Research on the Current Status of Private Economic Development in Shandong Province and Pathways for Enhancing High-Quality Development

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Abstract: The Shandong Province Regulations on Promoting the Private Economy came into effect on January 1, 2026. These regulations aim to optimize the development environment for the private economy, ensure that private economic entities enjoy equal legal status, market opportunities, and development rights alongside other economic entities, and focus on the goal of building a modern industrial system during the 15th Five-Year Plan period. They encourage technological upgrades and transformation and upgrading of traditional industries, and support private economic entities in investing and starting businesses in strategic emerging industries and future industries. To promote the high-quality development of Shandong's private economy, an in-depth survey was conducted on several representative enterprises within the province. The study identified existing issues and shortcomings, proposing countermeasures and recommendations in three key areas: improving pathways for the commercialization of scientific and technological achievements, accelerating the transformation and upgrading of private enterprises, and establishing high-level scientific and technological innovation platforms. These recommendations provide valuable guidance and reference for advancing the development of private enterprises in Shandong Province.

The Opinions of the CPC Central Committee and State Council on Promoting the Development and Strengthening of the Private Economy suggests that the private economy is a vital force for advancing Chinese-style modernization, an important foundation for high-quality development, and an important force for promoting China's comprehensive building of a socialist modernizing power and achieving the second century's goal[1]. In the overall economic development of the private economy contributes more than 50% of the tax revenue, more than 60% of the GDP, more than 70% of the technological innovation results, more than 80% of the urban labor employment, as well as more than 90% of the number of enterprises, injecting vitality and impetus for China's economic development. However, we should also see that the fundamentals of China's economy have not changed in the long term, and the lack of targeted policy guidance and financial support and other factors on the road to the growth of the private economy have made its development face greater difficulties and pressures, and urgently need to pay attention to and rectify the situation.

1. Current status of private enterprise development in China

1.1 Overall size and innovation capacity

First, in terms of overall scale, the market mainstay of China's private economy has increased rapidly in the past five years. As of the end of 2022, the total number of private enterprises in China reached 51.064 million[2] , an increase of 142.9% compared with 21.021 million in 2018, and the total number of private enterprises accounted for 92.3% of all enterprises. **Secondly, in terms of regional distribution, China's private enterprises present the remarkable characteristics of dense in the east and sparse in the west, thick in the south and thin in the north**. By the end of 2022, the number of private enterprises in Guangdong was 6.776 million, ranking first, followed by Shandong, Jiangsu and Zhejiang, with 4.218 million, 4.004

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million and 3.230 million, respectively, with the four provinces accounting for 35.7%. **Thirdly, in terms of innovation capacity, the innovation capacity of private enterprises in China has been increasing.** 2022 the country's new authorized invention patents exceeded 100,000, 65% from private enterprises[3] . By the end of 2022, there were a total of 370,000 national high-tech enterprises, of which more than 350,000 were private high-tech enterprises, accounting for 94%. The number of national high-tech enterprises in Guangdong is 68,926, ranking first, with private enterprises accounting for 92.1%. Followed by Jiangsu, Zhejiang and Shandong, the number of national high-tech enterprises is 43,890, 33,805 and 26,789 respectively, with private enterprises accounting for 92.5%, 93.3% and 95.9% respectively.

1.2 List of Top 500 Private Enterprises in China

According to the 2022 list of China's Top 500 Private Enterprises published by the All-China Federation of Industry and Commerce, the current status of China's Top 500 Private Enterprises has been organized. **First, in terms of regional distribution, 60% of the top 500 enterprises are located in Zhejiang, Jiangsu, Guangdong and Shandong provinces**. In terms of provincial distribution, the largest number of China's Top 500 Private Enterprises are registered in Zhejiang, Jiangsu, Guangdong and Shandong, with 107, 92, 51 and 50 enterprises respectively, which together account for 60% of China's Top 500 Private Enterprises. In terms of regional distribution, the number of enterprises shortlisted in the Top 500 in the eastern, central, western and northeastern regions were 393, 60, 40 and 7 respectively, accounting for 78.6%, 12%, 8% and 1.40% respectively. **Second, the industrial structure, the top 500 private enterprises are still mainly in the secondary industry**. 500 industries, the number of enterprises in the primary industry was 4, the same as the previous year; the secondary industry was 342, an increase of 23 over the previous year; the number of enterprises in the tertiary industry was 154, a decrease of 23 over the previous year. Top 500 private enterprises are still mainly in the manufacturing industry, the number of enterprises 301, an increase of 24 over the previous year. In terms of industry distribution, the ferrous metal smelting and rolling processing industry has topped the industry list for many consecutive years, followed by comprehensive, construction, wholesale, electrical machinery and equipment manufacturing, computer and communication industries. **Third, the R & D investment, the top 500 private enterprises to further increase R & D investment, and continue to deepen the cooperation between industry, academia and research.** From the perspective of R&D investment intensity, there are 6 top 500 enterprises with greater than 10%, 74 enterprises with 3%~10%, 118 enterprises with 1%~3%, and 255 enterprises with less than 1%. In terms of industry-university-research cooperation, there are 420 top 500 enterprises cooperating with universities and research institutes, the number of enterprises cooperating in the form of project cooperation is 361, 197 enterprises have jointly built R&D institutions, and 72 enterprises have jointly built disciplines and specialties. **Fourth, on the total business income and total assets, the top 500 private enterprises to maintain the eastern part of the main, the central region grew significantly**. From the point of view of total business income, Zhejiang ranked first, 78762.85 billion yuan, accounting for 21.40% of the top 500; followed by Jiangsu, Guangdong, Shandong, business income of 60495.98 billion yuan, 6,512.886 billion yuan, 3,025.778 billion yuan, accounting for 18.4%, 10.2%, 10% respectively. From the point of view of total assets, Guangdong, Zhejiang, Beijing ranked the top three, respectively, 1,115,544,000,000,000 yuan, 722,248,500,000 yuan, 4,414,573,000,000 yuan, accounting for 26.79%, 17.35%, 10.6%. The total assets of the top 500 enterprises in Shandong amounted to 19786.35 billion yuan, accounting for 4.75%.

1.3 List of Top 100 Chinese Industrial Clusters and Typical Cases

According to the list of China's top 100 industrial clusters in 2023 published by the China Private Economy Research Association, the current situation of the private enterprises concerned has been organized. **First, the regional development of the top 100 clusters is unbalanced, with more than 70% distributed in the eastern region**. By region, 71 clusters are located in the eastern region, 19 in the central region, 9 in the western region, and only 1 in the northeastern region. Provinces, Jiangsu, Zhejiang, Guangdong, Shandong and other private economic activity in the area

of eye-catching performance, the most shortlisted clusters, respectively, 18, 17, 14, 8, four provinces accounted for more than 50% of the total. Midwest based on location characteristics, resource endowment, industrial base construction of industrial clusters, Anhui, Jiangxi were selected 7, 5, but the total amount and proportion is still low. **Second, the top 100 clusters focus on industry resources scattered, green development capacity to be improved**. From the industrial structure, the advanced manufacturing industry has become a new driving force, and the leading role continues to strengthen. High-end equipment, new energy vehicles, electronic information, biomedicine, integrated circuits, mainly high-end manufacturing industry accounted for nearly 40%. From the perspective of green and low-carbon, only 18 of the top 100 clusters have a green development level higher than the level of innovation capacity, and the number of green supply chains of private enterprises is 51, accounting for only 45.9% of the total number of clusters, much lower than the proportion of other key indicators. **Third, private enterprises in the top 100 clusters are active in innovation, becoming the engine of high-quality development**. There are 2,419 state-level specialized, special and new "small giants" in the top 100 clusters, accounting for 26.5% of the country, of which nearly 80% are private enterprises, totaling 1,935; and there are 44,765 state-level high-tech enterprises in the clusters, accounting for about 12.1% of the country, of which nearly 90% are private enterprises, totaling 39,248.

Case 1: Shanghai IC Industry Cluster

Development Achievements: Starting with chip manufacturing, Shanghai has built the most complete IC industry chain in China in Zhangjiang and Jiading, with layouts from IC equipments and materials to chip design, manufacturing, packaging, testing and even EDA and other sub-fields. The scale of Shanghai IC industry exceeds 250 billion yuan, accounting for about 25% of the country, with more than 1,000 key enterprises, attracting nearly 40% of the country's IC talent.

Typical practices: First, our project has established a synergistic and efficient industrial division system, namely the “Shanghai Collective.” The circuit industry chain fully participates in the distribution of the global value chain, forming an intra-chain. A system of integrating production factors with a clear division of labor among enterprises. Second, introducing and cultivating leading enterprises. Shanghai has gathered a number of large-scale enterprises that hold the dominant voice in the field, as well as "specialized, special and new" hidden champions in niche areas. In the field of automotive electronic chips, Shanghai has companies such as Black Sesame Intelligence, Horizon, UW Semiconductor and Broadcom. In the field of equipment and materials, the products of leading enterprises such as Sinomicro and Shengmei have the ability to gradually replace international products. Third, we are committed to building the Yangtze River Delta innovation cluster. Since the establishment of the "909" project in Pudong, Shanghai, the Yangtze River Delta region has a foundation for industrial synergy and high-quality development of innovation clusters. Under the industrial spillover effect, the Yangtze River Delta has gathered 50% of the design enterprises, 55% of the manufacturing enterprises and 80% of the packaging and testing enterprises in China.

Case 2: Suzhou Biomedical Cluster

Development Achievements: Biomedicine and high-end medical devices as one of the pioneer industries in Suzhou, after more than 10 years of development, the biomedical industry in Suzhou in 2022 to achieve the industrial output value of 218.8 billion yuan, with more than 3,800 enterprises, of which 32 are listed. Among them, innovative drugs are in the leading position in China, and the five indicators of biological drugs are the first in the country, with the total production capacity accounting for more than 30% of the country.

Typical practices: First, backed by Shanghai to attract phoenixes. Zhangjiang's small and medium-sized biomedical enterprises for the consideration of operating costs and "overflow" Shanghai, Suzhou clear biomedical industry development in a timely manner to seize the opportunity, the Park Management Committee to "shopkeeper spirit" for business services, attracting a large number of enterprises. Second, the financial "living water" watering. Biomedical industry incubation and cultivation is difficult, long cycle, high risk. The government guidance fund not only provides financial assistance, but also helps enterprises to obtain support from science and

technology policies and workplaces, which greatly alleviates the financial constraints in the early growth process of enterprises. Thirdly, the industrial ecology sets trees into forests. By vigorously introducing new enterprises that can improve and enrich the industrial chain, the park has been able to promote business synergy while retaining talents through enterprise exchanges and interactions, building a more diversified ecology and helping the park to give birth to more breakthrough innovative drugs.

2. Current situation of private enterprise development in Shandong Province

2.1 Basic information on private enterprises

First, in terms of overall scale, Shandong Province has vigorously cultivated market entities, continued to grow in volume and scale, and promoted the healthy, high-quality development of the private economy[4] . According to the data of Enterprise Search platform, as of April 2023, the market main body of private economy in Shandong Province reached 13,776,000 households, and the number of private enterprises reached 4,497,000 households. **Secondly, on the list of top 500 finalists**, the 2022 list of China's top 500 private enterprises shows[5] that a total of 50 enterprises in Shandong Province have been selected, ranking fourth among all provinces and municipalities in the country.The 50 enterprises on the list are mainly distributed in the areas of Dongying (14), Binzhou (7), and Zibo (5), while Dezhou, Heze, Rizhao, and Tai'an have only one on the list, and Zaozhuang and Liaocheng have no enterprises on the list.

2.2 Private enterprises' access to policy support

From the policy level, Shandong Province has continued to promote the optimization of the development environment for private enterprises in recent years, following the introduction of "Several Opinions of Shandong Provincial People's Government on Supporting the High-Quality Development of the Private Economy" (LUGF [2018] No. 26) in 2018, and then put forward to carry out the "Shandong Province to Promote the High-Quality Development of the Private Economy[6] in 2023 Top Ten Special Actions", and issued the "Supporting the Healthy Development of Private Economy Several Opinions on Supporting the Healthy Development of the Private Economy and High-Quality Development, coming up with 40 measures, focusing on stimulating the endogenous momentum of the development of private enterprises, and promoting the confidence of private enterprises.

3. Problems in the Development of Private Enterprises in Shandong Province

According to the list of Top 500 Chinese Private Enterprises in 2022 published by the All-China Federation of Industry and Commerce (ACFIC) and the Decision on Shandong Province Science and Technology Awards for the Year 2022, the development of private enterprises in Shandong Province is found to have three problems by benchmarking against advanced regions such as Suzhou, Zhejiang and Guangdong.

3.1 The number of leading enterprises is low, and the scale of private enterprises needs to be cultivated and strengthened

The private economy is the vital force to promote Chinese-style modernization, and is an important foundation for high-quality development. To seize the green low-carbon high-quality development of the construction of the pioneer zone, and fully promote the green low-carbon high-quality development of industry in Shandong, to increase the cultivation of private market players, and promote the high-quality development of the private economy is undoubtedly the subject of the meaning[7]. Especially in recent years, Shandong has always put the development of the private economy in an important position, launched a package of pragmatic initiatives to stimulate the enthusiasm of private entrepreneurs, and promote the private economy in Shandong to achieve a new round of great development and leap forward[8]. 2022 private economy to realize the value-added of 4.53 trillion yuan, accounting for 51.8% of the GDP; the total amount of imports

and exports of 2.46 trillion yuan, accounting for 73.7% of the province's total imports and exports; tax payments of 850,000 yuan; the total amount of tax payments of 850,000 yuan. 73.7%; tax payment of 850.9 billion yuan, accounting for 73.3% of all tax revenue, and absorbing more than 80% of the total employment population.2022 Shandong Province is only 50 finalists in the top 500 private enterprises, lower than 107 in Zhejiang, 92 in Jiangsu, and 51 in Guangdong.

3.2 Insufficient innovation vitality of private enterprises and an industrial structure that favors traditional heavy chemical industries

In terms of the number of foreign investments, as of December 2022, 50 private enterprises in Shandong Province had investments in the country, lower than 107 in Zhejiang and 92 in Jiangsu. Among the 50 enterprises shortlisted in the top 500, the focus is distributed in the petroleum, coal and other fuel processing industry (19), metal smelting and rolling processing industry (9), chemical raw materials and chemical products manufacturing industry (2), papermaking and paper products industry (2) and other traditional chemical industries, the lack of industry in the field of emerging industries, and the lack of industry discourse in the field of strategic emerging industries.

3.3 Science and technology awards for private enterprises are relatively small and need to be further improved

According to the Decision on Shandong Province Science and Technology Awards for the Year 2022, the analysis of the awards found that the following aspects need to be improved urgently. **The innovation competitiveness of private enterprises is insufficient**[9]**.** From the perspective of the main undertaking unit, among the 210 provincial science and technology award projects, private enterprises participated in 74 of them, of which only 26 were the main undertaking unit. **The distribution of private enterprises is uneven.** From the distribution of municipalities, in the 74 private enterprise awards, Jinan and Qingdao won the largest number of awards, respectively, 25 and 19. **Insufficient basic research capacity of private enterprises**[10]**.** The Provincial Natural Science Award, as the highest award in the field of basic research in Shandong Province, has 36 items in 2022, and none of the private enterprises won the award.

4. Countermeasures and Suggestions for the Development of Private Enterprises in Shandong Province

4.1 Optimizing the business environment and making up for the shortcomings of private enterprise innovation

First, it is necessary to build a "pro" and "clean" government-business relationship, to enhance the dynamics and quality of government services to private enterprises, to streamline the government approval process, to establish and improve the system of contacting economic organizations by provincial leaders, and to stimulate and promote entrepreneurship. Secondly, we should gradually lower the threshold of market access, give full play to the market regulation mechanism, strive to eliminate trade and monopoly barriers, and actively encourage and guide private investment. Third, we will establish a standardized and convenient government service environment, realize the digital transformation of government services through "Internet + government services", and provide convenient and efficient digital solutions for private enterprises. Fourth, improving the statistical system of the private economy, exploring simple and feasible ways and means of data and statistics, providing data support for the study of the situation and the formulation of policies, and exploring third-party assessment of the development environment for small and medium-sized enterprises.

4.2 Improving the mechanism for the transformation of scientific and technological achievements and assisting private enterprises in scientific and technological innovation

First, the top-level design of "demand-driven + problem-oriented" transformation of scientific and technological achievements has been established, and a sound integrated service platform for the transformation of scientific and technological achievements has been set up to provide

convenient channels for the application of scientific and technological achievements in the market. Secondly, we will actively promote the cooperation between private enterprises and universities and research institutes to expand the network of scientific and technological achievements transformation. The third measure is to establish a scientific and effective incentive mechanism to encourage enterprises to effectively carry out the transformation of scientific and technological achievements. Fourth, improve tax incentives such as additional deduction for R&D expenses to support the transformation of scientific and technological achievements by private enterprises.

4.3 Accelerating the industrial transformation and upgrading of private enterprises to create high-powered industrial clusters and innovation ecosystems

First, it has built a platform for the gradient cultivation of high-quality small and medium-sized enterprises, carried out precise cultivation and growth support for private enterprises, and promoted the solution of enterprise problems and needs. It has also built a digital platform for industrial governance, and formed a big data base of leading enterprises, investment database, investment project database, talent resource database and so on. Second, strengthen cooperation with domestic and foreign high-quality service organizations to provide targeted guidance and services for enterprise development by region and industry. Thirdly, we will improve the gradient cultivation system of high-quality small and medium-sized enterprises, including innovative small and medium-sized enterprises, specialized and new small and medium-sized enterprises, gazelle unicorn enterprises and specialized and new "small giants" enterprises, and implement the cultivation plan for backbone enterprises to take a leap of faith, growing enterprises to help them run with precision, and potential start-ups to be energetic and empowered. Fourthly, we will build a national-level SME digital transformation promotion center, and accelerate the construction of a six-in-one SME digital transformation service eco-system with alliances, associations, service platforms, operating companies, special funds, training bases and policy packages.

4.4 Accelerating industrial transformation and upgrading, creating high-energy industrial clusters and innovation ecosystems, and promoting green, low-carbon and high-quality development

The first is to optimize the industrial structure, accelerate the promotion of the quality and efficiency of the five advantageous traditional industries, such as high-end chemical industry, modern and efficient agriculture, cultural creativity, boutique tourism and modern finance, and cultivate and grow the five emerging industries, such as new-generation information technology, high-end equipment, new energy and new materials, modern ocean, and medical and health care, so as to promote the advancement of the industrial base and the modernization of the industrial chain. Secondly, according to the industrial characteristics and advantages of various places in the province, build a number of strategic emerging industry clusters and advanced manufacturing clusters with high agglomeration and rootedness, make forward-looking layout around future industries such as meta-universe, brain-like intelligence, quantum information, integrated circuits, hydrogen energy and energy storage and other cutting-edge science and technology and industrial change fields, guide high-quality resources to efficiently concentrate in the clusters, and build a system of gradient cultivation of industrial clusters at the world-level, national-level, and regional-levels. It will build a gradient cultivation system for world-class, national and regional industrial clusters, and establish an industrial cluster innovation alliance and an industrial cluster exchange and cooperation platform. Select high-quality service organizations to form a service resource pool to provide customized and precise services for the clusters. Thirdly, we will create an open collaborative innovation ecology, promote the integrated development of industry and talents, organize and implement talent introduction and cultivation plans, establish and improve the dynamic list of shortage talents, form talent research consortiums, and cultivate and gather more "high-precision, sharp and short" talents. It has built industrial cluster innovation and public service complexes, explored cross-cluster, cross-field and cross-region "talent enclave" service models, and promoted the accelerated incubation of innovative achievements.

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Declarations

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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