



Spatial Element Allocation and Whole Industry Chain of Ten Billion Level Pre-made Food Industry

A Case Study of Shiquan Guyan Industrial Park

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Abstract. With the proposed national strategies of ecological civilization, new industrialization and new urbanization, the development of industrial parks in China is faced with the imbalance of the relationship between industrial chain and spatial factors. How to coordinate the relationship between industrial chain and spatial factors has become a difficult problem to be solved urgently in the planning of industrial parks in the new period. In this paper, through the construction of the whole industrial chain of pre-made food under the guidance of ten billion level, the exploration of spatial factor allocation of industrial park and the demonstration of park planning and design, we hope to enrich the relevant research perspective of spatial factor allocation of industrial park to a certain extent, and provide research ideas for the optimization of factors of ten billion level pre-made food industrial park.

Keywords: Industrial chain · pre-made food · ten billion level industrial park

1 Introduction

The inevitable trend of industrial park development is the coordination of industrial chain - space elements. Under the traditional construction mode, the development of industrial parks is faced with the imbalance of industry-space relationship [1], for example, "heavy industry" leads to the separation of jobs and housing, the intermingling of industrial and urban Spaces, and the low quality of park space. "Heavy space" leads to the lack of industrial development power, the lack of industrial scale effect, the disorder of industrial space and the inefficient allocation of industrial resources [2]. The period of transformation and quality improvement requires strengthening the interaction between spatial planning and industrial development [3, 4]. Based on the spatial demands of flexible development proposed by ecological civilization, the functional demands of intensive and efficient land use layout and integration of industry and city proposed by new urbanization, and the innovation demands of high concentration, high quality and

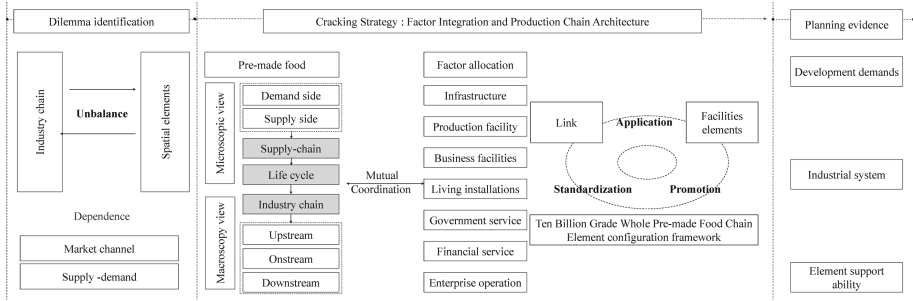


Fig. 1. Research thinking diagram

self-growth of elements proposed by new industrialization [5]. This article is based on the spatial factor allocation and industrial chain structure of the ten billion-level pre-made food industrial park. First, it explores the development dilemma and influencing factors of the industrial park; the second is to sort out the pre-made food and billions of spatial elements, and to build an applicable system for the allocation of production chain elements to coordinate them with each other; the third is to Shiquan County Guyan Industrial Park planning and design of the configuration system for empirical. With a view to China’s tens of billions of pre-made food industrial park factor allocation efficiency to provide ideas for in-depth study of industrial chain and spatial elements of the coupling relationship. Figure 1 is the research idea of this paper, namely dilemma identification → crackstrategy → case demonstration. “Fig. 1”.

2 Pre-made Food-Large-Scale Economic Products Under the Changing Times

2.1 Definition of Premade Food

Pre-made food can be defined from two perspectives. From the perspective of products, pre-prepared food is the collection of finished food and semi-finished food, which can be divided into ready-to-eat food, instant hot food, instant cooked food and instant prepared food. From the perspective of supply chain, premade food are the industrialization of food and beverage production [6], which generally need to be stored, transported and sold under cold chain conditions.

According to the forecast, the size of China’s pre-made food market will reach 4196 billion yuan in 2022, an increase of 21.3% year-on-year, and the size of China’s pre-made food market is expected to reach trillion yuan in 2026 [7]. Therefore, local intensive actions have introduced industrial policies, the formation of industrial parks to support the development of pre-made food industry.

2.2 Pre-made Food Industry Chain Growth Multidimensional Factors

From the demand side: lazy economy prevails, consumer demand continues to rise. Because the pre-made food can provide consumers with delicious and convenient cooking and dining solutions, coupled with the new retail model driven, open up the last

mile of pre-made food distribution, can help catering enterprises to reduce costs and improve efficiency, so the industry demand continues to expand. From the perspective of the supply side, the demand for cost reduction is strong, and the expansion needs the support of standardized supply chain. According to statistics, in the cost structure of catering, the cost of rent and property and labor rose the fastest. In 2019, the average ratio of the two expenses to income was 21% and 12%, respectively, up 3pct and 4pct compared with the previous year. Food and beverage manpower, rent cost pressure, food enterprises demand a strong cost reduction. From the supply chain point of view, upstream agriculture, midstream food manufacturing, downstream catering industry and through the whole process of circulation (wholesale and retail + logistics) have greater space for modernization and standardization. From the perspective of life cycle, after the category and the internal supply chain of the enterprise are mature, the pre-made food supply chain will become the core competitiveness of the industrial chain [8].

2.3 Pre-made Food Industry Chain Classification Model

One of the characteristics of the pre-made food industry is the long industrial chain, the whole industry chain of the current standards and models are still under construction; therefore, for different market positioning, it is necessary to further construct a special development industry chain classification model.

(1) Prototype product development. It mainly includes central kitchen port: through a series of standardized production of central kitchen, the research and development of pre-made food of signature dishes; From the perspective of food: mainly the cross-border joint cooperation between famous chefs and restaurants; From the perspective of food materials: It is in the upstream of the prefabricated food industry chain and has the advantage of low raw material cost. According to the characteristics of food materials and the advantages of the industry chain, it conducts the research and development of a variety of pre-made food products. (2) Initial processing/gathering and supply of agricultural products. It mainly includes standardization: establishing a series of information standardization of primary processing of agricultural products; acceptance center: including sensory indicators, physical and chemical indicators and safety and health indicators standards; trading center: the establishment of primary processing of agricultural products trading center, in the form of collection and supply, the formation of price advantage. (3) Industrialization and packaging. Industrialization: more precise and automated production line design for different cooking prototype points for higher reduction and adaptation. Packaging: the establishment of standardized segmentation and packaging plant, to promote the pre-made food to intelligent, green, simple and sustainable development. (4) Logistics warehousing and distribution. The whole chain cold chain logistics system including precooling, storage, packaging, transportation and information service is established from the fresh-keeping facilities and storage network such as cold storage, freezing and constant temperature in the place of origin and sales.

3 Integration of Spatial Elements of the Whole Production Chain of Ten Billion Level Pre-made Food

3.1 Element Composition of Ten Billion Level Pre-made Food Industrial Park

Ten billion level is the total output chain of more than ten billion yuan annual industrial park. The park should take planning roads, rivers and ecological green corridors as the basic elements of boundary configuration. These include:

(1) Infrastructure elements: including centralized water supply plant, heat source plant, substation, sewage treatment plant, garbage treatment plant, etc. (2) production facilities elements: including incubators, accelerators, standard workshops and public cold storage, to avoid each factory self-built small cold storage high power consumption, poor cooling effect, solve the problem of scale raw materials and finished products storage. (3) Business facilities elements: including hotels, convention and exhibition centers, while building pre-made food trading platforms, tasting centers, brand innovation centers, etc. (4) Elements of living facilities: the main purpose is to meet the basic living needs of workers and managers, supplemented by regional commercial, medical, educational and other living facilities. (5) Government service elements: build government service platform, information service platform, policy propaganda and docking platform, industry alliance and foreign exchange and public technology platform. (6) Financial service elements: including equity financing, debt financing, etc., to solve the problem of capital environment, industrial investment and incubation business under the condition of high capital intensity. (7) Operation service elements: including intermediary agency, finance and taxation, law, consulting, human resources, marketing, intellectual property and many other aspects of enterprise operation and management, to provide important support services for industrial development.

Through systematic park supporting and service element allocation, all kinds of elements converge, and become the core competitiveness of the ten billion level pre-made food industry park.

3.2 Ten Billion Pre-made Food Production Chain Factor Allocation System

Pre-made food span the catering industry and food processing industry. However, the standard deviation of food safety in these two industries is relatively large. As shown in Fig. 3, the spatial element allocation system of the pre-made food industry is structured in this paper under the secondary subdivision, linking vegetable planting, adding production and processing, inspection and testing centers, logistics and warehousing, etc., and allocating the production capacity of each enterprise by the industrial park platform. On the one hand, it reflects that the pre-made food are linked to the producing area of Tiantou on the one hand, and to the market table on the other hand, which drives the synergistic effect of the integrated development of primary, secondary and tertiary industries. On the other hand, it forms a set of planning and design framework suitable for ten billion level premade food industrial park. “Fig. 2”.

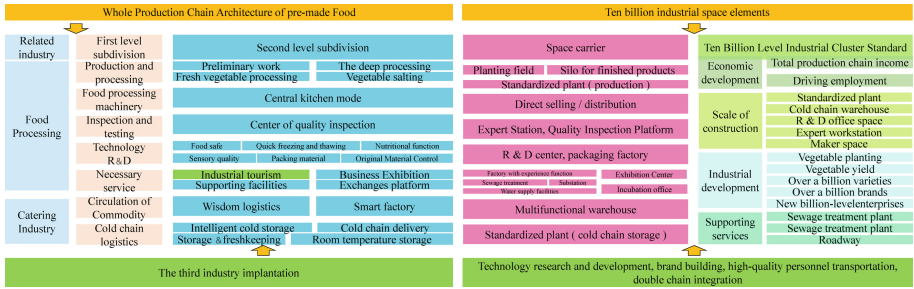


Fig. 2. Element configuration diagram of the whole production chain of ten billion level pre-made food

4 Shiquan County Guyan Industrial Park Planning Empirical

4.1 Development Demands Around the Current Situation of the Park

Shiquan County Guyan Industrial Park is located in Shiquan County provincial Economic Development Zone, its transportation is convenient, Shitian high speed G7011, Ningshi High speed (under construction), G210, G316 intersection in the county, Yang ‘an Railway runs from east to west, the planned area is 207.9ha. The current situation of the park mainly has the following three problems: in terms of industry, 70% of the existing non-food manufacturing enterprises are not compatible with each other, which is not conducive to the formation of the pre-made food industry cluster; In terms of facilities, the quality of road construction in the park is uneven, cold chain logistics and financial services are missing, and the supply capacity of water supply, power supply and sewage treatment cannot meet the basic demands of the development of the ten billion level industrial park; In terms of construction, most of the factory buildings are structurally complete and occasionally damaged, but the vacancy rate is high. Therefore, how to provide low-cost industrial space based on the current situation of the park and its surroundings, build a whole production chain system of pre-made food and a billion-level industrial park growing in the whole life cycle, and achieve the cluster effect of high internal cooperation and opening up linkage has become the core issue of the planning and design of the park.

4.2 Build an Industrial System Around Three-Dimensional Elements

The industrial system is structured from three dimensions. Policy orientation dimension: adhere to the quality first, efficiency first, accelerate the construction of ‘industry more high-end, innovation more surging ‘billions of high-quality industrial park; industrial agglomeration dimension: Considering the core functions of the industrial zone, the extension development mode of the whole industrial chain is proposed [9]. From the industrial supporting, industrial agglomeration, quality upgrading, research and incubation to develop the prefabricated food industry at all levels; Regional synergy dimension: A comprehensive consideration of the overall pattern of agricultural products industry in Ankang, with the help of agricultural resources in Shiquan County, forms a cluster effect

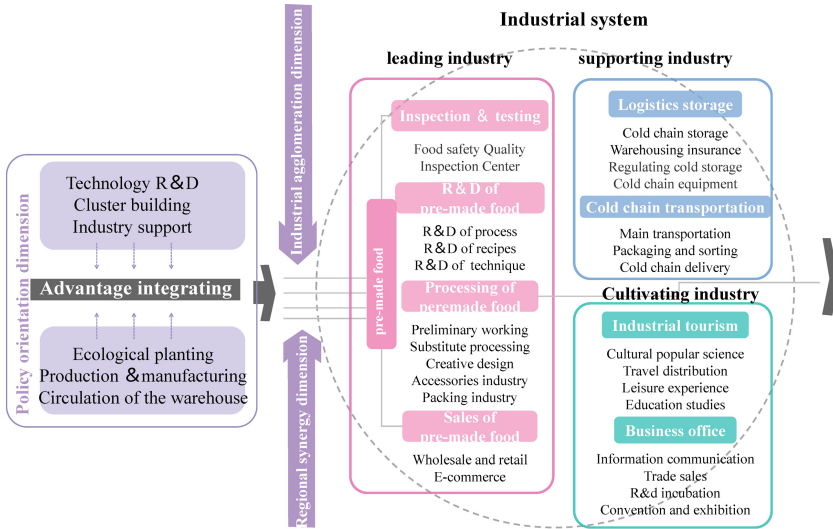


Fig. 3. Industrial system of Shiquan County Guyan Industrial Park

from point to surface and radiates to the surrounding areas, drives the quality upgrading of industries in Ningshan County, Ziyang County and Langao County, and connects with the surrounding areas. Therefore, based on the above three dimensions, the elements of the pre-made food industry are organized to build a standardized, characteristic and specialized high-quality park with pre-made food as the leading industry, logistics storage and cold chain transportation as the supporting industry, industrial tourism and business office as the cultivation industry. Relying on high-quality local food materials, we will accelerate the comprehensive strength and innovation ability of the park, strive to build a strong county of pre-made food industry in the country, ‘ the hometown of northwest pre-made food ‘, and build a ten billion-level pre-made food industrial park. “Fig. 3”.

Based on the factor allocation system of the whole production chain of 10 billion prefabricated vegetables and the industrial system of Guyan Industrial Park in Shiquan County, the framework of the optimal allocation of park factors is formed as shown in Table 1, including the short-term and long-term allocation of four first-level indicators such as economic development, construction scale, industrial development and supporting services, and 16 s-level indicators. At the same time, it reflects the complementary characteristics and synergistic effects among various industrial factors, realizes the optimal allocation of resource systems, and improves the efficiency of the whole industrial chain of the park. The park mainly forms four functional zones: comprehensive industrial zone, logistics storage zone, living supporting zone and ecological leisure

Table 1. List of element allocation of Guyan industrial park in Shiquan county

First index	Second index	Unit of measurement	2025	2030	Attribute
1. Economic development	Total production chain income	≥ ten billion yuan			Constraint
	Driving employment	Number	4000	5000	Anticipate
2. Scale of construction	Park area	km ²	2.2	-	Anticipate
	Standardized plant(production)	hectare	35	42	Anticipate
	Cold chain warehouse	ctare	10	12	Anticipate
	R & D office space	hectare	5	6	Anticipate
	Expert workstation	Number	2	4	Anticipate
	Maker space	Number	2	4	Anticipate
3.Industrial development	Vegetable planting	10000acres/year	10	12	Anticipate
	Vegetable yield	10000tons/year	40	48	Anticipate
	Over a billion varieties	Number	10	15	Anticipate
	Over a billion brands	Number	10	15	Anticipate
	New billion-level enterprises	Number	50	60	Anticipate
4. Supporting services	Sewage treatment plant	10000tons/day	0.4	0.4	Constraint
	Water consumption	10000tons/day	0.5	0.5	Constraint
	Roadway	Myriameter	1.5	2	Anticipate

zone. Among them: comprehensive industrial zone, focusing on the allocation of pre-fabricated vegetable industry demonstration base, testing center and experience center; logistics storage area is mainly equipped with cold chain logistics standardization plant, intelligent warehouse, etc. Life supporting area set up talent apartments, schools, hospitals and other facilities; ecological leisure area set up ecological park, leisure sightseeing agriculture, exhibition hall, commercial exhibition belt, etc.

In addition, 28 key projects were constructed to achieve the three major goals of “Pre-made food Industry Cluster Demonstration Base, “ “Northwest Pilot of pre-made food “ and “High-quality development supporting construction.” “Fig. 4”.

Pre-made food Industry Cluster	Northwest Pilot Park of pre-made food	High-quality development supporting construction
Demonstration Base		
1 Pre-made Food public service platform	2 products ' two products a standard ' certification	1 Pre-made Food safety training platform
1 Pre-made Food Products Exhibition Centre	1 Northwest Pre-made Food Quality Inspection and Evaluation Center	1 Logistics Information Open Application
1 tourism consulting service information platform	1-2 research centers of quick freezing and thawing technology	More than 5 Pre-made Food marketing
2-3 high-star hotels enhance tourism reception capacity	3-5 Pre-made Food engineering laboratories	100,000 m² standardized plant (cold chain storage)
1 industrial tourism demonstration base	2-3 international science and technology cooperation bases	350,000 m² standardized plant (production)
More than 5 Pre-made Food industrial tourism experience projects	2-3 technology transfer agencies	50 Pre-made Food enterprises settled down)
2 small micro enterprise incubation bases	1 State-level special fund	10 Pre-made Food billion yuan leading enterprises
2 Pre-made Food Promotion Centres	2 provincial special funds for industrial transformation	2 expert apartments, talent apartment living supporting area
8 - 10 ' Shiquan Shimei ' Pre-made Food Recipes Dishes	2 provincial expert workstations and R & D centers	Ten thousand tons of sewage treatment facilities
	2 provincial technology business incubators, maker space	

Fig. 4. 28 key projects of spatial elements of Guyan Industrial Park in Shiquan County

5 Conclusions

In order to effectively respond to the demands of new urbanization and new industrialization for the high-quality development of industrial parks in the period of industrial transformation, this paper takes the planning and design of Guyan industrial park in Shiquan County as an example. On the basis of fully integrating the elements of ten billion grade pre-made food industrial park, it explores the potential of the current situation of the park and constructs an industrial system from three-dimensional elements, so as to realize the industrial functional cooperation relationship in all links of the whole industrial chain of pre-made food, and better provide planning ideas for the problems of insufficient impetus for industrial development and inefficient allocation of resources in industrial parks.

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