Research on Planning Problems and Methods of Urban Logistics Park--Take Chenming Park Planning in China as an Example

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Abstract: As an important infrastructure of the city, Logistics Park plays a more and more important role in the development of city, the planning and construction of the logistics park is very important. Firstly, the paper wishes to point out the common problems in the development and planning of the logistics park, and analyze the reasons of the construction of Logistics Park. Secondly, the logistics park planning and design will be discussed, and the application of MSFLB model to analyze the logistics park planning system and provide a scientific basis for the planning of the logistics park. Finally, the model is applicable to an example of Chenming logistics park planning.

Keywords: Urban Logistics Park, Logistics Park Planning, MSFLB Model, Gray Model

1. The Problems of the Development and Planning of Urban Logistics Park

1.1. The Connotation of Logistics Park Plan

Logistics park refers to the space aggregates that is formed convergence in a variety of modes of transport logistics node, it also is a large sites that a variety of modern logistics facilities, equipments and several logistics organization concentrated on the spatial layout under the government planning guidance, which is the new logistics industry carrier with certain scale and a variety of service functions.

Logistics Park comes from Japan, and it has made a rapid development in China in recent years. With the logistics park construction boom, logistics park planning is further particularly important. However, there is a lack of theories and models of rational and effective planning in Chinese logistics park construction, the MSFLB model of foreign logistics park planning is rarely applied in Chinese logistics park planning [1].

1.2. City Logistics Park Development and Planning Problem Analysis

It is a great investment project to construct Logistics Park and difficult to obtain returns in a short time. With the increasingly fierce competition, Logistics Park planning has become even more important [2]. Nowadays, the major problem is the "demand is unclear, positioning allowed, dysfunction, not a smooth running," in the work of logistics park planning, and the result is largely due to the lack of reasonable and effective method in the planning. In practice, there is a lot of errors in the development process of Logistics Park, mainly because the vague understanding for Logistics Park features, lack of planning, etc. There is little knowledge about theoretical knowledge of Logistics Park Planning [3]. specifically in the following major areas.

(1) There is a lack of clearly market positioning of Logistics Park planning in China. It is not clear that the object of the park service, how to service and the problems of potential service. The functional orientation over the pursuit of a comprehensive and international, lack of understanding of the actual situation, and not clear who the customer is served lead to the unclear of customer needs and market positioning directly.

(2) Due to the restriction followed by its short term of development, construction and operation, there is a deficiency in the general development, planning and design of the zone and there are various issues and difficulties in its development. Such as, because of the lack of overall planning of national Logistics Park, there is no apparent systematic and standardized on the specific location of the park and covers an area of investment scale planning. Regardless of the actual needs on the scale of construction; because of the lack of coordination between the Logistics Park, there are duplication services seriously; because of the lack of scientific guidance on the Park internal planning and the lack of coordination between the various functional areas, there is affecting the efficiency of the Logistics Park [4].

(3) The purpose is focused on misappropriating enclosure while ignoring the practical effect is impure in Park planning. These problems greatly affect the overall planning of the logistics park planning, which also hinder the formation and development of regional logistics and national logistics park.

2. Significance and Necessity of Urban Logistics Park Planning and Construction

Theoretically speaking, modern logistics park has two mainly functions: one is efficient organization management functions, another is economic exploitation functions based on logistics services [5]. logistics park as a functional areas of urban logistics, including logistics center, distribution center, transportation hub facilities, transport organization and management center and logistics information center, and adapt to the urban logistics management and operation of logistics infrastructure; as economic function areas, whose main role is carried out the enterprise production and business activities to meet consumption of urban residents, the nearest production, regional production organization [6].

The internal function of logistics parks can be summarized in eight areas, including the comprehensive functions, intensive role, transaction information, centralized storage function, distribution and processing functions, multimodal transport function, auxiliary services, parking function. It integrates all kinds of logistics mode and logistics form can fully handle the storage, conversion packaging, handling, distribution processing, distribution and other operation modes and switch between different operations modes [7].

As a goods distribution center for the import, Logistics Park provides a platform for large purchasing and distribution. Logistics Park plays a core role in the entire logistics chain, and its normal function is conducive to achieve the goal of logistics. Logistics park has aroused great concern from all fields of society since the characterized of large scale, comprehensive service functions, and logistics organization management and economic exploitation functions. Logistics Park organizes logistics activities in accordance with the principles of specialization and focused on a number of logistics, to establish the strategic cooperative relationship formed cross industry complementary advantages and cooperation and share the infrastructure and supporting services and facilities, which is conducive to the development of the overall advantages to accomplish specialization, professional services and centralization of logistics.

Such as:

Relieve the pressure on urban traffic;

Reduce the adverse effects on the urban environment of logistics;

Benefits to achieve the scale management of logistics services business;

Meet the requirements of the large scale warehouse construction development;

Meet the development of freight transportation needs;

Effective means to reduce the total cost of social logistics.

3. The Design Scheme of Urban Logistics Park Planning

3.1. Technology Roadmap

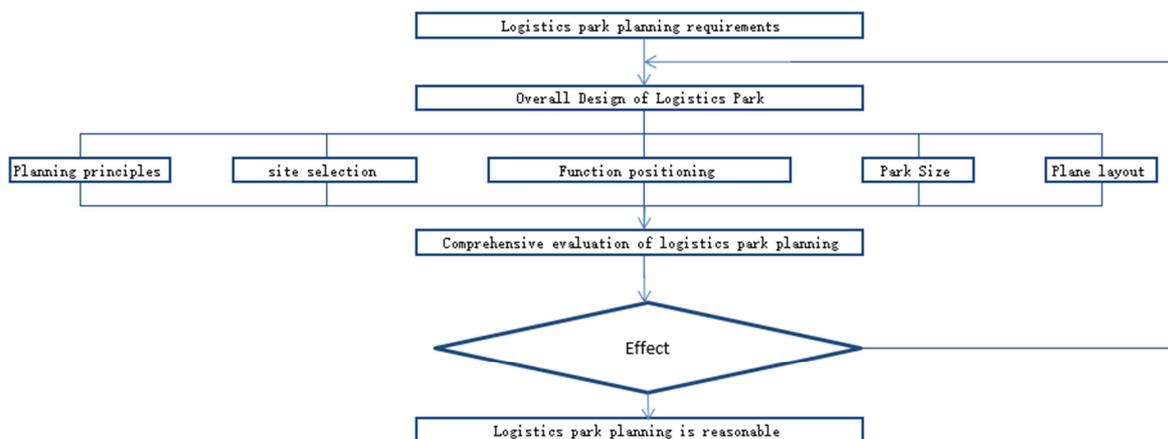The Technology Roadmap of Chenming as shown in figure 1.

***Figure 1.** Technology roadmap.*

3.2. MSFLB Model and Method

MSFLB park planning methodology is a summary of the German Faun of Logistics Research Institute from the logistics park planning practice, mainly divided into five steps: Market Study, Strategic Positioning, Function Design, Layout Design, and Business Plan [8].

(1) Market Study

To determine recently and long-term construction scale and development goals of Logistics Park, first of all, we need to in-depth knowledge of the economic development status of logistics park surrounding regions, market demand, infrastructure, service competition and so on. We should carry on a scientific plan for macroeconomic, industry and micro environment situation of logistics parks through a full investigation and study on.

Market study includes information collection, research and data analysis. In general, we carry out qualitative analysis based on the SCP model and quantitative analysis based on the REA model.

(2) Strategic positioning

After the completion of detailed qualitative and quantitative market research, planners must analyze overall advantages, weaknesses, opportunities and threats of Logistics Park (SWOT analysis), and must also analyze special SWOT if one service occupies a large proportion in throughout the park. The analysis is mainly aimed at helping the park planners to clarify the internal and external environment and proposing the development of the logistics park mission, vision and winning strategies, so as to carry out an accurate strategic positioning and help achieve its strategic objectives.

(3) Functional design

The functional design of the logistics park is mainly in a top-down approach. In other words, after determining the principles of Logistics Park planning, the core factors involved in the planning of the logistics function are enumerated and analyzed, in the most advanced international logistics park cases through the collection a series of the most advanced international logistics park. Subsequently, Logistics Park in the whole will be divided into several major functional areas, planners named for each functional area, distribution area, the introduction of related facilities, equipment and IT systems from two aspects of international best practice experience and the actual demand based on market research. The final step is to define and describe the core process of Logistics Park.

(4) Layout Design

Logistics Park facilities planning and layout design refer to the whole process of the goods into, assembly and processing until the goods are shipped out in scope of confirmed space and functional design, according to the logistics park strategic localization and the management goal, striving to the most appropriate distribution and the most effective combination of personnel, equipment and the space materials need so that to acquire the maximum economic benefits.

(5) Business Plan

The business plan is mainly including organizational structure and responsibilities of logistics Park Management Company, logistics park business patterns, revenue forecast, customer analysis, Park Sales/marketing strategy, investment income and other financial summary analysis.

4. Example Analysis of Chenming Logistics Park Planning Based on MSFLB Model

Chenming Logistics Park is located in Shouguang City, Shandong Province, and total planning area of 1395 acres. The park is close to the traffic artery of Shouguang City, and has convenient transportation by railway, highway, shipping, air. Overall planning of Chenming Logistics Park is the most important task of park construction and theoretical guidance in the future park construction. Overall planning must be based on the demand of Chenming logistics to meet the comprehensive, coordinated and take care of the overall urban planning. It also should be able to coordinate with land use, urban and transportation development plan [9].

4.1. The External Environment Market Demands Analysis of Chenming Logistics Park

The economic and environment analysis of Weifang city. Comprehensive economic aspects: There are more than 3000 logistics enterprises in Weifang City in 2015, and it includes 23 logistics enterprises are 3A and above levels, 12 logistics enterprises of 4A and above levels, and 2 logistics enterprises of 5A. It has built 46 large logistics parks, which attracts over 3500 companies to enter and support gradually form industry ecosystem.

The Infrastructure analysis of Chenming Logistics Park: By the end of 2013, the city's highway total mileage has reached 3341 km, laying the foundation to further improve logistics network coverage and connectivity. In Port and railway construction aspects, investments 1.8 billion Shouguang project total construction 13 berths of 2000-ton to complete the port cargo throughput of more than 200 tons from then open. Investment 780 million Yi Yang Road Project has been pull-through across the board.

4.2. Theoretical Analysis of Logistics Demand Forecast

Logistics demand forecast should follow the principle of quantitative analysis and qualitative analysis. Where in the quantitative analysis and forecasting mainly founded on the regression analysis and the elastic coefficient prediction. When performing the regression test analyses, we can select the relevant national economic indicators that have a great impact on the volume index to analyze the correlation between them, and determine the relevant predictive models, then obtain the forecasting results of volume. In order to make realistic predictions possible, not only establish the same indicators index and a related indicators of a regression model,

but also use more than one model to establish the index and a plurality of related indicators mono- or binary regression model, considering the development trend of the index from a different side, then through the comprehensive analysis of the predictions results of each model to obtain predict traffic indicators.

Economic indicators forecast, for instance, mainly consideration the related relationship with time, primary industry, and secondary industry can be used to establish a time series model, the corresponding index, Single-element regression model and bivariate regression model of GDP.

Since the total value of goods and transport demand indicators Regional Product (GDP), especially the first, the second industrial area GDP close.

Thus, when forecast cargo and freight turnover indicators, we should adopt the flexible analysis and linear regression forecasting and built the corresponding index and the national economy prediction model, including time series model that the gross regional product of the primary industry and secondary industry, the binary regression model.

Time Series Models: $y_1 = a_0 + a_1 x_1$

Single-element regression model: $y_2 = b_0 + b_1 x_2$

Bivariate regression model: $y_3 = c_0 + c_1 x_1 + c_2 x_2$

y_1: predictors (total cargo or cargo turnover)

X_1: year predicted value;

X_2: GDP corresponding year of the first, second industry ($ billion),

a_i, b_i, c_i: constant in model; and each variable coefficients

The paper mainly uses the quantitative method of industry forecast logistics volume supplies of coal, steel and other predictions, in general use the prediction coefficient and expert evaluation to forecast container transshipment. Referring to the region's GDP growth rate in recent years and the growth is expected the next few years, we can get the region's annual growth rate of logistics operation based on the amount of data in logistics park, we can get the amount of predict data stream occurs next few years. In the calculation process, we create different models to predict, for example, exponential regression analysis and gray model GM (1, 1).

4.3. Strategic Positioning of Chenming Logistics Park

This thesis mainly use the research method of interview with experts, and widely solicit the opinion of economic experts, logistics specialists, planners and builders of the park, major logistics enterprises, after many surveys, feedback, integrated, organize, summarize, amend, carrying on the fixed science position for development objectives, strategies and planning of logistics park.

Chenming Group is based on a number of industrial raw materials and the logistics demand of finished goods, relying on comprehensive traffic conditions and industrial advantages of Weifang, grasp the customs clearance regional integration and the national strategy of "The Belt and Road", in order to achieve the development of Chenming internal logistics integrated and socialized service of logistics park. Based on Shouguang and surrounding areas radiation and Weifang Peninsula to create a variety of functions of the modern integrated industrial logistics center and bonded logistics center.

4.4. Logistics Planning Functions of Chenming Logistics Park

According to the function of general logistics center and combine with the specific situation of Shouguang City. Chenming Logistics Park includes the basic function and information function. The specific function is shown in Table 1.

Table 1. Chenming logistics park function division.

function		content
Basic functions of Logistics Park	multimodal transport function	Chenming logistics park has road, rail transport function rely on excellent traffic environment and geographical of Shouguang and Weifang.
	Storage function	According to the characteristics of goods, the condition of warehousing and storage, the requirement of quality, hygiene and technical facilities to plan professional storage area
	Distribution processing function	Distribution processing service mainly for the raw materials of Chenming paper need and export of agricultural products and coke of Shouguang
	Distribution function	Including waste paper, agricultural products, coal and other bulk cargo, it can provide with distribution services and raw materials distribution services for the main customer in the service area, and can provide with sale distribution service business enterprises.
	Container transportation integrated service function	Shouguang is the Intersection of three modes of transport, It is advantageous to the container multimodal transport and to improve the functions of Logistics Park
	storage of bonded goods	Export goods can export tax rebate, import, goods duty-free storage, inventory management in the park.
Information function of park	Government service function	Logistics information platform should have the function of publish government information and macroeconomic information, in order to improve the efficiency of logistics enterprises obtain information
	Public information service function	To provide information support for all types of enterprises and government departments through publish and query functions of logistics management need.
	Electronic commerce function	E - Commerce will serve all kinds of enterprises that provide the whole process services, such as online transactions and management.

4.5. Layout Planning of Chenming Logistics Park

According to the general principles of logistics center function partition, Chenming Logistics Park can be divided into the following main functional area.

(1) Bonded logistics zone. It was built under the supervision of the Customs, and bonded goods warehousing, transportation, processing, distribution, maintenance and inspection declaration by enterprise logistics management, and to provide users with radiation of domestic and foreign multifunctional、 integrated comprehensive service bonded premises. The function mainly includes bonded warehousing, simple processing and value-added services, international logistics and distribution, import and export trade, international transit and entrepot trade, logistics information processing and so on.

(2) The operation centers of railway logistics. The surrounding area of Shouguang and Baofeng County have a lot of the logistics demand of coal, mechanical and electrical products and steel products, grew up heavy cargo, Chenming logistics park using the advantages of railway develop railway logistics operation center, providing services of goods arrival, transferring, storing, dial delivery. The establishment of railway logistics operation center in Chenming logistics park to provide adequate space for development of increasing coal, steel, and other large cargo transport logistics demand.

(3) Distribution processing zone. It mainly provides a variety of agricultural and sideline products of the local rich with processing and distribution services such as pigs, cows, tobacco,, provide logistics and distribution services for the supermarket chain, all kinds of stores and related enterprises, according to customer needs carry out the work of simple circulation processing, Sorting and packing support.

(4) Container freight station. It includes special railway, railway line. The function of the areas is to provide container shipping, loading and unloading, cut packing, LCL, empty container, and container cargo consolidation, storage, distribution, container rail transport logistics service.

(5) Commodity distribution area. It is mainly engaged in goods with (goods collection, processing, goods, picking, picking) and tissue on the user's delivery, it can reduce the number of transactions and circulation through the distribution center and bring economies of scale; it can reduce customer inventory and improve the degree of ensure inventory. And distribution center is the material and technological basis for the development of distribution activities in the modern electronic commerce activities. Chenming logistics distribution center can better use of logistics public information platform, coordination and cooperation to improve the operational efficiency of the logistics distribution.

(6) Comprehensive office service area. Mainly including purchasing, show Trading Center, e-commerce, settlement center, administrative office, financial services center, which is the main core part of the business management that used to coordinate and control the whole Chenming logistics park.

(7) Living and recreation area. It is used to have a rest for staff. The brief distribution diagram is shown in figure 2:
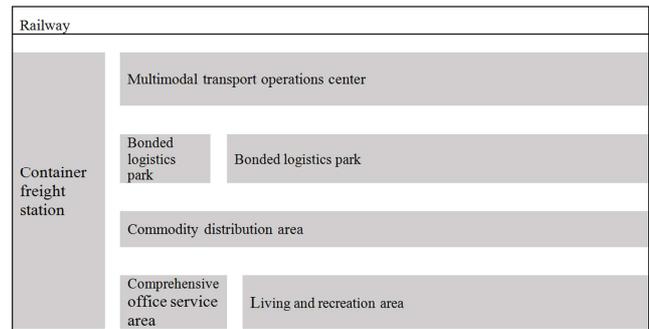

Figure 2. The Brief Layout Diagram of Chenming Logistics Park.

5. Conclusion

The paper uses the Chenming Logistics Park to conduct a preliminary planning based on the introduction of the MSFLB model. The planning is focused on how to apply the theory of specifically the steps of MSFLB model, but there is no detailed planning. So Chenming logistics park planning still needs detailed planning on the basis of the theory and the practice.

Acknowledgements

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