

RESEARCH ARTICLE

The Evolution of China's High-tech Zones and the Guiding Philosophy of the Developmental State

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Abstract

The Chinese economy is undergoing a transition from a development stage that relies on labor and resource advantages to a new development stage driven by technology and innovation. As a developmental state, the Chinese government is constantly changing its industrial policy concepts and tools while promoting the development of high-tech industries. The transformation of the Chinese government's development thinking has been well reflected in the development of high-tech zones at different stages. The heterogeneity of industrial policies in different periods has effectively promoted the evolution of high-tech zones from traditional industrial parks that provide infrastructure and industrial space to functional technology parks with high-tech enterprises, technology incubators and technology innovation platforms.

Keywords: Developmental state • Industrial policy • Economic structural transition • National high-tech zones • Innovation

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Since the reform and opening up program kicked off in 1978, the Chinese economy has maintained a high growth rate for more than four decades, which has led to a noticeable fast-growing economic aggregate. The capital, technological and experience accumulated at China's early stage of industrialization, when the labor-intensive light industries were fueled by China's endowment and comparative advantage, have served as fundamentals for the industrial transformation and upgrading and the development of high-tech industries in China (Lin et al., 1994; Wen, 2016). However, with diminishing demographic dividend, tightened environmental constraints, and rising labor and land costs, the investment-intensive, high-consuming, and high-polluting economic development featured by low quality, and low efficiency is unsustainable for China. In the face of increasingly unbalanced and inadequate development, it is imperative for China to shift growth drivers and transform the old growth mode. Since the beginning of the 21st century, new technologies, new industries, and new business forms have emerged, triggering major changes in line with the "techno-economic paradigm" (Perez, 1988). The Fourth Industrial Revolution led by new technologies such as artificial intelligence, genetic engineering, and quantum technology has made the global competition for high-tech and high-caliber talent increasingly intensive, as they are a catalyst for new technologies, new business forms, and new industries.

Upgrading the industrial structure is a critical way to transform economic development mode. Some middle-income countries that failed to transform and upgrade their industries have suffered from stagnation and fell into the "middle-income trap" (Gill & Kharas, 2007). So, the Chinese government decided to leverage its latecomer advantage to avoid the middle-income trap and achieve long-term sustainable development during the Fourth Industrial Revolution era. Transforming economic growth drivers based on the innovation-driven development strategy is an important means to make it happen. In recent years, giving priority to science, technology, and innovation as the primary boost at the new development stage, the Chinese government has been adopting a package of measures to promote the development of high-tech industries and move up the industries along the value chain so that China can transform its growth mode.

The focus of the debate on whether the Chinese government is a "developmental state" is whether the industrial policy formulated by the government has played a positive role (Gao, 2018; Lin & Chang, 2009). From a dynamic development perspective, when China shifted from a labor-intensive economy to a technology-intensive one, how did the development-oriented Chinese government generate an innovation-driven new development mode? Furthermore, when the government's development philosophy changed, what specific changes did the Chinese government make to its industrial policy tools? Analysis of these issues is relatively rare in the existing literature.

The Chinese government values a gradualistic approach and stresses seeking changes while maintaining stability. It usually tests new policies on a pilot basis before rolling them out nationwide. National High-tech Industrial Development Zones (Hi-tech Zones, HTZs) is an attempt by the Chinese government to reform the science and technology system and a pilot scheme to promote innovation-focused hi-tech industries. The Chinese government's approach toward high-tech zones at different development stages and its understanding of the changing role of high-tech zones reflect its reorientation of development strategy and concept.

Therefore, this paper samples national high-tech zones to analyze the differences in the development patterns of high-tech zones at different development stages and to explore how the changes in the Chinese government's industrial policy affects the HTZ development path. Part 2 of the paper explains the characteristics of the changes in China's industrial policy and theoretical basis for the changes. Part 3 proposes that establishing high-tech zones to develop emerging industries has become an important policy tool for the government as China's industrial development philosophy changes over time. Part 4 divides the HTZ development into three stages and analyzes the features and differences of each stage through comparison to identify the policy factors affecting these differences. Part 5 is a summary of the paper.

The Theoretical Basis for the Changes in China's Industrial Development Strategy

As the economic development stage changes, China transforms its design ideas, objectives, and industrial policy instruments (Jiang & Li, 2018). In the early stage of development, the main objectives of China's industrial policy were to support the leading industries and protect the infant industries; measures include setting import tariffs and quotas, reducing taxes on domestic products, and providing industrial land and infrastructure facilities to create favorable conditions for target industries. The leading industries at this stage are usually those that have lost their comparative advantage in developed countries or those that are already well developed. The government usually offered subsidies for introducing core technology and equipment for the target industries. The subsidies were instruments to incentivize them to leverage the "latecomer advantage" so as to achieve surging growth within a short period of time.

China's expanding industrial scales have been closing the gap with developed countries in terms of industrial strength. The high-tech industries competing with those in developed countries have become China's target industries too. Chinese enterprises are projecting increasing demands for state-of-the-art technology, which cannot be obtained by imitation. So, "endogenous innovation" becomes critical for China's high-tech industries to achieve sustained development. China needs to maintain

competitiveness in the global playing field through innovation. At this development stage, China's industrial development strategy and policy instruments have also begun to shift from leveraging the comparative advantage to creating incentives and favorable conditions for technological R&D and institutional innovation.

At the beginning of reform and opening-up, China's industrial development strategy was mainly influenced by Neoclassical Economics, and the industrial policy was produced to correct the "Market Failure". Since China initiated the innovation-driven development strategy in the 21st century, the Neo-Schumpeterian Economics that highlights the fundamental role of knowledge and technology on economic development has begun to exert its impact on China's industrial development (Liu et al., 2017).

The prominent difference between Neo-Schumpeterian and Neoclassical Economics lies in their interpretations of technological progress in economic growth. Neoclassical theory argues that economic growth results from increased levels of savings and investment caused by exogenous technological progress (Solow, 1956). A decrease in government intervention in the economy will lead to an increase in supply, and thus the economic growth will naturally settle into equilibrium. Neo-Schumpeterian Economics, on the other hand, does not regard technological progress as an exogenous variable of economic growth; instead, it regards technological innovation as an endogenous and determinant factor that drives economic growth. Notably, Romer (1986) suggests that economic output is not only dependent on the input of traditional factors such as capital and labor, but also on the accumulation of knowledge. Therefore, the incremental returns on the accumulation of knowledge can offset the diminishing returns on the accumulation of factors, making endogenous economic growth possible. This is another solid proof that the neoclassical growth model is inadequate in explaining the long-run trend of economic growth. After Romer (1986), Neo-Schumpeterian Economics characterized by "endogenous growth theory" began to refine the Neoclassical Economics (Grossman & Helpman, 1991; Romer, 1990). The core idea is to endogenously include education, research and development, and innovation into the growth model. The neo-Schumpeterian theory of growth refutes that economic growth is an equilibrium continuum. Instead, it defines that the economic growth breaks down existing economic relations, which is a "creative destruction" (Aghion & Howitt, 1992).

Another important difference between Neoclassical Economics and Neo-Schumpeterian Economics lies in their perception of the role of government. With extremely high costs and risks of R&D, and externalities of technology diffusion, R&D may produce much more benefits to the community than to the individuals. Therefore, market-driven R&D investment will be significantly insufficient. The neoclassical theory overemphasizes the role of the free market, and thus, to some extent, ignores the role of the government

in the intervention. However, the neo-Schumpeterian growth theory argues that the government should intervene in the economy when necessary (Freeman, 1989), especially when it comes to protecting intellectual property rights (IPRs) and establishing a patent system, subsidizing R&D for industrial innovation, and organizing, mobilizing and coordinating projects that are jointly implemented by the government, the enterprise, the research institution, and/or the institution of higher education. This also provides the theoretical basis for the Chinese government to enact support policies for high-tech industries in designated sectors.

HTZs: A Policy Tool for Piloting the Development Strategy of High-Tech Industries

In order to provide R&D subsidies, tax exemption and reduction, and lower-cost facilities for high-tech industries, the Chinese government has built HTZs to take advantage of the industrial agglomeration effect. It is an important policy tool for the Chinese government to develop high-tech industries.

Theories supporting the industrial park development originate from Weber's (1909) a least cost theory of industrial location. According to this theory, to reduce transportation costs of raw materials and labor costs, industrial enterprises tend to seek spatial clustering in a premium location. As the industry thrives in the area, firms of the same industry or related industries will relocate close to that area to access the existing infrastructure, machinery and equipment, and so on. Thus, a mutually beneficial symbiotic industrial organization is formed, resulting in the industrial agglomeration effect, as well as increasing productivity and returns to scale (Krugman, 1991; Marshall, 1891). Since the 20th century, many countries have been developing industrial parks. The park can amplify the functions of an industrial cluster. In building a park, the government can provide certain public goods, such as public transportation, sewage treatment, water, and electricity access, so that the resident firms can save these costs. For developing countries, industrial parks are designed for another important function: using limited funds to create an enabling business environment to attract foreign capital together with advanced technology to boost the regional economy.

High-tech industries are less dependent on land and natural resources than traditional industries, but generally have higher requirements for high-quality human capital, easy access to knowledge, and an enabling environment for innovation and entrepreneurship. Therefore, the favorable conditions provided by HTZs are distinct from those provided by traditional industrial development zones. For example, HTZs are meant to accelerate regional "industry-university-research" cooperation to form a multifaceted, and sophisticated interaction network between different institutions and organizations such as enterprises, research institutions, universities, intermediary

service agencies, and financial institutions. In terms of location, HTZs need to be built close to universities, research institutes, and other intellectual resources-intensive areas to pool human resources. In terms of infrastructure, HTZs should achieve intensive use of their building space to provide startups with functional areas for industrial incubation, technology transfer, achievement exchange, and more, as well as livable environment with convenient communication networks. In terms of the institutional environment, HTZs need to establish a series of laws and regulations that facilitate the transformation of S&T achievements, protect IPRs, and encourage venture capital. Therefore, HTZs only work when a certain level of economic development has been achieved.

Development Stages and Policy Factors of China's HTZs

China's national HTZs are set up for the purpose of developing high technologies in designated areas. As comprehensive vehicles based on intensive intellectual resources and technologies with an open environment, HTZs equipped with various preferential policies and reform measures optimize the soft and hard environment for the development of high-tech industries in designated areas. The HTZ system is a great achievement of China in reforming the economic, scientific, and technological systems. The official mission of HTZs is "developing high technology to realize industrialization"¹. However, since HTZs are built at different stages of China's economic development, their objectives and functions may vary. With the transformation of the national development strategy, HTZs have been evolving from economic and technological development zone (ETDZ)-featured traditional industrial parks to functional S&T parks powered by high-tech enterprises, tech incubators, and tech-innovation platforms. Generally, the development of national HTZs can be divided into three stages, also known as "the Three Stages". The evolution of the three stages demonstrates that the development of China's high-tech industries has shifted its focus from factor accumulation-powered industrialization to state-of-the-art technology-driven innovation.

The rest of the section will analyze the characteristics of industrial parks at different stages in terms of the form, industrial structure, characteristics of industrial technology, and industry-university-research cooperation modality. The impact of the government's understandings and policy measures on the development of HTZs and hi-tech industries will be analyzed based on the major measures and policies HTZs adopted at different development stages.

1 On April 23, 1991, Deng Xiaoping inscribed for the Work Conference of the "863 program" held by the State Science and Technology Commission and the Work Conference of the High Technology Industry Development Zones "developing high technology to realize industrialization." This inscription also became the purpose of the industrial development of HTZs.

“The First Stage”: (1991-2000)

The first HTZ in China was the Beijing High Technology Industrial Development Pilot Zone (predecessor of the Zhongguancun Science and Technology Park) established in 1988. The predecessor of the first HTZ is the “Zhongguancun Electronics Street” in the early 1980s, the eve of China’s reform and opening-up program applying nationwide. At that time, the country’s industrial foundation was rather weak and high-tech industries were virtually non-existing. Since 1988, provinces and cities across the country have followed the suit of Zhongguancun and established HTZs tailored for regional characteristics and conditions. In 1991, the State Council issued the Notice of the State Council Concerning the Approval of the National Development Zones for High Technology Industries and Relevant Policies and Provisions. The first 26 state-level HTZs were approved along with the Notice. In 1992, 25 more HTZs were approved. From the first in 1988 to Shaanxi Yangling Agricultural High-tech Industry Demonstration Zone set up in 1997, the State Council altogether approved 53 HTZs in total in the First Stage (see Figure 1), opening the curtain on the large-scale development of national HTZs.

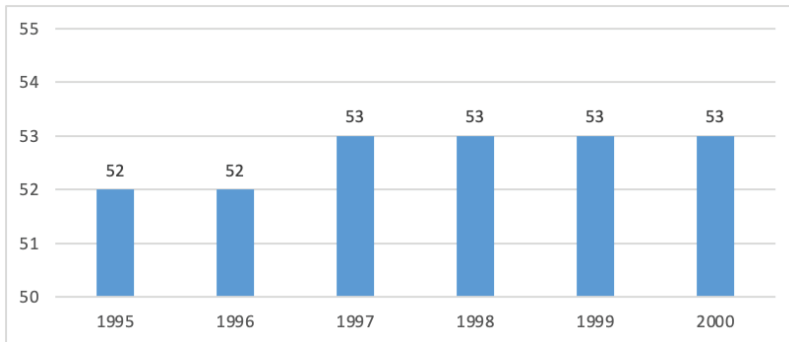


Figure 1. National HTZs in “the First Stage.”

Based on the analysis of the major characteristics of this development stage, HTZs are basically in the “budding” stage. Extensive development is the main pattern of development, whose major purpose is to build up the basic support for industrial development. Most HTZs “put industrialization first”, i.e., they gathered production factors swiftly by introducing industrial enterprises. Most HTZs in coastal areas have undertaken massive global industrial transfer to develop processing manufacturing, textile, automobile manufacturing, electronics manufacturing, and other industries. They provided sound infrastructure, such as “five accesses and one leveling” (i.e. accesses to water, electricity, transport, communication, ventilation, and land leveling). Generally speaking, at this stage, HTZs were manifested as “industrial parks” or industrial agglomerations. The total industrial output value of HTZs registered a sustained and rapid growth. In 2000, the 53 HTZs generated nearly 800 billion yuan

(120.85 billion USD) industrial output value (Figure 2). Therefore, both the nature and form of HTZs at this stage were industrial park-featured.

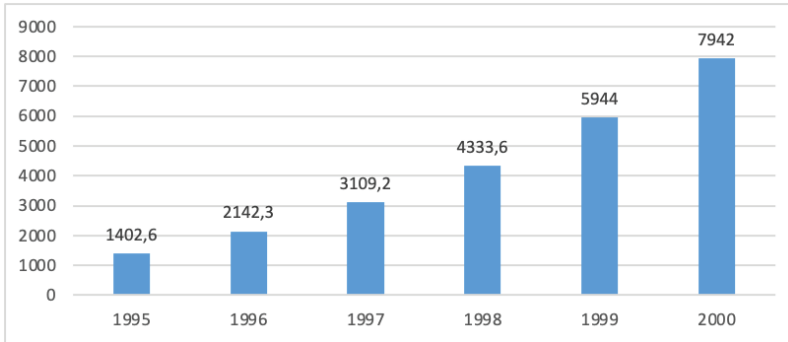


Figure 2. Total industrial output value in “the First Stage” (100 million yuan).

The Focus of the HTZ Development Policies in “The First Stage”: Piloting Policies and Building Sound Infrastructure to Create Industrial Development Prospect

In 1982, the Chinese Government put forth the strategic guideline that “economic development must rely on science and technology, and science and technology work must be oriented toward economic development”. In March 1985, The Decision of the CPC Central Committee on the Reform of the Science and Technology System was promulgated, which formally kicked off the system reform program. According to the requirements on economic development proposed at the 13th CPC National Congress and Plans on Industrial Development made by the CPC Central Committee, the State Science and Technology Commission (SSTC), the predecessor of the Ministry of Science and Technology (MoST), began to implement the “Torch Program” in July 1988. To ensure the success of the State Council-approved HTZs in Beijing and other regions was written in the “Torch Program” (1988-1990). Furthermore, coastal regions and human resource-intensive hinterland cities were encouraged to establish pilot HTZs according to their respective conditions and to create an enabling environment for technological and industrial growth. In 1991, the SSTC and the State Taxation Administration issued the Interim Provisions on Certain Policies Concerning National High Technology Zones and the Regulations on the Tax Policy for the National High-Tech Industries Parks respectively, rendering legislative teeth to the preferential policies of HTZs, especially in taxation, credit, and land.

With the improvement of China-US relations in the 1980s, the US and Europe eased controls on technology export to China, so the local governments in China introduced many sets of foreign industrial equipment. In addition to the earliest “Shenzhen Science

and Technology Industrial Park” and “Beijing Zhongguancun Electronics Street”, Beijing, Shanghai, Wuhan, Nanjing, Tianjin, Guangzhou, Lanzhou, Xi’an, Shenyang, Changsha, and Guilin were all working on making overall plans and preferential policies for HTZs. They raised funds and selected special projects in line with their respective comparative advantage.

In terms of the first-stage HTZ development, constrained by the economic development at that time, the focus was on the allocation of production factors. The government’s main policy measures include: first, providing “five accesses and one leveling”, and other production conditions; second, vigorously attracting investment with preferential policies, such as tax holidays and land transfer. Besides, following the experience of the Beijing High Technology Industrial Development Pilot Zone, the local governments granted certain autonomy to the HTZs under their administration. With streamlined procedures for project approval, business registration, and HTZ settlement, the delegation improved administration efficiency and service. As a result, at the initial stage, HTZs, with preferential policies and institutional mechanisms, have gathered a large number of production factors in a short time. However, due to the lack of attention to the selection of high-tech industries, the HTZs were basically a gathering of traditional industries.

Table 1
Features of HTZ Development Forms and Policy Transmission Mechanism in “the First Stage”

Time	1991—2000
Features	
Industrial Structure	No leading industries. Most industries are machinery manufacturing, auto parts manufacturing, electronics manufacturing, etc.
Technology Features	Undertaking overseas industrial transfer with a low technology level
Industry-University-Research Cooperation	Basically, no close cooperation
Layout and Form	A separate area designated by the government with an industrial park-featured form
Industrial policy orientation	
Major Objectives	HTZ-led regional economic development
Policy Focus	Attracting foreign investment to expand industrial scale
Major Measures	Preferential policies in taxation, land, and credit, government subsidies, provision of “five accesses and one leveling”
Guiding Policies	<i>Notice of the State Council Concerning the Approval of the National Development Zones for High Technology Industries and Relevant Policies and Provisions</i> (1991), <i>Regulations on the Tax Policy for the National New and High Technology Industries Parks</i> (1991), <i>Circular of the State Science and Technology Commission on Strictly Controlling the Adjustment of the Planned Area of the National New and High Technology Industries Parks</i> (1997), <i>Guiding Opinions on Promoting the Exports of High-tech Products</i> (1999)

“The Second Stage”: (2001—2010)

In the 21st century, along with the acceleration of China’s reform and opening up, the first national HTZs have gained strong industrial and economic strength. However, as a rising economy, China has put forward higher requirements for HTZs. “The First Stage” overemphasized attracting investment and clustering industrial enterprises and failed to fully materialize the original purpose of integrating science and technology into the economy, technology transfer, transformation of technological achievements, and endogenous and intensive development of HTZs. As a result, most high-tech industries in the HTZs stayed at the low end of the value chain, i.e. in the processing and manufacturing sectors.

In 2001, based on the latest status of HTZs, MoST proposed to adjust the development goals. At a symposium participated by mayors of the cities where national HTZs were located, Minister Xu Guanhua suggested that restrained by limited industrial space and diminishing returns, the extensive development of HTZs in “the First Stage” was held back, and that “the Second Stage” should be based on endogenous growth and development-oriented rather than survival-oriented. In November 2002, MoST issued the Decision of the Ministry of Science and Technology on Further Supporting the National Development Zones to support HTZs to engage in “the Second Stage”.

At this stage, the role of science and technology in development were better reflected in HTZs. Available approaches include introducing R&D institutions as well as S&T and educational resources to create a knowledge-rich atmosphere, establish innovation platforms, promote the transformation of scientific and technological achievements, and build incubators. As shown in Figure 3 and 4, the increase in tech company incubators, Productivity Promotion Centers, and other entrepreneurship and technology service institutions based in HTZs at the second stage present a steeper upward curve than it was at the first stage. This also shows that HTZs in China have embarked on the journey toward “science and technology parks”, consistent with its original orientation.

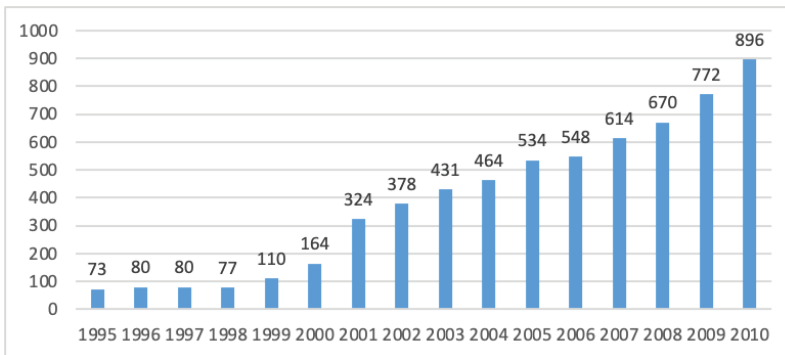


Figure 3. The number of tech company incubators in HTZs.

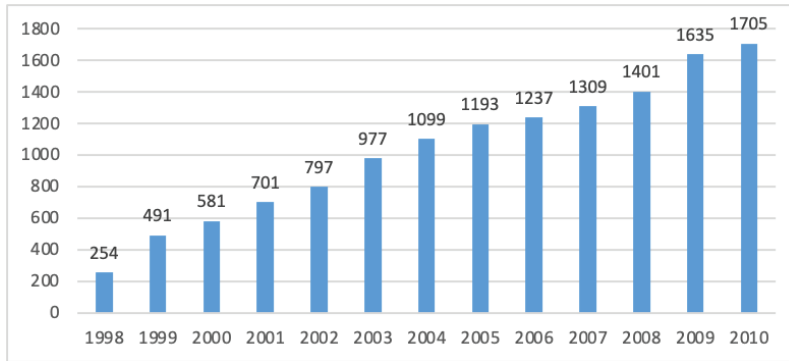


Figure 4. The number of Productivity Promotion Centers in HTZs.

Since the major goal of “the Second Stage” of HTZs was to promote value chain upgrading and technological transformation. The development of the leading industries focused on undertaking the transfer of overseas well-developed technologies and to absorb them. Transformation and upgrading of traditional industries, electronic information industry, computer manufacturing, and Internet industry were the leading industries in most HTZs. On the whole, the HTZs were a mix of a science and technology park and an industrial park.

The Focus of the HTZ Development Policy in “the Second Stage”: Promoting S&T Transformation for Technology Absorption and Building Platforms for Industry-University-Research Cooperation to Develop the Technological Service Sector

Since China’s accession to the WTO in 2001, the international trade environment has undergone profound changes, which, to a large extent, promoted the introduction of foreign capital and technologies to China. Meanwhile, HTZs quickly accumulated capital, technologies, and human resources. The role of enterprises as major innovation players has been increasingly prominent, and they have developed their technological strength and capacity to absorb technologies.

At this stage, under the influence of Neo-Schumpeterian Economics, the Chinese government began to refocus its development strategy. In 2005, the State Council put forward a “Four-Pronged Overall Plan”² for the development of national HTZs. MoST introduced “Transformations on Five Fronts” to “the Second Stage”, namely, the transformation from a factor (e.g. resource, capital, etc.)-intensive growth mode to

2 During his visit to Zhongguancun Science and Technology Park in June 2005, the then Premier Wen Jiabao stated that the National HTZ should leverage its advantages as an important base for high-tech industrialization, and strive to become a major vehicle for promoting technological progress and enhancing endogenous innovation, a powerful engine for driving restructuring and transformation of regional economic growth patterns, a service platform for high-tech enterprises to go global and participate in international competition, and a frontline for seizing the high ground of the world’s high-tech industry.

one that is driven by technological innovation, the transformation from a preferential policy and investment introduction-driven mode to one that focuses on optimizing the innovation and entrepreneurial environment and fostering endogenous driving force, the transformation from a homogeneous industrial development mode to the one focuses on the development of specialty and leading industries, the transformation from hard environment-focused construction to soft environment-focused development which facilitates the optimal allocation of scientific and technological resources for quality service, the transformation from a domestic market-oriented mode that champions “bringing in” to an international market-oriented mode that integrates “bringing in” and “going global”.

Insufficient innovative factors constrained the regional economy, so a major mission of the national HTZ was to take a lead in building a stronger innovation capacity for the region. Therefore, at this stage, a number of policies were rolled out in HTZs to build technological business incubators and R&D centers, promote industry-university-research cooperation programs, and establish industrial alliances. To introduce industries into HTZs, more attention was paid to the planning of leading industries and the implementation of the planning. More research institutes and HTZ-based enterprises began to cooperate for technological achievements transformation. And more HTZs began to understand the significance of a science and technology park.

Table 2
Features of HTZ Development Forms and Policy Transmission Mechanism in “the Second Stage”

Time	2001—2010
Features	
Industrial structure	Electronic information industry, computer manufacturing, and Internet industry
Technology features	Introducing international technologies for further absorption. Most industries focus on low value-added manufacturing
Industry-University-Research cooperation	Sporadic and less close cooperation
Layout and form	As some parks begin to merge and expand, a pattern of “multiple parks in one zone” is established, which is a mix of a science and technology park and an industrial park
Industrial policy orientation	
Major objective	HTZ-led industrial technology innovation
Policy focus	Promoting the introduction and transformation of technologies to build industrial clusters
Major measures	Cultivating hi-tech businesses based on incubators, encouraging S&T intermediary service, granting subsidies and awards for technological introduction, and planning leading industries
Guiding policies	<i>Guiding Opinions on Piloting Equity Incentives for State-owned High-tech Enterprises (2002), Decision of the Ministry of Science and Technology on Further Supporting the National Development Zones for New and High Technology Industries (2002), Action Plan for the Eleventh Five-Year Plan to Build National High-tech Industry and Environment (Torch Program) (2007), Measures for the Administration of the Accreditation of High-Tech Enterprises (2008)</i>

“The Third Stage”: (2011-Now)

Since 2011, national HTZs have entered the third stage, i.e. “the Third Stage”. This period has witnessed significant changes in the international and domestic environment. First, China has become the second largest economy in the world with an urgent need to build its economic strength rather than simply build its size. Second, after 20 years of development, more national HTZs have been approved with a much larger size in terms of both output and area. It is their mission to achieve innovation-driven development. Since the 18th CPC National Congress, innovation has become a top priority of the Five Development Concepts with changing nature and scope.

At this stage, more national HTZs have been approved (as shown in Figure 5), and the number reached 169 in 2018. HTZs are no longer local experiments but applied nationwide and playing a bigger role in leading economic growth and transformation. In terms of leading industries, most HTZs have been moving from traditional secondary industries to strategic emerging industries and high-end service industries, with focuses on next-generation information technology, biomedicine, artificial intelligence, integrated circuits, and other industries. As a result, this stage has seen more high-tech enterprises with stronger value creation ability compared with the second stage (see Figure 6 and 7).

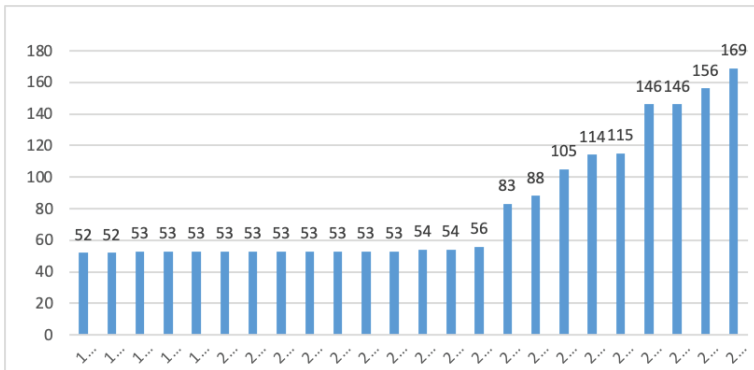


Figure 5. The number of national HTZs in “the Second Stage” and “the Third Stage.”

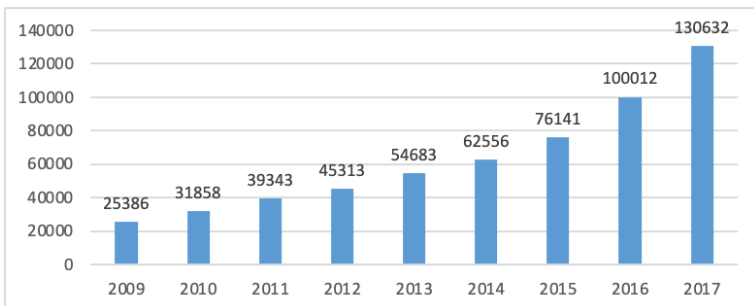


Figure 6. The number of enterprises in national HTZs.

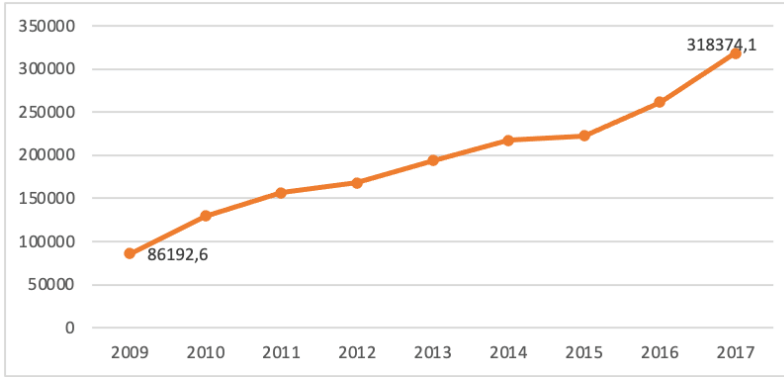


Figure 7. Revenue of hi-tech enterprises (100 million yuan).

With all these changes, national HTZs have entered a “comprehensive innovation” stage. To achieve comprehensive innovation, HTZs should leverage every innovation-conducive factor and stay committed to creating an enabling environment for endogenous innovation. This has geared HTZs toward building “an innovation ecosystem” for comprehensive development. Also, as the city-industry integrated development in major HTZs becomes mainstream and creates a new form of towns, they are more and more “innovation economy”-featured and -structured (Wang, 2017).

The Focus of the HTZ Development Policies of “The Third Stage”: Improving the Innovation Environment and Encouraging Endogenous R&D to Further the Institutional Reform

In 2012, the 18th CPC National Congress initiated the innovation-driven development strategy and highlighted that S&T innovation is a strategic support for social productivity and comprehensive national power (CNP) and must occupy a central place in China’s development plan. In 2013, the Third Plenary Session of the 18th CPC Central Committee adopted the “Decision of the Central Committee of the CPC on Some Major Issues Concerning Comprehensively Deepening the Reform” and laid out the goal to promote the integrated industry-city development. In 2015, Opinions of the Central Committee of the CPC and the State Council on Deepening the Institutional Reform to Accelerate the Implementation of Innovation-driven Development Strategy and Plan for the Implementation of Deepening the Science and Technology System Reform was issued. The 19th CPC National Congress mapped out the ambition of building an innovative country and a global powerhouse in science and technology and established the vision of high-quality development. The Chinese government has made a series of shifts in strategic thinking at this new stage, which reflects China’s understanding and application of the theory that proposes intensive growth driven by

technological innovation. By strengthening innovation in technology, industry, and system in HTZs, the Central government hopes to create regional innovation demonstration zones. In addition, it will keep optimizing the layout of national endogenous innovation demonstration zones to develop high technology and nurturing new industries.

Since HTZ serves as the core vehicle for innovation-driven development strategy, national HTZ is the best manifestation of China's integration of science and technology with the economy. Undoubtedly, it should be defined as the most important strategic force for China's high-tech industry and a leading force to achieve science and innovation-oriented sustainable development. At this stage, all governments administering HTZs have set how to build regional innovation models as their primary development goal, with specific initiatives including widening access to global high-end innovation factors to attract high-caliber talent; encouraging R&D by rewarding endogenous innovation; building SME incubations; promoting reform of institutional mechanisms for innovation; and establishing business-friendly and livable city-industry integration zones.

These initiatives also reflect that the Chinese government has transformed its development philosophy in four aspects. First, it aimed to shift its growth drivers from being resource-labor intensive to innovation-intensive. HTZs have become more aware of the importance of endogenous innovation, more active to nurture new growth drivers, broad new prospects for development, and promote S&T-focused comprehensive innovation. Second, it focuses on improving the supply system for a sound industrial system. It also accelerates the development of cutting-edge emerging technologies such as big data and artificial intelligence for deeper integration with the real economy. Third, it aims to eliminate the dichotomy between scientific and technological development and economic development and helps enterprises shake off institutional mechanism constraints on innovation. It encourages enterprises to cooperate with research institutes to build an "innovation complex" that integrates R&D, production, financing, and mode reform. Fourth, it extends park management to social governance, ecological governance, and protection of people's rights and wellbeing.

Table 3
Features of HTZ Development and Policy Transmission Mechanism in “the Third Stage”

Time	2001—2010
Features	
Industrial structure	Next-generation information technology, biomedicine, artificial intelligence, integrated circuits, etc.
Technology features	Promoting endogenous technological innovation and gradually enhancing the endogenous industrial innovation capability
Industry-University-Research cooperation	A close-knit innovation community
Layout and form	Well-developed parks demonstrate an industry-city integration, generating cross-regional growth and creating an innovation complex
Industrial policy orientation	
Major objectives	Building a regional innovation model
Policy focus	Improving the innovation system environment, motivating entrepreneurial innovation, and reforming institutions and mechanisms
Major measures	Building the international innovation platform for international talent introduction, developing venture capital funds to support the construction of new R&D institutions, and improving urban environment
Guiding policies	<i>Notice on Issuing the Guidance on Further Strengthening the Torch Program to Promote High-tech Industrialization (2011), Opinions on Deepening the Reform of the Scientific and Technological System and Speeding up the Building of a National Innovation System (2013), Opinions of the General Office of the State Council on Strengthening the Dominant Position of Enterprise Technological Innovation to Comprehensively Improve Innovation Capabilities of Enterprises (2013) Opinions of the State Council on Several Policies Measures for Vigorously Advancing Entrepreneurship and Innovation (2015), Notice by the Ministry of Science and Technology of Issuing the Guiding Opinions on Promoting the Development of New Types of Research and Development Institutions (2019), Notice of the Ministry of Science and Technology on Issuing Some Policy Measures for Supporting Small and Medium-Sized Tech Companies in Innovative Development in the New Era (2019), Guiding Opinions of the General Office of the State Council on Supporting State-level New Areas in Deepening Reform and Innovation and Accelerating High-quality Development (2019), Opinions of the State Council on Promoting High-quality Development of National High-tech Industrial Development Zones (2020)</i>

Conclusion

In summary, in the four decades of the reform and opening up, the Chinese government has demonstrated a distinctive pragmatic approach in promoting industrial development. In the early stage of reform, it made full use of neoclassical economic ideas and vigorously attracted foreign investment and industrial technologies with its opening-up policy to compensate for market failures and to provide sufficient space for industrial development in line with its comparative advantage. In the process of capital accumulation and economic transition, it gradually recognized the key role of the industrial core technology in modern economic development, drew on the neo-Schumpeterian growth theory, and put it into practice extensively. For example, it promoted endogenous research and development and industry-university-research

cooperation, attached importance to the introduction and training of talent, encouraged the development of emerging industries and industrial transformation and upgrading, laying a theoretical foundation for innovation-driven development.

The transformation of the Chinese government's development philosophy has been well reflected in different HTZ development stages. As a developmental state, the Chinese government whose industrial development philosophy has evolved can offer special reference value for other developing countries. Different development stages also adopted different industrial policy tools. At the first stage, by making full use of the comparative advantage and the latecomer advantage, HTZs in China focused on labor-intensive industries as the leading industries, and accumulation of capital by attracting foreign investment and expanding industrial scale. The government provided facilitating conditions for industrial development by granting preferential policies in taxation, land, and credit as well as subsidies to a large extent, and also by improving infrastructure and investment environment. In the second stage, the scope of opening up is expanded to especially encourage the introduction, imitation, digestion, and absorption of technologies. With the support of technology transfer intermediaries and achievement transformation platforms, the government cultivated the technology application capacity of enterprises and guided industrial development with planning by offering subsidies and incentives for technology introduction. In the third stage, the strength of endogenous innovation has been improved, especially in the sectors with frog-leaping opportunities, to create scenarios and markets for industrial development. In the field of source technology, which requires long-term research, platforms for endogenous technological innovation have been built. Human and financial investment in basic research and development have been continuously strengthened through the introduction of overseas high-caliber talent and venture capital funds. Government supports establishing market-oriented new R&D institutions jointly by scientific research institutions and enterprises, to break down barriers to the transformation of achievements, make up for shortcomings in the industrial chain, and continuously promote industrial transformation and upgrading.

It should be noted that at each stage of transition, the effective implementation of development concepts depends on the timely formulation of reasonable industrial development policies. To bridge the gap between policies and implementation and address the conflicts between the two, policymakers and executing agencies need to unify their thinking and strengthen coordination in the design and testing of new policies, which may be another reason why the HTZ, as a pilot area, can better reflect the government's philosophy on transformation.

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