

A PEST Analysis of the Vegetable Industry in Shouguang

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Abstract: Taking the PEST analytical model as the research framework, this paper systematically dissects the external development environment of Shouguang's vegetable industry from four dimensions: policy, economy, society and technology. From the policy perspective, national, Shandong provincial, Weifang municipal and Shouguang municipal authorities have successively issued hierarchical supporting policies targeting rural revitalization, digital commerce-driven agriculture, and innovation in modern vegetable seed industries since 2018. A complete policy support system has been established to advance the iterative upgrading of the "Shouguang Model", fostering the development of digital agriculture, vegetable seed breeding and rural e-commerce. Economically, domestic residents are witnessing continuous consumption upgrading of vegetables and fruits, generating robust market demand for high-quality agricultural products. Meanwhile, Shouguang boasts solid local economic strength, a well-established full industrial chain for vegetables, emerging formats such as prefabricated dishes, prominent achievements in sci-tech-empowered agriculture and common prosperity, laying a stable economic foundation for industrial growth. Socially, Shouguang leads the nation in the scale of its vegetable seed industry; seed expos and industry-academia-research platforms keep improving, alongside a systematic cultivation system for new professional farmers that nurtures a large pool of skilled agricultural technicians. Technologically, Shouguang possesses abundant vegetable germplasm resources and multi-level high-end scientific research platforms, with smart facility agriculture and digital planting technologies based on the Internet of Things widely applied, delivering strong capacity for commercial transformation of scientific and technological achievements. Overall, favorable conditions across policy, economic, social and technological dimensions jointly underpin the modernization of Shouguang's vegetable industry. Its experience in seed breeding, digital agriculture, talent training and full industrial chain development can offer practical references for the coordinated advancement of vegetable industries in other regions.

Keywords: Shouguang Vegetable Industry, Rural Revitalization, Digital Commerce-driven Agriculture.

1. Introduction

As a characteristic and advantageous agricultural sector under China's rural revitalization strategy, the vegetable industry serves as a core driver to guarantee residents' stable supply of fresh produce, boost county-level economic revenue and advance the modernization transformation of agriculture. Renowned nationwide as the "Capital of Vegetables", Shouguang has cultivated the distinctive "Shouguang Model" through years of development. It ranks among the country's top regions in facility cultivation, vegetable breeding, agricultural product circulation and digital agriculture, acting as a typical model for high-quality development of the vegetable industry in northern China.

Against the backdrop of nationwide comprehensive rural revitalization, continuous industrial upgrading of agriculture, digital commerce-driven agriculture and seed industry revitalization, county-level vegetable industries across the country are embracing transformative development opportunities. To clarify the external development conditions underlying Shouguang's vegetable industry, accurately identify its developmental strengths and underlying supporting factors, this paper adopts the classic PEST analysis model to conduct in-depth research from four external environmental dimensions: Policy, Economy, Society and Technology. It sorts out supporting agricultural policies issued by authorities at national, provincial, municipal and county levels from 2018 to 2025, and analyzes changes in domestic consumption of agricultural products, local industrial and economic foundations of Shouguang, social resources covering seed breeding and talent pools, as well as the status of germplasm research and smart

agricultural technologies. This paper thoroughly unpacks favorable environmental factors for the growth of Shouguang's vegetable industry, summarizes its developmental advantages, and provides theoretical basis and practical references for the high-quality coordinated development of regional vegetable industries.

2. Political Environment

2.1. Overview of Agriculture-related Policies at National and Provincial Levels

Since 2018, central and Shandong provincial authorities have rolled out a series of top-level designs and implementation policies focusing on rural revitalization, agricultural modernization, digital commerce, county-level commerce and financial security. The Rural Revitalization Strategic Plan (2018–2022) issued in 2018 initiated the systematic arrangement for comprehensive rural revitalization. Subsequent annual Central Government No.1 Documents have kept prioritizing key tasks for comprehensive rural revitalization, framing it as the general guideline for agricultural and rural work in the new era. From 2023 to 2024, the state intensively released the Three-Year Action Plan for County-level Commerce (2023–2025) and the Three-Year Action Plan for Digital Commerce (2024–2026), taking digital commerce-driven agriculture as a core direction for county economic growth and rural e-commerce, so as to advance the digital upgrading of agricultural product circulation. Shandong Province has rolled out matching measures including the Administrative Measures for Financial Subsidy Funds for Consolidating and Expanding Poverty Alleviation Outcomes and Promoting Rural

Revitalization to strengthen fund guarantee and project supervision. From central overall planning to provincial implementation, a policy system centered on rural revitalization, empowered by digital commerce-driven agriculture, and backed by targeted funds and projects has taken shape, delivering a stable institutional environment for agricultural industrial upgrading and high-quality county development nationwide.

2.2. Modernization of Shouguang's Vegetable Industry Driven by Policy Implementation

Closely aligning with policy guidelines from superior authorities, Shouguang continues to upgrade the "Shouguang Model" with four core focuses: seed industry innovation, digital agriculture, brand quality and rural e-commerce. In policy execution, Shouguang implements requirements for innovative development of modern seed industries issued by Shandong Province and Weifang City, introducing municipal

supporting policies for vegetable seed breeding to reinforce independent breeding and grassroots agricultural technology extension. Relying on a high-tech demonstration base for modern agriculture, over 200 cutting-edge technologies and diverse modern greenhouse types are integrated for application, alongside the construction of 100-mu-scale intelligent glass greenhouses supported by IoT, big data and cloud computing for precise agricultural control. New quality productive forces in agriculture are cultivated via technological innovation. Meanwhile, seizing opportunities brought by digital commerce-driven agriculture and county-level commerce construction, Shouguang advances the Digital Shouguang Plan and high-quality development schemes for county economies to vigorously expand rural e-commerce. It has been accredited as a national demonstration county for rural e-commerce development, a national demonstration city for innovation and application of vegetable supply chains, and ranks high in the national list of top 100 counties for digital agricultural products.

Table 1. Sorting of Policies on Rural Revitalization and Agricultural Modernization Issued by National and Shouguang Authorities (2018–2025)

Release Time	Policy Document	Core Keywords
Sep 2018	Rural Revitalization Strategic Plan (2018–2022) (Document No. Zhongfa[2018]18)	Rural Revitalization
Jan 2021	Opinions of the CPC Central Committee and the State Council on Comprehensively Promoting Rural Revitalization and Accelerating Agricultural and Rural Modernization (Document No. Zhongfa [2021]1)	Rural Revitalization
Jun 2021	Administrative Measures of Shandong Province for Financial Subsidy Funds for Consolidating and Expanding Poverty Alleviation Outcomes and Promoting Rural Revitalization (Document No. Lucainong [2021]25)	Financial Subsidy
Jan 2023	Opinions of the CPC Central Committee and the State Council on Key Tasks for Advancing Comprehensive Rural Revitalization in 2023 (Document No. Zhongfa [2023]1)	Rural Revitalization
Jul 2023	Three-Year Action Plan for County-level Commerce (2023–2025) (Document No. Shangbanliutonghan [2023]419)	Rural Revitalization
Aug 2023	Three-Year Action Plan for County-level Commerce (2023–2025) (Document No. Shangbanliutonghan [2023]347)	Digital Commerce-driven Agriculture
Jan 2024	Opinions of the CPC Central Committee and the State Council on Effectively Advancing Comprehensive Rural Revitalization by Learning from the Experience of the "One Thousand Demonstration Villages and Ten Thousand Renovated Villages" Campaign (Document No. Zhongfa [2024]1)	Rural Revitalization
Apr 2024	Three-Year Action Plan for Digital Commerce (2024–2026) (Document No. Shangdianfa [2024]81)	Digital Commerce-driven Agriculture
Jan 2025	Opinions of the CPC Central Committee and the State Council on Further Deepening Rural Reform and Promoting Solid Comprehensive Rural Revitalization (Document No. Zhongfa [2025]1)	Rural Revitalization
Jan 2025	Plan for Comprehensive Rural Revitalization (2024–2027) (Document No. Zhongfa [2025]7)	Rural Revitalization
Shouguang Municipal Policies		
Mar 2021	Implementation Opinions of the General Office of Shandong Provincial People's Government on Accelerating the Innovative Development of Modern Seed Industries (Document No. Luzhengbanzi [2020]172)	Seed Industry Innovation
Jul 2021	Implementation Opinions of the General Office of Weifang Municipal People's Government on Accelerating the Innovative Development of Modern Seed Industries (Document No. Weizhengbanfa [2021]6)	Seed Industry Innovation
Jun 2023	Notice Issued by the General Office of Shouguang Municipal People's Government on Supporting Policies for Accelerating the Innovative Development of Modern Vegetable Seed Industries (Document No. Shouzhengbanfa [2023]18)	Seed Industry Innovation
Nov 2023	Digital Shouguang and Digital Government Development Plan (2023–2025) (Document No. Shouzhengfa [2023]15)	Digital Commerce-driven Agriculture
Sep 2024	Work Plan for High-quality Development of County-level Economy in Shouguang (2024–2025) (Document No. Shouzhengfa [2024]13)	Digital Commerce-driven Agriculture

3. Economic Environment

3.1. Upgraded Consumer Demand for Premium Vegetables Among Chinese Residents

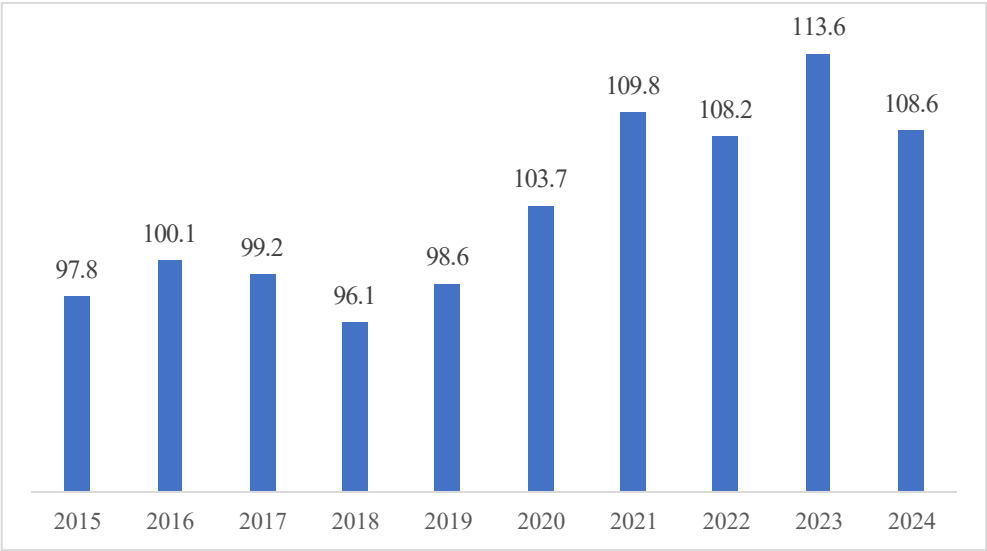


Figure 1. Per Capita Consumption of Vegetables and Edible Fungi by Residents (Unit: Kilograms), 2015–2024

Data Source: Compiled from 2025 National Bureau of Statistics data

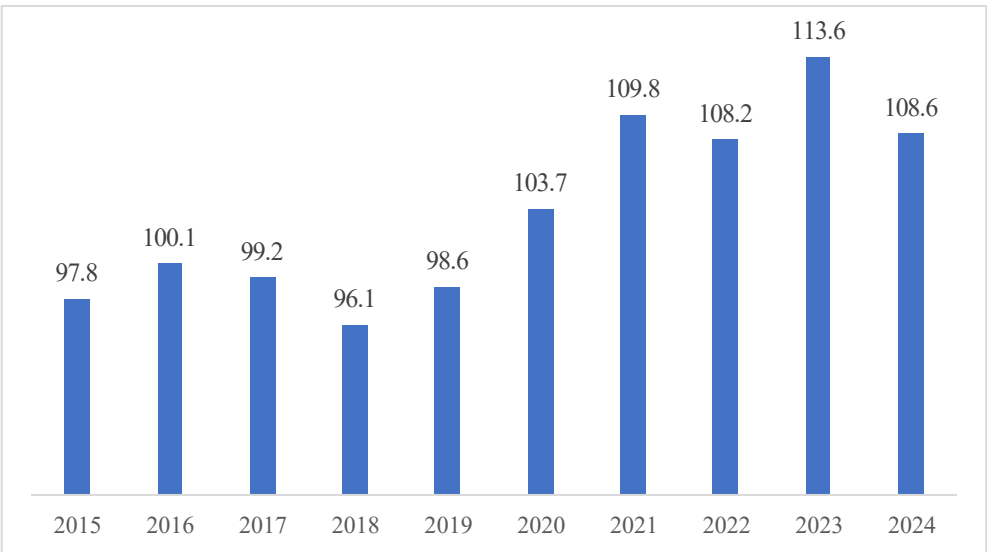


Figure 2. Per Capita Consumption of Fresh Fruits by Residents (Unit: Kilograms), 2015–2024

Data Source: Compiled from 2025 National Bureau of Statistics data

An analysis based on Figure 1 and Figure 2 reveals that per capita consumption of vegetables, edible fungi and fresh fruits among Chinese residents maintained an overall upward trend from 2015 to 2024, indicating prominent consumption upgrading. Residents show growing demand for fresh and high-quality agricultural products, with the consumption growth rate of fresh fruits far exceeding that of vegetables, which reflects the shift of dietary structures toward more nutritious and diversified diets. Meanwhile, vegetable consumption rose steadily, demonstrating rigid market demand for safe and premium vegetables.

3.2. Local Economic Conditions of Shouguang

(1) Robust Economic Strength

Shouguang achieved a regional GDP of 108.19 billion RMB in 2024, ranking 4th among county-level

in Shandong Province [1]. In the first three quarters of 2025, its total output value of agriculture, forestry, animal husbandry and fishery hit 22.693 billion RMB, topping the list in Weifang City, while online retail sales of agricultural products exceeded 730 million RMB.

(2) Complete Industrial Chain

Shouguang hosts 805 full-chain business entities and 147 large-scale agricultural product processing enterprises, generating a total annual operating revenue of 64.2 billion RMB. Industrial clusters for prefabricated dishes and cleaned vegetables have taken shape, covering 22 qualified enterprises with an annual processing capacity of over

400,000 metric tons, driving an annual income increase of more than 6% for local farmers. As the country's largest production and distribution hub for vegetables, Shouguang boasts 600,000 mu of vegetable planting areas with an annual output value of 11 billion RMB and annual trading volume of 20 billion RMB, laying an industrial foundation for the coordinated development of the Shouguang-Xinxian vegetable industry alliance.

(3) Sci-tech-empowered Agriculture

The China (Shouguang) International Vegetable Science and Technology Fair has been held for 25 consecutive years. Shouguang possesses 12 state-level R&D platforms, with 12 local standards elevated to national or industrial standards. It has independently developed 257 vegetable varieties, accounting for half of Shandong's total, breeds 1.8 billion seedlings annually (one quarter of the provincial volume), and owns 205 authorized plant variety rights. Forty-six provincial-level demonstration villages for harmonious rural revitalization have been built; Shouguang ranks first across Shandong in the provincial assessment of county-wide ecological rural revitalization, and has been accredited as a national demonstration county for agricultural mechanization and digital agriculture development. It provides technological and brand leadership for the coordinated development of the Shouguang-Shenxian vegetable industry.

(4) Remarkable Outcomes in Pursuing Common Prosperity

Collective economic income of 166 villages exceeds one million RMB each. The per capita disposable income of rural residents reaches 32,000 RMB, far above the national average. Shouguang is designated a provincial pilot county for common prosperity, with a narrower urban-rural income gap than national and provincial averages. Its practical experience in shared prosperity offers references for the coordinated wealth development of the Shouguang-Shenxian vegetable industry.

4. Social Environment

(1) Nation-leading Seed Industry

Shouguang ranks at the forefront of China's vegetable seed industry, serving as the country's largest seedling breeding base and a national regional base for improved seed propagation. It is home to 21 vegetable breeding enterprises, including 3 state-level integrated enterprises covering breeding, multiplication and promotion, and 7 provincial technological R&D centers. A total of 290 self-developed vegetable varieties have been cultivated, making up half of Shandong's aggregate volume. The annual seedling breeding capacity hits 2 billion plants, creating an output value exceeding 1 billion RMB [2].

The International Vegetable Seed Industry Expo has run for 22 sessions consecutively, forming a pivotal nationwide platform for seed exchange and new variety promotion. Cumulatively, 6,586 exhibitors have participated, displaying 65,000+ varieties and selecting 1,179 premium cultivars. Industry-university-research cooperation platforms are under construction, with plans to build four first-class domestic centers for vegetable breeding, achievement transformation, processing and seedling propagation by 2030 to advance national seed industry revitalization.

(2) Cultivation of Professional New Farmers

Shouguang has established a multi-dimensional system for talent training and evaluation. In collaboration with human resources authorities, it implements professional title assessment for farmers and sets up a technical evaluation

system for local rural talents, covering 26,000 certified agricultural technicians across the city. The "Jia Sixie New Farmers Alliance" has been founded, recruiting over 300 technical personnel to build a socialized service and exchange platform for agricultural talents, enabling the replicable promotion of the "Shouguang Model".

Institutional guarantees are provided via the Measures for Selection and Administration of Shouguang Rural Stars. Key cultivation projects include 30 leading figures for rural industrial revitalization, 4,861 high-caliber farmers and 74 Shouguang Rural Stars. In total, 43 individuals have been named Weifang Rural Stars, 42 Shandong Qilu Rural Stars, and 19 included in the "Aiwei Youwei (lit. 'Talented Youths Empowering Weifang') program for new farmers. A high-quality agricultural talent team has been assembled to underpin rural industrial revitalization and comprehensive agricultural upgrading [3].

5. Technological Environment

(1) Industrial Empowerment via Breeding Technology

Shouguang has laid a solid foundation for germplasm resource conservation and utilization, delivering core support for collaborative innovation in seed breeding between Shouguang and Shenxian. It operates the largest county-level vegetable germplasm gene bank nationwide, conserving more than 26,000 germplasm accessions. Leading enterprises have built commercial breeding systems and developed a considerable number of proprietary varieties, effectively realizing import substitution for vegetable seeds and capturing market share in the high-end seed sector.

(2) Reinforced Scientific Research Backing

Shouguang boasts outstanding scientific research platforms and technological breakthrough capacity to facilitate technological collaboration in the Shouguang-Shenxian vegetable industry. High-end research institutions such as the CAAS Shouguang Vegetable R&D Center are stationed locally, alongside 7 provincial-level enterprise R&D centers and specialized laboratories for molecular biology and cell engineering. A sound grassroots agricultural technology extension system accelerates the conversion of scientific outcomes into new quality productive forces.

(3) Demonstrative Smart Planting Systems

Shouguang takes the lead in smart agriculture and facility agriculture, offering mature demonstration models for joint construction of industrial parks between Shouguang and Shenxian. Traditional agriculture is digitally and intelligently renovated, covering 18 key vegetable parks spanning 23,000 mu. A high-tech demonstration base for modern agriculture integrates over 200 cutting-edge technologies and more than 10 types of modern greenhouses. Shouguang-style intelligent glass greenhouses incorporate 120+ patented technologies, supporting full-process precise management via IoT, big data and cloud computing. Over 300 advanced technologies including greenhouse drip irrigation, intelligent temperature control and bumblebee pollination have been popularized across the city, placing Shouguang among the nation's top regions for modernized facility agriculture.

6. Conclusion

This paper adopts the PEST model to analyze the developmental environment of Shouguang's vegetable industry. Multi-layered agricultural policies issued by authorities from central to local levels continuously empower

industrial digitalization and seed industry upgrading. Upgrading domestic demand for fresh agricultural products expands market space for premium vegetables, while Shouguang's robust local economy and complete industrial chain serve as solid underpinnings. The region's leading seed industry and sufficient reserve of professional new farmers, combined with a comprehensive scientific innovation system supported by germplasm gene banks and smart agricultural technologies, jointly forge the core competitiveness of Shouguang's vegetable industry. Its replicable developmental experience can provide demonstrative references for coordinated regional vegetable industry growth and national agricultural modernization.

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