

---

AI translation · View original & related papers at  
[chinaxiv.org/items/chinaxiv-202405.00196](https://chinaxiv.org/items/chinaxiv-202405.00196)

---

## Developing a Screening System for Regional Strategic Emerging Industries Oriented toward Major Scientific and Technological Infrastructures: Structural Framework and Practical Considerations (Postprint)

**Authors:** Zhang Lingling, Huang Congli, Zhou Feite, Xu Xiang, Liu Long

**Date:** 2024-05-18T00:00:00+00:00

### Abstract

In the context of a new round of technological revolution and industrial transformation, considering multiple factors such as regional resources and industrial foundations, oriented toward the 14th Five-Year industrial development plan and actual social needs, the screening of strategic emerging industries suitable for prioritized regional development and the full leveraging of the scientific and technological innovation capabilities of major scientific and technological infrastructure have become important tasks for government industrial planning. From the perspectives of industrial economics and management, drawing on multiple classic theories of industry screening, this article constructs a regional strategic emerging industry screening system for major scientific and technological infrastructure based on Porter's Diamond Model, encompassing six dimensions: regional resource endowments, industrial upgrading potential, technological support capabilities, social demand conditions, government intervention intensity, and other related opportunities, with the aim of providing guiding recommendations and industry screening tools for governments and relevant departments.

### Full Text

#### Abstract

Under the circumstances of a new wave of scientific and technological revolution and industrial transformation, it has become imperative for government industrial planning to effectively integrate regional resources with scientific and technological innovation capabilities, identify suitable regional strategic emerging industries, and establish clear directions for industrial development. Draw-

ing on various classical theories of industrial selection from the perspectives of industrial economics and management, this research comprehensively considers six dimensions: technical support capacity of facilities, potential for industrial upgrading, regional resource endowment, social demands, government intervention, and opportunities. Based on the Porter Diamond Model, a robust system is developed to select leading industries under major science and technology infrastructures. This research hopefully provides valuable guidance suggestions as well as industry selection tools for governmental authorities and relevant agencies.

**Keywords:** major scientific and technological infrastructure, strategic emerging industry, industry selection

## **1. The New Wave of Scientific and Technological Revolution and Industrial Transformation Urgently Requires a Selection System for Industries Oriented Toward Major Scientific and Technological Infrastructure**

### **1.1 Concept and Evolution of Strategic Emerging Industries**

Strategic emerging industries arise from major technological breakthroughs and emerging demands, characterized by intensive knowledge and technology, low resource consumption, tremendous potential, and significant comprehensive benefits, playing a crucial guiding role in economic and social development. In 2010, the State Council issued the “Decision on Accelerating the Cultivation and Development of Strategic Emerging Industries.” During the 12th Five-Year Plan period, seven strategic emerging industries were identified for development: new-generation information technology, biotechnology, high-end equipment manufacturing, new energy, new materials, new energy vehicles, and energy conservation and environmental protection. During the 13th Five-Year Plan period, the connotation of strategic emerging industries was further expanded to include digital creative industries in addition to the seven foundational sectors. The 14th Five-Year Plan emphasizes “focusing on seizing future industrial development opportunities, cultivating pilot and pillar industries, and promoting the integration, clustering, and ecological development of strategic emerging industries,” setting new and higher requirements for their development.

### **1.2 Strategic Emerging Industries as Key Drivers of High-Quality Regional Economic Development**

Strategic emerging industries represent new directions in technological revolution and industrial transformation, serving as critical pathways for cultivating regional growth drivers and building future competitive advantages. During the 13th Five-Year Plan period, these industries developed rapidly with expanding scale and steady breakthroughs in key technologies, becoming essential for forming new quality productive forces at the regional level. For instance, in

2023, Shenzhen's strategic emerging industries achieved an added value of 1.45 trillion yuan, representing an 8.8% growth rate and accounting for 41.9% of GDP—significantly exceeding the 6.2% growth rate of industrial output above designated size. These industries have become a vital engine for Shenzhen's economic development. During the 14th Five-Year Plan period, strategic emerging industries must further orient toward frontier technologies and emerging fields, seize new opportunities from the latest industrial and technological transformations, focus on new directions emerging from global industrial restructuring and layout adjustments, and boldly pioneer new industrial territories, explore new development drivers, and identify winning tracks.

### **1.3 Bottlenecks in Strategic Emerging Industry Development**

China's strategic emerging industries currently stand at a critical juncture of capturing commanding heights and achieving upward leaps, facing four major bottlenecks. First, insufficient original industrial innovation capability. China's overall level of investment in basic research remains relatively low compared to developed countries, with basic research capacity representing a noticeable weakness. The “bottleneck” problem of original innovation capability urgently requires breakthroughs to achieve “from zero to one” advances. Second, structural shortages of high-level technical talent. Strategic emerging industries feature intensive knowledge and technology, involving numerous cutting-edge advanced technologies. However, China has yet to establish a global talent absorption system for talent introduction, and the talent cultivation system fails to match industrial development needs. Third, long industrial cultivation cycles with substantial capital investment and market risks. Strategic emerging industry projects often involve high uncertainty and long capital return periods, making it difficult for government or a few leading enterprises alone to meet the industry's ballooning capital demands. Fourth, weak foundations for industrial chain collaborative development. Leading enterprises have not effectively guided upstream and downstream firms to form complementary cluster development patterns, while small and medium-sized enterprises remain limited in scale and competitiveness.

### **1.4 Major Scientific and Technological Infrastructure as Critical Support for Key Technology Breakthroughs**

New quality productive forces are primarily driven by scientific and technological innovation, for which major scientific and technological infrastructure serves as the leading platform and support. The Central Economic Work Conference in December 2023 proposed “using scientific and technological innovation to drive industrial innovation, particularly using disruptive and frontier technologies to spawn new industries, new models, and new drivers, thereby developing new quality productive forces.” As crucial support for revolutionary breakthroughs at scientific frontiers, major scientific and technological infrastructure can effectively strengthen basic research, attract high-level domestic and international

talent, and gather and lead the common development of emerging industries, playing a vital supporting role in key technology breakthroughs for strategic emerging industries. For example, Dongguan' s 14th Five-Year Plan prioritizes the development of the biomedicine industry, fully leveraging the agglomeration effect of the Spallation Neutron Source on the biomedical sector. By 2022, the Songshan Lake Biomedicine Industry Base had concentrated over 80% of the city' s biological industry innovation resources, with approximately 500 registered biomedical enterprises, including 21 large-scale ones, achieving a total output value of nearly 24 billion yuan and becoming an important nuclear medicine research and development center and biomedical R&D manufacturing base.

### **1.5 Developed Countries Actively Deploy Major Scientific and Technological Infrastructure**

Scientific and technological innovation has become the key track for enhancing national core competitiveness, with countries worldwide competing to gain advantages in global competition. Major scientific and technological infrastructure, as an important support platform for scientific and technological innovation activities, plays a significant role in driving national economic growth, promoting industrial restructuring and upgrading, and improving scientific and technological competitiveness [3]. The United States, United Kingdom, Germany, Japan, and other developed countries have been competing to layout frontier basic disciplines since the mid-20th century, strengthening the construction of major scientific and technological infrastructure and vigorously developing emerging industries to seize the commanding heights of future technological development. For example, after the 2008 financial crisis, the United Kingdom gradually formed three major industrial clusters—health, energy, and aviation—by relying on platform-type major scientific and technological infrastructure such as synchrotron radiation sources, spallation neutron sources, and large laser facilities, creating substantial employment opportunities. Germany' s research directions for major scientific and technological infrastructure are no longer limited to traditional disciplines such as astronomy and physics but have shifted toward frontier technologies like next-generation trains and automobiles that can better drive industrial upgrading [4]. Japan' s layout of major scientific and technological infrastructure provides important support for technologies needed in the “Society 5.0” era, including network digitalization, low-carbon energy, disaster prevention, and epidemic prevention [5].

## **2. Construction of the Industry Selection System**

Current research on industry selection primarily focuses on the scientific value, development strategies, and management mechanisms of major scientific and technological infrastructure, providing corresponding industrial development recommendations based on facilities' scientific value and internal management models. However, these studies lack relevant theoretical frameworks and benchmark systems [6], offering insufficient guidance for industrial development direc-

tions and hindering the realization of facilities' economic value. Industry selection for major scientific and technological infrastructure differs from traditional regional industry selection, especially given the varying research scopes, primary disciplines, geographical locations, investment levels, and facility scales. Only by fully considering the combination of facilities' technical advantages and agglomeration effects with regional industries' economic scale, growth rate, resource conditions, and market demands can appropriate strategic emerging industries be selected to facilitate local industrial transformation and drive regional and even national industrial development.

Based on the seven strategic emerging industries identified in the 12th Five-Year Plan and the "Strategic Emerging Industries Classification (2018)" standard formulated by the National Bureau of Statistics, this study constructs a strategic emerging industry selection system grounded in Porter's Diamond Model (Michael Porter Diamond Model), fully incorporating the characteristics of major scientific and technological infrastructure to provide references for local governments in developing strategic emerging industries.

## 2.1 Strategic Emerging Industry Selection Model Based on Porter's Diamond Model

The objective of industry selection for major scientific and technological infrastructure is to maximize facilities' social and economic benefits and drive the development of related regional industries. The selection targets are often high-tech industries or strategic emerging industries with characteristics of technology intensity, high added value, and high risk [7]. However, classical industry selection theories developed in the mid-20th century, each with its own historical background, assumptions, and specific application scope, are not entirely suitable for China's current situation of unbalanced regional economic development [8] or for industry selection systems centered on major scientific and technological infrastructure. Moreover, the selection objectives and targets of classical theories differ. For instance, Porter's Diamond Model, also known as the Diamond Theory or National Competitive Advantage Theory, was proposed by renowned Harvard Business School strategic management scholar Michael Porter in his 1990 book *The Competitive Advantage of Nations* [9]. It primarily analyzes why a particular industry in a country possesses strong international competitiveness. The model comprises four mutually reinforcing factors—production factors, demand conditions, related and supporting industries, and firm strategy, structure, and rivalry—plus two variables related to government and chance. The model mainly studies the dynamic factor system of competitiveness for specific industries or enterprises in international trade and economic fields, and its analytical elements lack universality when applied to other research areas [10].

Therefore, this study synthesizes current major industry selection theories, considers the particularity and supporting nature of major scientific and technological infrastructure, and modifies Porter's Diamond Model to establish a diamond

model suitable for facility-oriented strategic emerging industry selection (Figure 1 [Figure 1: see original paper]). This model has three characteristics: First, it emphasizes technical support capacity by extracting technology resources from production factors as a separate dimension. The important prerequisite for developing strategic emerging industries relying on facilities is that the facilities possess technical support capacity, providing a material foundation for core technology breakthroughs in related industries and subsequently diffusing to the entire region to promote technological development. Second, it de-emphasizes corporate competition by incorporating it into industrial competitiveness indicators. The original diamond model primarily studies national competitiveness, making competition among large enterprises unavoidable, whereas this study focuses on facilities' promotional effects on regional industries, mainly considering whether leading enterprises can achieve technological breakthroughs through facilities to drive regional industrial development. Third, it highlights the role of government intervention. Industries that facilities can support are mostly strategic emerging or high-tech industries, and selecting industries aligned with government strategic planning can promote industrial chain optimization and upgrading.

## 2.2 Strategic Emerging Industry Selection Indicator System

The strategic emerging industry selection diamond model for major scientific and technological infrastructure proposed in this study includes six selection dimensions and 11 corresponding first-level indicators: regional resource endowment, industrial upgrading potential, technical support capacity, social demand conditions, government intervention intensity, and other related opportunities.

**(1) Regional Resource Endowment.** According to Heckscher and Ohlin's Factor Endowment Theory and the production factor conditions in Porter's Diamond Model, strategic emerging industries targeted for regional development should have favorable regional resource endowment that can effectively support the development of related industries and industrial clusters. Porter [9] noted that the key to establishing sustainable competitive advantage lies in having mechanisms to create production factors rather than merely possessing them. To build strong and lasting industrial competitive advantages, a region must develop advanced and specialized production factors, including primary factors such as natural resources, human resources, and infrastructure, as well as advanced factors such as knowledge and capital resources.

**(2) Industrial Upgrading Potential.** A region's success depends not on the prosperity of a single industry but on interwoven industrial clusters. Therefore, industry selection cannot rely solely on existing pillar industries but must also focus on potentially emerging industries [11]. Based on Hirschman's Industry Linkage Criterion and industrial factors from Porter's Diamond Model, and considering the characteristics of strategic emerging industries, this study evaluates industrial upgrading potential from two aspects: industrial growth capability and industrial competitiveness. Industrial growth capability can be

assessed through basic indicators such as industrial scale, industrial added value, project investment amount, cost-expense ratio, and total asset contribution rate, or by using influence coefficients and sensitivity coefficients from input-output analysis to evaluate the degree of inter-industry connections and diffusion effects. The content of industrial competitiveness comparison is industrial competitive advantage, reflected in the market realization capabilities of products, enterprises, and industries. The stronger the industrial competitiveness, the more steadily the strategic emerging industries supported by facilities can develop, cultivating local characteristic industrial clusters to achieve sustainable competitive advantages and organic integration of economic and social benefits [12].

**(3) Technical Support Capacity.** Major scientific and technological infrastructure are technology-intensive research facilities, and the strategic emerging industries they can support often depend on facilities' technical support capacity for corresponding technologies. This study evaluates facilities' technical support capacity through two aspects: relevant technology maturity and facility dependency. Technology maturity is a crucial standard for technology development and application, which can be assessed based on the Technology Readiness Level (TRL) developed by NASA and evaluated by experts in technical fields. Scientific and technological achievements with immature technologies are difficult to accurately assess regarding technical feasibility, market prospects, economic value, and investment needs, hindering the transformation and industrialization of scientific and technological achievements [13]. Scientific and technological achievements with high technology maturity represent benchmark practices successfully applied in domestic and international industrial fields, where related technologies have already broken through and can rapidly drive local industrial development upon industrialization. Facility dependency refers to the reliance of an industry' s related technology breakthroughs on the major scientific and technological infrastructure. Generally, higher dependency indicates stronger facility capacity to agglomerate industries, attract characteristic related industries to the region, and reflect the facility' s importance to the industry and its industrial agglomeration capability.

**(4) Social Demand Conditions.** According to Shinohara' s demand income elasticity criterion and demand conditions in Porter' s Diamond Model, the social demand conditions dimension includes two indicators: ecological environmental protection and market demand. Ecological environment and its protection are fundamental issues related to human survival and social development, representing the essential needs of the people in an era of rapid productivity advancement. This can be measured through indicators such as industrial energy consumption, output value per unit energy consumption, and waste discharge volume, while also considering sustainable industrial development and environmental protection during technology R&D and transformation processes. Market demand refers to the demand for specific industry products or services in the domestic market. Globalized competition has made global scientific and technological innovation unprecedentedly intensive and active, with innovative technologies and products continuously emerging. Consumers' willingness and

demands are constantly evolving, pursuing higher standards of product quality and services, which stimulates continuous industrial innovation.

**(5) Government Intervention Intensity.** The government can indirectly influence other elements through strategic planning and intervention measures, including legal, policy, investment, and taxation approaches [14]. Only under stable and flexible top-level design guarantees can the government become an authoritative force effectively promoting strategic emerging industry development, enabling favorable resource flows and reasonable resource allocation within market operation mechanisms. Government intervention intensity can be comprehensively evaluated by analyzing strategic planning, such as whether an industry is included in local 14th Five-Year Plans, key areas of government planning, planned investment amounts, number of new projects, and tax reduction policies.

**(6) Other Related Opportunities.** This mainly refers to opportunities with significant impacts on industries, including major technological breakthroughs, financial or energy crises, foreign political decisions, wars, natural disasters, and other unexpected events. For example, the COVID-19 pandemic drove the development of the biomedical industry, the Russia-Ukraine conflict caused a global energy crisis, and U.S. technological blockades constrained the development of certain industries in China. These opportunities cause industrial discontinuities, with certain products or technologies emerging rapidly and exerting tremendous impacts on industries, potentially even reshaping industrial structures. However, when such opportunities arise, whether industries can leverage them to form and enhance competitive advantages becomes crucial [15].

### 3. Empirical Study—Case Study of the High Efficiency and Low Carbon Gas Turbine Test Equipment

The High Efficiency and Low Carbon Gas Turbine Test Equipment is a major scientific and technological infrastructure project under the 12th Five-Year Plan, designed to provide fundamental conditions for tackling major scientific issues in gas turbines and fill the long-standing gap in high-power gas turbine test facilities in China. The construction and operation of this facility provide world-leading test platforms for multiple fields, including efficient natural gas utilization, clean coal utilization, renewable energy, fourth-generation nuclear energy, energy storage, and energy conservation, thereby promoting the development of strategic emerging industries, enhancing regional original innovation capabilities, improving independent capabilities in related industries, and achieving high-level scientific and technological self-reliance.

This study identified preliminary selection objects by participating in industrial and academic conferences, interviewing relevant leaders from leading enterprises, universities, and research institutions, and reviewing extensive academic literature, policy documents, and industry reports. The research team collected substantial data and materials. Simultaneously, through seminars with the fa-

cility's legal entity, the Institute of Engineering Thermophysics of the Chinese Academy of Sciences, and the co-construction unit, Jiangsu Zhongke Energy Power Research Center, relevant experts and leaders jointly determined the strategic emerging industries that the facility could support, calculation methods and scales for industrial selection evaluation indicators, and the maturity levels of gas turbine-related technologies in China. Ultimately, this section was compiled based on the aforementioned data and evaluation results.

### 3.1 Determining Preliminary Selection Objects

According to the "Strategic Emerging Industries Classification (2018)" standard formulated by the National Bureau of Statistics, literature related to gas turbines [16-20], and interview data, as shown in Figure 2 [Figure 2: see original paper], the facility can primarily support six strategic emerging industries: new materials, new energy, energy conservation and environmental protection, high-end equipment manufacturing, new-generation information technology, and high-tech services (related services), encompassing 23 secondary industries and 71 tertiary industries. Excluding engineering technology and construction during the facility construction phase, the facility can support 151 types of products and services in the long-term operation phase, including advanced materials, gas turbine components, complete gas turbine units, gas turbine-related systems, corresponding scientific and engineering technologies, information, finance, and legal services. Given that the gas turbine industrial chain is extensive, involving tens of thousands of components and thousands of cutting-edge technologies, as shown in Table 1, this study preliminarily screened and summarized 14 relevant secondary industries and key products and services that the facility can strongly support as preliminary selection objects.

### 3.2 Selection Results and Policy Recommendations

This study employs quantitative assessment and qualitative-to-quantitative assessment methods to comprehensively evaluate Lianyungang's strategic emerging industries in relation to the High Efficiency and Low Carbon Gas Turbine Test Equipment. Specifically, quantifiable indicators are assigned corresponding scores based on relevant data, while expert scoring methods are used to assign scores to qualitative indicators, thereby converting qualitative indicators into measurable standards. Finally, the Analytic Hierarchy Process is applied to assign weights to each indicator. This study distributed three questionnaires: "Lianyungang Industry Selection System Indicator Weight Survey," "High Efficiency and Low Carbon Gas Turbine Test Equipment Main Related Industries Qualitative Indicator Comprehensive Assessment," and "High Efficiency and Low Carbon Gas Turbine Test Equipment Main Related Industries Technology Maturity Assessment," collecting 55 valid responses.

Based on existing data and questionnaire results, comprehensive assessments were conducted across the six selection dimensions: regional resource endowment, industrial upgrading potential, technical support capacity, social demand

conditions, government intervention intensity, and other related opportunities. The evaluation results indicate that among the six emerging industries, the energy conservation and environmental protection industry received the highest score, followed by the new energy industry. Based on these results, the Lianyungang Economic and Technological Development Zone should prioritize the energy conservation and environmental protection industry and the new energy industry as its key strategic emerging industries for future development.

**(1) Policy Recommendations for Developing Lianyungang' s Energy Conservation and Environmental Protection Industry.** First, increase policy support for cultivating the energy conservation and environmental protection industry. As a strategic emerging industry, energy conservation and environmental protection is crucial for promoting ecological civilization construction and achieving carbon peaking and carbon neutrality goals. It not only helps reduce enterprise energy costs and improve economic benefits but also expands effective investment, stabilizes industrial economy, and maintains employment channels. Lianyungang' s energy conservation and environmental protection industry is still in its initial stage, and the government should actively implement national policies to provide more comprehensive support for high-quality industrial development. Second, strengthen the role and function of the High Efficiency and Low Carbon Gas Turbine Test Equipment. As an emerging industry, the rapid development of energy conservation and environmental protection depends on continuous innovation in core industrial technologies. Therefore, the industry should be encouraged to undertake technological transformation relying on the High Efficiency and Low Carbon Gas Turbine Test Equipment, strengthening the facility' s role to facilitate rapid industry development. Third, guide active participation of social capital. As an industry with tremendous development potential, energy conservation and environmental protection strongly attracts social capital. To promote its rapid growth, the Lianyungang government should actively play a guiding role, encouraging and facilitating social capital participation to jointly cultivate this industry.

**(2) Policy Recommendations for Developing the New Energy Industry.** First, implement the 14th Five-Year Plan to promote high-quality development of the new energy industry. The “Lianyungang 14th Five-Year Energy Development Plan” states that during the 14th Five-Year Plan period, Lianyungang should adhere to green development, improve the clean utilization level of fossil energy, and promote further scaling of the new energy industry. However, new energy industry development is constrained by technical capabilities and costs. The Lianyungang government should encourage the new energy industry to rely primarily on the High Efficiency and Low Carbon Gas Turbine Test Equipment to achieve core technology breakthroughs and reduce technical costs, helping the new energy industry rapidly achieve scale. Second, guide continuous industry innovation around the “dual carbon” goals. Lianyungang enjoys a superior geographical location as an important transportation hub for the “21st Century Maritime Silk Road.” Under the background of carbon peaking and carbon neutrality, Lianyungang should establish pilot demonstrations relying on

the High Efficiency and Low Carbon Gas Turbine Test Equipment, promote the integration of gas turbine facilities with the new energy industry, and facilitate industry-university-research collaboration to help enterprises continuously innovate, thereby achieving high-quality energy development and building a strong support point for the “Belt and Road” initiative.

#### **4. Practical Considerations for Implementing the Industry Selection System for Major Scientific and Technological Infrastructure**

**(1) Local governments should fully leverage the agglomeration effect of major scientific and technological infrastructure on strategic emerging industries.** The unique test conditions and high-level technical support provided by facilities offer indispensable material foundations for leading enterprises in emerging industries to explore scientific frontiers. This plays a powerful supporting role in gathering innovation resources, attracting high-end talent, promoting R&D and application of new technologies, and driving industrial upgrading. Taking the European Synchrotron Radiation Facility (ESRF), the UK’s Diamond Light Source, and the Shanghai Synchrotron Radiation Facility as examples, they have successfully attracted Fortune Global 500 companies and industry leaders such as Roche, Shanghai Innovation Center, and Johnson & Johnson’s pharmaceutical R&D center through advanced scientific equipment and services. The agglomeration of these enterprises not only drives significant local economic growth but also generates strong driving effects across the entire industrial chain, injecting robust momentum into regional economic prosperity.

**(2) Local governments should thoroughly explore the diverse industries that major scientific and technological infrastructure can derive throughout its entire lifecycle to further enrich and expand the regional industrial ecosystem.** Major scientific and technological infrastructure can generate extensive and profound derivative benefits during planning, construction, and operation phases. Using synchrotron radiation sources as an example, during the construction phase, there is extremely strong demand for high-end scientific instruments requiring substantial customized R&D equipment to support project implementation. In response to this demand, local governments can proactively engage in close coordination with research institutes to systematically catalog specific instrument requirements during facility construction, thereby efficiently linking innovation chain and industrial chain resources. Through such cooperation and coordination, local governments can attract a batch of high-end instrument and equipment R&D and manufacturing enterprises to settle locally, further promoting regional industrial upgrading and development and strengthening local industrial competitiveness to inject new vitality into sustained regional economic growth.

**(3) Local governments should recognize the importance of basic research, strengthen the construction and utilization of major scientific**

**and technological infrastructure, and strive to achieve major breakthroughs in original innovation to provide solid source support for the vigorous development of strategic new technologies.** Taking Dongguan' s new energy vehicle industry as an example, China' s Spallation Neutron Source provided crucial assistance to local high-tech enterprises in solving key issues such as new blade battery material structures and battery infiltration. Currently, the deep integration of new-generation information technology, new energy, new materials, and biotechnology is reshaping industrial patterns and blurring traditional industrial boundaries. Local governments must continue to target global scientific and technological frontiers, lead regional scientific and technological development directions, promote organized industry-university-research collaboration, and innovate key core technologies to undertake the significant historical mission entrusted to them.

## References

1. Bai Guangzu, Wan Jinbo, Peng Xianke, et al. Strengthening the support of national strategic scientific and technological forces to serve the construction of a new development pattern. *Science and Technology Review*, 2022, 40(11): 6-14.
2. Wang Yifang, Bai Yunxiang. Using major scientific and technological infrastructure to lead global innovation. *Management World*, 2020, 36(5): 172-188.
3. Qu Wenjian, Tang Jing, Chen Danzhi. Research on the characteristics and evolution trends of high-tech industry policies. *Science and Technology Progress and Policy*, 2019, 36(3): 61-69.
4. Fan Xiaoxiao, Li Zexia, Song Wei, et al. The formulation of Germany' s major scientific and technological infrastructure roadmap and its implications. *Science and Technology Management Research*, 2019, 39(8): 15-19.
5. Onoda T, Ito Y. On the boundary of services and research collaborations in Japanese state-of-the-art academic research infrastructures. *Science and Public Policy*, 2022, 49(3): 402-413.
6. Shang Zhicong, Zhao Kai. Analysis of the transformation model of large scientific facilities' achievements: A case study of the Beijing Electron-Positron Collider. *Science and Technology Progress and Policy*, 2011, 28(19): 6-10.
7. Wang Zilong, Tan Qingmei. Research on the criteria and application of selecting regional high-tech leading industries. *Science of Science and Management of Science and Technology*, 2004, 25(9): 67-70.
8. Liu Yaobin, Li Xinwei, Li Xiaomeng. Research on the leading industry selection model based on the diamond model. *China Soft Science*, 2006, (1): 145-152.

9. Porter M E. The competitive advantage of nations. *Harvard Business Review*, 1990, 73: 91.
10. Song Danfeng, Li Xingyun, Yang Yuan. Research on the selection of marine leading industries in Nansha District of Guangzhou City: Based on the modified “diamond model” . *Management and Administration*, 2023, doi: 10.16517/j.cnki.cn12-1034/f.20230330.003.
11. Shi Xianhu. The selection of leading industries in Japan and government cultivation policies. *Productivity Research*, 1996, (3): 70-72.
12. Fan Mingyue. Research on the evaluation of strategic emerging industry development. *Science and Technology Progress and Policy*, 2011, 28(21): 121-123.
13. He Limin, Liu Haibo, Xiao Bing. Research on the strategy of transforming scientific and technological achievements based on technology readiness level: A case study of Ningbo Institute of Materials, Chinese Academy of Sciences. *Studies in Science of Science*, 2021, 39(12): 2170-2178.
14. Zhao Z, Zhang S, Zuo J. A critical analysis of the photovoltaic power industry in China-From diamond model to gear model. *Renewable and Sustainable Energy Reviews*, 2011, 15(9): 4963-4971.
15. Weng Yiwu, Wen Xueyou, Weng Shilie. Gas turbine technology and development. *Chinese Journal of Nature*, 2017, 39(1): 43-47.
16. Yang Gongxian, Zhang Qiongyuan, Gao Zhenhuan, et al. Current status and trends of hot section component materials for heavy-duty gas turbines. *Aerospace Power*, 2019, (2): 70-73.
17. Jiang Hongde, Ren Jing, Li Xueying, et al. Current status and development trends of heavy-duty gas turbines. *Proceedings of the Chinese Society of Electrical Engineering*, 2014, 34(29): 5096-5102.
18. Shu Gequn, Yu Chunhui, Shen Guohua, et al. Research on the development of heavy-duty gas turbines in China in the new era. *Strategic Study of Chinese Academy of Engineering*, 2022, 24(6): 184-192.
19. Shuai Sansan, Li Shilei, Xuan Weidong, et al. Research progress on materials and manufacturing technology for heavy-duty gas turbine blades. *Thermal Turbine*, 2022, 51(3): 161-169.
20. Shi Changxu, Zhong Zengyong. Development and innovation of superalloys in China. *Acta Metallurgica Sinica*, 2010, 46(11): 1281-1288.

---

**Notes:**

Factor Endowment Theory was developed by Swedish economist Ohlin based on the research of Swedish economist Heckscher, proposed in the 1933 book *Interregional and International Trade*.

Hirschman' s Criterion was proposed by American economist Albert O. Hirschman in his book *The Strategy of Economic Development*.

Shinohara' s Two Benchmark Theory was proposed by Japanese economist Shinohara Michiyoshi in 1957 for Japan' s industrial structure planning, comprising demand income elasticity criterion and productivity growth rate criterion.

*Note: Figure translations are in progress. See original paper for figures.*

*Source: ChinaXiv –Machine translation. Verify with original.*