

A Research on the Competitiveness of National High-Tech Industrial Development Zones in Guangdong Province

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Abstract. Based on evaluation index system of national high-tech industrial development zone, this issue, with indexes corresponding to four capabilities of industrial upgrading and structural optimization, knowledge creation and technical innovation, internationalization and global competition as well as sustainable development, applies statistics of torch center in the research on national high-tech industrial development zones in Guangdong Province and puts forward some targeted suggestions on overall competitiveness improvement.

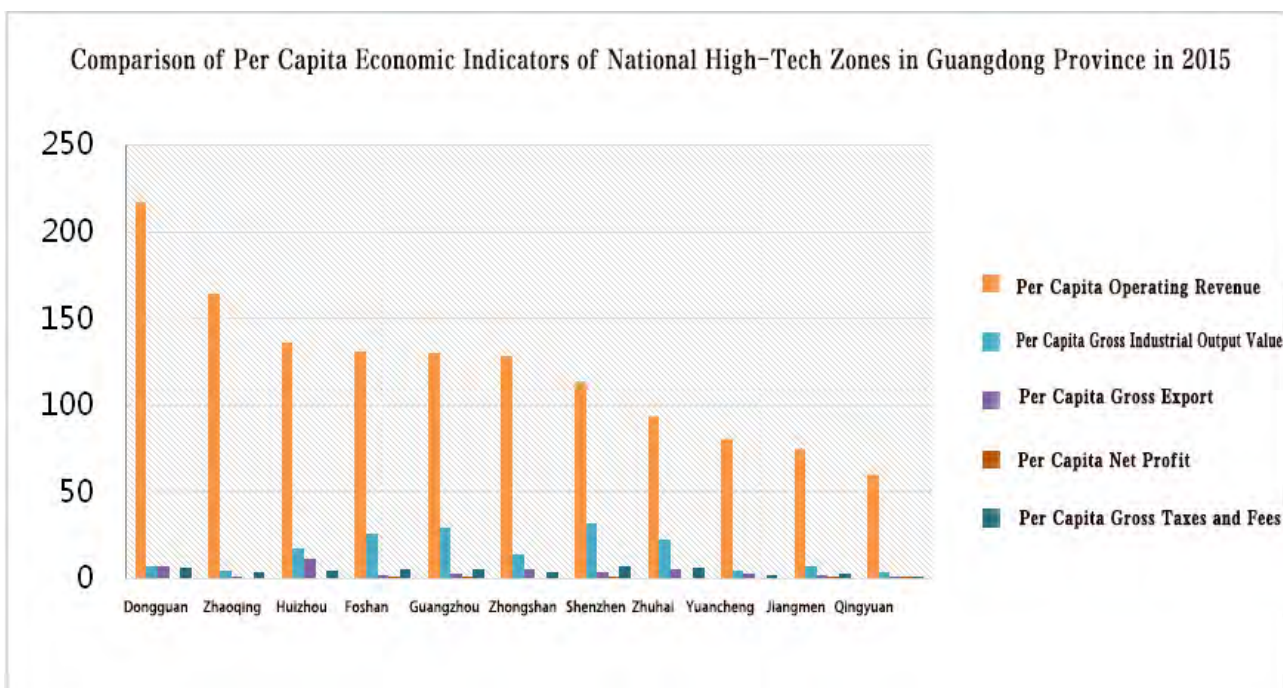
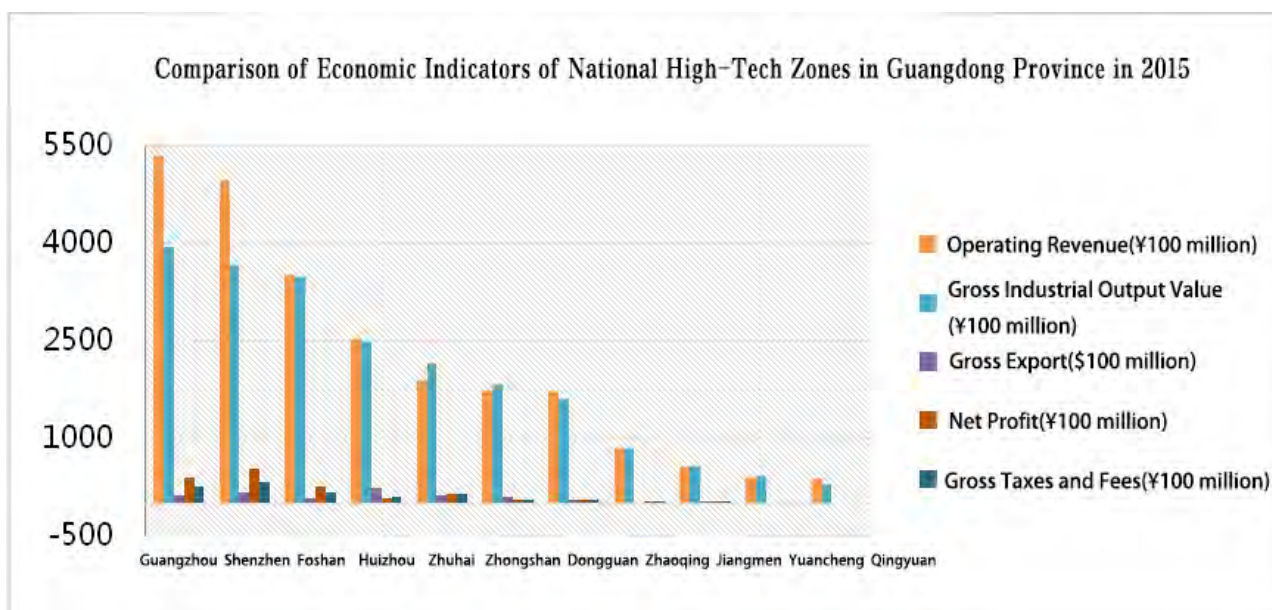
Introduction

In the new era, as global economic pattern evolves, new technology fission mode and Chinese economy has entered the new normal. While adjustment of macro-level strategy is being sped up, innovation-driven development shows the way to build China into a science and technology giant. The Belt and Road Initiative provides solution for the expansion of development space and ushers in a China Era of international economic cooperation and global governance mode. Besides, industrial structure is adjusted and industry transformation and upgrading is promoted. By fusing the achievements of new technological revolution, traditional industry is upgraded and meanwhile, emerging high-end industries are developed, which injects new impetus to economic and social progress.

Analysis on the Competitiveness Ranking of National High-Tech Industrial Development Zones in Guangdong Province

From Guangdong Province's perspective, the Guangdong Pilot Free Trade Zone is to be built into the Guangdong-Hong Kong-Macao Deep Cooperation Demonstration Area, one of the most important hubs of 21st Century Maritime Silk Road and the first mover in the new round of nationwide Reform and Opening by relying on Hong Kong and Macao, serving the mainland of China and looking forward to the world. The Pearl River Delta National-Independently Innovative Demonstration Area consists of Guangzhou, Zhuhai, Foshan, Huizhou Zhongkai, Dongguan Songshan Lake, Zhongshan Torch, Jiangmen and Zhaoqing High-Tech Industrial Zones plus the Shenzhen Self-dependent Innovation Demonstration Area authorized in 2004, which, under the leadership of Guangzhou and Shenzhen, constructs a pattern of "1+1+7" and builds a world-class center for innovation and entrepreneurship. Meanwhile, the construction of self-dependent innovation demonstration area escorts the comprehensively deepening reforms and "Early and Pilot Implementation" Policy for high-tech zones under the new situation. Regional economic belts such as the Zhujiang-Xijiang Economic Belt, the Pearl River West Bank Advanced Equipment Manufacturing Industrial Belt and the South-west Economic Circle provide regional linkage development and resources allocation optimization with a new opportunity.

Based on the development state of national high-tech industrial development zones in Guangdong Province at present, they are roughly divided into four echelons: economic scale and benefit of Shenzhen and Guangzhou high-tech zones are on the first echelon which is the model of high-tech zones development in Guangdong Province, for their operating revenues are both over 5 hundred billion and gross industrial output values are over 3.5 hundred billion; Dongguan, Foshan, Zhongshan, Zhuhai and Huizhou high-tech zones are on the second echelon; Jiangmen and Zhaoqing high-tech zones are on the third echelon while Qingyuan and Yuancheng whose upgrade time is relatively short are on the fourth echelon.



According to the *Evaluation Results of National High-Tech Industrial Development Zones* issued and piloted by Ministry of Science and Technology of the People's Republic of China, among 147 units including 146 national high-tech zones and Suzhou Industrial Park, changes of overall rankings of national high-tech zones in Guangdong Province between 2011 and 2015 can be seen: Shenzhen and Guangzhou high-tech zones are on the first echelon steadily around the top 10; Dongguan, Foshan, Zhongshan, Zhuhai and Huizhou high-tech zones which rank between 25 to 60, are on the

second echelon; Jiangmen and Zhaoqing high-tech zones are on the third echelon, ranking after 70; Qingyuan and Yuancheng which have just upgraded, are on the fourth echelon, ranking after 100. In addition to Zhongshan, Huizhou and Zhaoqing high-tech zones, rankings of the others are all on rise year by year and Jiangmen keeps drawing closer to the second echelon. However, the overall ranking of Zhaoqing high-tech zones tends to fell in recent 5 years and especially in 2016, falling by 13 places, it is very close to 100 and just ahead of the newly upgraded Qingyuan and Yuancheng.

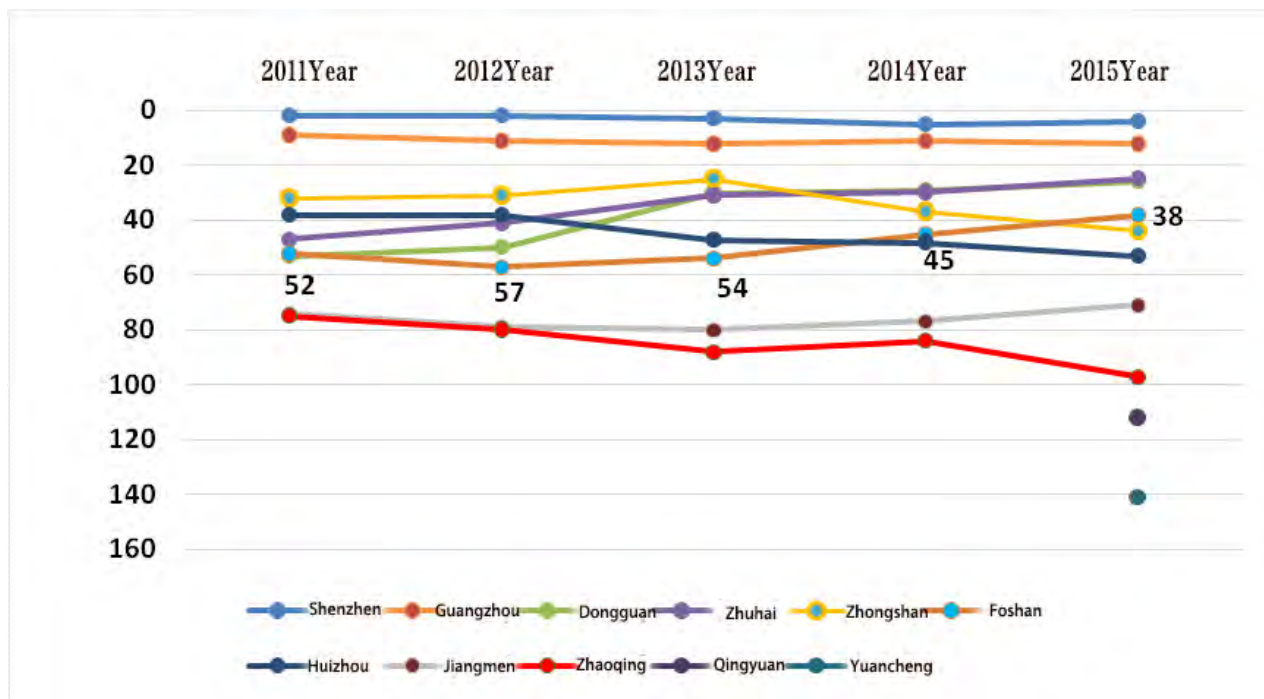


Table 1, Rankings of national High-Tech Zones in Guangdong province between 2011 and 2015

| High-Tech Zones | 2011 | 2012 | 2013 | 2014 | 2015 |
|-----------------|------|------|------|------|------|
| Shenzhen | 2 | 2 | 3 | 5 | 4 |
| Guangzhou | 9 | 11 | 12 | 11 | 12 |
| Dongguan | 53 | 50 | 30 | 29 | 26 |
| Zhuhai | 47 | 41 | 31 | 30 | 25 |
| Zhongshan | 32 | 31 | 25 | 37 | 44 |
| Foshan | 52 | 57 | 54 | 45 | 38 |
| Huizhou | 38 | 38 | 47 | 48 | 53 |
| Jiangmen | 74 | 79 | 80 | 77 | 71 |
| Zhaoqing | 75 | 80 | 88 | 84 | 97 |
| Qingyuan | | | | | 112 |
| Yuancheng | | | | | 141 |

Analysis on Competitiveness Rankings of Second-level Indicators of National High-Tech Zones in Guangdong Province

Knowledge Creation and Technical Innovation Capability

Multiple Guangdong averages are lower than national averages. For example, per capita transaction volume of contract for technology, the number of bachelor's degrees and above per 10,000 persons, newly increased invention patents authorization in that year per 10,000 persons in domestic state-owned enterprises and business profit rate rank kind of down and are 62.25%, 43.59%, 37.28% and 19.81% respectively lower than national averages, which reflects some deficiencies of national

high-tech zones in Guangdong Province: national and regional potential for knowledge creation and technical innovation is not optimistic; bachelor's degrees and above as well as science and technology input is insufficient; technology market is short of activeness.

The average number of national-level research and development institutions in Guangdong Province is equal to national average. The average number of national-level incubators and that of science and technology input from the fiscal expenditure of Management Committee in that year are 33.33% and 4.75% respectively more than national averages. Seen from cultivation and science and technology input of technological enterprises, national high-tech zones in Guangdong Province have huge potential.

Table 2, Comparison of knowledge creation and technical innovation capability indicators of Guangdong and national High-Tech Zones

| Knowledge Creation and Technical Innovation Capability | National Average | Guangdong Average |
|--|-------------------------|--------------------------|
| 1.1 The number of bachelor's degrees and above per 10,000 persons | 3220.5 | 1816.64 |
| 1.2 R&D expenditure from enterprises per ¥10,000 sales revenue | 212.8 | 195.40 |
| 1.3 The number of national-level R&D institutions | 19 | 19 |
| 1.4 The number of national-level incubators | 3 | 4 |
| 1.5 The number of newly increased invention patents authorization in that year per 10,000 persons in domestic state-owned enterprises (pieces) | 30.1 | 18.88 |
| 1.6 Science and technology input from the fiscal expenditure of Management Committee in that year (¥100 million) | 4.0 | 4.19 |
| 1.7 Per capita transaction volume of contract for technology (¥10,000) | 15.1 | 5.70 |
| 1.8 Industrial added value rate (%) | 20.4 | 18 |
| 1.9 Business profit rate (%) | 6.36 | 5.1 |

Rankings of Industrial Upgrading and Structural Optimization Capability Indicators

Many Guangdong averages index are lower than national averages. For example, service income as a percentage of total operating income, value added per capita and numbers of new intellectual property applied by 10,000 persons in that year (including registered trademarks) are 61.48%, 22.41% and 14.13% respectively lower than national averages, that is to say, cultivation and development of service industry need to be strengthened and further adjustment of industrial structure is required.

The average number of national service industry providers in Guangdong Province is equal to national average. The number of high-tech enterprises with operating income exceeding ¥3 billion, enterprise net profit rate and employee average wage as a percentage of value added per capita are 25.00%, 16.98% and 13.27% more than national averages. The higher the enterprise net profit rate is, the more efficient the enterprise value creation is and moreover, the stronger the profitability is.

Table 3, Rankings of Guangdong and the national High-Tech industrial upgrading and structural optimization capacity indicators

| Industrial Upgrading and Structural Optimization Capabilities | National Average | Guangdong Average |
|---|-------------------------|--------------------------|
| 2.1 The number of high-tech enterprises with operating income exceeding ¥3 billion | 4 | 5 |
| 2.2 Service income as a percentage of total operating income (%) | 24.4 | 9.4 |
| 2.3 Value added per capita (¥10,000) | 30.3 | 23.51 |
| 2.4 The proportion of high-tech enterprises in the total number of enterprises (%) | 37.46 | 34.5 |
| 2.5 Numbers of national industry service providers | 7 | 7 |
| 2.6 Numbers of new intellectual property applied by 10,000 persons(including registered trademark) (Pieces) | 178.4 | 153.19 |
| 2.7 The number of listed companies that per 10,000 persons own | 0.71 | 0.66 |
| 2.8 Enterprise net assets profit rate (%) | 10.6 | 12.4 |
| 2.9 Employee average wage as a percentage of Value Added per capita (%) | 33.9 | 38.4 |

Rankings of Indicators of Internationalization and Participation in Global Competitiveness

Compared with the national average, the proportion of Guangdong's total exports of technical services to total exports, the proportion of returned overseas students and permanent residents in foreign employment and the number of newly granted patents in Europe, the United States and Japan in the same year were below the national average by respectively 67.50%, 45.63%, 10.00%. It shows that the total export volume of technical services by enterprises in the park is relatively low and the independent intellectual property rights lack international competitiveness. Therefore, it is necessary to step up supportive efforts and encourage enterprises to set up overseas branches to apply for international intellectual property rights. In particular, the ability to participate in the formulation of international standards for industries, which is an important means and guarantees on the future integration of international innovative resources and exploring the international market.

The amount of overseas direct investment in domestic-funded enterprises in Guangdong Province, the share of high-tech enterprises in the total revenue of the park and new European, American and Japanese registered trademarks applied by 10,000 persons in that year were more than the national average by respectively 118.70%, 95% and 64.04%. It shows that the innovative enterprises in the park are more involved in international investment and exports, with higher degree of internationalization and stronger ability to participate in global competition.

Table 4, Rankings of internationalization and participation in global competitiveness indicators of Guangdong province and High-Tech Zones in China

| Internationalization and Participation in Global Competitiveness | National Average | Guangdong Average |
|--|-------------------------|--------------------------|
| 3.1 Proportion of overseas returned students and permanent residents in employees (%) | 1.03 | 0.56 |
| 3.2 The proportion of export volumes of High-tech enterprises to the park's operating income (%) | 0.80 | 1.56 |
| 3.3 The ratio of exports of technical services to total exports | 4.00 | 1.3 |
| 3.4 The number of overseas branches established by the enterprise | 25 | 35 |
| 3.5 Newly registered trademarks in 10,000 persons in Europe, America and Japan (Pieces) | 27.5 | 45.11 |
| 3.6 Newly increased European and American patents in 10,000 persons in that year (pieces) | 7.8 | 7.02 |
| 3.7 The total number of enterprises participating in the formulation of industry international standards | 7 | 11 |
| 3.8 Domestic direct investment of domestic-funded corporation in that year (¥100 million) | 4.6 | 10.06 |

Rankings of Sustainable Development Capability Indicator of National High-Tech Zones

The index of sustainable development capability is the best single indicator of Guangdong National Hi-tech Zone. Among the six indicators for sustainable development in 2015, five indexes have the leading advantage. Among them, the number of employees increased 4.52 percentage points higher than the national average; the number of enterprises increased 4.52 percentage points higher than the national average; corporate tax surpassed the national average of 23 percentage points; the total new investment of enterprises in that year was ¥10 billion higher than the national average. Comprehensive energy consumption for added value per unit is lower than the national average of 24.17%, indicating that the park in Guangdong Province attaches great importance to environmental protection and has made great efforts in saving energy and reducing consumption while ensuring rapid economic development. "The proportion of master's and Ph.D. staff in the workforce" is the only one that fails to reach the national average and is below the national average of 2.8 percentage points.

Table 5, Rankings of sustainable development capability indicator of Guangdong and the national High-Tech Zones

| Sustainable Development Capability of High-Tech Zone | National Average | Guangdong Average |
|---|-------------------------|--------------------------|
| 4.1 Growth rate of employed staffs (%) | 3.4 | 7.92 |
| 4.2 The proportions of master degree and Ph.D. degree in employed staffs (%) | 5.4 | 2.6 |
| 4.3 Growth rate of enterprise numbers (%) | 5.4 | 8.68 |
| 4.4 Growth rate of corporate total income tax (%) | 4.3 | 27.3 |
| 4.5 Enterprise's newly added investment in that year (¥100 million) | 45.2 | 55.26 |
| 4.6 Comprehensive energy consumption for added value per unit (tone of standard coal) | 0.426 | 0.323 |

Summary

First, optimize the industrial structure and vigorously develop the modern service industry. Major science platforms, equipment and networks will be rested on to carry out cutting-edge major scientific research and strengthen the original innovation and knowledge output; make use of its radiation-driven role in promoting the park personnel training gathering, intelligent manufacturing capabilities. The service industries will be improved such as technology services, financial services, software design, smart logistics, e-commerce and cultural and creative industries as well as lifestyle services such as real estate, business services and hotel business. The industrial structure will be upgraded and an innovative industrial ecology will be built to provide economic support for the follow-up development of the park to provide new momentum.

Second, optimize the talent structure and gather high-end talent. Focusing on the needs of industrial development, the policy of starting a business will be formulated to attract entrepreneurs with the business incubator as a link, and the development of technology-based small and medium-sized enterprises in the park will be promoted as an intermediary to attract innovative talents; the structure of talents will be optimized by advancing the industrial structure. To strengthen cooperation with well-known institutions in schools and enterprises at home and abroad, the transformation of scientific, technological achievements and gathering high-end innovative talents will be speed up at the same time; the green card system and the construction of international schools will be explored to attract overseas students returning homeland and foreigners to enter the park. The interaction and cooperation with top-notch talents will be strengthened, meeting the high-end talent pool of academicians of the two academies, the "Thousand Talents Program", and constructing innovative industrial parks of academicians and experts, and enhancing the influence in the forefront of the park.

Third, enhance the level of innovation and entrepreneurship; improve the vitality of innovation and entrepreneurship in the zone and inner growth of industry. Investments such as innovation and entrepreneurship platform will be strengthened. More policy support will be given to enhance the park's incubator service capabilities of current high-tech enterprises, integrate and the existing innovation and entrepreneurship platform level will be enhanced; the needs to develop leading industry in the park will be focused; leading enterprises, colleges and institutes will be relied on to cultivate a number of New Research and Development (R&D) institutions, specialized construction, with the park characteristics of a public space, gathering high-end venture team. The service capabilities of the technology market will be enhanced; the vitality of the technology market will be stimulated; a variety of online and offline technology trading networks will be built and the deep integration of the technology market and the capital market will be promoted.

Fourth, strengthen open cooperation and promote regional and international competitiveness. The Pearl River Delta Independent Innovation Demonstration Zone will be taken as a link to jointly establish an innovation consortium, a cross-regional industrial technology innovation strategic alliance, a joint talent training base and an industrial investment fund to achieve the linkage between resources and elements; the advantage of the trade policy of Guangdong Free Trade Zone will be taken; the export of advantageous special products will be vigorously promoted; the level of foreign trade and service will be upgraded; the initiative will be taken to undertake areas such as industry, capital and technology in the free trade zone; the transformation and upgrading of the manufacturing industry in the zone will be promoted; the cooperation with foreign agencies, international tripartite cooperation and multi-directional links to overseas high-end innovative resources will be strengthened to guide enterprises; overseas market institutions and R & D institutions will be set up to guide enterprises in overseas mergers and acquisitions or investment cooperation and enterprises will be guided to apply for international trademark and international patents and to participate in and even dominate international technical cooperation in building international standards.

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