in institutional frameworks, and creating a moderately relaxed industrial development environment for enterprises. In 2018, the Tech Town promoted the introduction of policies by the Tianjin municipal government regarding land approval, talent settlement, and enterprise qualification certification, as part of the citys fiscal system reform pilot. In 2021, it actively sought support from the Tianjin municipal government in terms of industrial special funds, relaxed talent introduction policies, and inclusion in the national high-tech zone category. In 2024, it pushed for enhanced support from the Tianjin municipal government in areas such as improving coordination levels, supporting key industries, relaxing transitional policies for national-level high-tech enterprises, strengthening financing support, simplifying talent policy application procedures, and reinforcing educational resource guarantees.

Regional Collaboration: Strengthen the implementation of the ZGC Baodi model, which emphasizes "R&D incubation in Beijing and production manufacturing in Baodi." As a key industrial collaboration platform jointly developed by Beijing and Tianjin, the Tech Town actively promotes regional coordinated development. In terms of industrial chain synergy, the Tech Town focuses on building leading industrial chains such as new energy intelligent connected vehicles and semiconductors, supporting major automotive parts projects like Germanys Bosen Company, Lianheng Industrial, Rikos, and Katusi for companies like Beijing Daimler-Benz, Xiaomi, and Li Auto. It also supports upstream product supply from semiconductor leaders like BOE, Zhonghuan, and JinkoSolar through enterprises like Boyu Semiconductor, Nanxuan, and Chuangyuda. Focusing on the industrialization of Beijings scientific and technological achievements, the Tech Town targets "chokepoint" technologies, introducing high-quality projects like Hozon Energy from laboratories to facilitate local conversion of research results from labs like Sinobio outside Beijing. To build platforms between the two cities, the Tech Town has established national-level metrology inspection and testing platforms, the Tianjin branch headquarters of Peking University Science Park, and the pilot base of Tsinghua Zijing Innovation Institute[4].

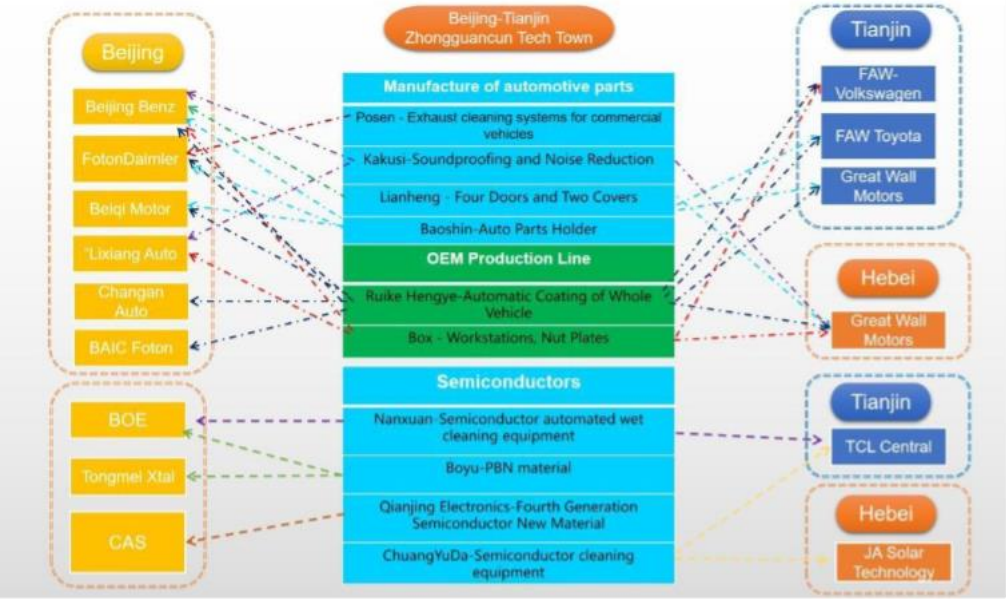

Figure 3Technology City Beijing-Tianjin-Hebei industrial chain coordination map

Innovative Ecosystem Construction: Focus on Building a "ZGC-like" Innovative Ecosystem. The Tech Town is accelerating the development of a "ZGC-like innovation and entrepreneurship ecosystem," with high-level planning for the construction of "ten service platforms." It has integrated all 203 service

packages from Beijings ZGC into the Tech Town "Top Ten Service Platforms." This integration provides comprehensive services in enterprise services, investment promotion, technology finance, human resources, and more, covering various aspects such as entrepreneurial consulting, management, business, market, and international cooperation. In conjunction with the Comprehensive Service Center, it aims to create an integrated platform featuring "centralized display, online platform sharing, package-style services, and regional development," meeting the full range of needs for enterprises in areas like innovation and entrepreneurship, intellectual property, application markets, financial services, technology transfer, talent cultivation, and university-enterprise collaboration.

Integration of Industry and City: In line with the standards for building international science and technology parks, we will advance hardware upgrades and optimize the soft environment. The Tech Town actively benchmarks against the ZGC standard, combining both hardware and software to create a high-quality urban environment conducive to business growth. In terms of soft environment recruitment, we advocate the concept that businesses should not only land but also take root, focusing on extending service chains, integrating resources, and building comprehensive development platforms around industry-academia-research collaboration, technology finance, innovation and entrepreneurship, human resources, and more. For the optimization of hardware environment facilities, we adhere to a people-oriented approach, benchmarking against the construction standards of "medium-sized cities," setting forward-looking urban functional positioning, and introducing matching educational, scientific, cultural, health, university, and research institute resources to form a virtuous cycle throughout the region.

III. CONCLUSIONS AND IMPLICATION

1.Research conclusions

This study confirms that science and technology parks can effectively promote industrial upgrading and innovation through multiple mechanisms such as complementary advantages, agglomeration effects, and integration of industry and city. The practice of science and technology cities provides a systematic solution for effectively addressing challenges in underdeveloped areas, including resource scarcity and backward industries, with the approach of "top-level design leadership—innovation empowerment—regional collaboration breakthrough—integration of industry and city upgrade."

2.Lessons learned

The successful experience of the Beijing-Tianjin ZGC ZGC Tech Town demonstrates that in the construction of science and technology parks in underdeveloped areas, emphasis should be placed on top-level design, innovation-driven development, industrial ecosystem building, and regional collaboration. Through government-enterprise cooperation, market-oriented operations, and resource integration, the science and technology city has effectively promoted regional economic transformation and upgrading, providing a replicable development path for other underdeveloped regions.

(1)Top-level design: scientific planning and long-termism

Scientific and rational top-level design will have a direct impact on the overall operational management level of the park in its later stages. In underdeveloped areas, it is essential to clarify the top-level design at the initial planning stage of science and technology parks, ensuring that the projects overall goals and direction are clear. This guarantees that subsequent project advancements can revolve around core objectives, avoiding deviations and errors during the construction and operation process of the park. Adhere to long-termism, ensuring "a single blueprint is followed through to the end."

(2) Regional cooperation: sharing benefits and complementing strengths

Regional cooperation is a crucial approach for underdeveloped areas to achieve leapfrog development. Through regional collaboration, both regions can fully leverage their comparative advantages, optimize resource allocation, and achieve mutual benefits and win-win outcomes. In the external cooperation between Beijings ZGC and its partner regions, the latter actively introduces high-end talent, original innovation, finance, and professional services from within Beijing to empower local enterprises. At the Beijing level, the partner regions can provide application scenarios and industrialization space for companies in Beijing. Both sides promote the optimal allocation of resources and overall competitiveness enhancement through innovative exchanges and resource sharing. Therefore, underdeveloped regions should be adept at collaborating with developed regions, establishing cooperative mechanisms, making full use of high-quality innovative resources from developed regions, combining them with regional resource endowments, and building new productive forces suited to local conditions. Ultimately, this will facilitate the transformation and upgrading of regional industries and achieve high-quality economic development.

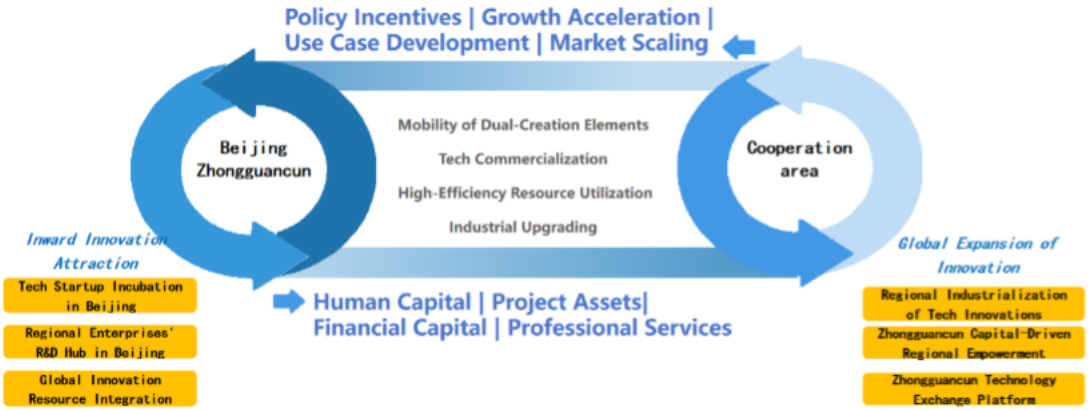

Figure 4 Cross-regional cooperation mechanism of ZGC

3. Development impetus: innovation-driven and loose environment

"The less developed the region, the more it needs to implement an innovation-driven development strategy." Throughout its construction and development, the Science City has consistently placed innovation at the core, keeping pace with the forefront of technology and market trends. It actively seeks innovative support policies, optimizes the innovation environment, activates innovation momentum, and empowers enterprises and talents through innovation, significantly enhancing the parks internal competitiveness. For less developed regions, it is even more important to strengthen innovation awareness, deepen cooperation among industry, academia, and research, build robust innovation platforms, create a favorable environment for scientific and technological innovation, and promote innovation to empower both the park and regional economic transformation and upgrading.

4. Industrial ecology: openness, inclusiveness and resource integration

The rapid development of ZGC in Beijing is largely attributed to the establishment of a favorable industrial ecosystem. All external cooperation projects in ZGC focus on building an "industrial ecosystem similar to ZGC," covering the entire lifecycle of enterprises from small to large and from good to strong. This not only enhances the appeal for companies to settle in the park but also provides solid support for their growth and development. For underdeveloped regions, constructing and optimizing an industrial ecosystem is crucial for promoting regional industrial upgrading and enhancing industrial competitiveness. Efforts should be made to build comprehensive services throughout the enterprises lifecycle, focusing on human resources, technology finance, brand promotion, and carrier maintenance, thereby strengthening the attraction for companies to take root and thrive.

5. Integration of industry and city: people-oriented and sustainable development

The integration of industry and city is the core development trend for Tech Town in the future. Since its establishment, Tech Town has always adhered to the philosophy of "gathering people through industries, promoting people through industries, and integrating industry with city," insisting on the logic of "industry, city, people, scenery, and culture" in urban development. It firmly advances on the path of dual integration between industrial layout and urban planning. The concept of integrated development of industry and city in Tech Town not only injects a continuous flow of talent into the parks technological innovation but also provides solid support for Baodi District to build a livable, workable, business-friendly, and tourist-attractive city, promoting economic transformation and enhancing urban competitiveness. For underdeveloped regions, it is essential to gradually add composite urban functions to the initial single industrial function, entering science parks to create a virtuous cycle of industry, population, and urbanization levels, thereby achieving sustained high-quality development.