Regional Distribution of Tropical Agricultural Industry at Home and Abroad and Enlightenment to Hainan Agriculture

H. J. Zhang¹,*, J. Jiang², C. L. Wang¹, H. Y. Sun¹, J. M. Zhao¹ and H. L. Huang¹

¹Institute of science and technology information, Chinese Academy of Tropical Agricultural Sciences (CATAS)
²Hainan Tropical Ocean University (HTOU)

*Corresponding author email: 369418614@qq.com

Abstract. The layout and development of tropical agriculture is very important to the construction of Hainan Free Trade Port (HNFTP). Only by reasonably planning to the agricultural layout, the agricultural development could be promoted and met the needs of developing Hainan Free Trade Port (HNFTP). To scientifically and effectively plan Hainan's agricultural spatial layout, this research thinks about the agricultural spatial layout of developed areas as a reference could be taken into consideration, and combine with the local characteristics, formulate guidelines, overall planning, and specific implementation.

Keywords: Regional Distribution; Tropical Agricultural Industry; Enlightenment; Hainan Agriculture.

1. Introduction

Hainan is playing an important role in developing tropical agriculture in China. Agriculture is also an important pillar industry of Hainan's national economy. Since the establishment of Hainan Province in 1988, Hainan has always attached great importance to agricultural development, implemented the strategy of invigorating agriculture through science and education and sustainable development, played the three cards of “seasonal variation, famous, special and pollution-free”, and achieved continuous growth of agriculture for more than 30 years. However, the current growth is still resource-based and extensive, and there are still some problems, such as the mismatch between the industrial layout and the regional main function, the homogenization of regional industries, the small scale of characteristic industries, and the low degree of control over the two markets of two kinds of resources. In constructing Hainan free trade port today, its agriculture should learn from the successful experience of domestic and foreign layout, with the help of preferential policies of free trade port, comprehensively consider economic, social, natural and other factors, optimize the spatial structure of tropical agriculture, improve the spatial efficiency of tropical agricultural economy, and actively participate in regional economic integration [1-3].

2. Distribution of Tropical Agriculture in Foreign Countries

Due to the limited availability of data, the distribution of tropical crops in tropical regions (excluding Taiwan Province) at home and abroad is taken as an example to analyze the regional distribution of tropical agriculture.

The world tropical region covers more than 160 countries (regions) in Asia, Africa, Latin America and Oceania, most of those are along the Belt and Road, other more than 160 countries (regions), including four continents, including Asia, Africa, Latin America and Oceania, are basically developing countries...
with a total population of 4.4 billion. 95% of the tropical agricultural products in the world are produced in developing countries, and 80% of the consumption is mainly concentrated in developed countries. In recent years, with the global economic integration, the guidance of government industrial policies, coupled with the impact of climate warming, diseases and insect pests, labour costs and other factors, the tropical crop production has concentrated from the origin to the dominant production areas. For example, the main production area of natural rubber transferred from South America to Southeast Asia and Southeast China, and the output of these two production areas has accounted for more than 85% of the world; the main production area of oil palm has been transferred from Africa to Indonesia and Malaysia, and the production of palm oil in the two countries has accounted for more than 85% of the world; The main production area of banana has been transferred from Southeast China and Southeast Asia to South America and Africa; China has overtaken Australia as the largest producer of macadamia nuts.

Table 1. Regional distribution of main tropical crops in the world.

| Varieties                        | Main Distribution Countries                                      |
|----------------------------------|-----------------------------------------------------------------|
| Hevea Brasiliensis (Wild. Ex A. Juss) | Indonesia, Thailand, China, Malaysia, Viet Nam                  |
| Manihot Esculenta Crantz(M. Utilissima Pohl) | Nigeria, Democratic Republic of Congo, Thailand, Brazil, Tanzania |
| Agave Sisalana Perr. Ex Engelm. | Brazil, Tanzania, Kenya, Mexico, Haiti                          |
| Areca Catechu                     | India, Bangladesh, Indonesia, Myanmar, China                    |
| Piper Nigrum L.                   | Indonesia, India, Viet Nam, Sri Lanka, Brazil                   |
| Coffea Linn                       | Brazil, Viet Nam, Colombia, Indonesia, Honduras                 |
| Musa Nana Lour.                   | Uganda, India, Philippines, Colombia, Nigeria                   |
| Litchi Chinensis Sonn.            | China, India, Viet Nam, Thailand, Madagascar                   |
| Dimocarpus Longan Lour.           | China, Thailand, Viet Nam                                       |
| Mangifera IndicaL.               | India, Thailand, China, Mexico, Philippines                    |
| Macadamia Ternifolia F. Muell.    | China, South Africa, Australia, Kenya, Guatemala                |

3. Regional Distribution of Tropical Agriculture in China

3.1 The Production Layout of Tropical Cash Crops and Tropical Fruits has been Constantly Adjusted, and the Coordination of Production Structure within the Planting Industry has been Enhanced

Since 1995-2018, the scale and benefit of tropical crops in China have been on a fluctuating upward trend. In 2015, the planting area reached a historical peak of 10.22 million thousand ha. In 2018, due to the adjustment of statistical caliber, some crop data were excluded. The planting area of main tropical crops was 4.38 million thousand ha, year-on-year rising 2.08%.

Industrial distribution of tropical cash crops and tropical fruits has been constantly adjusted. The main performance is as follows: the proportion of planting area of tropical cash crops has decreased (from 64.92% in 1995 to 59.67% in 2018), and the proportion of planting area of tropical fruits has increased (from 35.08% in 1995 to 40.33% in 2018).

The coordination of the industrial structure within each crop has been enhanced. With the change of market demand and the cross influence of local industrial planning and national regional planning of industry, the industrial distribution of economic crops is increasingly concentrated in the advantageous production areas, and the planting area and yield of the dominant production areas have been improved, and the role of stabilizing and increasing production has become increasingly apparent. In recent years, the proportion of high-efficiency crops such as coffee, areca nut and star anise had increased, while the proportion of other economic crops had decreased; Within the tropical fruits, the proportion of planting area of banana, longan, mango, grapefruit, passion fruit, Macadamia, pitaya, guava, yellow peel, carambola and other small fruits increased, while the proportion of pineapple and other fruits decreased. In terms of yield, the proportion of main tropical fruits in the total yield of tropical crops increased rapidly from 11.33% in 1995 to 85.70% in 2018.
3.2 The Regional Distribution of Agricultural Products Gathering in the Superior Production Areas is Further Optimized, and the Large-scale Development of Large-scale Crops has the Advantage

In recent years, China has successively issued the regional layout plan of main tropical crops (2007-2015), the regional layout plan of characteristic agricultural products (2013-2020), and the regional layout of major tropical crops (2016-2020), etc., and selected cassava, banana, litchi, longan, mango, pineapple, natural rubber and other advantageous agricultural products for support. After years of development, the superior agricultural products has been planted increasingly concentrated in advantageous regions, and the production pattern of "large and complete, small and complete" has been further broken. The concentration degree of tropical crop production in China has been steadily improved, which has promoted the gradual improvement of the regional distribution of advantageous agricultural products. At present, it is mainly distributed in Guangxi (1.12 million thousand ha), Yunnan (1.12 million ha), Guangdong (925.11 thousand ha), Hainan (883.14 thousand ha) and Fujian (210.84 thousand ha), a few in Guizhou, Hunan, Sichuan and Tibet. The value of tropical agricultural products increased from 147.814 billion yuan in 2008 to 149.356 billion yuan in 2018. The distribution area of south subtropical crops in Guangdong Province is located in 108 counties (cities or districts) in 20 prefecture level cities in the south of 24”north latitude. The total land area of subtropical crops is 142000 square kilometres, accounting for 79.1% of the total land area of the province. The main varieties are natural rubber, pineapple, banana, litchi and sisal (sorted according to the planting scale in 2018). The output of litchi and sisal ranks first, and cassava output ranks second in China; There are 54 counties (cities) in Guangxi hot region, with a total area of 114000 square kilometers, accounting for 48% of the total land area of the whole region, accounting for nearly one fourth of the National Tropical Area. The main varieties are cassava, litchi, cinnamon, longan, mango, banana and sisal (sorted according to the planting scale). The area and output of cassava, star anise, longan, mango, passion fruit and pitaya rank first in China; The tropical regions in Yunnan involve 15 states, 85 counties and cities, with a land area of 81100 square kilometers, accounting for 16.9% of the total land area of the whole country and 21.9% of the whole province's land area. The main production areas are Xishuangbanna, Puer, Lincang, Dehong and other regions. The main varieties include natural rubber, coffee, Macadamia, banana and Mango (sorted according to the planting scale). The area and output of natural rubber, coffee, Macadamia, Moringa, Amomum villosum rank first in China; the tropical region in Fujian is defined as 51 counties, with a total land area of 3.4 million ha, accounting for 30.8% of the province. The main varieties in Fujian are grapefruit, litchi, banana and passion fruit (sorted according to the planting scale); The tropical region in Sichuan is mainly distributed in some low mountain valley areas of 41 districts and counties in 8 cities of Panzhihua, Liangshan, Luzhou, Yibin, Zigong, Leshan, Neijiang and Ziyang. With a total land area of 65200 square kilometers, accounting for 13% of the total area of the province. Main varieties in Sichuan are mango, longan, litchi and banana; The tropical region in Guizhou Province are mainly located in the Panjiang River Basin, Hongshui River Basin, Chishui River Basin, Wujiang River Basin and its tributaries, Duliu River Basin and its south. There are 32 cities and counties in the Qingshui River Basin, with a total land area of about 22844 km², accounting for 12.97% of the total land area of the province, and the main tropical crop varieties in this province are pomelo, banana, pitaya, mango and passion fruit; The tropical region in Hunan is distributed in southern Hunan, which governs Chenzhou and Yongzhou, covering an area of 3.92 million ha, and the main tropical crop varieties in this province varieties are cassava and tropical fruit; The tropical region in Tibet is mainly located in Motuo County, Chayu county and Bomi County of Linzhi city, and the main tropical crop varieties in this province are banana.

Although China is rich in tropical crop resources and has a wide variety of tropical crop, tropical crop production is concentrated in a few varieties. From the perspective of crop variety distribution, tropical fruit is the largest category of tropical crop in China, including pineapple, litchi, longan, mango, grapefruit, carambola, rambutan, passion fruit, guava, pitaya, wampee, etc. In 2018, the total planting scale reached 1.87 million ha, followed by natural rubber, with a planting scale of 1.14 million ha in 2018; the third was betel nut, with a planting scale of 109.95 thousand ha at the end of 2018; and the planting scale of litchi, banana, star anise, longan, cassava, mango, Macadamia, coffee, etc. all exceeded 100.0 thousand ha, accounting for 87.33% of the tropical crop.
3.3 Further Optimization of the Industry Layout of Important Industrial Raw Material Crops Represented by Natural Rubber is Conducive to Ensuring China's Strategic Security

Since 1995, the planting area of natural rubber, cassava, sisal and other important industrial raw materials crops in China has steadily increased, especially in 2010-2015, the price of natural rubber was at a high level, and the planting area of natural rubber increased steadily, reaching nearly 1.14 million ha by the end of 2018. Under the background that natural rubber safety has been in a high strategic position, natural rubber planting area occupies the dominant position in the total planting area of tropical crops in China. In terms of planting layout of industrial raw material crops, natural rubber was mainly distributed in Hainan and Yunnan (accounting for 96.05% of the total planting area), cassava was mainly distributed in Guangxi and Guangdong (accounting for 90.36% of the total planting area), and sisal was mainly distributed in Guangxi (accounting for 81.26% of the total planting area).

3.4 The Distribution of Main Import Products is Overlapped with that of Export Products, and the Distribution of Sales Areas is Different from that of Production Areas

From the perspective of international trade, the import and export of tropical crops products in China involve 31 varieties. The import products are mainly natural rubber, and the export products are mainly coffee and other emerging crops. In 2018, the import and export volume of tropical crops products in Chinese amounted to US$21.10 billion, up 46.90% from 2008 (US$14.37 billion). Among them, the import value was US $19.986 billion, an increase of 52.09% compared with that in 2008 (US $13.141 billion); the export value was US $1.116 billion, a decrease of 8.82% compared with that in 2008 (US $1.224 million). The trade deficit was US $19.99 billion, an increase of 67.71% over 2008. It can be seen that the international competitiveness of tropical crops and their products continues to decline, its unfavorable balance of trade further increase. According to the statistics of the Agricultural Reclamation Bureau of the Ministry of agriculture and rural areas, natural rubber was the largest import tropical crop in China in 2018, with an import of US $4.917 billion. The import volume of natural rubber, palm oil and cassava accounted for 55.36% of the total imports of hot crops and their products. Coffee is China's largest export tropical crop product, with an export value of 356.12 million US dollars in 2018. Among the 31 import and export hot crops and their products, only litchi, mango, guava, carambola, grapefruit and cinnamon achieved trade surplus. Natural rubber, palm oil and cassava are the top three varieties with the largest trade deficit, and the three products play an important role in China's economy. Therefore, how to improve the supply capacity of natural rubber, cassava and oil palm, and improve the international competitiveness of products is of great importance to the development of Chinese tropical crop industry.

The main import and export tropical crops in China are distributed in Southern Chinese provinces with relatively backward economy. There are overlapping production areas and competing for land between crops. Therefore, it is necessary to make different distribution of these crops. The regional distribution of main tropical crops in marketing areas is quite different from that in production areas in China. The regional distribution in marketing areas is mainly concentrated in Beijing, Shanghai, Guangdong and other first tier cities. According to the data from authoritative websites such as the comprehensive wholesale market trading network of agricultural products, the sales of major tropical crops in these first-tier cities account for 80% of the national total.

4. Regional distribution of Tropical Agriculture in Hainan Province and Its Comparative Advantages in Agricultural Production

4.1 Regional Distribution of Tropical Agriculture in Hainan Province

Statistics show that in 2018, the crop planting area of the whole province is 1.58 million hectares, and the total output value is 72.951 billion yuan. Among the cities or counties, Danzhou has the largest planting area of tropical crops, and Dongfang City is the smallest. In animal husbandry, Danzhou City, Haikou City and Dingan County are the top three cities or counties in swine breeding scale; Ledong, Dingan and Tunchang are the top three cities or counties in cattle breeding scale, and Wenchang, Qionghai and Chengmai are the top three cities or counties in poultry breeding scale. Wenchang City,
Danzhou City and Lingao County are the top three multi-culture scales, while Wenchang, Chengmai and Haikou are the top three freshwater aquaculture scales.

Hainan is rich in tropical resources, and a major province of betel nut, pepper and coconut. In recent years, the price of areca nut is relatively good. Areca nut is the tropical crop with the highest economic benefit in Hainan. By the end of 2018, the actual area was 109.95 thousand ha, and the total output value was 19.25 billion yuan, which was an important source for farmers to increase their income. By the end of 2018, the actual coconut area was 34.39 thousand ha, with a total output value of 386 million yuan, and the actual area of pepper was 24.53 thousand ha, and the total output value was 1.42 billion yuan.

Hainan has a wide variety of tropical fruits. By the end of 2018, the planting area of tropical fruits was 153.83 thousand ha, accounting for 8.23% of the total area of tropical fruits in China. Mango, banana, litchi and pineapple are large-scale tropical fruits in Hainan Province, with a total area of 125.97 thousand ha, accounting for 82.57% of the total tropical fruits in Hainan Province. Rambutan is a characteristic variety in Hainan. By the end of 2018, the actual area was 3140 ha, the output value was 269 million yuan, and the economic benefit was high.

4.2 Comparative Advantages of County agricultural Production in Hainan

Under the guidance of market, the production of agricultural products has gradually changed from natural distribution to economic distribution, and the production scale and operation mode are adjusted by the change of supply and demand relationship and market fluctuation. At present, the existing agricultural industrial layout in Hainan Province is formed spontaneously according to the principle of comparative advantage.

The domestic research methods of agricultural comparative advantage mainly include domestic resource cost method (DRCC), comprehensive comparative advantage index (CCAI), dominant comparative advantage index (DCAI) and trade competitiveness index (TCI). When studying the comparative advantage of regional agricultural production, the comprehensive comparative advantage index method is usually used. The method of comprehensive comparative advantage index is suitable for comparing the comparative advantages of a certain product in different regions or different products in the same region within the country. In this study, the comprehensive comparative advantage index is used to measure the comparative advantage of Hainan's main agricultural products. The calculation results are shown in Table 2.

| Agricultural products | Comprehensive advantage index >1 | Weak advantage area |
|-----------------------|---------------------------------|--------------------|
| Vegetables            | Sanya, Qionghai, Baoting, Haikou | Dingan, Wenchang, Chengmai, Tunchang, Wuzhishan, Ledong, Wanning |
| Natural Rubber        | Lingao, Danzhou, Baisha, Dongfang, Changjiang, Chengmai | Qiongzhou, Tunchang |
| Areca Nut             | Lingshui, Sanya, Wanning, Ding'an, Ledong, Qiongzhou and Baoting | Tunchang |
| Pepper                | Wenchang, Haikou, Wanning, Dingan, Tunchang | Ledong, Dongfang |
| Banana                | Lingshui, Chengmai, Changjiang, Baisha, Danzhou, Wuzhishan | Changjiang, Wanning, Ledong |
| Mango                 | Sanya, Dongfang, Lingshui, Ledong, Baoting | Changjiang, Wanning, Ledong |
| Swine                 | Baoting, Qiongzhou, Baisha, Dongfang, Lingshui, Sanya, Haikou, Danzhou, Wuzhishan, Tunchang | Changjiang, Wanning, Ledong |
| Goat                  | Ledong, Sanya, Changjiang, Baisha, Qiongzhou, Baoting | Haikou |
| Poultry               | Wenchang, Qionghai, Chengmai | Wenchang, Haikou, Wenchang, Dongfang and Changjiang |
| Sea Breeding          | Wanning, Danzhou, Haikou, Wenchang, Dongfang and Changjiang | Wenchang, Haikou, Wanning, Dongfang and Changjiang |
| Freshwater Breeding   | Baisha, Baoting, Qiongzhou, Haikou, Wenchang, Qionghai | Ledong |

Note: in descending order.

Vegetable superiority areas: Vegetables have comparative advantages in 11 cities or counties of the province, among which Sanya, Qionghai, Haikou and Baoting in the middle are the strong advantages.
The eastern coastal area has the characteristics of convenient transportation, large consumer groups, well-developed tourism market and large vegetable consumption. The fresh agricultural products in Hainan Province are mainly supplied out of the island, and the convenient transportation conditions are convenient for vegetable logistics transportation.

Areca palm vegetable superiority areas: It is mainly concentrated in the eastern and central regions. Areca palm is a characteristic crop in Hainan Province. Areca palm is only planted in Hainan in China, which is the tropical crop with the highest economic benefit in Hainan. The eastern part of Hainan is a traditional areca planting area with a long planting history, and areca processing enterprises are mainly concentrated in the East. But in recent years, with the spread of betel nut yellow disease, betel nut planting began to move to the Midwest. The development history of areca nut in Western China is short, the planting is scattered, the production scale is small, and the industrial benefit is not significant.

Rubber tree superiority areas: It is mainly concentrated in the central-western regions, Lingao, Danzhou, Baisha, Dongfang, Changjiang and Chengmai are the strong advantage areas. Rubber production is greatly affected by natural disasters such as typhoons. In recent years, the agricultural production structure in Hainan Province has been adjusted, and rubber planting has been gradually transferred to areas with less wind damage, and rubber planting has been gradually withdrawn from the eastern coastal areas.

Pepper superiority areas: It is mainly concentrated in Wenchang, Haikou, Wanning, Ding'an and Tunchang, all of which are strong advantages. Pepper is a characteristic spice beverage crop in Hainan. 85% of the pepper is produced in Hainan. In recent years, the economic benefit of pepper is getting better, and the scale of pepper planting is expanding.

Banana superiority areas: It is mainly concentrated in the central and western regions. Due to the serious Fusarium Wilt Disease (FWD) and typhoon, the traditional banana planting areas in eastern China have no production advantages.

Mango superiority areas: It is mainly concentrated in the eastern region. Sanya is the largest mango producing area in Hainan, with complete mango industry chain, many production and operation entities, and large scale. "Sanya mango" has become one of the regional brands most recognized by consumers, and has been ranked in the top 100 list of regional brands (geographical indication products). Driven by the mango industry in Sanya, the surrounding areas of Sanya have formed the advantageous mango production areas in Hainan Province.

Swine breeding superiority areas: There are 10 cities or counties in the province with comparative advantages in swine breeding, including 4 in the western region, 4 in the eastern region and 2 in the central region. The Western swine industry belt is the main traditional swine breeding area in Hainan Province. It has a good foundation of swine breeding industry. It has a high degree of scale and organization of swine production. It has a number of swine breeding enterprises. The region mainly develops large and medium-sized swine farms, which is the key area of Hainan swine breeding. The eastern region is the tourism development area of Hainan Province. The requirements of ecological environment protection restrict the development of swine. It is necessary to arrange reasonably, avoid local regional pollution, and develop intensive and scientific swine breeding. The central region is an ecotourism area and water source protection area, which is not suitable for the development of large-scale breeding. In this region, the development of small standardized swine farms is the main. The local black swine with Wuzhishan Wujiao swine and Danzhou black swine as geographical indications is the characteristic brand of Hainan swine. In recent years, the scale of breeding has been expanding, and Zongzi with black pork as raw material has become the characteristic food of Hainan.

Goat breeding superiority areas: It is mainly concentrated in the eastern-central regions. Danzhou, Ledong, Chengmai, Dongfang, Lingao and Changjiang are the main producing areas of mutton sheep in Hainan Province. Only Changjiang has comparative advantages, and other areas are still at a disadvantage in goat breeding. Black goat is a special breed in Hainan. The demand for black goat is large, and the production is always in short supply. Dongshan goat is well-known in China. However, there is a lack of improved breed breeding system, production system and technical support system are not perfect, and the production advantages of main goat producing areas have not been fully developed.
Poultry breeding superiority areas: It is mainly concentrated in the western and southern regions. Hainan's poultry farming has local characteristics, such as Wenchang Chicken and Danzhou chicken, Chengmai, Tunchang, Qiongzhong Bailian goose; Digan Siji goose, and Qionghai Jiaji Duck, Haikou Yafeng saltwater duck and Ding'an sea duck have gradually opened up their market reputation.

Sea Breeding superiority areas: Six of the 12 coastal cities or counties in Hainan have comparative advantages in Sea Breeding. Aquaculture in Hainan Province is mainly concentrated in freshwater aquaculture, and the area of Sea Breeding accounts for only 33% of the total aquaculture area. The utilization of marine fishery resources in Hainan Province is mainly reflected in marine fishing, and the output of marine swine counts for only 18% of the total output of aquatic products. Lingao and Danzhou have the largest marine fishing output, accounting for 63% of the province's marine catch, followed by Lingshui, Sanya and Qionghai. Hainan Province is rich in marine resources, not only to give full play to the advantages of Sea Breeding, but also to fully exploit the advantages of marine fishing resources.

Freshwater aquaculture superiority areas: It is mainly concentrated in the eastern-central regions. The inland of the central region is not close to the sea, and the aquatic products mainly come from freshwater aquaculture, and the output of freshwater fishing is less. In 2017, the output of freshwater aquaculture accounted for 60% of the total aquaculture output. Wenchang is the region with the largest freshwater aquaculture area and output in Hainan, with freshwater aquaculture output accounting for 39% of the province's freshwater aquaculture output in 2017.

5. Experience of Foreign Agricultural Industry Layout and Its Enlightenment to Hainan Agricultural Layout

Compared with the tropical agriculture of other provinces and regions, Hainan's tropical agriculture has the advantages of superior resources and environment, various varieties of tropical agricultural products, vast water area, great potential of fishery production, strong regional characteristics of products, and high product efficiency. However, Hainan's tropical agriculture has disadvantages of scattered regional distribution, small scale, weak export competitiveness and low globalization index. We should further complement the disadvantages, identify the correct positioning, and achieve complementary advantages and win-win cooperation with other production areas.

5.1 Successful Experience of Foreign Agricultural Industry Layout

5.1.1 Different layout patterns are formed based on resource endowment. The industrial layout model can be divided into four modes: homogeneous mode, growth pole mode, point axis mode and network mode. The agricultural distribution of developed countries mainly adopts the growth pole model and network model.

Network mode: a region develops into an organic whole, which makes the whole region develop in the direction of integration. Due to the different climate, soil, labour force and market conditions in different regions, the agricultural layout of the United States and Australia adopts the network model, and gradually forms a series of specialized areas. The agricultural distribution of the United States can be roughly divided into: Northeast dairy belt; Eastern cotton belt; Southeast Subtropical Crop belt; north central spring wheat and corn belt; central winter wheat belt; central and southern mixed agricultural belt; Northwest wheat and forestry and animal husbandry region; western animal husbandry and irrigation agricultural area; Southwest Mediterranean agricultural area. This specialization brings more space for scale and mechanization, and also makes the production efficiency quite high. In 1914, American agriculture realized planting specialization to a large extent. Agricultural production and marketing realize the integration of “from field to dining table”. The agricultural system in the United States is called "agribusiness". The number of employees accounts for 17% of the national labour force, which is much higher than the labour force absorbed by agriculture itself. There are three obvious agricultural areas in Australia: intensive agricultural belt, also known as high rainfall zone. Its range extends from the northern coast of Queensland to the southeast corner of South Australia, as well as the southwest of Western Australia and Tasmania, with abundant rainfall, which mainly develops planting industry and dairy cattle industry; the wheat and
cattle raising belt extends southward from the central part of Queensland, passing through the slope land of new South Wales to the agricultural area of Northern Victoria and South Australia, which is the transition from semi-arid to humid climate. The annual rainfall is 400-600 mm, mainly dry farming, and most of the farms are engaged in wheat, sheep and beef cattle; the animal husbandry belt, including Western Australia, most parts of South Australia, Western New South Wales and Southern Queensland, has an annual rainfall of less than 400 mm, while the desert area in the central part of the mainland is less than 200 mm. The area of this area is the largest, with a pasture area of 380 million hectares. However, the climate is dry and the vegetation is sparse. Cattle’s farming is the main industry and the management is extensive.

Growth pole model: the leading industry and innovation industry gather in some specific areas and give priority to development. After the growth pole is formed, it will contact with the surrounding points. It is necessary to establish various circulation channels (transportation, power and water conservancy) to stimulate the economic development of the areas along the line. In order to solve the problems of small cultivated land area and scattered location, Japan adopts the growth pole model to develop its own agriculture, that is, to carry out systematic cultivation and layout of scattered plots, cultivate new varieties adapted to local characteristics according to different regional characteristics, and different crops produced in different regions have their own characteristics, so as to improve the efficiency and efficiency of agriculture.

5.1.2 Take all kinds of farms as basic units to organize production. The United States, Japan and Australia all take the highly commercialized small farms as the basic unit for agricultural production. At present, there are 2.04 million farms in the United States, the average size of which is 193.4 hectares, and its agricultural labour force has more than 2 million people, accounting for about 2% of the total labour force in the country. The number of small farms is more than 90%, accounting for 70% of the total agricultural assets. At present, the number of "corporate farms" is on the rise, with more than 70000. Although the number is not large, the area and sales volume of "corporate farms" account for a large proportion in American farms. Japan's regional agriculture adheres to the mode of "specialized agriculture + ecology + regional culture + regional brand" to carry out factory production and the socialized division of labour is prominent. The responsibility and scale of farmers should be strictly regulated, and horizontal collaborative development should be carried out through decentralized family farms. Intensive farming should be extended and expanded to expand the scale of operation. In Australia, the number of family farms decreased, the scale of enterprise farms increased, the scale of operation was large, and the degree of agricultural intensification was high. Agricultural planting and breeding were basically mechanized, and labour efficiency was greatly improved. Agricultural mechanization degree is very high, labour productivity is high.

5.1.3 Management of agricultural development in different regions through top-level design. The United States and Australia promote the development of agricultural industrial belt in the United States by encouraging producers to comply with the resource protection requirements of corresponding regions, providing various support policies such as loan convenience, sales convenience and export subsidies for the crops produced by producers; Japan promotes the development of regional agriculture through fine management, that is, formulating agricultural development strategies in different regions through a series of laws At the same time, the responsibility and scale of farmers should be strictly regulated. Through decentralized family farms, agricultural horizontal collaborative development in different regions will be carried out, and intensive farming will be extended and expanded to expand the business scale.

5.2 Hainan Agricultural Layout Optimization Path Based on Successful Experience

5.2.1 Innovative layout mode. According to the general requirements of Hainan free trade port construction and Hainan's resource endowment, Hainan agriculture should adopt the point axis development model for layout, that is, taking Haikou and Sanya as growth poles, taking Hainan's west ring axis (Haikou Chengmai Danzhou, the Western reform and innovation driving axis) and the
5.2.2 Effective organization of small farmers to form joint management entities. Through the top-level design and organization of small farmers in cities and counties of the province, innovative operation mechanism and incentive mechanism are adopted to form the joint operation subject with profit link, highlight the regional social division of labour, and carry out the whole industry chain production by adhering to the mode of "professional new business entity + advantage or local agricultural industry cluster + biodiversity + regional culture + regional brand" We should strictly regulate the responsibility and scale of farmers, carry out horizontal collaborative development through decentralized professional new business entities, and spread radiation to the surrounding areas, so as to drive the development of surrounding areas and expand the scale of production and operation.

5.2.3 Guiding regional development through regional subdivision policy. In accordance with the functional orientation of China (Hainan) free trade port policy for each region in Hainan, we should formulate agricultural regional subdivision policy, strictly control and manage the land use of each city (county), never waste and idle. At the same time, we should strictly regulate the responsibility and scale of farmers, guide producers to comply with the requirements of resource protection and regional development in corresponding regions, and produce for qualified producers In order to promote the coordinated development with the three leading industries of China (Hainan) free trade port - tourism, modern service industry and high-tech industry, and Hainan's basic industry - agricultural industry.

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