

Research on the Planning of Modern Agricultural Industrial Park from the Perspective of Rural Revitalization in the Case of Southern Medicine Industrial Park

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Abstract—The rural revitalization strategy has been pioneered in China and the first step is to promote industrial revitalization. However, short industrial chain, backward production technology and slow industrial modernization are common in most rural areas of China. The modern agricultural industrial park has prominent functions such as industrial integration, peasant impetus, technology integration and employment income increase, leading the agricultural supply-side structural reform to accelerate the modernization of agriculture and rural areas. This paper, through intensive study on southern medicine industrial park, puts forward ideas of planning for southern medicine industrial park from the perspective of rural revitalization, which embodies that a panoramic industrial chain of southern medicine is constructed by using and deploying authentic southern medicinal materials with long history and unique experience as well as brand-name and high-quality genuine medicinal materials from specific place of origin in Lingnan area. Combination between the construction of southern medicine industrial park and the implementation of rural revitalization strategy can make the southern medicine industry integrate with technology and with the market, increasing farmers' income.

Index Terms—rural revitalization, modern agricultural industrial park, southern medicine industrial park, planning

I. INTRODUCTION

In the Xijiang River basin, there are abundant resources of traditional Chinese herbal medicines of high quality. Local farmers making use of regional resource advantages have actively developed southern medicine industry for a long time with *Morinda officinalis*, *Fructus Citri Sarcodactylis*, cinnamon and *polygonum multiflorum* thunb as the representatives, which has become one of the leading industries of local new

agriculture. However, southern medicine industry has been under small-scale peasant economy and decentralized management for long, so the good and bad are intermingled and representative varieties and leading enterprises are devoid of influence, for which southern medicine economy still could not move towards standardized and industrialized development. Difficult problems such as how to insist quality first and benefit prior in the light of high-quality development requirement, how to build up agricultural industrial system, manufacturing system and management system and how to promote the large-scale, intensive, optimized, characterized and branding development of southern medicine industry, are waiting to be solved.

The modern agricultural industrial park has outstanding functions such as industrial integration, peasant impetus, technology integration and employment income increase, leading the agricultural supply-side structural reform to accelerate the modernization of agriculture and rural areas. Modern agricultural industrial park refers to the clustering area of modern agriculture spatially and regionally which is a comprehensive demonstration park, the high-level form of agricultural demonstration zones, integrating multiple functions such as agricultural production, science and technology, ecology as well as tourism, based on modern technology and material equipment, guided by the government, operated by enterprises, constructed and managed by the concept of industrial park, with the goal of promoting agricultural modernization and increasing farmers' income by implementing intensive production and enterprise-style management.

II. LITERATURE REVIEW

Zhu Siming studies the landscape planning and design of planting and processing base for Chinese herbal medicine in Qinling Mountains, and proposes that based on the integration of Chinese herbal medicine

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development and surrounding ecological environment, the rational landscape planning of processing area should be focused on, so as to realize the coordinated development of industrial base and ecological environment as well as the organic combination of economic and ecological benefits [1].

Chen Xin and Yu Shu carry out a research on agricultural industrial parks in Jiangsu. They find that modern agricultural industrial parks in Jiangsu started from the 1990s and have entered a stage of steady development at present. They have become the main platform for integrated demonstration of agricultural technology, and the incubation base for enterprises of agricultural technology, and the important carrier for training and promotion of agricultural technology. The park scale is continuously expanding, the functions of parks are constantly enriched, and the demonstration role is significantly enhanced [2].

Liu Yongfei and Jiang Hongqi study the development of the National Modern Agricultural Demonstration Zone in Lianyungang in the era of big data. They propose that in the 21st century, the century of big data, development of "Internet plus" information technology such as mobile Internet, Internet of Things, big data, cloud computing, provides technical support for the innovation of agricultural industrial development mode and is an important measure to promote the high-quality development of modern agriculture [3].

Lu Yiming and Feng Cunli put forward the planning of ecological agricultural park based on the reverse design theory. Designers can collect data from the target according to relevant data, and after data processing, design 3D CAD model on physical object with related software which can realize and present the reverse three-dimensional modeling [4].

Yu Jun, with the planning of Qingzhong Loquat Sightseeing Park in Jinting Township, Wuzhong District, Suzhou as an example, analyzes its industrial development, advantages and disadvantages. From the aspects of project positioning, planning concept, function division, scenic spot design and infrastructure planning, the design concept and technology of "One Brand for One Village" of the Qingzhong Loquat Sightseeing Park are introduced, which is the foundation for building "One Brand for One Village" in order to achieve agricultural high-efficiency development scale [5].

Zhu Siyu carried out a research in the agricultural and industrial parks in a large city, where air and soil samples in summer and winter were collected. The result shows that the spatial distribution of agricultural and eco-industrial parks and seasonal changes may be related to different geographical factors, soil properties and meteorological conditions. Human health risk assessment indicates that soil and air have no non-carcinogenic risks and very low cancer risk for HCH in human health. The result of the research provides valuable data for assessing the fate of HCH and health risk in this region [6].

In conclusion, the modern agricultural park is a display window for modern agriculture, an incubator for the transformation of agricultural technological achievements,

a production base for ecologically safe food, and an exposition park for modern agricultural information, technology and variety, which is the inevitable choice to improve rural economic benefits and farmers' income. The modern agricultural industrial park is conducive to giving full play to the typical demonstration role of transformation from traditional agriculture to modern agriculture, and is beneficial to exploring the development path from traditional agriculture to the high-yield, high-efficiency and high-quality modern agriculture.

III. DEVELOPMENT STATUS AND HEALTH PRESERVING CHARACTERISTICS OF CHINESE SOUTHERN MEDICINE

Climate in midstream and downstream of the Xijiang River mainstream is mild, humid and sunny with abundant in rainfall throughout the year. Advantages of the geographical location and land resources as well as the unique ecological environment have bred rich and high-quality Chinese herbal medicinal resources including large-scale cultivation of authentic Chinese herbal medicines such as *Morinda officinalis*, *Polygonum multiflorum* thunb, *Fructus Citri Sarcodactylis* and cinnamon as well as small and medium-sized cultivation of characteristic local varieties like Gorgon fruit, *hylocereus undatus*, *pachyrhizua angulatus*, *gardenia jasminoides*, *Dendrobium officinale*, *Moringa oleifera*, *Anoectochilus roxburghii* and *Begonia fimbriatipula* Hance. Among southern medicines represented by *Morinda officinalis*, *Polygonum multiflorum* thunb, *Fructus Citri Sarcodactylis* and cinnamon, *Morinda officinalis* whose main chemical components are saccharides and anthraquinones, is therapeutic in impotence, emission, uterus cold, infertility, rheumatic arthralgia and flaccidity of extremities [7]-[10].

Oligosaccharide, a kind of healthy prebiotics, helps to improve the memory of AD animal model [11], [12]. *Polygonum multiflorum* thunb is effective in tranquilization, nourishing blood, improving collateral circulation, removing toxicity and eliminating carbuncle whose main chemical constituents are: phospholipids such as phosphatidylinositol and phosphatidyl ethanolamine [13]; stilbene glycosides including TSG and resveratrol; flavonoid such as rutin, luteolin and quercetin [14]; saccharides including D-glucose, D-fructose and sucrose; microelements such as zinc and calcium. Polysaccharides from *polygonum multiflorum* thunb correlate with human aging [15]. *Fructus Citri Sarcodactylis* works well in regulating vital energy, invigorating the stomach, stopping vomit and eliminating phlegm. Its chemical components are mainly terpene of which limonene accounts for 55.24%, o-cymene accounts for 19.77% and γ -terpinene accounts for 8.65%, helpful in antioxidation and antibiosis [16], [17]. Cinnamon is effective in warming spleen and stomach, tonifying kidney, dispelling cold and relieving pain. Its main chemical components are cinnamic aldehyde, cinnamic acid, o-methoxycinnamic aldehyde, phenylpropyl cete, catechin and protocatechuic acid of polyphenols, apigenin and quercetin of flavonoids, coumarin and inorganic

elements. Therein, cinnamic aldehyde helps to restrain obesity and oral squamous cell carcinoma [18]-[20]. The planning of southern medicine industrial park mainly includes the project design of overall planning, the concrete expression based on the established environment, industrial background, development concept, planning layout, function positioning, circle-layer design, landscape design, business model planning of the target park, which has positive significance for strengthening southern medicine industry development and increasing farmers' income.

IV. PLANNING POINTS OF SOUTHERN MEDICINE INDUSTRIAL PARK

Health preserving landscape space is a place to prevent and treat disease and relieve stress. Several studies at home and abroad have shown that more exposure to natural or artificial landscape is conducive to the recovery of people's mental health, and landscape can improve people's mood and restore cognitive function [21], [22]. With the healing function of landscape, urban residents' body and mind are relaxed and reached a healthy state. By expanding the curative landscape from traditional medical institution environment to urban living environment as well as the tourism industrial park, more people will be benefited, that is to say, the significance of the health preserving landscape to people can be embodied.

A. Precise Positioning

It is necessary for the southern medicine industrial park to have a clear and accurate positioning, which will reflect the leading role of industrial planning, resulting in clear definition of park's spatial scale, unified layout, and more concentrated core area. Vigorously developing the industrialized operation of southern medicine will add new impetus to modern southern medicine industry development: first, implement the brand strategy to continuously improve the quality of southern medicine planting and processing as well as the market competitiveness; second, driven by leading enterprises, the scale impetus of the development of southern medicine industrialization will be continued to condense; third, promote industrial upgrading and continuously encourage farmers to become professional workers of southern medicine industry in order to build the southern medicine industrial park into a modern agricultural industrial park with obvious industrial characteristics, high-tech content, dynamic operation mechanism and strong capacity to increase farmers' income.

B. Construct A Planting Circle Layer for Southern Medicine

Southern medicine park is mainly planted with various types of southern medicines represented by *Morinda officinalis*, *Polygonum multiflorum* thunb, *Fructus Citri Sarcodactylis* and cinnamon. There are also some small and medium-sized varieties such as Gorgon fruit, *hylocereus undatus*, *pachyrhizua angulatus*, *gardenia jasminoides*, *Dendrobium officinale*, *Moringa oleifera*,

Anoectochilus roxburghii and *Begonia fimbristipula* Hance. How to divide the planting area is a very important issue. Rational layout is based on different varieties, growth habits, functional positioning and related volume of southern medicine. Design the "sun" circle layer of planting area, according to the acreage, characteristics of different varieties, product features and revenue channel as well as factors which decide the planting structure such as area deciding planting, identifying theme planting and technicalizing cultivated land, products of same latitude and high-tech agricultural products.

C. Continuously Expand the Functions of Park

Insist on expanding the construction scale and enhancing the demonstration role of the park so as to build the main platform for technology integration demonstration of southern medicine, the incubation base for southern medicine technology enterprise, and the important carrier for training and promotion of southern medicine technology. In accordance with the requirements of "government providing support, diversified investment, market operation and industry revitalizing the park", neighboring farmers are driven to adjust the variety structure of southern medicines and transform their production methods, by adopting ways of "company + base + farmers" and "cooperative organization + base + farmers" and carrying out commercialized centralized seedling, southern medicine technology training, quality testing, market information release and technical guidance of production, which greatly improves the development of southern medicine modernization.

D. Vigorously Develop the Sixth Industry

To develop modern southern medicine industrial park, it is necessary to break the regional boundary, break through the scale advantage, and adhere to the road of regionalized layout, integrated operation and cooperative production of southern medicine industry. Promoting the integrated development of the first, second and third industries should be regarded as development concept, and scale and branding production and management as development strategy. Developing industrialization is the only way to achieve agricultural modernization and large-scale production is the inherent requirement of agricultural industrialization. Southern medicine industry is the core foundation of the park, but it is not the only one. Leisure and health care projects should be taken as the starting point, and housing, land and manpower resources should be integrated, and landscape, health preserving and experience of southern medicine should be distributed rationally. A series of southern medicine festival activities that integrate functions like science, tourism and experience are ought to be held so as to actively promote the integration of ecological agriculture, cultural tourism and health preserving.

E. Scientifically Design Business Model

Deep integration of the "Internet plus" and the development of modern agricultural industry, better

serves the production, operation and management of southern medicine, realizes the connectivity of agricultural supply chain, industrial chain and value chain, and greatly enhances the intelligent production and network management of southern medicine. Integrate the modern technological elements into the development model of southern medicine, and through the “Internet plus”, combine agricultural management entities such as medicinal herb collectors, farms and agricultural cooperatives with planting, production, processing, sales, and technology promotion so as to realize the recombination and crossover of the first, second, and third industries and to reconstruct the southern medicine industry chain. Meanwhile, enterprises can accelerate their development through the “Internet plus” platform forming a good cycle model. As shown in the Fig. 1, with the help of “Internet plus”, management entities of southern medicine can better obtain the information of the integrated development of the first, second and third industries. Both the seller and buyer can grasp the real-time data immediately, reducing the intermediate links or processes and transaction costs effectively.

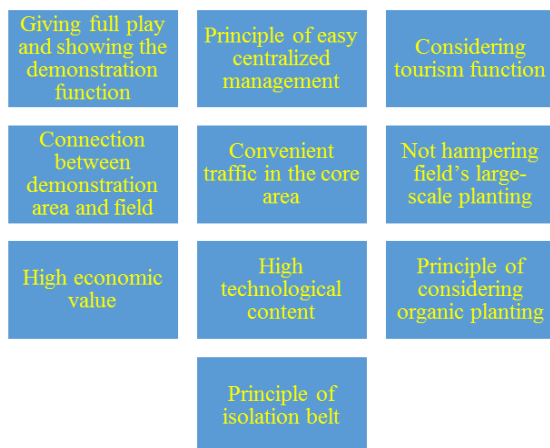


Figure 1. Planning points of southern medicine industrial park

V. PRACTICE OF PLANNING

A. Diversified Functional Design

The agricultural area has productive function and other functions such as promoting urbanization, attracting people, improving land value as well as satisfying various needs of customers. These functional divisions are: agricultural production area, residential area, cultural landscape area, leisure gathering area, health preserving activity area and comprehensive service area. The path of agricultural industry is complete with industrial support, infrastructure, public services and environmental products.

B. Tourist Attraction Design

Four major designs are included. The first one is science popularization and generalization design of industrial park. The science popularization function which is mainly represented by the innovation of science popularization forms of southern medicinal knowledge

such as route, content, atmosphere and culture, is the focus of the industrial park to attract tourists. The second one is the organizational design of touring line which is the process propelling the entire park to achieve the desired results. The third is the design of attractions. The key is to create more effective sightseeing and experience for tourists in the industrial park. The fourth is the design of the rest nodes which make tourists stay in typical knowledge landscape. In this way, the tour can be slowed down with sightseeing pavilions and observation decks.

C. Landscape Design of Industrial Park

The landscape design of southern medicine industrial park has its own characteristics, including natural and human landscape designs. The natural landscape design is based on the original natural environment of the industrial park while human landscape design is inclined to cultural experience design which creates an atmosphere and scene to attract visitors with a variety of means and media. As for people, the industrial park is inseparable from its buildings with unique exterior. The iconic building is also a very attractive landscape of the industrial park. The architectural design of the industrial park should excavate and innovate the inherited culture of the industrial park and transform it into the architectural language, which makes the building itself have fresh vitality.

D. Business Model Design

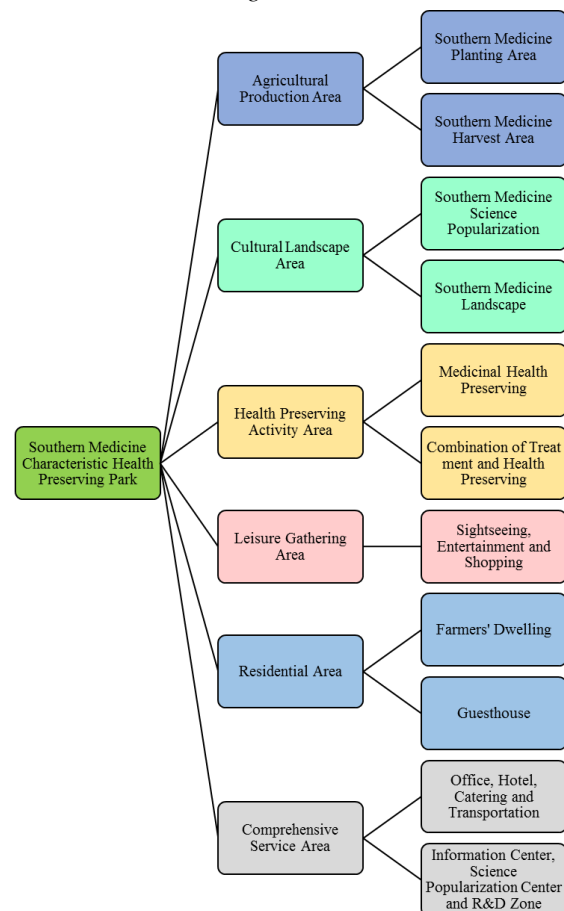


Figure 2. Planning of function division of southern medicine industrial park

As shown in the Fig. 2, there are five aspects included in the business model design of industrial park. The first is target market. It is necessary to define the target market the industrial park is aiming at, and to figure out which product and who should be offered to. The second is sales and marketing. Sales channel and marketing plan of the industrial park is ought to be determined. The third is the product or service, that is to say, the products and services that the industrial park can provide should be clarified so as to meet the needs of tourists. The fourth is the income model. Information on how and when the industrial park can earn operating income should be provided. The last one is the cost structure. It is supposed to analyze the cost and its specific composition of the industrial park operation.

VI. SUMMARY

The research on the planning design of southern medicine characteristic industrial park was carried out based on China's rural revitalization strategy and combined with unique local south medicinal resources. For local development status such as the short industrial chain, underdeveloped production and processing technology and insignificant cultural features, the planning puts forward that China's southern medicine industry should be combined with technological innovation, advanced technology for agricultural production is ought to be introduced and rational optimization of industrial structure is supposed to be promoted, in order to complete the agricultural supply-side structural reform and accelerate the development of local rural agricultural modernization. In addition, it is necessary to focus on excavating the historical and cultural connotation of local authentic southern medicinal materials. Taking advantage of the pharmacological characteristics of southern medicine, build a southern medicine characteristic health preserving park to create a local characteristic cultural brand industry and to promote the integrated development of the first, second and third industries. Southern medicine characteristic health preserving park can not only drive local farmers to start business, increasing their income, but also serve as a demonstration base for modern agricultural industrial parks, providing valuable reference for rural revitalization and industrial construction in other countries.

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