

Research and Strategic Planning on the Growth of the Modern Agricultural Sector in Taizhou City's North Ecological Economic Belt

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Abstract

China is a traditionally agricultural nation with an industrial structure that is mostly centered on farming. But there aren't many high-quality agricultural products, and agricultural products have a low technology component. Building agricultural industrial belts can take full use of the structural traits of the agricultural industries and boost agricultural industrialization's competitiveness. However, the development of agricultural industrial parks has also brought to light several pressing issues that demand attention and resolution. Therefore, in order to ensure the modern agricultural industry's healthy development, it is imperative to study sustainable planning. This study is based on the North Ecological Economic Belt of Taizhou City's resource endowment, geographical characteristics, industrial advantages, economic condition, and development foundation by examining in depth the geographic features, natural resources, socioeconomic situation, and level of agricultural development of the proposed location, briefly summarizing the benefits and drawbacks of developing in the projected area, relying on the local culture, the rural landscapes, and the resources of the metro area nearby, focusing on thoroughly displaying regional traits, embracing rural value, capturing regional culture, and methodically boosting product quantity, quality, and efficiency and making a plan of action for the development of modern agriculture production in the northern ecological economic region of Taizhou City. The findings of the study will help direct how agricultural modernization in the area will progress going forward.

Keywords

Ecological Economic Zone, Agricultural Industry Planning, Yangtze River

1. Introduction

The 14th Five Year Plan is the beginning of a new journey to fully modernize the nation as a socialist state (Xi, 2020). It is also a crucial time for the historical reorientation of the “three rural” work to fully support rural revitalization and hasten agricultural and rural modernization (Lin, 2003). The central government has recommended to emphasize the growth of rural and agricultural communities, to actively support rural rejuvenation, and to hasten the modernization of rural and agricultural communities (Wang & Su, 2017). This is a once-in-a-life-time opportunity for Taizhou’s rural and agricultural growth, as well as an unmatched wonderful historical mission (Hu & Bian, 2023). It is crucial to scientifically prepare a new roadmap for modernizing agriculture and rural development in Taizhou City during the 14th Five Year prepare period in order to address the new circumstances, tasks, and challenges of agricultural and rural development in the new era (Gao, 2022).

Planning the agricultural sector scientifically is crucial since it will increase the brand value of the planning region. The region’s resource background is still unclear, and the industrial growth is chaotic, which is the current issue. Clarifying the current status of the endowment of local resources, the local distinctive contemporary agricultural industry, and the future development direction is important prior to performing scientific planning. This is the only method to accomplish systematic and scientific progress.

2. Analysis of Basic Conditions

2.1. Analysis of Location Conditions

As shown in **Figure 1**, the Hailing District, which is part of the economic belt and is situated in Jiangsu Province’s hinterland at the confluence of the Yangtze River Delta and the Lixia River Plain, is bordered to the west by Jiangdu, to the north and east by Jiangyan District, and to the south by Gaogang District. It is a key node in the Jiangsu coastal and riverside T-shaped economic belt and is situated at the intersection of the coastline and Yangtze River “T” shaped industrial belts. It is a transportation hub that links southern and northern Jiangsu, making its economic location crucial. It also connects Shanghai and Nanjing, two significant economic circles in the east and west, respectively (Zhang, 2023).

The exterior transportation position of Hailing District is reachable from all directions, as depicted in **Figure 2**. The Beijing Shanghai Expressway, National Highway 328, the Ningqi Railway, and five rivers to sea rivers in Suzhong, which intersect here, are all modes of land transit. It serves as a key intersection for the province’s transportation network of roads, railroads, and waterways. A half-hour drive will get you to Yangzhou Taizhou International Airport, which is just over

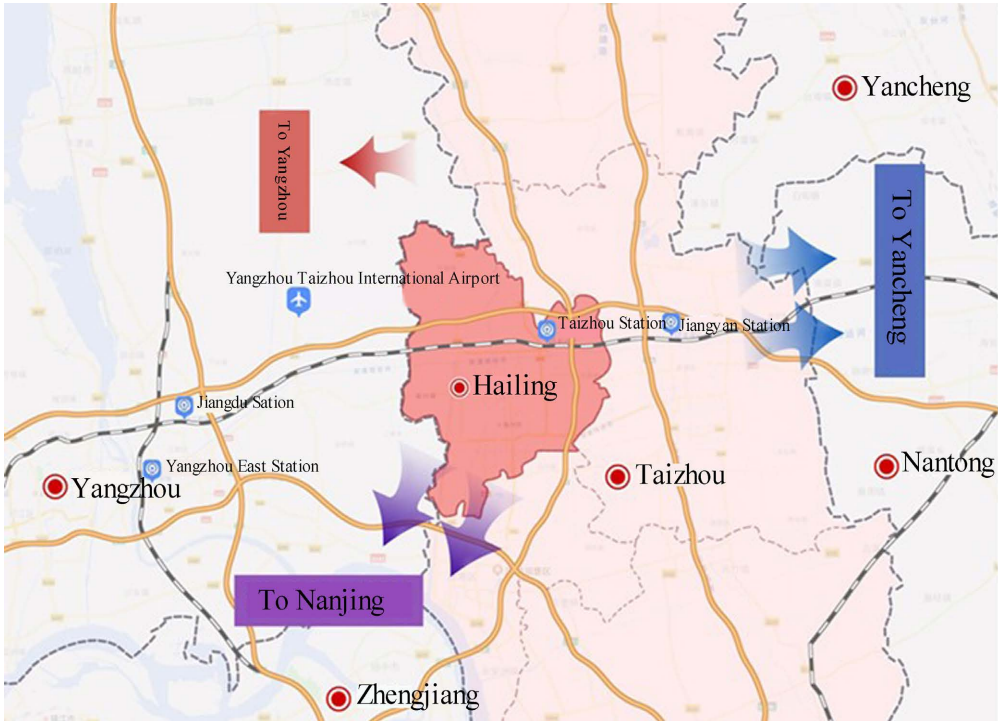


Figure 1. Chengbei ecological economic belt and its adjacent areas in Taizhou city.

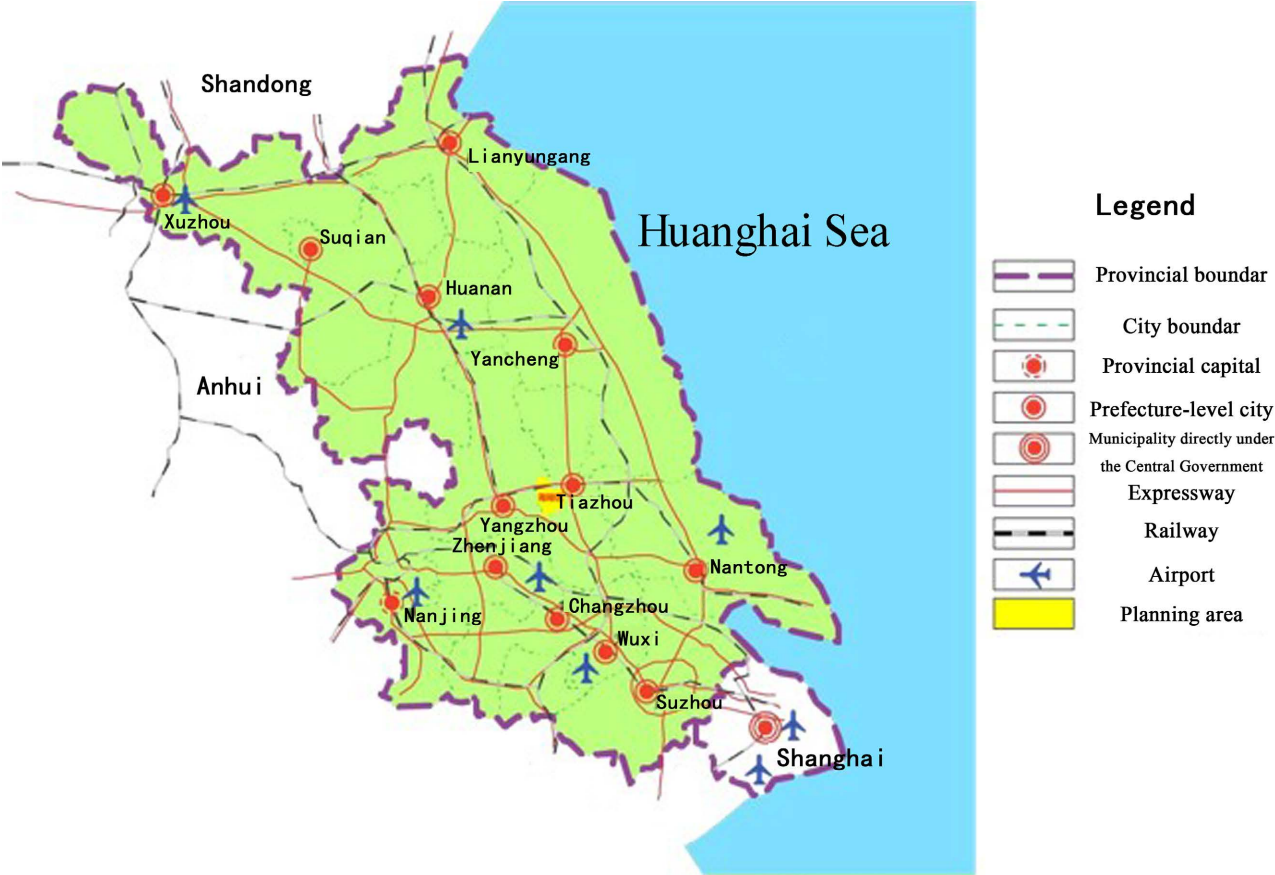


Figure 2. Location and traffic diagram of the northern ecological economic belt in Taizhou city in Jiangsu Province.

ten kilometers to the west of Hailing District, making the aviation circumstances there very favorable as well. Driving times from Hailing District to Nanjing and Shanghai are respectively 2 and 3 hours and 100 and 200 kilometers. With the development of the Yantai Xichang Yibin Railway and the North Yangtze River High Speed Railway, Hailing's position advantage will become more pronounced in the future, and the distribution function will develop day by day (Jiang et al., 2019).

The Yantai Wuxi Changyi Railway runs through the proposed region. Both Taizhou West Station and Taizhou Station on the Ningqi Railway are located in the planned region and have access to Nanjing, Yangzhou, and other locations. An economic ring road network is made up of the Qiyang Expressway, Fuli Expressway, S231 and S353 motorways. The Xintongyang Canal joins the Hanting River and Taidong River, creating a dispersed water system and river layout that supports the growth of the agricultural industry in the economic belt. The transportation of agricultural products has laid a solid foundation.

2.2. Natural Resources and Environment

Hailing District has four distinct seasons, a long frost-free season, a lot of heat, and a lot of precipitation. It is in the northern subtropical humid monsoon climatic zone. With an average annual precipitation of 1049.1 millimeters and an average annual rainfall of 116.3 days, the average annual temperature ranges from 13.9°C to 15.7°C. The maximum yearly precipitation was 1694 millimeters, and the lowest annual precipitation was 395.5 millimeters. There is a large inter-annual variance in precipitation. The spring rainy season lasts from mid-April to early-May, the plum rainy season lasts from mid-June to early-July, and the typhoon season lasts from mid-August to mid-September (Tian et al., 2014).

The Yangtze River Delta Plain is located in the southern portion of Hailing District, which is separated from the northern Lixia River Plain by the Tongyang Highway. Both are buried in geologically old Quaternary deposits. The entire region has flat topography with high points in the south and low points in the north. The south is primarily flat, although the north has a substantial river system. The elevation of the ground ranges from 2.6 to 5.5 meters, with Yuefu being the highest point at 20.28 meters. Tidal soil and paddy soil, each with six subcategories, twelve soil species, and three variants, are the two main soil types found in the territory. The soil texture along the Tongyang Highway in the G planning area ranges from sandy soil to light soil, with high sandy soil being the predominant type; the texture on both sides of the Tongyang Canal is medium soil, primarily composed of small silty soil; on both sides of the Hanting River are stacked fields of soil; the aquaculture farm is a gley paddy soil; and the area between the aquaculture farm and the Xintongyang Canal is mostly composed of soil.

Hailing is situated where the Huai River (Lixia River) and Yangtze River (Tongnan) water systems converge. A fourth of the water in the area is dispersed

among the crisscrossed rivers, a diverse array of water bodies, and the dense water network. The Yangtze River system is made up of a number of rivers, including the Nanguan, Zhoushan, Laotongyang, Chenghe, Fanshen, Wangzhuang, Zhongshi, Xishi, Yudai, Liuxi, Yangtze Port, Wuwei, Chengnan, Fenghuang, Dongxie, Qianjin, and Jingzhuang Rivers. The Huai River system is made up of a number of rivers, including the Yinjiang River, Taidong River, Xintongyang Canal, Luting River, Daohe River, Caohe River, Laodong River, Yanhe River, Wucha River, Qingfeng River, Jiuligou, Qili River, Dongfeng River, Jiuli River, etc. The Suchen River, Hanting River, Maoshan River, Xiehe River, Xiaoji River, and other major rivers are located in the planned area.

With a burial depth of 650 to 1800 meters and water temperatures ranging from 38°C to 70°C, Hailing District has an abundance of geothermal mineral water resources. It has useful trace elements for the human body, including iodine, bromine, and strontium. The area as a whole is covered in a large amount of water and is rich in resources, producing mainly fish, shrimp, crabs, clams, turtles, etc. Brick, tile, and clay make up the majority of the mineral resources, which comprise over 1.2483 million cubic meters. There aren't any other mineral resources accessible right now.

2.3. Socio Economic Conditions

A regional GDP of 62.19 billion yuan, a per-person GDP of 119,000 yuan, and general government budget revenue of 3.6 billion yuan were all attained in the Hailing District in 2020. The combined value of Hailing District's agricultural, forestry, animal husbandry, and fisheries output in 2020 was 2.167 billion yuan. The first, second, and third industries together accounted for 1.272 billion yuan, 15.233 billion yuan, and 11.582 billion yuan of the planned area's 28.087 billion yuan (current price) regional gross domestic product. The amount of disposable income per person in 2020 was 42486.7 yuan.

By the end of 2020, the Hailing District will have a total registered resident population of 467,183 (excluding non-residents), with 230,750 men making up 49.4% of the population and 236,433 women making up 50.6% of the total. Men and women's sex ratios ought to be kept within the typical range. Throughout the year, there were 3757 deaths and 3078 births. In the entire territory, there are 35 different ethnic minorities, totaling 1330 persons, or 0.28% of the population. With 349 individuals, the Hui make up the majority of the minority population. There are around 88,800 registered residents in the planning area overall, and there are 137,500 rural workers annually.

Since Hailing County was founded in the early Han Dynasty, it has a history of more than 2100 years and is regarded as the "Ancient County of the Han and Tang Dynasties, Famous District of Huaihai". In the Lixia River area of the middle and southern areas of Jiangsu, hailing has long been a crucial hub for accessing the rivers and the sea as well as a gateway and a center for the transport of goods for northern Jiangsu. Hailing has long been a place with excellent talent,

businesspeople, a thriving market, and a thriving culture. “The prosperity of Confucianism and the highest reputation in Huainan” has always been Hailing’s cultural calling card. It and the other “Four Tombs”—Guangling Yangzhou, Lanling Changzhou, and Jinling Nanjing—were formerly known as. There has always been a considerable influx of inhabitants and traders. Cultures such as theatre, zen, and salt tax have been passed down through the generations. Zhang Huai-guan, a well-known calligrapher in the Tang Dynasty, Hu Yuan, a teacher in the Song Dynasty, Wang Gen, a philosopher in the Ming Dynasty, Liu Jingting, a master storyteller in the Ming and Qing dynasties, Mei Lanfang, a well-known master of contemporary Peking Opera art, the head of the World Buddhist Sangha Association, the Chinese monk Dan Sheng The urban development of Hailing District recreates the original style and appearance of the ancient inhabitants, creating a distinctive landscape design. Incorporating beautiful areas and historical landmarks like Guangxiao Temple, the Fengcheng River beautiful Area, Taoyuan, Qiaoyuan, Wanghai Tower, and the Xuezheng Experimental Institute, it has developed an ancient city style with a rich history and culture. Additionally, there are numerous tourist resources in the Outer Hailing District, including Daohe Scenic Area, Qiuxue Lake Ecological Scenic Area, Yuanbo Garden, Taizhou Sanshui Bay, Mei Lanfang Memorial Hall, Taizhou Nanshan Temple, etc.

2.4. Current Situation of Agricultural Development

The current state of agricultural development in the planning area is thoroughly examined in this chapter, encompassing the agricultural industry, agricultural corporate entities, creation of industry university research platforms, leisure agriculture, and agricultural projects planned for the local agricultural economy requires an understanding of the current state of agricultural development in the planned region.

2.4.1. Current Situation of Agricultural Industry

1) Seed and seedling industry

A national level modern agricultural industrial park has been proposed for the planned area’s Hongqi Street and Huagang Town regions in 2021, which has essentially created a seed industry structure centered on “two waters.” It has a number of resources for the locally known seed business that are headed by the province, including “Nanjing 5055” and “Taixiangjing 1402” for rice and “Taizhou Goose,” “Sanhua Goose,” and “Black Feather Muscovy Duck” for poultry. In the planning region, there are high-quality rice germplasm resource nurseries and waterfowl gene banks on a national scale. Currently, 13 high-quality rice and wheat germplasm resources, 33 waterfowl varieties, including 25 local Chinese waterfowl variations, 3 cultivated varieties, and 5 foreign waterfowl types, have been maintained. It is a renowned rice seed industry park in the province and the largest and most standardized waterfowl seed industrial park in China. We pri-

marily rely on Jiangsu Hongqi Seed Industry Co., Ltd. to construct a high-quality rice and wheat germplasm resource garden with a 12,000 acre footprint in terms of the rice seed industry. The “Hongqi” brand seed trademark has been registered as a famous trademark in Jiangsu Province. In terms of the waterfowl breeding industry, there are currently 25 local waterfowl varieties preserved in China, with a population size of 17,000. 53.3% of the country’s total is made up of collected types of geese, whereas 29.7% are collected varieties of duck. It is the biggest and best-preserved waterfowl variety in the nation, giving China access to a wide range of resources for its work on waterfowl germplasm innovation. Additionally, it has successively established 12 provincial-level platforms, including the Jiangsu Province Waterfowl Germplasm Resource Gene Bank Technology Innovation Service Platform, Jiangsu Province Waterfowl Production Performance Measurement Center, Waterfowl Breeding and Promotion Center, and other seed conservation and research platforms, including the National Domestic Animal Germplasm Resource Platform and the Waterfowl Germplasm Resource Sub platform. The “Sumu No.1” white goose, the “Sumu” duck, and the black-feathered Muscovy duck (which has been included in the creation of significant new agricultural varieties in the province) are three high-quality waterfowl products that have been developed by the waterfowl technology team led by Academician Rao Zihe. We have established 17 standards and granted 35 patents, 8 of which are invention patents.

2) High quality rice and wheat industry

Around 158,500 acres of rice and wheat were planted in the planning area in 2020 (containing all 6 streets and towns), primarily in Huagang Town and Gangyang Town. We’ve developed a functional base for grain production, a base for grain production covering 10,000 acres, and a structure for the growth of the rice and wheat industries, under the direction of the Hongqi Seed Industry. While the “Taixiangjing 1402” accounts for 20% of the primary rice production areas in our province, the “Nanjing 5055” produced accounts for 30% to 40% of the key rice production regions in Jiangsu Province.

3) Green fruit and vegetable industry

Approximately 6000 acres are slated for fruit and vegetable cultivation, the majority of which will be planted with locally grown seasonal melons and vegetables. Grapes, strawberries, and other fruits are the most commonly grown fruits, and they are primarily grown in Huagang Town, Chengxi Street, and Chengdong Street. It is currently planned to build 1 - 2 green vegetable industrial bases to achieve an output value of more than 200 million yuan for green vegetables, relying on vegetable production bases like the “shopping basket program” vegetable production base and Huagang 10,000 mu pollution-free vegetable production base.

4) Ecological livestock and poultry industry

Live pigs and waterfowl are the main products of livestock and poultry husbandry, and they are primarily sold at Chengxi Street, Gangyang Town, and

Hongqi Street. There are currently 8900 live pigs in the stock, of which 3800 are for meat pigs, 800 are for breeding sows, and 4200 are for breeding pigs. In 2020, the total meat production in the proposed area will reach 6783 tons, and there will be 146,900 poultry in the region. There are currently 3 pig farms in the area, along with 2 egg and 2 meat poultry scale farms, making a total of 7 large-scale farms.

5) Characteristic flower industry

In the north of the city, on Gangyang Town and Hongqi Street, is where the flower business congregates for planning purposes. The largest red palm production base in Asia is Taizhou Suzhong Horticulture Co., Ltd. Other businesses like Feicai Horticulture and Yiming Agriculture have also relocated there. Currently, 60,000 square meters of flower greenhouses are being built, and 78,000 square meters of intelligent greenhouses have been built. These greenhouses will primarily grow seed bulbs, such as *Anthurium andraeanum*, pineapple, phalaenopsis, bamboo taro, potted flowers, four-season grass flowers, and other high-quality flowers, with an annual output value of more than 50 million yuan. This will initially create a flower industry.

6) Healthy aquatic industry

The entire output of various aquatic goods within the projected area is 6400 tons, with the aquaculture area being 24,400 acres, of which 4600 acres are for efficient fishing. High-quality freshwater fish, Chinese mitten crabs, Roche's swamp shrimp, etc. are some of the principal kinds. Among them, 80.7% of the demonstration area for wholesome aquaculture is completed, and 90.6% of high-quality kinds are grown. Fisheries' level of green development is always rising.

2.4.2. Current Situation of Agricultural Business Entities

There are many businesses in the area, including 115 new businesses including different family farms, farmer cooperatives, and leading enterprises for agricultural industrialization. One of them, Taizhou Meixiang Food Co., Ltd., is a national agricultural leading firm, and Taizhou Modern Agricultural Development Group and Taizhou Weigang Dairy Co., Ltd. each represent six provincial-level agricultural modernization leading enterprises. One of the biggest wholesale trading markets for agricultural products in the Suzhong region is the Taizhou Suzhong Agricultural Products Wholesale Trading Market.

2.4.3. Current Situation of Industry, University, and Research Platform Construction

The Jiangsu Agricultural and Animal Husbandry Technology Vocational College, Jiangsu Academy of Agricultural Sciences Taizhou Agricultural Science Institute, Nanjing Agricultural University Taizhou Branch, and Hongqi Seed Industry are just a few of the numerous agricultural science and education institutions and seed industry businesses we have gathered. The benefits of innovation in the rice and poultry seed industries are rather clear, and we have 19 provin-

cial-level or higher scientific and technology research and development platforms. One of the first batches of livestock and poultry genetic resource gene pools approved by the Ministry of Agriculture and Rural Affairs is the national level waterfowl gene pool created by Jiangsu Agricultural and Animal Husbandry Technology Vocational College. It is also one of the first batches of agricultural germplasm resource gene pools in Jiangsu Province. It has essentially built a hierarchical seed conservation pattern for preserved duck varieties in the southern region and preserved goose varieties in the northern region. It has also thoroughly formed a waterfowl living species conservation area, a waterfowl species conservation monitoring center, and a waterfowl performance measurement center. The four main functional layouts of the waterfowl breeding center are in a leading position nationally.

2.4.4. Current Situation of Leisure Agriculture

In order to develop leisure agricultural activities like fishing, ecological restaurants, self-planting and self-harvesting vegetables, flower and seedling viewing, tourism, and vacation, the planned area makes use of the characteristics of the suburban location and focuses on exploring the depth of creative leisure agriculture. Currently, we have one national three-star enterprise in leisure agriculture and rural tourism, three themed creative agricultural parks at the provincial level, one boutique village for leisure agriculture at the provincial level, two sightseeing demonstration villages for leisure agriculture at the municipal level, and one boutique route for leisure agriculture at the provincial level. A total of 300 million yuan in agricultural tourism revenue was generated in 2020 thanks to the almost 1 million leisure and sightseeing visitors it attracted.

2.4.5. Current Situation of Agricultural Projects

At present, there are 16 main agricultural projects in the planned area, as shown in **Figure 3**.

2.5. Development Advantages and Constraints

2.5.1. Development Advantages

1) Superior economic location conditions

The Yangtze River Delta and the Lixia River Plain meet at Taizhou City, Jiangsu Province's hinterland, where the Economic Belt is situated. The intersection of six rivers, including the Hanting River, Nanguan River, Taidong River, Yinjiang River, Xintongyang Canal, and Laotongyang Canal, is located in the middle of the Ningtong Highway National Highway. Jiangdu City is bounded by Jiangyan District to the north and east, Gaogang District to the south, and Jiangdu City to the west. It is situated where the "T" industrial belt along the Yangtze River and the coast meet. An important junction of the Jiangsu expressway, railway, and canal transportation network is located in central Jiangsu at the convergence of the Beijing Shanghai Expressway, National Highway 328, Ningqi Railway, and the five rivers to sea waterways. It takes roughly two hours

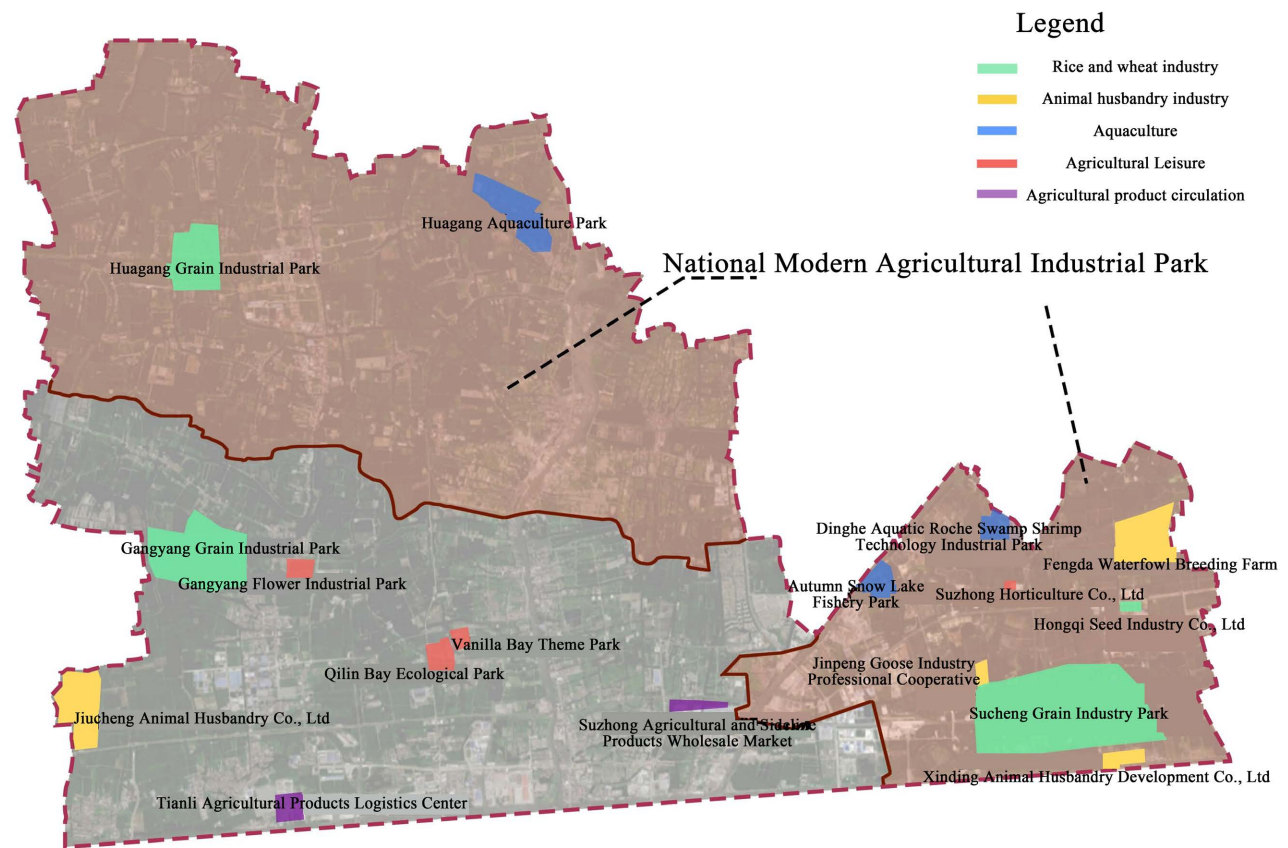


Figure 3. Distribution of main agricultural projects in the planned area.

to get to Nanjing, Shanghai, and Hangzhou. The development of the seed industry's production and processing logistics depends on the location of the transportation hub being in good condition.

2) Solid foundation for the development of the seed industry

In the economic corridor of Gangyang Town, Hongqi Street, and Huagang Town, a national level modern agricultural industrial park was successfully established in 2021 with “rice and waterfowl seed industry” as the leading industries. Jiangsu Hongqi Seed Industry Co., Ltd. is the main organization in the park. The business is a partnership between the Jiangsu Provincial Seed Industry Fund and the National Modern Seed Industry Fund. We hold the “Breeding and Promotion” integrated seed business license issued by the Ministry of Agriculture, the “Red Flag” brand trademark, which has been rated as a well-known trademark in Jiangsu Province, and the authority to independently manage the import and export of seeds. The “Red Flag” brand seeds are well-liked by the populace and are praised as “reliable seeds” in more than 200 counties (cities, districts) throughout 19 provinces (cities) nationally. A total of 2 million kilograms of hybrid rice seeds and more than 36 million kilograms of traditional rice and wheat seeds are produced annually in the planning area's 20,000 mu of hybrid rice seed production bases and more than 60,000 mu of entrusted seed production bases. With 16 sets of seed drying units and a batch processing ca-

capacity of 264 tons, Hongqi Seed Industry boasts a top-notch storage, testing, and processing facility. Additionally, there are 2 seed processing assembly lines with a processing capacity of 20 tons per hour. The foundation for the growth of the seed industry is strong; there are two low-temperature refrigerated warehouses with a total area of over 1300 square meters and 13 standard seed warehouses with a total area of over 6000 square meters and a storage capacity of 12.5 million kilograms.

3) Leading agricultural enterprises with strong leadership

The leading agricultural industrialization businesses in the economic belt are more strongly influencing the income of millions of farmers. 115 new business entities, including family farms, farmer cooperatives, and agricultural industrialization leading enterprises, are currently operating. These include 1 national agricultural industry leading enterprise, 6 provincial agricultural industry leading enterprises, and 19 municipal agricultural industry leading enterprises. Eight agricultural high-tech businesses are located in Hailing District, increasing the park's core competitiveness by encouraging the development and implementation of new technologies. We vigorously conduct technology research and development and achievement promotion in distinctive industries like new variety breeding and high-end intelligent agricultural equipment, relying on the technological strength of businesses like Jiangsu Hongqi Seed Industry Co., Ltd. and AWL Agricultural Technology (Taizhou) Co., Ltd., laying a solid foundation for the development, demonstration, and promotion of agricultural technologies like rice seed industry.

4) Integration of agriculture and tourism to form industrial assistance force

At present, there is one multi-functional comprehensive national demonstration site for leisure agriculture and rural tourism that integrates ecology, sightseeing, leisure, tourism, etc. (Agricultural Development Zone), two national star level demonstration parks for leisure agriculture and rural tourism (Taizhou Tianyuan Muge Tourism Development Co., Ltd., Hailing District Xiangyeli), and one beautiful Chinese countryside ("Colorful Rice Fields" in Nansha Village, Agricultural Development Zone), One leisure and sightseeing agricultural boutique village in Jiangsu Province (Qilin Community, Chengxi Street, Hailing District), nine themed creative agricultural parks in Jiangsu, and one agricultural practice base and one health beauty base in Jiangsu each have preliminarily formed the development pattern of suburban agriculture in Hailing District, greatly promoting rural economic development and providing more choices for citizens' weekend or holiday life and entertainment.

5) Scientific research platforms provide industrial breakthrough capabilities

The planning area has attracted a sizable number of seed industry businesses with strong breeding innovation capabilities, including Hongqi Seed Industry, Jiangsu Agricultural and Animal Husbandry Technology Vocational College, Jiang-

su Academy of Agricultural Sciences Taizhou Institute, Nanjing Agricultural University Taizhou Branch, and Jiangsu Academy of Agricultural Sciences. The advantages of the types produced by the rice and poultry seed industries for innovation are very clear, and there are 19 provincial-level or higher scientific and technology research and development platforms. One of the first batches of livestock and poultry genetic resource gene pools approved by the Ministry of Agriculture and Rural Affairs is the national level waterfowl gene pool created by Jiangsu Agricultural and Animal Husbandry Technology Vocational College. It is also one of the first batches of agricultural germplasm resource gene pools in Jiangsu Province. It has essentially built a hierarchical seed conservation pattern for preserved duck varieties in the southern region and preserved goose varieties in the northern region. It has also thoroughly formed a waterfowl living species conservation area, a waterfowl species conservation monitoring center, and a waterfowl performance measurement center. The four main functional layouts of the waterfowl breeding center are in a leading position nationally.

2.5.2. Constraints

1) The land plots are relatively scattered and have a low degree of scale

The agricultural land in Hailing District presents issues like small scale and dispersed distribution due to the unique terrain and topography of the northern part of the district with dense water networks, as well as the restrictions on farmland protection red lines, ecological protection red lines, and land use established in recent years. The land scale is generally small and the level of land intensification is low, which to some extent impedes the growth of local agricultural mechanization and intensification and leads to a limited scale of various agricultural sub sectors in Hailing District. The agricultural production level of Hailing District has been severely constrained by the emergence of various types of agricultural industries, small scale, dispersed layout, weak cooperative cooperation among leading agricultural enterprises, dispersed production organizations, and overall low land efficiency.

2) Difficulty in approving facility land and shortage of agricultural land

The northern suburbs of Taizhou City are home to the ecological and economic zone of Hailing District. Recent years have seen a gradual decline in the amount of land that is available in the Hailing District as a result of the acceleration of urbanization, a shortage of agricultural land, an increase in the seeming conflict between people and land, and a scarcity of resources for arable land. The development of agricultural industries is further constrained by the tightening of land use rules, and it is challenging to get approval for agricultural facilities and building land, which impedes the growth of agriculture-related secondary and tertiary industries. The infrastructure development of the leisure agriculture, leisure fishing, leisure product processing, and other related industries cannot keep up with development needs, severely limiting the scale and speed of their development, and preventing further deep integration of the primary, secondary, and tertiary industries in Hailing District.

3) The degree of agricultural operation organization is relatively backward

There are currently a few notable agricultural businesses in Hailing District, but there is a noticeable gap in the production connections with nearby farms. Local farmers lack the necessary driving force, and there is a communication gap between businesses and farmers. Second, there aren't many farmers who belong to professional cooperative organizations. Although the growth of farmers' professional cooperative groups has advanced quickly in the Hailing District, overall, they are numerous and of poor quality. First off, the scope is modest and the structure is ad hoc. Second, there is not enough uniformity in how cooperatives operate. Thirdly, many cooperatives continue to concentrate on the straightforward production and sale of basic agricultural products because the foundation of cooperatives is weak. Because of their weak collective service and bargaining strength, it is challenging to establish a large-scale agricultural sector.

4) Slow creation of agricultural characteristic brands

First off, there is a lack of significant brand awareness. Although Taizhou City and Hailing District have given considerable attention to building agricultural product brands over the past two years and have also developed a few geographical indication brands, some businesses and grassroots organizations still do not fully grasp the importance of building brands and have not yet developed a strong urge or sense of urgency to do so. In order to better comprehend agricultural product brands in society, it is still necessary to investigate the breadth and depth of brand promotion. Second, there is a weak sense of quality and safety. The standard production level of agricultural product quality has been impacted by the existing standardization system's sluggish construction. Although some regulations exist, they are not always strictly followed, which in some ways limits the development of agricultural product brands.

5) The integration of second and third industries needs to be strengthened

Overall, the Hailing District's northern section still has a shallow level of agriculture industry integration that is in its early stages of growth. The industrial chains for the rice, wheat, and vegetable sectors are still incomplete, and the added value of the goods is low. The industrial processing chain must be extended, and various deep processing product types must be developed. Low levels of industrialization in agriculture, a lack of strong new business entities, a lack of large family farms and professional households, a lack of exploration of multifunctional agriculture, a low degree of industrial chain integration, and weak industry connections are all factors that need to be addressed. The present leisure agricultural attractions are mostly focused on sightseeing, with a clear homogeneity phenomenon and a homogeneous style. Furthermore, it is difficult to realize commercial gains due to the inability of supporting service facility building to keep up. There isn't yet a tourist route that has distinct regional characteristics and a positive reputation for agricultural leisure travel.

6) The degree of agricultural management organization is relatively backward

There are currently a number of notable businesses engaged in agriculture connected to rice and wheat in the northern portion of Hailing District, but there is a noticeable gap in the production connections with local farmers. However, at the moment, the development of the vegetable industry is relatively behind that of the rice, wheat, aquatic products, and flower industries, with a low degree of organization and a low level of professional cooperative organizations among farmers. Local farmers lack a strong driving force, and there is a lack of communication between businesses and farmers. Overall, even while professional cooperative groups for farmers in many industries have developed quickly, the quantity and quality are both high. Cooperatives have a number of drawbacks, including a relatively limited scale, a loose organizational structure, a lack of sufficient standardization in their operations, and a shaky foundation. It is challenging to establish a large-scale operation of the agriculture sector since many cooperative social security systems continue to focus on the straightforward production and sale of primary agricultural products. This is due to the weak unified service and negotiating strength.

3. Results and Discussion

3.1. Guiding Ideology

Coordinate the promotion of the “Four Comprehensives” strategic plan, fully implement the “innovation, coordination, green, openness, and sharing” development concept, continue to deepen the structural reform of the agricultural supply side, choose the integrated development of the primary, secondary, and tertiary industries as the path, based on regional characteristics and industrial advantages, increase investment in contemporary agricultural industry infrastructure, and so on. By extending the industrial chain, connecting the value chain, and advancing agricultural modernization with high output efficiency, product safety, resource conservation, and environmental friendliness, new formats, models, and technologies will encourage high-quality growth and industry transformation.

3.2. Development Ideas

Taking advantage of the historical opportunity for rural revitalization, we will concentrate on understanding the connotation characteristics of excellent industrial structure, high quality and efficiency, strong business entities, advanced technology and equipment, and new path models, and promote the transformation of modern agriculture from yield quantification to yield quality. Create a modern agricultural industry system based on science, with the seed and seedling sector leading the way, followed by the high-quality rice and wheat, ecological livestock, and poultry. The system is also extended by agricultural product processing logistics and leisure agriculture, and it is characterized by distinctive

flowers, green fruits and vegetables, and healthy aquatic products. Through government promotion, urban linkage, market operation, and farmers' participation, the system takes the seed industry park as the platform, the integration of three industries as the direction, innovative development as the driving force, and brand building as the starting point. With talent cultivation as the support, we will deploy an innovation chain in the industrial chain, upgrade the value chain in the innovation chain, fully promote the new agricultural development model of "agriculture + science and technology", "agriculture + service" and "agriculture + tourism", and deeply implement the empowerment and appreciation of germplasm resources, the cultivation and optimization of characteristic brands, the integration of primary, secondary and tertiary industries, the upgrading of agricultural parks, the innovation and entrepreneurship of combining agriculture and enriching farmers, the improvement of quality and efficiency of green agriculture, the innovation and upgrading of science and technology platforms. The ten major projects of deepening digital agriculture, product quality and safety assurance, and new service expansion will strive to build the ecological economic belt in the north of Hailing District into a leading agricultural modernization zone, an agricultural high-tech integration zone, and a leisure and tourism zone that is first-class in the city and leading in the province.

3.3. Overall Positioning

With standardization, branding, intelligence, and greening as the development directions, focusing on the breeding of waterfowl, rice, and aquatic products, or the "three water" industries, and strengthening the research and development protection of seed, Hailing District's National Modern Seed Industry Park was built on the foundation of the agricultural industry and the natural resource endowment in the northern part of the district. Promoting high-level grafting, cross-restructuring, and infiltration integration of modern industries like agriculture and culture, tourism, education, health care, and services, as well as developing creative agriculture, parent-child experiences, science popularization training, functional agriculture, and other business models. Actively integrating the local geographic environment characteristics and cultural customs of Hailing. In the end, Hailing District's northern ecological economic zone will be transformed into the "three water" seed industry's birthplace and urban agriculture's back yard.

3.4. Development Goals

3.4.1. Overall Development Goals

By establishing the northern ecological economic belt of the Hailing District, we will investigate common models and technological avenues for the green development of modern agricultural industries, forming a modern agricultural industry system led by the seed and seedling industry, led by high-quality rice and wheat, ecological livestock, and poultry, characterized by distinctive flowers,

green fruits and vegetables, and healthy aquatic products, and extended by agricultural technologies. By 2025, the Chengbei Ecological Economic Belt in Hailing District will gradually fit the current agricultural industry layout and resource environmental bearing capability, making progress in changing the development mode of the agricultural industry. Agriculture's high-tech level of growth will keep rising, as will its efficiency in protecting and utilizing its natural resources. The governance of the environmental issues that arise from agricultural industry development will also steadily improve. The ecosystem's performance will gradually get better. The regional seed industry's value chain will advance to a high level on the national stage by 2030, modernizing the capacity and system of agricultural governance. With strong supply guarantees, effective resource utilization, a good production environment, and a stable ecosystem, a new pattern of modern agricultural industry development will emerge, and a number of modern agricultural industry development indicators will be at the forefront of the province and the nation.

3.4.2. Specific Development Goals

The following precise development goals are scientifically established by evaluating the present state of resources in the planning area, visiting pertinent functional departments, performing market research, and thoroughly examining the actual situation of the area.

The specific development goals are shown in **Table 1**.

3.5. Spatial Layout

3.5.1. Overall Layout

Promote actively the modification of the agricultural industry layout in accordance with the idea of adapting to local conditions, complementing advantages, highlighting characteristics, and coordinating development to ensure the smooth realization of various goals for the development of modern agriculture in Hailing District. This is done in conjunction with the 14th Five Year Plan for Agricultural and Rural Modernization in Hailing District and in combination with urban construction, as shown in **Figure 4**.

One Core: core area

It is situated in the eastern portion of Hailing District and covers an area of roughly 38,000 acres. It borders Hailing District to the east and north, Hongqi Street to the west, and the south. We will strengthen innovation and research and development of agricultural technology, actively promote the deep integration of innovation driven development strategy and rural revitalization strategy, play the important role of technology as the first productive foray into the agricultural sector, and lead by leading agricultural enterprises. Based on the construction of Hailing Agricultural Development Zone, based on the research and development advantages of germplasm resources in Hongqi Street, and based on A "seed industry technology innovation demonstration demonstration zone,

Table 1. Specific development goals of the northern ecological economic belt in Taizhou city.

Indicator Name	Primary indicators	Secondary indicators	Target value (2030)	
Agricultural production system	Effective supply of agricultural products	Grain yield stability (%)	≤1.2	
		Greenization of agriculture	Total area of grain production (mu)	75,000
			Stability guarantee index for vegetables, fruits, and aquatic products	30
			‘Three highs and one beauty’ index (%)	100
			Comprehensive utilization rate of agricultural waste (%)	98
	Agricultural Science and Technology	Soil testing formula fertilization coverage rate (%)	100	
		Agricultural standardization	Pesticide reduction level (%)	-1.8
			Proportion of green and high-quality agricultural products (%)	95
			Number of industry, university, and research platforms	2
			Coverage rate of agricultural technology promotion (%)	100
	Agricultural Equipment and Information Technology	Proportion of Farmer Training Quantity (%)	90	
		Proportion of high standard farmland (%)	85	
		High standard fish pond proportion (%)	100	
		Proportion of high standard greenhouse facilities (%)	98	
		Comprehensive mechanization rate of agriculture (%)	99	
Agricultural industry system	Comprehensive agricultural output	Coverage rate of agricultural informatization (%)	100	
		Intelligent level of agriculture (%)	90	
		Agricultural land output rate (10,000 yuan/hectare)	13	
	Integration of agricultural industries	Per capita disposable income of rural residents (yuan)	48,000	
		Ratio of agricultural product processing output value to total agricultural output value	13	
		Ratio of agricultural tourism output value to total agricultural output value	3:1	
		Number of Beautiful Rural Construction Projects	3	
Agricultural innovation and entrepreneurship	Number of agricultural innovation and entrepreneurship platforms with 10,000 people	7		
	Proportion of Entrepreneurs Engaged in Agriculture and Tourism (%)	70		
Agricultural management system	New agricultural management	Ratio of Agricultural Park Area to Cultivated Land Area (%)	100	
		Number of leading agricultural enterprises	25	
		Proportion of family farm operation scale (%)	60	
	Agricultural risk protection	Ratio of e-commerce sales to total agricultural sales (%)	70	
		Agricultural insurance coverage rate (%)	100	
		Social Service Organization	Number of breeding, agricultural machinery and other business entities	50

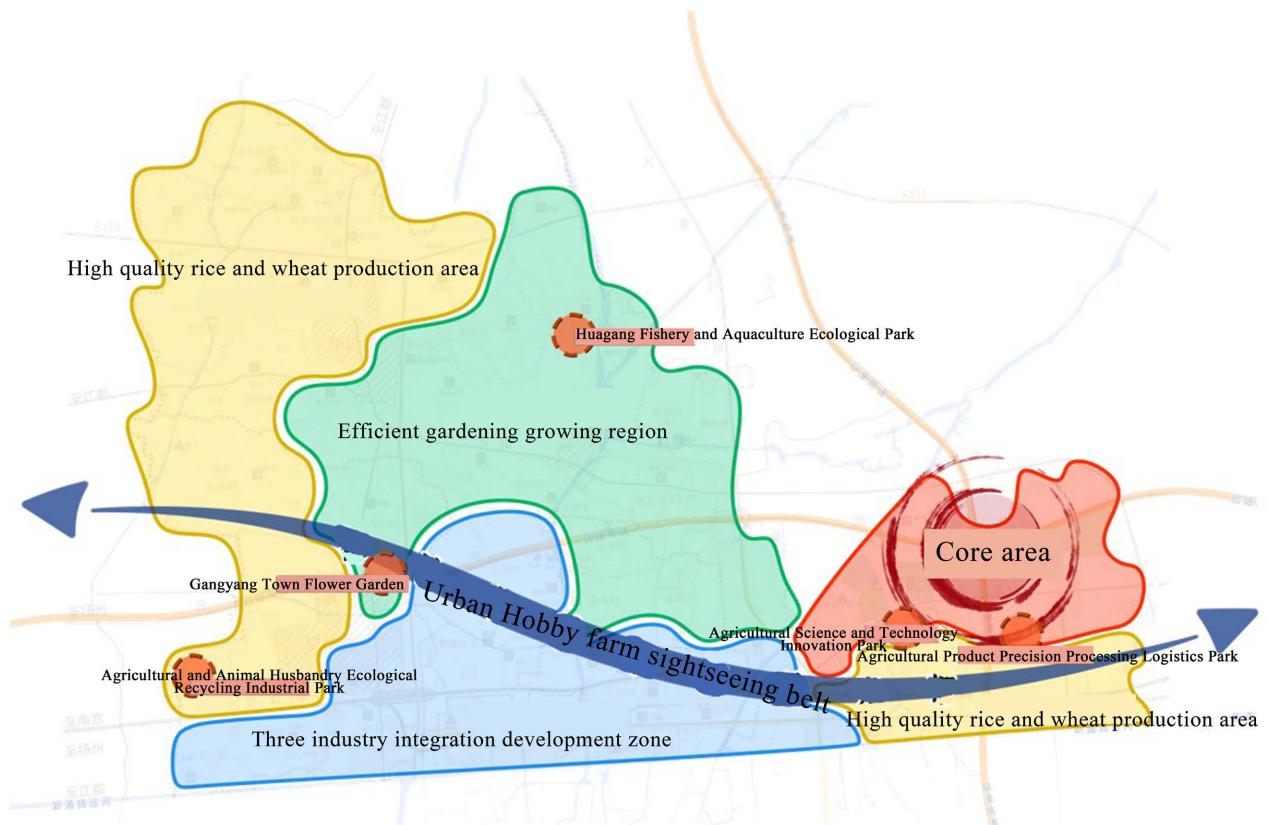


Figure 4. Overall layout of the ecological economic belt in the north of Taizhou city.

seed industry demonstration zone, and seed industry integration development demonstration zone” has steadily developed in the central construction area integrating science popularization training and leisure tourism.

One Belt: Urban Leisure Agriculture Sightseeing Belt

We want to build a leisure agricultural attraction that connects the Qiuxue Lake Ecological Scenic Area, Xiumei Orchard, Hailing Modern Agriculture Industrial Park, “Xiangcaowan” Lavender Theme Manor, Qilin Ji Township, and Gangyang Flower Industrial Park, starting from Hongqi Avenue in the east and Qilin Avenue in the west and relying on leisure agricultural projects on both sides of the road.

Three Zones: high-quality rice and wheat production zone, integrated development zone of three industries, and efficient horticultural planting zone

Area that produces high-quality rice and wheat is separated into two primary regions: east and west, with the western region mostly comprising portions of Huangang Town and Gangyang Town. The eastern portion of the region is mainly made up of Xuzhuang Village and Beizhuang Village in Suchen Town, with a total area of about 96,000 acres in the two main rice and wheat production areas. It ends at the Luting River in the east, ends at Gangyang Town in the south, and extends to the western and northern boundaries of Hailing District. Using the regional Huangang, Suchen Grain Industrial Park, and grain (seed) production

functional bases as our foundations, we will develop high-quality rice and wheat production, advance the ecological comprehensive planting and breeding model of rice fields, advance large-scale, mechanized, standardized, and ecological production, accelerate new variety promotion experiments and demonstrations, and create a demonstration zone for high-tech rice and wheat planting, high-quality rice, and high-quality wheat.

Located in the southern portion of the planned area, the three industrial integration development zone extends south to the Tongyang Canal, north to Port Village, east to Hongqi Street, and west to the Hanting River. 36,000 acres make up the intended area. We will moderately develop agricultural product processing, increase the promotion of new technologies, models, and varieties, take advantage of the region's excellent road traffic conditions, collaborate with Taizhou Agricultural Product Processing Logistics Park, and introduce professional agricultural product processing enterprises to promote the deep p In addition, we will actively promote the integration of agriculture and tourism, agricultural tourism integration, and cultural tourism integration, create an immersive and panoramic agricultural landscape, and transform the area into a demonstration zone for the integrated development of primary, secondary, and anterograde education. We will use the Xiangcaowan Theme Park Qilin Ecological Park and other areas to develop characteristic agricultural tourism and urban leisure agriculture.

Efficient Horticultural Planting Area: Located in the central part of the planned area, south to the Tongyang Canal, north to the boundary of Hailing District, east to Hongqi Street, and west to Hanting River. The planned area covers an area of 26,000 acres, relying on the vegetable planting foundation in the eastern part of Huagang Town and the Gang Yang flower industry. Through land transfer and other means, the degree of organization in vegetable and fruit production and operation is improved, new varieties of flowers are actively cultivated, standardized management models are introduced, and high standard infrastructure is constructed, Vigorously promote the application of standardized production, develop advanced, practical, and highly operational production technology regulations for different varieties, introduce intelligent horticultural planting facilities and equipment, and create an efficient horticultural new model, new variety, and new technology integrated application demonstration zone with scientific management, strong product competitiveness, high output efficiency, clear technological advantages, and strong demonstration and driving ability for flower and vegetable planting and cultivation.

Five Parks: Gangyang Flower and Horticultural Style Park, Huagang Rice and Fishery Breeding Ecological Park, Agriculture and Animal Husbandry Ecological Recycling Industrial Park, Agricultural Science and Technology Innovation Park, and Agricultural Product Deep Processing Logistics Park

The about 1000-acre Gangyang Flower Garden is spread out over Gangmen Village and Yangzhuang Village in Gangyang Town. By establishing high-quality

flowers like red palm, pineapple, and butterfly orchids, we actively meet market demand and raise the quality of flowers based on the development of the Flower Industry Park in Gangyang Town. A characteristic flower industrial park that combines characteristic flower planting, seedling cultivation, tourism, cultural experience, and scientific research education is what we aim to create at the same time by utilizing the leisure and sightseeing benefits of flower resources, creating distinctive flower landscapes, and supporting the growth of the tourism industry.

Huagang Fishery and Aquaculture Ecological Park: Located in Xiaxi Village, west of Huagang Town, with a planned area of 2000 acres. Based on the foundation of fisheries and aquaculture in the eastern part of Huagang Town, we will improve the existing breeding technology of improved aquatic species, carry out the construction of high standard fishery industry bases, introduce digital and intelligent production technologies, promote the circular aquaculture model of the fishery industry, and strengthen the construction of leisure and sightseeing fishery bases, creating a healthy aquatic ecological aquaculture park that integrates multiple elements such as fishery production, improved species breeding, fishery technology, and fishery leisure tourism.

The 2000-acre Huagang Fishery and Aquaculture Ecological Park is situated in Xiaxi Village, west of Huagang Town. We will build high standard fishery industry bases on the foundation of fisheries and aquaculture in the eastern part of Huagang Town, introduce digital and intelligent production technologies, promote the circular aquaculture model of the fishery industry, and strengthen the construction of leisure and sightseeing fishery bases, creating a healthy aquatic ecological aquaculture.

A park dedicated to agricultural science and technology may be found to the west of Hongqi Street. We seek to construct an agricultural technology innovation platform, establish talent introduction and training bases, and encourage the incubation of agricultural technology projects by relying on organizations like Jiangsu Hongqi Seed Industry Co., Ltd. and AWL Agricultural Technology (Taizhou) Co., Ltd. Promote “Three Waters” breeding research and development, raise the degree of local technology, digitization, intelligence, and specialization, and build a technological foundation for the growth of Hailing’s modern agriculture sector. **Agriculture-related goods Deep Processing Logistics Park:** A 200-acre planned area that is situated on Hongqi Street, south of Hongqi Avenue. Take use of agricultural development zones to grow the intensive processing industry and encourage the production and processing of agricultural products.

A logistics park for deep processing of agricultural products will be created with complete functions, optimized structure, reasonable layout, high quality, and efficiency as a result of equipment updating and upgrading, which will support the industry’s transition from primary processing to deep processing and from quantity growth to quality improvement.

3.5.2. Layout of the Core Area

As shown in **Figure 5**, The core area is planned to form a development layout of “one center, two parks, and three zones” taking into full consideration the “1 + 3” modern agricultural industry in the northern ecological and economic belt of the city, which includes the integration of seed seedlings and agricultural tourism, deep processing of agricultural products, and manufacturing of agricultural materials and equipment.

One Heart: Modern Agriculture Comprehensive Service Center

It has evolved into a comprehensive command center and agricultural comprehensive service area, relying on the National Modern Seed Industry Park’s existing management committee construction base, for coordinating the growth of the agricultural industry in the north of the city.

Agricultural Products Park and Agricultural Science and Technology Innovation Park are two parks. **Three zones in Deep Processing Logistics Park:**

The goal of the Seed Industry Innovation Demonstration Zone is to develop a comprehensive demonstration area that combines activities like research and development, breeding, promotion, and application of improved varieties. It is situated northeast of the core area, east and north to the boundary of the development zone, and south to the boundary of Suchen Town.

It has evolved into an agricultural and tourism development zone that integrates fishing, science popularization, and tourism. It is situated in the central northern part of the core area, east to the Qili Expressway, west to the Qiuxue Lake Scenic Area, and south to the Hongqi Avenue.

Intelligent Equipment Integration Zone: This area has been developed as a demonstration zone for agricultural production front-end equipment manufacture

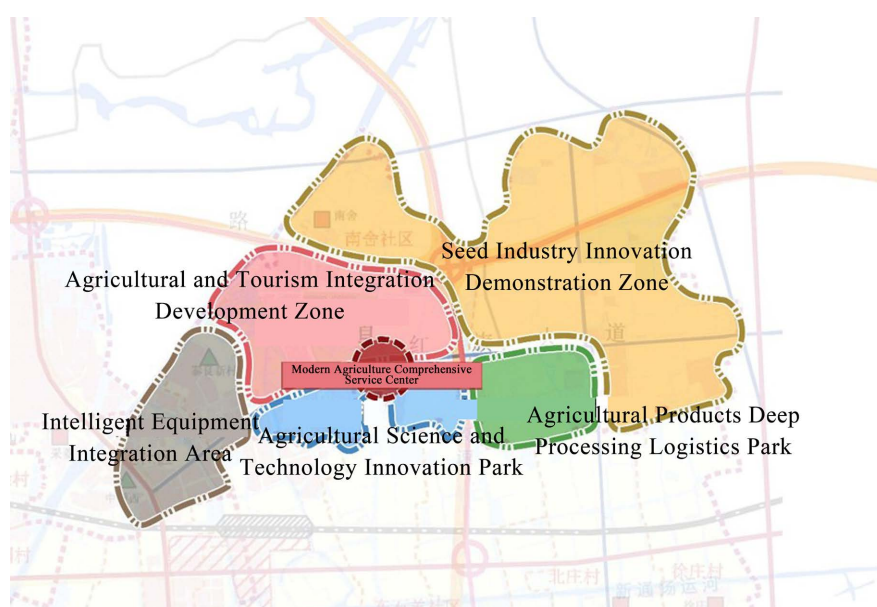


Figure 5. Layout of the spatial core area of the north ecological economic belt in Taizhou City.

integration. It is situated in the western portion of the core area, west to the border of Hongqi Street, and east to the Qiuxue Lake Scenic Area.

4. Conclusion

The advantages and limitations of the planning area's growth are summarized together with a thorough analysis of the location circumstances, natural resources, socioeconomic, and agricultural development status of the planning area. By establishing the northern ecological economic belt of the Hailing District, we will investigate common models and technological avenues for the green development of modern agricultural industries, forming a modern agricultural industry system led by the seed and seedling industry, led by high-quality rice and wheat, ecological livestock, and poultry, characterized by distinctive flowers, green fruits and vegetables, and healthy aquatic products, and extended by agricultural technologies. In conjunction with the 14th Five Year Plan for Agricultural and Rural Modernization in Hailing District, and in conjunction with urban construction, actively promote the adjustment of agricultural industry layout, and plan to form a regional layout of "one core, one belt, three zones, and five parks" based on the concept of adapting to local conditions. This will ensure the smooth realization of various goals for the development of modern agriculture in Hailing District.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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