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# Current Status and Suggestions for Agricultural Production in Wucheng Town, Dezhou City, Shandong Province

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***Abstract:*** *Wucheng Town, located in Dezhou City, Shandong Province, is situated on the North China Plain and boasts abundant natural resources and favorable climatic conditions, providing an exceptional environment for agricultural production. As a typical agricultural township, Wucheng Town's agricultural sector is characterized by the following features: staple crops such as wheat and corn dominate, with a relatively rational planting structure; the variety of vegetable crops is limited, with a focus on low-value-added vegetables and underdeveloped infrastructure; rural specialized cooperatives are not well-organized, and land fragmentation is severe; the overall age of farmers is relatively high, with low educational levels, posing challenges for the adoption of new agricultural technologies. Based on the above findings, this paper proposes the following countermeasures and suggestions: strengthen technical training for farmers to improve their scientific and technological literacy; develop a distinctive vegetable industry and brand to promote diversified income growth for farmers; facilitate land transfer and large-scale operations to attract more young laborers to return home and start businesses, thereby providing a foundation for rural revitalization in Wucheng Town. Additionally, agricultural infrastructure needs improvement, agricultural production models require innovation, and avenues for increasing farmers' income need to be expanded.*

***Keywords:*** *Wucheng Town; Agriculture; Current Situation of Production; Suggestions*

## 1. Introduction

The report of the 20th National Congress of the Communist Party of China explicitly proposed to comprehensively advance rural revitalization, accelerate the construction of an agricultural powerhouse, ensure food security, and promote high-quality agricultural development. As an important vehicle for rural revitalization, the development of agriculture in townships should be driven by technological innovation, optimizing the industrial structure, and enhancing the level of agricultural modernization. By strengthening the construction of high-standard farmland, promoting green agricultural technologies, and developing the processing industry of characteristic agricultural products, township agriculture can achieve a transformation from traditional production to efficient, ecological, and sustainable modern agriculture. At the same time, deepening the reform of the rural land system, cultivating new types of agricultural business entities, and promoting the organic connection between small farmers and modern agriculture are key pathways to achieving increased income for farmers and enhanced efficiency in agriculture.

As the foundational industry of the nation, agriculture has always held a pivotal position in economic and social development. In recent years, the state has placed great emphasis on the issues concerning agriculture, rural areas, and farmers, continuously increasing support for agriculture and introducing a series of policies to strengthen, benefit, and enrich agriculture. Under the powerful impetus of these policies, the level of agricultural modernization in China has significantly improved. However, the development of agriculture in various township areas is influenced by factors such as resource endowment, economic foundation, and technological application capabilities, resulting in considerable disparities. Delving into the current state of township agriculture and comprehensively understanding its level of development, challenges, and opportunities are crucial for formulating development strategies tailored to local conditions and promoting high-quality development of township agriculture..

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## 2. Current Status of Domestic Research

Agriculture, as the foundation of the national economy, has consistently been a focal area of research within the country. With the development of the social economy and the advancement of technology, domestic scholars have conducted in-depth research on agriculture from various perspectives, yielding abundant results that provide strong theoretical support and practical guidance for the modernization of agriculture and the revitalization of rural areas.

Chen Jin [1] focused on strawberry sales in Jiangsu Province, conducting a thorough comparison between traditional and modern sales channels. He discovered that modern sales models, such as "farmers + e-commerce platforms + consumers" and "farmers + cooperatives + enterprises + consumers," offer significant advantages to growers. Li Dongxue [2], after investigating the radiation area of the Luan County Baixin Peanut Planting Professional Cooperative, found that farmers' willingness to participate in cooperatives is deeply influenced by various factors. Li Zeyuan [3] proposed a series of recommendations to promote the willingness of vegetable growers to utilize straw resources in Shandong Province, based on the total amount and current utilization status of vegetable straw. In terms of organizational models, she suggested constructing a straw collection model centered around straw brokers, individual farmers, and large-scale vegetable growers, with cooperatives serving as the link to improve collection efficiency. Lei Zenghui's [4] field research in Dengfeng City revealed that the rural population is experiencing a trend of fewer children, empty nesting, and aging, with the degree of rural population aging continuously deepening. This phenomenon has a significant impact on rural land transfer. Zeng Hao's [5] investigation and analysis of the development of the "one village, one product" characteristic agriculture in Wuhua County, Guangdong Province, found that the local area has achieved remarkable results after several years of development. Meng Jingyi [6] pointed out that digital technology plays a significant role in enhancing the total factor productivity level of agriculture.

## 3. Overview of the Study Area

Wucheng Town is located in the central-eastern part of Wucheng County, bordering Encheng Town of Pingyuan County to the east, Xiajin to the south, Jiamaying Town and Lijiahu Town to the west, and Luquantun Town and Haowangzhuang Town to the north. The town covers a total area of 150 square kilometers, with a cultivated land area of 8,631.28 hectares. The main crops grown include wheat, corn, and cotton. In 2023, the total agricultural output value reached 594 million yuan, and the total grain output reached 169,000 tons. Wucheng Town administers 73 administrative villages with a total population of 56,000 people. In 2020, it was awarded the title of "2020 Shandong Provincial Strong Agricultural Industry Town" by the Department of Agriculture and Rural Affairs of Shandong Province.

## 4. Experimental Methods and Data Sources

The data utilized in this study were derived from a questionnaire survey conducted on the agricultural conditions of Wucheng Town, Dezhou City, spanning from March 2023 to October 2023. The survey employed a stratified random sampling method, dividing Wucheng Town into eight districts, from which 25 to 30 farming households were selected for the questionnaire survey in each district. A total of 220 questionnaires were distributed, with 210 returned, yielding a response rate of 95.45%. After discarding incomplete questionnaires and those with logical inconsistencies, 201 valid questionnaires remained, resulting in an effective questionnaire rate of 95.71%. Consequently, 201 farmer questionnaires were selected as the research sample. The survey questionnaire primarily encompassed basic information of the growers, costs and benefits of cultivation, production characteristics, and institutional policies.

## 5. Current Status of Agricultural Production in Wucheng Town

### *5.1 Main Crop Cultivation Status in Wucheng Town*

By visiting the government to obtain information on the cultivation of main crops, it was found that in 2024, Wucheng Town planted the largest area of wheat, amounting to 137,579.51 mu, followed by corn with 135,783.49 mu, and cotton with 2,576.64 mu. Wheat and corn are important grain crops in China and are easy to manage, which is why almost all the land in Wucheng Town is used to cultivate these two crops. The planting area for these crops remains relatively stable each year.

ISSN 2616-5910 Vol. 6, Issue 1: 47-52, DOI: 10.25236/AJALS.2025.060107

### *5.2 Output Value Status of Main Crops in Wucheng Town*

Through visits and research conducted with cooperatives and large-scale growers, the output value of crops has been statistically analyzed. The average yield of wheat is 563.50 kg/mu, with a planting cost of 740.00 yuan. The planting costs mainly include seed expenses, fertilizer costs, pesticide costs, irrigation fees, mechanical operation fees (plowing, sowing, harvesting), and labor costs (spraying). Based on the average wheat price of previous years, the net profit of wheat is calculated to be 499.70 yuan/mu, with a cost-profit ratio of 67.53%. The average yield of corn is 713.89 kg/mu, with a planting cost of 680.00 yuan. The planting costs mainly include seed expenses, fertilizer costs, pesticide costs, irrigation fees, mechanical operation fees (sowing, harvesting), and labor costs (spraying). Based on the average corn price of previous years, the net profit of corn is calculated to be 619.28 yuan/mu, with a cost-profit ratio of 91.07%. The average yield of cotton is 330.52 kg/mu, with a planting cost of 906.00 yuan. The planting costs mainly include seed expenses, fertilizer costs, pesticide costs, mechanical operation fees (sowing, harvesting), and labor costs (spraying, pruning, harvesting). Based on the average cotton price of previous years, the net profit of cotton is calculated to be 416.08 yuan/mu, with a cost-profit ratio of 45.92%.

### *5.3 Cultivation Area of Growers in Wucheng Town*

By visiting the Agricultural Technology Station of Wucheng Town, the cultivation area of 9,536 households in the town was obtained, and the data was statistically summarized. The data shows that the growers in Wucheng Town are mainly engaged in small-scale cultivation, with each household's cultivation area generally allocated according to the number of family members. The majority of households, 8,539 in total, accounting for 89.54%, have cultivation areas ranging from 0 to 19 mu. The next group, with cultivation areas between 20 and 49 mu, consists of 782 households, accounting for 8.20%, primarily managing land on behalf of relatives and neighbors. The range of 50 to 199 mu mainly includes individual contractors and small cooperative cultivation models, with 99 households cultivating 50-99 mu, accounting for 1.04%, and 68 households cultivating 100-199 mu, accounting for 0.71%. The smallest group, with cultivation areas of 200 mu and above, consists of 48 households, accounting for 0.51%, mainly involving agricultural cooperatives that transfer farmers' land for mechanized management.

In summary, the growers in Wucheng Town are predominantly engaged in small-scale cultivation, with generally small-scale land transfers. There are differences in the amount of land contracted by large-scale growers, and there are relatively few large-scale contractors with extensive land holdings.

### *5.4 Vegetable Cultivation Status in Wucheng Town*

As a major agricultural town, Wucheng Town primarily cultivates grain crops, with a relatively small overall scale of vegetable cultivation. Relevant data obtained from the Agricultural Technology Station of Wucheng Town is as follows: the total vegetable cultivation area is 205 mu, with the top three crops being green onions, cabbage, and peppers. The cultivation area for green onions is 95 mu, for cabbage is 60 mu, for peppers is 34 mu, and for Chinese cabbage is only 16 mu. Green onions are planted from May to June and harvested from September to October, after which cabbage or autumn Chinese cabbage is planted. Peppers are planted from mid-March to early April, with one crop per year, and the land is left fallow for several months after harvest from August to September.

## 6. Research on the Basic Situation of Agricultural Production and Management System

### *6.1 Gender of Growers*

In Wucheng Town, the majority of farmers engaged in agriculture are male. In the gender distribution of the sample, there are 152 males, accounting for 75.62% of the total, and 49 females, accounting for 24.38%. Additionally, during the questionnaire survey process, it was observed that males are often the heads of households and are more familiar with the cultivation situation than females. Therefore, more males than females were willing to fill out the survey questionnaires.

### *6.2 Age of Growers*

A survey was conducted on the age structure of the farming population. The number of respondents

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aged 20-29 was 5, accounting for 2.49%, and the number of respondents aged 30-39 was 23, accounting for 11.44%. Villagers in the age group of 20-39 mostly go out for work or further education and are unwilling to engage in traditional agricultural cultivation work. A total of 28 respondents in this age group account for 13.93% of the overall sample. The majority of farmers are distributed in the age group of 50-59, with a proportion of 40.30%, mostly middle-aged people, followed by those aged 40-49, with a proportion of 27.86%. A total of 137 respondents aged 40-59 account for 68.16% of the overall sample. There are 36 people aged 60 and above, accounting for 17.91%. This indicates that in the agricultural production of Wucheng Town, most of the cultivation is done by middle-aged and elderly people, while the local young and middle-aged people are mostly engaged in non-agricultural production.

### *6.3 Educational Level of Growers*

The overall educational level of the sampled growers is not high. The educational background of the growers is mainly concentrated at the primary school level and below, with 92 individuals, accounting for 45.77%. This is followed by junior high school education, with 61 individuals, accounting for 30.35%. The proportions of those with high school or technical secondary school education and college education and above are relatively small, at 19.40% and 4.48%, respectively.

### *6.4 Willingness to Transfer Land*

The willingness of growers in Wucheng Town to transfer land is distinctly divided. Approximately 60.2% of the growers, due to their rich farming experience and deep emotional and economic dependence on the land, are concerned about the income, rights protection, and uncertainties after the transfer, and are unwilling to transfer their land. This reflects the traditional farmers' lack of understanding of the policy and their concerns about risks. About 25.87% of the growers hold a neutral stance, influenced by policies, the effects of surrounding land transfers, market conditions, and other factors. If guidance and publicity are strengthened, they could potentially become a force for land transfer. Only about 8.95% of the growers are willing to transfer their land, and 4.98% are very willing to do so, with the two groups combined accounting for 13.93% of the total. One group consists of young, highly educated growers who hope to improve the efficiency of modern agricultural production through land transfer. The other group includes elderly growers who, due to physical or health issues, wish to obtain stable subsidies through land transfer. Overall, the attitudes of the growers reflect the challenges and opportunities in the transition from traditional to modern agriculture. To promote the land transfer policy, it is necessary to increase publicity and guidance to alleviate farmers' concerns, while providing differentiated support for different willingness groups, such as offering technical and financial support to young growers and designing pension security mechanisms for elderly growers.

### *6.5 Farmland Irrigation Methods*

In Wucheng Town, farmland irrigation is predominantly traditional, with insufficient application of modern technology. Mechanical river water irrigation accounts for 59.70% and is the primary method. Water is supplied by the water conservancy department, and villagers use tractors and other means for irrigation. Although this method meets the demand, it is inefficient, energy-consuming, and labor-intensive, requiring significant human and time investment during peak irrigation periods. Well water electric irrigation accounts for 37.31%, relying on groundwater extraction. Long-term use can lead to environmental issues such as declining groundwater levels and land subsidence, raising concerns about sustainability. Modern water-saving irrigation technologies like sprinkler or drip irrigation account for only 2.99%. These technologies are water-efficient, highly effective, and provide uniform irrigation, improving water resource utilization and reducing labor input. Currently, traditional irrigation models dominate in Wucheng Town, with limited application of modern technologies, which affects agricultural production efficiency and quality and is not conducive to the sustainable use of water resources. Relevant departments should allocate funds for the construction, improvement, and maintenance of modern irrigation technologies.

### *6.6 Analysis of Seed Purchase Situation*

In terms of seed selection channels, farmers have a high level of trust in the seeds recommended by the township agricultural technology stations, with the largest proportion of farmers, 54.23%, choosing to purchase the varieties recommended by these stations. This indicates that township agricultural

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technology stations play a crucial guiding role in agricultural production. In contrast, since most vegetable seeds and corn seeds sold are F1 hybrids, farmers cannot save seeds themselves. Only some wheat varieties are conventional, so the proportion of farmers choosing to save their own seeds is the smallest, at only 5.47%. Self-saved seeds grow unevenly and have poor stress resistance, unable to meet the production needs of modern agriculture. Additionally, 15.42% of farmers choose to buy seeds from familiar stores, possibly preferring to rely on long-term seed suppliers to ensure the reliability and stability of the seeds. Meanwhile, 24.88% of farmers select seeds based on past planting experiences, indicating that some farmers place more emphasis on their practical experience and tend to choose varieties that have performed well in the past.

Overall, the data shows that township agricultural technology stations play a vital role in agricultural production, with their recommended seeds gaining the recognition of the majority of farmers. Seed selection directly affects crop yield and quality, and modern agriculture's reliance on scientific planting and high-quality seeds means that relevant government departments should increase the promotion and demonstration of advanced agricultural technologies and strengthen the supervision of seed quality. This ensures that farmers can purchase the genuine seeds they desire and learn scientific planting techniques.

## 7. Conclusions and Suggestions

In the current agricultural production landscape of Wucheng Town, wheat and corn serve as the primary crops, complementing each other to form a relatively rational planting structure. This structure not only ensures a stable supply of grain but also aligns with the local climate, soil, and other natural conditions. However, upon a deeper analysis of the agricultural status in Wucheng Town, several issues emerge. The relatively low comprehensive quality of growers is a prominent problem, as many lack systematic and professional agricultural knowledge, limiting their ability to adopt new planting technologies and management concepts, which significantly hinders the promotion and application of advanced agricultural techniques.

The phenomenon of land fragmentation is extremely severe, with a large amount of land divided into small, scattered plots, making it difficult to carry out large-scale, intensive modern agricultural production. Most growers engage in small-scale cultivation, constrained by traditional beliefs and a lack of understanding of land transfer policies, resulting in a low willingness to transfer land. This prevents the efficient integration and utilization of land resources.

The variety of agricultural products is relatively limited, primarily focusing on basic crops such as wheat and corn, with a lack of diverse supplementary specialty products, making it difficult to gain higher profits through differentiated advantages in market competition. Rural specialized cooperatives also face management issues, with inadequate internal operational mechanisms, a lack of scientific organizational structures, and standardized management processes, preventing them from fully leveraging their role in integrating resources, serving farmers, and connecting with the market.

The backwardness of agricultural infrastructure is another critical factor constraining agricultural development. Traditional irrigation methods still dominate, leading to severe water waste and low irrigation efficiency, making it difficult to meet the precise water requirements of crops at different growth stages. In the seed selection process, growers mainly rely on recommendations from township agricultural technology stations, lacking the ability and channels to independently select high-quality seeds, which to some extent affects crop yield and quality. Notably, among the existing crops, corn has the highest output value in Wucheng Town's agricultural system, with its economic benefits significantly surpassing those of wheat and cotton, providing a reference direction for future adjustments in planting structure and the enhancement of overall agricultural efficiency.

To advance the agricultural development of Wucheng Town, a multi-pronged approach is imperative. On one front, efforts must be concentrated on elevating the caliber of cultivators. This can be achieved by intensifying vocational skills training, establishing exemplary guidance mechanisms, and furnishing informational and service support to enhance their professional aptitude, thereby facilitating the dissemination and adoption of agricultural technologies. Concurrently, measures should be taken to entice the younger workforce back to the fields. By ameliorating agricultural production conditions, augmenting economic benefits, and providing policy support and services, fresh vigor and innovative capacity can be infused into agricultural production.

On another front, expediting land transfer and scale management is crucial. By bolstering

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promotional guidance, refining the service system, and innovating transfer modalities, the scale and intensification of agricultural development can be promoted, thus elevating production efficiency. Attention must also be directed towards specialty agriculture and brand building. Through market research, meticulous selection of varieties, introduction of technology, brand creation, and expansion of marketing channels, the added value and market competitiveness of agricultural products can be enhanced.

Furthermore, increasing investment in agricultural infrastructure construction, extending the industrial service chain, developing rural tourism, and promoting the integration of the primary, secondary, and tertiary industries will amplify comprehensive benefits. Looking ahead, the agricultural development of Wucheng Town must closely align with the strategic arrangements of the 20th National Congress of the Communist Party of China, focusing on digitalization and intelligentization as pivotal points to propel the upgrading of the entire agricultural industry chain. This will enable the realization of scaled, standardized, modernized, and branded agricultural production, thereby strengthening the market competitiveness of agricultural products.

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