Research on Strategies to Promote High-quality Development of High-Tech Zones Industrial Economy in Shandong

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Abstract. The high-tech zones is a concentrated distribution area of high-tech industrial clusters, which plays a key leading role in the high-quality development of industrial economy. This paper analyzes the current situation and existing problems of high-tech zones in Shandong Province in the development of industrial economy. Based on the above research, this paper puts forward some policy recommendations, such as speed up the cultivation of new quality productive forces, develop characteristic industries, etc. These suggestions may provide effective reference for the construction of high-tech zones in our province.

1. Introduction

As a functional area of economic division, the HTZ (high-tech zone) is a gathering place for advanced and sophisticated industries. It plays a role in promoting scientific and technological breakthroughs in development and positioning, leading regional economic development and promoting economic transformation. In Shandong, high-tech zones are the strategic vanguard leading industrial transformation and high-quality development [1].

Based on the development orientation and function of Shandong HTZ, this paper combined with the development status and existing problems in Shandong HTZs, analyzes the existing factors and development deficiencies, which can provide an important reference for the development of industrial economy in Shandong Province [2][3].

2. Development status

2.1. Distribution of high-tech zones and development status of leading industries

Up to now, 13 national HTZs have been built in Shandong Province. In addition to the national HTZs, the Shandong provincial government has successively approved the establishment of a number of provincial high-tech development zones under the development and construction for many years, and the number of provincial HTZs has increased to 14.From the perspective of the distribution of leading industries, the HTZs in the province have basically completed the coverage of the ' top ten ' industries. The concentration trend of the proportion of pillar industries is more obvious, the scale of local characteristic industries is formed, and the leading industries of industrial economy are moving towards high-end.

2.2. Distribution of high-tech zones and development status of leading industries

Through the analysis of the public data of each HTZ, it can be found that the current industrial economic development of HTZs in Shandong Province mainly presents the following characteristics:

The development of industrial economy has been steadily advancing. The industrial economy of each HTZ has grown steadily, and the construction of industrial clusters has achieved remarkable results. Among them, the industrial economy of Jinan HTZ has grown by 9.2 %, 2.7 % and 6.4 % respectively in the past three years, and the scale of high-end equipment and biomedical industry has exceeded 100 billion yuan. The industrial scale of Weifang HTZ is expanding, the scale of high-end equipment manufacturing industry has exceeded 100 billion yuan, and the medical and health care and new material industries have exceeded 10 billion yuan. Weihai HTZ has built two hundred billion-level industrial clusters of electronic information and intelligent manufacturing, medical equipment and biomedical industry. The industrial economic growth of other HTZs is shown in Table 1.

Table 1. Development of industrial economy in some HTZs in 2023.

Designation	The revenue of industrial enterprises above designated size increased	The added value of revenue of industrial enterprises above designated size increased year on year
Zibo HTZ	9.9%	10.75%
Yantai HTZ	7.1%	12%

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Zaozhuang HTZ	7.69%	19.6%
Jining HTZ	—	21.8%
Liaocheng HTZ	—	2.1%

Innovation ability is increasing. HTZs have become the main force of scientific and technological innovation in Shandong Province. With 1.7 % of the province 's land area, Shandong HTZ has gathered more than 21.9 % of the province 's high-tech enterprises, contributed more than 47.6 % of the effective invention patents, and built 60 % of the national science and technology business incubators. In 2023, Shandong Province added 12 national industrial design centers (covering Shandong Lingong Heavy Machinery and Jinan GWEIKE in Jinan HTZ, Tianrui Heavy Industry in Weifang HTZ, Shandong Yarward Electronics in Zibo HTZ, and Guangwei Composite in Weihai Torch HTZ) ; Four new national technology innovation demonstration enterprises were added (covering FREDA in Jinan HTZ) .

The digital transformation has been fully accelerated. The industrial digital transformation of each HTZ has achieved remarkable results. Jinan HTZ is currently the only region in the province with the ability of integrated circuit design, semiconductor material manufacturing and sealing the whole industrial chain. The scale of intelligent equipment industry accounts for more than 40 % in Jinan, and the scale of biomedical industry continues to rank among the top of the national HTZs; Jining HTZ has achieved 100 % coverage of digital transformation of industrial enterprises on the scale, and has built 18 industrial Internet platforms above the municipal level, 1 intelligent manufacturing benchmark enterprise in Shandong Province, 4 provincial-level intelligent factories, and 5 provincial-level digital workshops; Six projects in Qingdao HTZ were successfully selected into the list of suppliers of digital workshops, intelligent manufacturing scenarios and system solutions of Shandong provincial intelligent factories in 2023.

3. Development status

3.1. Echelon construction is backward

As shown in Fig. 1, the number of provincial HTZs is lower than that of national HTZs for a long time. The problem of quantity inversion will not be solved until 2023, and the construction of reserve forces is relatively lacking. It is difficult to cultivate, identify and upgrade provincial HTZs. The above deficiencies are reflected in the following aspects. First, some HTZs lack planning in the development of high-tech, lack support in the early stage of technological development. Second, the construction of high-tech scale and industrialization needs to be strengthened [4].

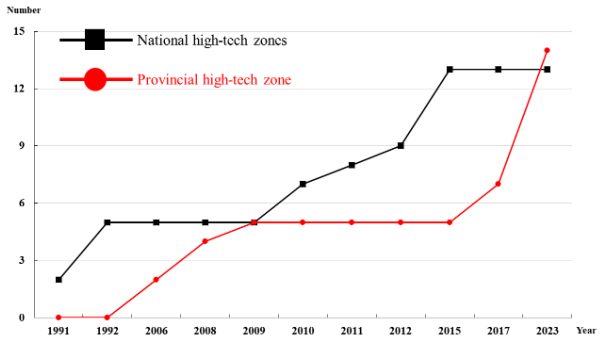

Fig. 1. Annual change in the number of HTZs in Shandong Province.

3.2. Lack of comprehensive construction

Lack of comprehensive construction. One is that the differentiated construction of industrial industries still needs to be promoted. High tech zones within the province have shown a strong homogenization phenomenon in the distribution of industrial leading industries. As shown in Fig. 2, multiple HTZs have laid out in high-end equipment, medical care and health. And to a certain extent, it has caused overcapacity, intensified malicious competition, reduced regional competitiveness, and increased regional economic risks. Secondly, the core competitiveness of HTZs within the province is not strong, and there is a lack of high-end innovation resources and scientific and technological talents. As shown in Table 2, none of the 13 national level HTZs in the province have entered the top ten in the country [5].

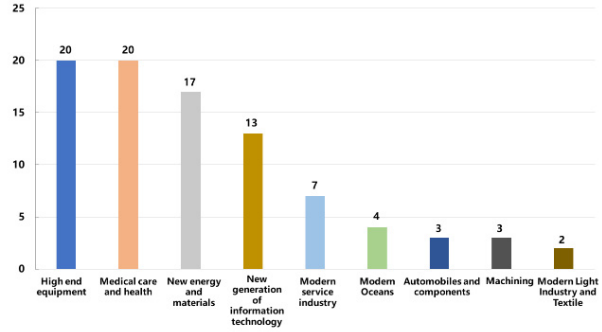

Fig. 2. Number of HTZs for layout of various leading industries.

Table 2. Top 30 High Quality Development Zones in China.

Designation	Rankings for 2022	Rankings for 2023	Ranking exchange
Jinan HTZ	19	19	——
Qingdao HTZ	29	27	Up 2

3.3. Cluster construction needs to be further strengthened

According to the China Private Economic Development Forum released the 2023 list of China's top 100 industrial clusters. Shandong has eight clusters on the list, They are ranked 41 intelligent home appliance cluster (Qingdao), ranked 44 Yantai high-end chemical industry cluster

(Yantai), ranked 55 Zibo high-end fine chemical industry cluster (Zibo), ranked 69 Weihai high-end medical device industry cluster (Weihai), ranked 83 Liaocheng bearing industry cluster (Liaocheng), ranked 93 Binzhou textile and garment industry cluster (Binzhou) Ranked 94 Zibo New pharmaceutical industry cluster (Zibo), ranked 100 Weifang intelligent agricultural machinery industry cluster (Weifang). Among the 16 prefectures and cities, the number of top 100 industrial clusters in Shandong Province ranks behind Jiangsu, Zhejiang and Guangdong. The specific distribution of the top 100 clusters is shown in Fig. 3.

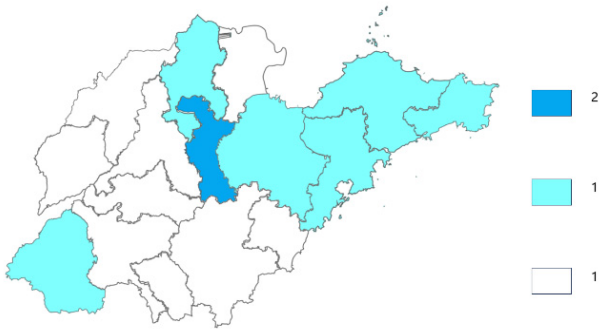

Fig. 3. Distribution and corresponding number of the top 100 industrial clusters in Shandong Province.

From the ranking and distribution of the top 100 industries, the ranking and distribution of industrial clusters in Shandong Province need to be further strengthened.

3.4. Open and coordinated development needs to be deepened

The pattern of benign interaction and differentiated development of the HTZ echelon in the province has not yet been formed. Limited by factors such as location : First, the development of some HTZs is relatively closed, there is a long-term lack of investment from foreign-funded enterprises, and the overall development vitality is insufficient. Some HTZs are faced with the situation of small number of foreign-funded enterprises, lack of new foreign-funded projects, and limited stock of foreign capital in the development of industrial economy. Second, the coordination of various regions in the province is limited. Although the HTZs in the province have a high correlation in pillar industries, there is still a lack of special work coordination and promotion mechanism for cities with similar regions and industries to jointly create cross-regional clusters. The cooperation between HTZs needs to be further promoted.

4. Policy recommendations

4.1. Speed up the cultivation of new quality productive forces

The new quality productive forces includes the development logic of gathering scientific and technological resources, optimizing the new industrial structure and cultivating new kinetic energy, which is in line with the mission of the national HTZ to ' develop high-tech and realize industrialization '. The foothold of accelerating new productivity is to open up more new fields and new tracks. It is required to accelerate the innovation of existing industries, promote the construction of high-end, green and intelligent industries, explore the ' discipline + industry ', ' incubation + investment ' and other models for brain-like intelligence and other cutting-edge technologies and industries to be developed, and improve the future industrial cultivation mechanism [6].

4.2. Accelerate the development of characteristic industries

Combined with the development and construction experience of characteristic industries represented by the existing HTZs, such as the lithium battery industry in Zaozhuang HTZ, the functional sugar industry in Dezhou HTZ, and the printer industry in Weihai HTZ, each HTZ should accelerate the agglomeration of local characteristic industries through channels such as specialized division of labor, knowledge diffusion, resource sharing, public cost sharing, and logistics cost reduction based on the existing industrial development foundation. At the same time, efforts will be accelerated in the supply of industrial chains, construction of industrial clusters, improvement of technological level, realization of brand characteristics, transformation of production models, construction of industrial formats, Guiding opinions and policy support documents will be issued to promote the regional characteristics of HTZs to the international first-class level, and form characteristic industrial clusters [7][8].

4.3. Promote open and coordinated development.

To accelerate the the coordinated and cooperative development of HTZs, the first is to promote the sharing of industrial resources, complementary advantages and collaborative innovation in various HTZs. Through the cooperation among HTZs, promote the linkage and upgrading of industrial industries, form a sound symbiotic development ecology. Second, in each HTZ, around the construction of a modern industrial system, the development ecology of new and old coordination, virtual and real integration, and cross-disciplinary cooperation is formed, and the construction of an innovation and entrepreneurship community for the industrial economy is accelerated. Support the HTZ to build ' government-industry-university-research-finance-application ' cooperation platform, promote integrated special road shows, project docking and other activities, and promote the integration and development of industrial industries in HTZs.

4.4. Strengthen the cultivation and construction of high-tech zone park

The cultivation and construction mainly focus on the following aspects. For existing high-tech zones in the

province, especially provincial-level high-tech zones, we should seize the opportunity to upgrade the construction of high-tech zones, make good use of national policy opportunities such as large-scale equipment updates, focus on expanding investment, promoting demand, helping enterprises, strengthening momentum, stabilizing expectations, and achieving new breakthroughs in the number of national level high-tech zones; We need to analyze the gaps between existing national high-tech zones, adhere to the direction of high-end, intelligent, green, and cluster development, and accelerate the construction of a modern industrial system; To support regions with potential, we should lead industrial innovation with technological innovation, cultivate and strengthen a group of advanced manufacturing clusters, small and medium-sized enterprise characteristic industrial clusters, and new industrialization industry demonstration bases, and build a reserve team for provincial-level high-tech zones. We must effectively focus on industrial operation. Forming a trend of upgrading provincial-level high-tech zones and competing for national high-tech zones.

5. Conclusion

The Shandong HTZ has achieved good results in the development of industrial economy under construction, but there are still some problems. Through accelerating the cultivation and optimization of HTZs, optimizing industrial structure, promoting balanced regional development and other measures, the high-quality development of industrial economy can be promoted in HTZs [9][10].

Acknowledgments

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