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**WORLD MARITIME UNIVERSITY**

Shanghai, China

**RESEARCH ON LOGISTICS PARK'S  
DEVELOPMENT MODE IN WENZHOU**

By

**Xu Jiazheng**

**China**

A research paper submitted to the World Maritime University in partial  
Fulfillment of the requirements for the award of

**MASTER OF SCIENCE**

**(INTERNATIONAL TRANSPORT AND LOGISTICS)**

2006

## DECLARATION

I certify that all the material in this research paper that is not my own work has been identified, and that no material is included for which a degree has previously been conferred on me.

The contents of this research paper reflect my own personal views, and are not necessarily endorsed by the University.

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## **ABSTRACT**

Title of Dissertation:     **Research on logistics park' development mode in Wenzhou**

Degree:                             **MSc**

The degree of logistics industry's development is regarded as a sign of measuring a country or a region's modernization and integrative strength. In the dissertation, firstly, I analyze the necessity of building the logistics parks in Wenzhou. 1. The development of the logistics parks is the certain result of rapid development of third part logistics. 2. The laggard logistics park has become a bottleneck of modern transportation system in Wenzhou. 3. Wenzhou is an international light industrial city, which is more dependent on modern logistics service. 4. The logistics park is an effective way of industrial upgrade. Secondly, I make Feasibility analysis of building professional logistics parks in Wenzhou. In fact, there is a rudiment of professional logistics park in Wenzhou's industrial cluster. Besides, the professional logistics park benefits balanced development of Wenzhou's economy. Then, I use Analytic Hierarchy Process (AHP) to analyze necessity of building the professional logistics parks.

**KEYWORDS:** Logistics Park, Wenzhou, AHP



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## **LIST OF ABBREVIATIONS**

AHP	Analytic Hierarchy Process
US	Unchanged strategy
PLP	Panqiao logistics park
PLL	Professional leather logistics park
CI	Calculating coherence Index
CR	Coherence ratio
RI	Random index
USD	U.S. Dollar
GDP	Gross Domestic Product

## **Chapter One Preamble**

The degree of logistics industry's development is regarded as a sign of measuring a country or a region's modernization and integrative strength. It is called the accelerator, which stimulates economy development. As a foreland of china's innovation and openness, Wenzhou has formed sophisticated transportation network of highway, railway, navigation and shipping. But Wenzhou's modern logistics' development far lag behind Wenzhou's modern transportation network's development and the logistic bottleneck phenomena is becoming increasingly obvious. The characteristics of Wenzhou's enterprises is that both raw materials needed and selling market are outside Wenzhou, which need strong support of effective logistics. Light industry is the support industry in Wenzhou. Due to agile private economy and low cost advantage, Wenzhou has formed 21 industrial bases like "china shoe city", "china appliance city" "china leather city" and "china lock city". Light product takes high market share in domestic market, even in international market. Therein, leather accounts for 25% of the domestic market, low-pressure appliance accounts for 35%, fastener accounts for 80%, slide fastener accounts for 30% and so on. Nevertheless, this kind of "Wenzhou economy mode" with low cost advantage will gradually lose competition advantage because of high logistic cost. Recently, a large number of powerful corporations in Wenzhou have moved from Wenzhou which gives warning to Wenzhou's laggard logistic industry and prospect of Wenzhou's economy.

Many industrial parks are the major Character of Wenzhou economy. Every park only produces a kind of products, which takes very high market share in China, even in the world. These industrial parks also can be called as 'industrial clusters'. These professional and single-product industrial parks need professional logistic service. Each professional logistics park just provides customer's service for a certain industrial park. It forms scale efficiency, reduces cost and heightens service level. But the professional logistics park easily leads to monopoly, because manufactories have to choose the park as their partner. Beside, almost of manufactories in Wenzhou are

small and lack bargain power. Therefore, it is important to build intra competition in a professional logistics park. So in my dissertation, I think that government should supervise and manage the professional logistics park directly. Then, the logistics park is divided into different parts and sale or rent to many logistic companies. The size of manufactories in Wenzou is generally small so that they cannot afford high-cost marketing. Therefore, it is efficient and economical to set up exhibition halls in the logistics parks so that customers are easy to choose product and the logistic time will reduce a lot.

## **Chapter Two The basic concept of logistics park**

### 2.1 Definition of logistics park

Like ‘logistics’, there is no specific definition of ‘Logistics Park’. The term “logistics centers” generally denotes those sites specially organized for carrying out logistics activities. The name of these sites may vary depending on the customs in practice in each country – for instance we may find:

1. Centres logistiques de fret
2. Gares routières de marchandises
3. Logistics park
4. Platform freight terminal
5. Interporto
6. Centro integrado de mercancías
7. Güterverkehrszentrum
8. Transport centre
9. Freight village
10. Transport center

Unit Nation Economic Commission for Europe in 2004 thinks ‘A Logistics Center is the hub of a specific area where all the activities relating to transport, logistics and goods distribution – both for national and international transit – are carried out on a commercial basis by various operators. The operators may be either owners or tenants of the buildings or facilities (warehouses, distribution centers, storage areas, offices, truck services, etc.) built there. In order to comply with free market rules, a Logistics Center must be accessible to all companies involved in the activities set out above. A Logistics Center must also be equipped with all the public facilities necessary to carry out the above-mentioned operations. If possible, it should also include public services for the staff as well as users’ equipment. In order to encourage intermodal transport

for goods handling, a Logistics Center should preferably be served by a variety of transport methods (roads, rail, sea, inland waterways, air). It is vital that a Logistics Center be managed as a single and neutral legal body (preferably by a Public-Private-Partnership) if synergy and commercial cooperation are to be ensured. Finally, a Logistics Center must comply with European standards and quality performance in order to provide the framework for commercial and sustainable transport solutions.’<sup>1</sup>

A program ‘FV-2000-Quality Freight Villages Structure and Operations’ supported by European Commission defines ‘Logistics park’ as ‘a freight village is a defined area. In the area, it includes all of goods transportation. The activities of logistics and delivery, including international and domestic transportation will be achieved by operators.’

In the China’s national standard of ‘Logistics Terminology’ (GB/T 18354-2001), the definition of ‘Logistics Park’ is that ‘it is a site or organization of operating logistics matters. It should accord with several requirements as follows: 1. mostly arming at social service. 2. Self-contained function of logistics. 3. Perfect information system; 4. Covering a big area. 5. A few kinds of products with a large number. 6. Ability of storing and operating abundant products. 7. Unified management.’ (China Quality Supervision Bureau, 2001).

## 2.2 Origin of logistics park

The concept of freight village originates from Germany. The traditional function of freight village is cargo distribution center. It could collect, inventory, and distribute cargo. Along with development of economy and society in Germany, freight village began to provide more and more value added service such as processing, assembly, package, information support, customs clears and living service. All of service is to satisfy the demand of manufactories and traders. In order to reduce products’ cost and

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<sup>1</sup> <http://www.unece.org/trans/main/eatl/docs/>

improve core competition of products, many manufactories and traders outsource more and more their logistics businesses, such as transportation, loading and discharging, inventory, processing and packaging and other logistics services to third part logistics operators. In the developing process of demand and supply of logistics service, Germany' freight village become a public organization which holds different logistics facilities, many types of logistics operators and provide various logistics services. (Xu Ping, 2005, pp. 32-34)

The purpose of building logistics parks is to reduce traffic jam in Tokyo. Government has planed to establish logistics parks that are located in transportation pivot between downtown and suburb. For example, Peace Island Logistics Park has become transit center, which connects Tokyo and some other cities. Local government provide loan with very low interest rate for the development of the logistics parks. (Zhang Xiaodong, 2004, pp. 44-46)

## **Chapter Three Necessity analysis of building the logistics parks in Wenzhou**

### 3.1 Modern logistics parks are the physical vehicles of the third party logistics

Currently, with the rapid development of science and technology, corporations can't keep advantages in all areas. Generally, corporations will keep their core competitions and outsource the other businesses to the third party logistics operators. Influenced by out-sourcing management concept, many corporations focus on their core businesses and invest a majority of money, human resources and material resources in that and outsource the other businesses. Social division of labor forms professional service and manufacture with high efficiency. Logistics is a typical out-sourcing industry. Professional logistics service reduces cost and improves service.

In the past twenty years, a lot of corporations have begun their global strategies because of improvement of technologies and decrease of trade barriers. Besides, many corporations have used supply chain management to manage their businesses. So many corporations have more requirements in quick response, JIT, and certain logistics time with more difficult logistics operations. Therefore, more and more corporations can't afford so complicated and professional logistics services and have to choose the third party logistics operators.

Currently, the third party logistics service is not only transportation. It provides more and more services such as inventory, distribution and assembling. So a modern and efficient logistics park is an essential factor of a successful logistics service. A modern logistics park holds professional management advanced facilities and efficient service that are the physical vehicle of the third party logistics.

## 3.2 Laggard logistics parks have become the bottleneck of modern transportation system in Wenzhou

### 3.2.1 Modern transportation system in Wenzhou.

Wenzhou government has invested a lot of money in building logistics infrastructure. For example, the plan of 'six major projects' in current five years should spend 30 billions Yuan. There are 16 billions in super-highway project, 6 billions in expedite project, 2 billions in rural load project, and 5.5 billions in waterway project.

#### 1. Highway system

Ministry of communication has appointed Wenzhou as the one of the 45 highway pivots in China. One horizontal national highway 104-national highway and one vertical national highway 330-national highway intersect in Wenzhou. In the plan of 'five-vertical-and-seven-horizon' national highway system, there are one horizontal and one vertical national highway pass Wenzhou, namely, Wenzhou section of coastal highway and Wenzhou section of Jin-Li-Wen highway. There are Yong-Tai-Wen super highway, Jin-Li-Wen super highway and Wen-Fu super highway in Wenzhou. Wenzhou section of Zhu-Yong super highway and Raocheng super highway are being built. Due to advanced super highway system, 4-hour transportation circle has been achieved within Zhejiang province, and it only needs 4 hours from Wenzhou to Hangzhou. When the Hangzhouwan Bridge finishes, there will only be 427 kilometers from Wenzhou to Shanghai. It only needs 4 hours from Wenzhou to Shanghai at that time. In the next 15 years, Wenzhou will plan major highway system of 'three vertical, two horizon and one circle' and high-speed load system of 'two vertical and two horizon'. The character of whole highway system is 'circularity+actinomorphy', which improves rural transportation system. The high-speed coastal highway, from Yueqing, passing by Wenyang, Huanghua, Binhai, Tianhe, across Oujiang River and Feiyun River, to Ruian, will achieve linear transit in coastal area. It avoids curvilinear transit due to the obstacles of rivers, marshes and mountain. Yuanjing super-highway, Wuniu-Yueqing section of Yong-Tai-Wen super highway,

and the highway from Guantou, passing by Tonglin, and Tongpu, to Bishan have been rebuilt. They facilitate cross-cities transportation in urban, northern Ou Hai, Liushi, and eastern Ruian. Besides, there are three highways that are building in order to improve the transportation among the major towns. The first highway is from Longwang, passing by Linkun Island, to Zhangyuanao and Dongtou. The second highway is from Qiaoxia, passing by Tengqiao, to Lianjiang. The last highway is from Yong-Tai-Wen super highway, passing by Dingtian, to Yuanjing highway.

## 2. Railway system

As for railway, Jinwen railway has operated many years under a good condition. Fuwen railway will be finished before July 2008. It will run with 200 kilometer per hour. Yong-Tai-Wen railway also will be finished before 2009. It invests 17.1 billions and there is 282 kilometer totally and the speed is 200 kilometer per hour. So it just needs less than 2 hour from Wenzhou to Ningbo when the project finishes.

## 3. Air system

The total cargo volume in Wenzhou Yongqiang Air Station is 40 thousands ton in 2005. The extension of second stage construction will invest 360 millions. The local government plans the airport to become an international airport. It tries to open airlines to Southeastern Asia in China's 11th-five-year. In governmental new prospect program, Wenzhou will build a new and far bigger airport in Dongtou.

## 4. Port system

Wenzhou port is the one of the 20 major pivot ports in China. Wenzhou port situate 580 sea miles east to Nagasaki, Japan, 320 sea miles and 219 sea miles north to Shanghai and Ningbo, and 206 sea miles south to Keelung, Taiwan. There are three major inland waterways, namely, Oujiang River, Fengyun River, and Aojiang River. Wenzhou port is the major waterway of southern Zhejiang province and eastern Jiangxi. It plays an important role in the local economic development. The total investment of Wenzhou Qili terminal is 800 millions. There is 20-thousands-tons multi-berth and 20-thousands-tons bulk-berth in second-stage program. Wenzhou has

planned three major terminals, namely, Yueqing terminal, Daxiaomen island terminal and Zhuangyuan'ao terminal. Yueqing terminal is in charge of international and long-distance' major bulks transportation, such as energy and raw material. It will build coastal industries and port logistics centers. Daxiaomen island terminal is in charge of petroleum and petrochemical transportation, transit, inventory and processing. Zhuangyuan'ao terminal is in charge of ocean transit transportation and it will build some large coastal industry parks. It makes Wenzhou downtown broaden to east area. (Wenzhou Development and Layout Committee, 2005)

### 3.2.2 Laggard logistics parks have become the bottleneck of modern transportation system in Wenzhou.

Due to modern traffic system, it becomes more and more convenient to transport cargoes to and out Wenzhou. The transportation time has reduced significantly in the past few years. For example, when Yong-Tai-Wen railway is completed, it just needs less than 2 hour from Wenzhou to Ningbo. Nevertheless, a lot of logistics time is wasted by laggard logistics service. There are no big transportation carriers in Wenzhou. A majority of transportation carriers only hold one or two trucks and they run businesses respectively and do not cooperate with each other, so large numbers of cargoes have to be transported sporadically. So carriers have to wait one or more days in order to get one full-loading cargoes. Therefore, if a cargo wants to transport to Ningbo, the transport time on road is 2 hours when Yong-Tai-Wen railway is completed, but the waiting, inventory and value-added service time may spend more than 2 days. Therefore, it is obvious that logistics service has become a serious bottleneck of modern transportation system. A completed logistics park is precondition of efficient logistics service.

### 3.2.3 Cost-benefit analysis of investing traffic facilities and investing logistics parks

Wenzhou is a mountainous city. The transportation system was very laggard 10 years ago, which restricted local economic development significantly. In order to break

away transportation bottleneck and reduce logistics time, Wenzhou invests a lot of money in transportation projects. Just in the year between 1998 and 2002, Wenzhou invested 13.7 billions in traffic infrastructures. From Taizhou to Wenzhou, the distance of super highway is about 200 kilometers, but there are more than 25 tunnels on the way. It is obviously that the cost of developing traffic system in Wenzhou is very high. But the idea that advanced traffic system is the precondition of prosperous economy for a city is easily accepted by local administrators and residents. In order to reduce several -minutes logistics time, Wenzhou has to devote far more human and material resources than the other cities. Nevertheless, the idea of modern logistics is new to them. The improving space of the laggard logistics industry in Wenzhou is huge. The cargo wants to transport to Ningbo, the transport time on road is 2 hours when Yong-Tai-Wen railway is completed, but the waiting, inventory and value-added service time may spend more than 2 days. Obviously, compared with cost of reducing transportation time on road, cost of reducing waiting and inventory time is far lower. Obviously, logistics service has become the bottleneck of logistics. The relationships between logistics service level and cost of traffic infrastructure and the relationship between logistics service level and the cost of the other logistics facilities are shown clearly in figure 3.1. In Wenzhou, traffic infrastructure had a rapid development in the past decade years. The traffic system in Wenzhou has had relative advancement. There are more than 2 millions Wenzhou' salesmen in every corner of China and world. They realize deeply that traffic infrastructure between Wenzhou and another places is a lifeline of Wenzhou economy. So from now on, the logistics service level will improve very slowly even though you invest a lot of money in traffic infrastructure. Modern logistics idea is so new that Wenzhou' people don't know that efficient logistics service is also one of major sources of profit and a lifeline of Wenzhou's economy in the past several years. The level of logistics facilities and service in Wenzhou is quite laggard. The level of logistics service will improve significantly if only we invest a little of money in these logistics facilities. Comparing the two factors contributing to logistics service level, developing logistics facilities, especially logistics parks, is the developing core in the next decade years.

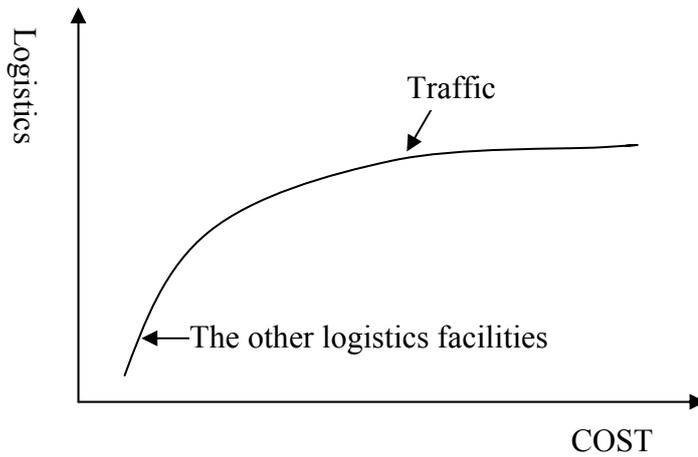


Figure 3.1 Logistics service and cost

Source: Draw on my own

### 3.3 Logistics park is the most effective way to integrate laggard logistics industry in Wenzhou

Even though Wenzhou industries are more dependent on logistics service than that in other cities, logistics service industry is pretty laggard. Logistics cost accounts for about 40% of total product cost in Wenzhou. The figure is 20%-40% in China and about 10% in developed countries. Total cost of inventory, procurement, transportation and financing in Wenzhou is about 25% more than that in Shanghai and Guangzhou. Current situation of Wenzhou logistics is low value added, passive adaptation, small scale and in chaotic order. Currently, there are 7000 transportation companies in Wenzhou and about one hundred of them are named as 'logistics companies'. But according to evaluation criterion of communication ministry, there is only one company meets standard of grade 3. There is no company with standard of grade 1, or 2. It is calculated that on average one transportation company only hold 2 trucks and 100 square meters operating area. The majorities of these corporations only run some traditional transportation businesses. Few of them cover the domain of distribution, inventory and information support. The value added is pretty low. A lot of small van-body trucks that belongs to different individual operators park at some professional freight markets. Those individual operators without delivery certificate compete with regular companies with pretty low price. When they can't get cargo, they just wait at freight markets, which not only influence traffic, but also waste transportation capacity. Besides, many consignors hesitate to contract with those

individual operators because of high risk so that a lot of cargoes can't be transported in time. The majorities of local logistics companies only rent temporary sites to operate their businesses. They only choose scrap factories as their temporary sites due to low rent. In fact, they can't afford high land cost if they want to build regular logistic center. Because their operators often need to move their temporary sites from one place to another and the traffic in these places often is laggard, they are hard to keep long-term relationship with their customers and provide customized and efficient service for them. The only goal of these logistics companies is to try their best to gain money. Therefore, it is very important to build a logistics park to integrate them. Logistics Park provides an ideal site for local logistics companies to achieve their long-term strategies. Logistics Park can provide effective logistics support service for logistics operators with long-term relationship but not temporary relationship and owing it logistics companies dare to buy more facilities and provide more value added service for their customers even though it increases profit cycle. Through logistics Park, administrators are easy to manage logistics companies, confine illegal operation and support regular logistics companies. In the logistics park, carriers are easy to build trust with consignors. Logistics Park integrates different scattered resources and maximizes their efficiencies. Beside, advance idea will be implied in logistic park, especially information technology so that more and more professional talents will join in the industry. In Wenzhou, another important bottleneck of limiting logistic development is the shortage of professional talents

### 3.4 Specific Wenzhou' industrial structure is more dependent on modern logistics service

#### 3.4.1 Light industrial products are more dependent on modern logistics service

In 2005, Wenzhou' GDP is 160 billions, and rose 13.0% year-on-year and industrial economy contributes 50% to it. The total industrial output value in Wenzhou is 353.687 billions and rose 17.9% year-on-year. As for light industry, output of large light industrial manufactories is 85.728 billions, and rose 22.1% year-on-year in 2005.

Light industry is the support industry in Wenzhou. Recently, Wenzhou has formed 21 production bases like “china shoe city”, “china appliance city” “china leather city” and “china lock city”. Light product takes high market share in domestic market. Therein, leather accounts for 25% of the whole market, low-pressure appliance accounts for 35%, fastener accounts for 80%, slide fastener accounts for 30% and so on. Huge industrial power creates huge demand of logistics service. Logistics cost especially transportation cost of light industrial products takes far higher proportion of total cost than the other products. Currently, the annual output of logistics industry is RMB 2.5 billions in Wenzhou, and the freight volumes are 150 millions tons. In fact, the figure is just a part of traditional transportation business. A great deal of logistics service was not calculated. For example, inventory, distribution and assembling that were operated by manufactories themselves belong to the cost of manufacture but not logistics service.

3.4.2 The characteristics of Wenzhou’s enterprise is that both raw materials needed and selling market are outside Wenzhou

An important characteristic of Wenzhou’s enterprise is that both raw materials needed and selling market are outside Wenzhou. Wenzhou is ‘China Shoes City’ and ‘China Leather City’. The demand of leather is enormous, but a majority of leather raw materials come outside Wenzhou. Just the demand number of pig hides is more than 20 million and all of them are brought outside Wenzhou, a majority of them are outside Zhejiang, partially outside China. In order to control sources of raw material, Wenzhou corporations even build raw material bases in origin place. How to operate the complicated logistics between raw material bases and manufactories is huge challenge for them. For example, Wenzhou is developing their furniture industry, but lacking enough timber resource. They have to depend on other place. In March 2006, Wenzhou Chamber of furniture commerce signed the contract with Fujian Jianyang government. Wenzhou enterprises will build a furniture base of about 800 acre in Jianyang. At that time, there are more than 20 Wenzhou furniture manufactories founding their procurement departments in Jianyang. Therefore, it is very necessary

for those manufactories to build a logistics park to operate an efficient supply chain system.

Wenzhou is an international light industrial city. The main industries focus on some light industrial products that take high market share in China, even in the world. The main export products in Wenzhou are shoes, clothes, electric machine and so on. Local residents only consume a very small part of light industrial products and a very large proportion of products will be distributed to other place. For example, in ‘China Shoes City’, it produces more than 600 millions shoes but the residents in Wenzhou are less than 10 millions. A large quantity of shoes is soled to the place outside Wenzhou. The export value of shoes in China Shoes City is USD 1.15 billions in 2004. There are 8 types of products in Wenzhou that account for more than 50% of China’ market share. It was estimated by World Bank that the total logistics expenditures account for 20% of GDP in Wenzhou. The figure in China is 8.1%. Therefore, Wenzhou industries are more dependent on logistics service than that in other cities.

### 3.4.3 The increasing rate of total logistics volumes is faster than the increasing rate of industrial output in Wenzhou

Due to saturated domestic market, Wenzhou government has issued many favorite policies to support local enterprises to explore overseas market, which need more professional logistics service. It is evident that Wenzhou’ economy become more and more export-oriented. Wenzhou’s economy experiences four steps. That is from selling within Wenzhou, selling outside Wenzhou, Selling within whole China’s market to selling in international market. The degree of dependence on logistics service becomes higher and higher with the change of distribution market. Therefore, the increasing rate of total logistics volumes is faster than the increasing rate of industrial output in Wenzhou.

It is not a good year for international trade in 2005. The trade friction between China and other countries are becoming fiercer and fiercer, such as textile trade conflict

between China and America. But the total export value is USD 6.184 billions, and rose 35.2% year-on-year in 2005.<sup>2</sup> From Figure 3.2, it is obvious that the increasing rate of total import and export value is far bigger than the increasing rate of GDP. Therefore, in the years between 1999 and 2005 trading value plays more and more important role of Wenzhou's GDP and the figure is from 14% to 42%. Generally, the logistics cost of import and export product is much higher than the cost of domestic trading products.

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<sup>2</sup> <http://www.wzstats.gov.cn/infoshow.asp?id=5606>

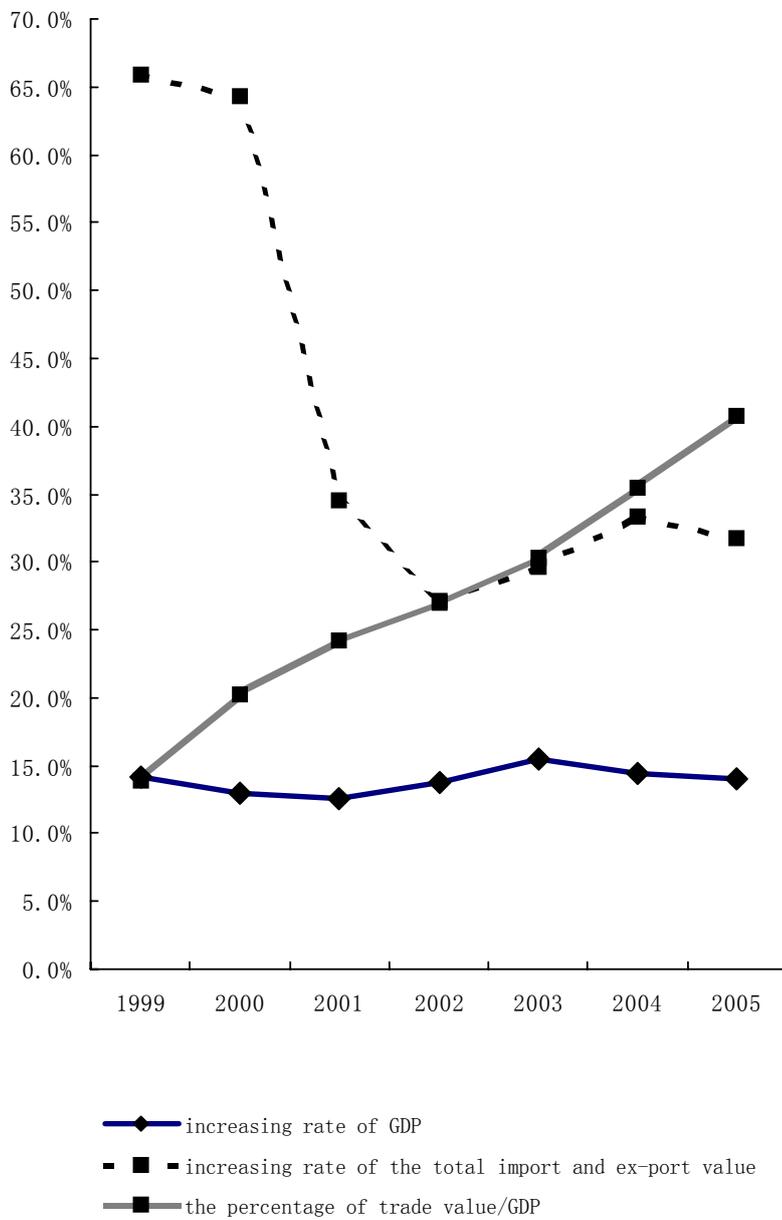


Figure 3.2 The percentage of trade value/GDP  
 Source: Draw on my own

### 3.5 The logistics park is an effective way of industrial upgrade in Wenzhou

#### 3.5.1 The necessity of industrial upgrade in Wenzhou

Wenzhou economic development experienced three steps. The step one is from the third plenum of the 11th central committee of the CPC to the middle of 1980s. Wenzhou individual economy originates from rural area. A lot of family workshops boomed and form respective professional small commodities markets. The step two is from the middle of 1980s to the early 1990s. On the base of workshops, a lot of workshops began to integrate and enlarge their scale and strengthen their power. They began to develop stock and partner economy. The step three is from the time of the Speech of Deng Xiaoping' South Cruises to the 14th central committee of the CPC. At that time, Wenzhou companies had finished primitive accumulation of capital as a whole. They tried to build advanced managing system of corporations. More and more corporations began international businesses.<sup>3</sup> All in all, compared with other places, Wenzhou's individual economy always go ahead a lot. Nevertheless, with the depth of economic reform and opening, private economy began to develop in the other places. The advantage of Wenzhou private economy had lost gradually. In the first half of 2003, the increasing rate of Wenzhou' GDP was last but one in Zhejiang. In July, August 2003, the rank is last one in Zhejiang. Besides, because the number of corporations is very large, the land resources become scarcer and scarcer and labor cost increases significantly. If Wenzhou continues to keep their current conditions, they will not only lose their advantages, but also will form some disadvantages of their private industries. Besides, the profit of commodities has been reducing rapidly, especially in international trade. The production capability of commodities is superfluous a lot. Therefore, in order to sell their products, they have to reduce their price. Exchange rate is an important factor of product profit in international trade. For example, the profit rate of textile trade is about 3%-15%. When Renminbi appreciates

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<sup>3</sup> [http://www.hb.xinhuanet.com/job/2006-01/16/content\\_6063195.htm](http://www.hb.xinhuanet.com/job/2006-01/16/content_6063195.htm)

one percent, the profit rate of textile trade reduce 2%-6%.<sup>4</sup> With the appreciation of Renminbi, the profit of textile trade will reduce again. Therefore, in order to keep their advantages and to survive, it is essential to upgrade local industries and search new profit point.

### 3.5.2 Logistics Park service insures the in-depth outsourcing

In Wenzhou, the division of labor is advanced. Generally, the size of local manufactories is small and they can't produce a lot of parties. Except some core businesses, a lot of links are outsourced to some professional suppliers. In Wenzhou, you can open a shoes manufactory with less than RMB 10 thousand because you can buy almost any parties of shoes in the market. So what you should do is only to assemble those parties. But how to integrate these parties suppliers. The logistics park is the best choice. In order to reduce investing cost and producing cost, they outsource a large quantity of parties of products even though they don't know the theory of 'outsourcing'. Around China Shoes City, there are a lot of tread, insole, upper and lining suppliers. With the further development of local manufactories, in order to reduce manufacturing cost a lot of local manufactories will outsource more links in depth. The outsourcing of manufactories in Wenzhou is pretty advanced and there is not too much adjusting space. Therefore, more and more manufactories focus on logistics outsourcing. For example, measuring machine in pig leather industry will be used one time per month generally, so a large number of manufactories outsource the business. But they have to transport pig leathers to measuring machine center and then transport them back again. If there is a Logistics Park, they can measure and store the pig leathers in Logistics Park together hence reducing logistics cost. Besides, because of that the size of local manufactories become bigger and bigger and the original workshop building can't satisfy demand of new producing, they have to search new workshop. Logistics Park just satisfies the demand.

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<sup>4</sup> <http://gifts.asiaec.com/developments/543089.html>

### 3.5.3 Logistics Park service makes industrial upgrade with limited fund

Even though there is the same perspective in Wenzhou to upgrade industries, they don't find an ideal way to upgrade their industries. Due to shortage of fund, technology and talent, it is hard to upgrade their industries with high technology. There are many factors cumbering local manufactories' development: 1. Price of product reducing; 2. Raw material, land and labor cost increasing; 3. More rivals; 4. More demand of value added service from customers; 5. Quicker order time with more complicated distribution channels; 5. More complicated management due to bigger size of manufactory. Nevertheless, fund and energy are limited. Local manufacturers confuse how to survive so complicate market conditions. Logistics Park service is an ideal way to upgrade local industries with limited fund. For example, with advanced information technology, more and more customers require information platform and make business with electronic ordering, such as EDI. But as for small-size and middle-size manufactories, they can't afford so huge investment. In fact, the utilization rate of information platform is pretty low for them. If Logistics Park provides information platform service for the whole industry park, the manufactories do not have to establish information platform respectively for their customers hence saving a lot of money. Local manufactories can provide more and more value added services for their customers, but they don't have to invest any money. Under this situation, they can save a lot of money and energy hence focusing on their core businesses.

## **Chapter Four Feasibility analysis of building professional logistics parks in Wenzhou**

### 4.1 Different types of logistics parks and their characteristics

Different countries and regions use different standards to classify types of Logistics Park. There is no unified mode and standard. According to structure of position relationship, Logistics Park can be divided into centralized and non-centralized. According to types of services provided, Logistics Park can be classified into professional and comprehensive. According to service range and target, Logistics Park can be classified into international, regional and city.

According to professional character, Pan Wen'an classifies Logistics Park into four types as follows. (Pan Wennan, 2005, pp. 17-66)

#### 1. Pivot-mode Logistics Park

This kind of Logistics Park generally locates in the area of transportation pivot. It is a distribution center. The Logistics Park can provide the functions like loading and discharging, movement, distribution, transit, short-time inventory and packaging.

#### 2. Trade-mode Logistics Park

The function of the Logistics Park is definite. Usually, it is next to a centralized industrial park and provides specific service for specific industry. Trade-mode Logistics Park provides an ideal area for operators to trade. It also provides regional transportation and intra-city distribution. In china, Zhejiang Chuanghua Logistics Base, Guangdong Gaozhou Logistics Base, Hunan Liuyang Medicine Logistics Park,

Guangdong Xiqiao Textile Logistics Park and Chengdu China Motor Logistics Base belong to the trade-mode logistics park. Usually, the trade-mode logistics park locates in traditional commodities' distribution center. The key benefit of the trade-mode logistics park is to enlarge trade scale and reduce trade cost. The trade-mode logistics park can be classified into the professional market logistics park and the international trade logistics park.

### 3. Distribution-mode Logistics Park

The basic function of distribution-mode Logistics Park is to provide distribution service for customers. According to distribution distance, it can be classified into two types: 1>. Regional Distribution-mode Logistics Park. It is located in the transit pivot of multi-transportation system. It is in charge of commodities transit among different cities. 2>. Intra-city Distribution-mode Logistics Park. It connects end-use consumption directly.

### 4. Integration-mode Logistics Park

The purpose of integration-mode Logistics Park is to integrate scattered logistics activities into one site. It can reduce traffic pressure and improve logistics efficiency.

Expert of location theory EdgerHoover classify Logistics Park into three types as follows.<sup>5</sup>

#### 1. Circulation-mode distribution center

It just provide short-time inventory. Firstly, large quantities of commodities discharged from trucks are sorted with sorting system. Then, according to different demand of customer, those commodities are classified into different types and are loaded in different trucks and then distribute to customers. In order to reduce order time, circulation-mode distribution center usually tries it's best to near to customers' location.

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<sup>5</sup> <http://logistics.nankai.edu.cn/bbs/topframeauthor.asp>

## 2. Processing-mode distribution center

Usually, processing-mode distribution center is near to commodities manufactories. Large quantities of semi-finished products are conveyed to the logistics park and processed according to different demand of customers. The logistics park can collect a lot of commodities from different manufactories and then transport them together. It improves utilization rate of trucks and reduce transportation cost. In China, it is not a typical logistics park. Shanghai ship plate distribution center which is built by six shipyards belongs to processing-mode distribution center

## 3. Storing-mode Distribution Center

In the buyer's market, storing-mode distribution center should provide large-scale warehouse to support product sales. In the seller's market, storing-mode distribution center should provide large-scale warehouse to support raw material and spare parts inventory. If the range of product distribution is large, it also needs a storing-mode distribution center. Switzerland GIBA-GEIGY Corporation holds one of largest-scale warehouse in the world. This storing-mode distribution center can store about 40 thousands pallets. Currently, distribution center built is centralized warehouse and can store a large number of commodities.

### 4.2 Definition of 'The Professional Logistics Park'

In fact, the function of a real logistics park isn't limited by one or two modes. Usually, a real logistics park has some functions of different types of logistics parks. In my dissertation, I insist that Wenzhou should build 'Professional Logistics Park' which has functions of trade-mode Logistics Park and processing-mode distribution center.

The 'Professional Logistics Park' is near to a professional industry park. Large quantities of semi-finished products from an industry park are stored in a special professional logistics park. Usually, the professional logistics park only provides service for one kind of semi-finished product and finished product. The professional

logistics park not only provides inventory, sorting and transportation services, but also provides assembling, processing and information services. The purpose of the professional logistics park is to increase utilization rate of equipments and to reduce cost by right of economy of scale. Besides, the professional logistics park can provide exhibition-hall service for manufactories. Manufacturers can establish exhibition halls in the professional logistics park to exhibit their products.

### 4.3 Qualitative analysis of building ‘professional logistics park’ in Wenzhou

#### 4.3.1 The professional logistics park is the result of industrial cluster’ development

Porter in 1998 defines that industrial cluster is ‘in a specific field (usually leading industry is dominating), a lot of corporations relating to the leading industry and relative originations cluster in a space to improve competitive advantage of the industry. (Zhang Li, 2004, pp. 48-50) As a typical economic space, many scholars pay their attention on researching on industrial cluster. Marshall is the first person to explain industrial cluster in his theory of scale economy. In the theory of location of industry, theory of new industrial district, Diamond system theory of Michael.E.Porter and theory of regional innovation, they also explained the development of industrial cluster. Since china’s opening and reforming, the trend of industrial cluster is obvious especially for private corporations, such as tie industry in Shengzhou, leather industry in Haining, shoe industry in Wenzhou, electronic industry in Dongwang and so on. Many scholars in China have paid their attention on industrial cluster research. The key problem of industrial cluster is how to optimize and upgrade industrial structure with advantages of industrial cluster.

In Wenzhou, industrial cluster is the result of free market competition. Small-scale fund of Wenzhou’s private corporations limits their expansion of industrial chain, so they have to outsource upstream and downstream businesses to other corporations. Then, a lot of small-scale corporations begin to be in charge of their relative parts of the whole industry. Professional divisions of functions in horizontal and vertical

direction have rapid development in Wenzhou. There are suppliers of equipments and raw material, manufactories of assembling and processing, agents of distribution and transportation, professional companies of design, consultation, finance, training, and technology and so on in a specific site. Nevertheless, with industrial upgrading, logistics become more and more important in industrial processes. Logistics becomes an important part of an industrial cluster. The system of industrial cluster is shown in figure 4.1. In fact, industrial cluster is a big logistics system at present. The relative upstream and downstream corporations integrate logistics system of package, transportation, loading and discharging, inventory and information transfer. In an industrial cluster, it forms a completed logistics chain. Corporations in an industrial cluster can keep close relationship and coordinate with each other to insure synchronous operation. Synchronous operation not only can reduce waiting time and inventory level but also can increase utilization rate of equipments. In fact, within Wenzhou' industrial cluster, it has formed non-centralized professional logistics park. All of links of the logistics park are located at different locations of the industrial cluster, not at one centralized site. A common logistics park far away from industrial cluster belongs to external economy of industrial cluster and serves for various products. It can't focus on an industrial cluster and provide customer service for them. It should consider others products' service, so the site of a common logistics park usually is not the best place for the industrial cluster. Obviously a professional Logistics Park is an important part of industrial cluster at present; a common logistics park can't satisfy demand. Besides, a professional logistics park is close to industrial cluster and reduces transportation and communication cost. The equipments and services in the professional logistics park are designed according to demand of industrial cluster.

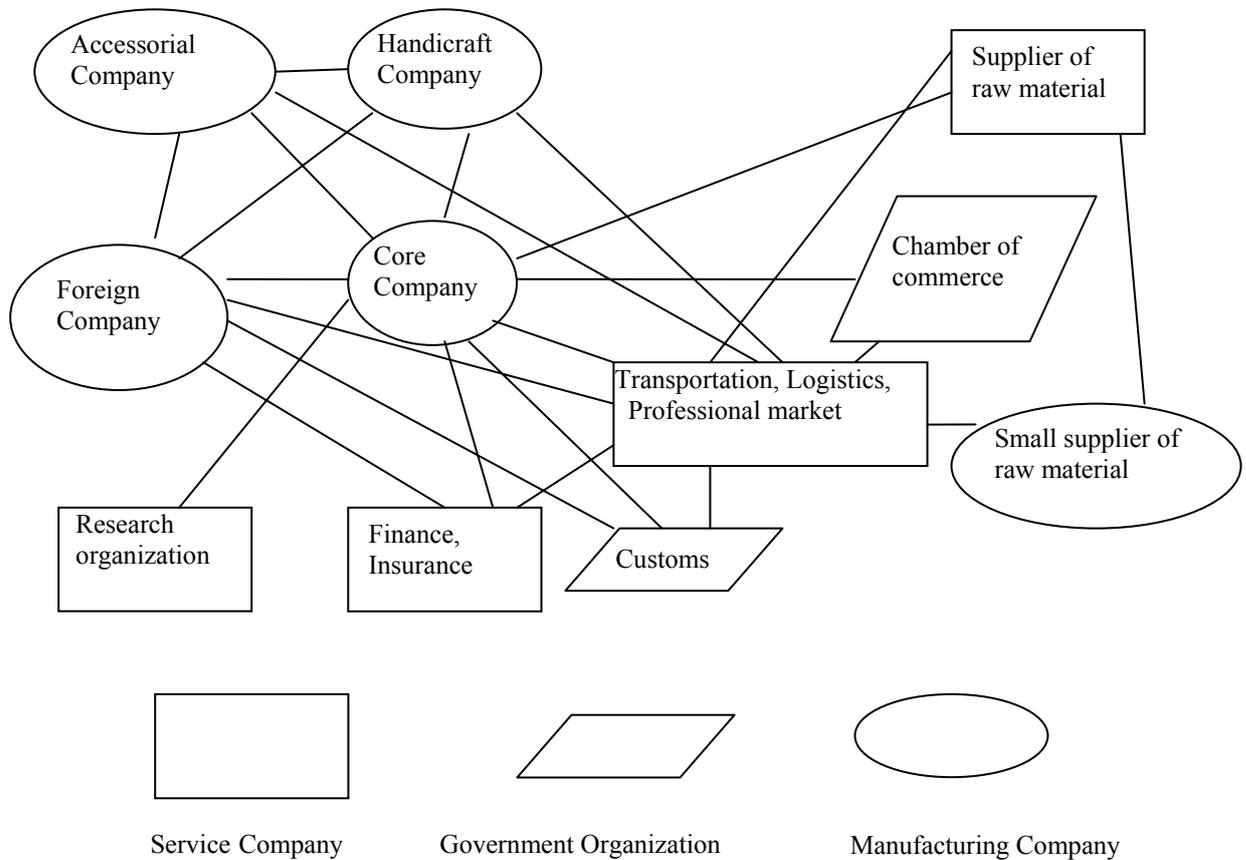


Figure 4.1 Net structure of industrial cluster  
 Source: Li Zhaoyun.(2003). *The research on logistics parks' development with industrial clusters*.  
 Unpublished master's thesis, Tianjin University, Tianjin, China.

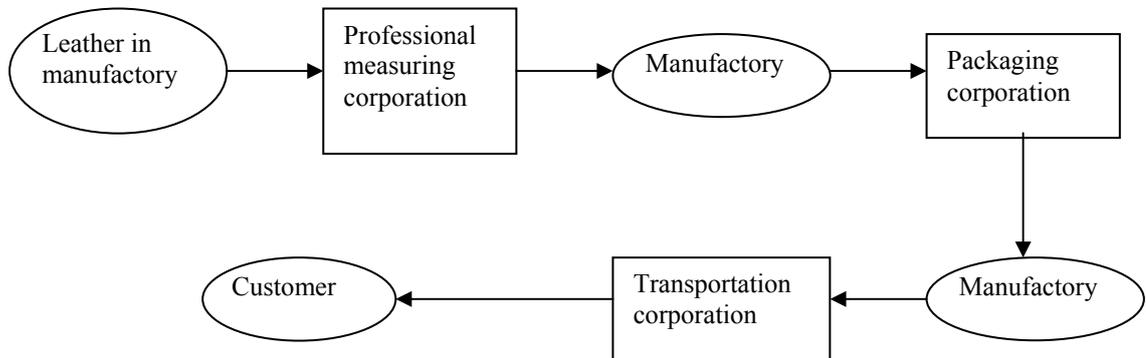
#### 4.3.2 The professional logistics park insures intra-integration of industrial cluster

##### 1. Internal economic efficiency of intra-integration

As to clustering economy, corporations in an industrial cluster can use public equipments and reduce extra-investment of scattered allocation. (Li Zhaoyun, 2003) Nevertheless in Wenzhou, even though there is a large number of small-size upstream and downstream corporations providing professional processes and service for core manufactories, they are pretty scattered and they haven't formed a real big public platform. They compete with each other overly and only operate respectively with

small size scale. Even though they achieve professional processes, they don't achieve real scale efficiency. So the advantage of industrial cluster in Wenzhou haven't achieved to maximum. For example, Liushi low voltage apparatus industrial cluster in Wenzhou accounts for 40% of China's market share. There are more than 10 large-size manufactories, about one thousand small-size manufactories and several thousands operators of processes. The social division of labor is obvious. But they are pretty scattered and don't provide effective economic scale. If these small-size upstream and downstream corporations are integrated into several big-size corporations and then these big-size corporations operate at a professional logistics park, the maximum scale efficiency will be achieved with proper intra-competition. For example, in China Leather City, the processes of measuring and packaging are operated one time per month, so investment in buying measuring and packaging machines is not economical. Therefore, manufactories usually outsource these processes to professional corporations. But these professional corporations are located at different place of the cluster space. So the manufactories have to transport products to measuring corporation and then transport them back. Then, according to customer request, they transport these products to packaging corporations and then transport them back. Therefore, a professional logistics park just integrates those processes at one place and reduces flow links. Due to the professional logistics park, the leather is transported to the professional logistics park and then measuring, packaging, inventory and transportation are operated at the logistics park. The two types of processes are shown in figure 4.2. In fact, a professional logistics park is a public platform. A lot of upstream and downstream logistics corporations cluster at the public platform and provide coordinated process service for core manufactories in an industrial cluster. Nevertheless, a general logistics park usually is good at one or two processes such as inventory and transportation. It can't provide coordinated process service for an industry.

A general process in an industrial



A process with a professional logistics park in an industrial

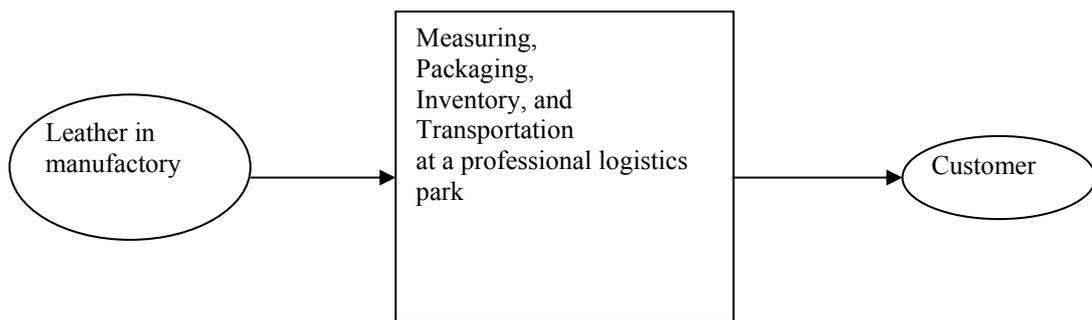


Figure 4.2 two types of flow processes

Source: Draw on my own

## 2. External economic efficiency of intra-integration

The manufactories in one industrial cluster are easy to build a common platform to procure, distribute and keep good relationship with government together. If they procure raw material together, the number of procurement is large. So they can increase power of negotiation and reduce price of procurement as well as reduce transportation cost per unit and routine cost of procurement. They also can found common distribution center and form wholesale and retail market so that they can reduce internal transportation cost and inventory cost. Key problem is how to build

these common platforms. A scattered organization is hard to build a common platform. A professional logistics park just provides a proper organization and space for these scattered corporations to build a common platform.

#### 4.3.3 A professional logistics park accords with humanity relationship in an industrial cluster.

Complicated humanity relationship, such as consanguinity, regional relationship and emotion relationship are the major characters of Wenzhou's industrial cluster. Corporations in an industrial cluster communicate information, technology and knowledge with each other through humanity relationship. So information, technology and knowledge spread rapidly with low cost. In fact, in an industrial cluster, all of corporations can share all of up-to-date information and technology to a great extent. Lihou and Guo Dejun in 2002 considered that 'from social perspective, Credit mechanism in the industrial cluster is built on humanity relationship such as consanguinity, regional relationship and emotion relationship. Day by day, the humanity relationship form 'potential credit'. From economic perspective, the cost of supervision and punishment of breaching contract is pretty low. If you breach contract or do unethical events, it will spread rapidly. The cost of breaching contract and doing unethical events is quite high and few corporations in the industrial cluster dare to reach contract or to do unethical events.' (Li Zhaoyun, 2003) A professional logistics park is an important part of an industrial cluster. If a general logistics park is chosen, it will be far away from industrial cluster and doesn't have any humanity relationship with corporations of industrial cluster. Corporations of industrial cluster have to pay more money to build Credit mechanism and supervision mechanism. In fact, if there is only a general logistics park, a majority of corporations of industrial clusters will keep previous industrial structure and dare not to make business with the general logistics park. Because corporations' management mechanism in Wenzhou is unsoundness, it is hard to manage logistics processes if Logistics Park is far away from industrial cluster and don't have any humanity relationship with them. It is also a main reason that china's corporations are afraid of outsourcing their logistics services. Therefore, a professional logistics park just satisfies all of these conditions.

#### 4.3.4 Professional logistics park benefits balanced development of Wenzhou's economy

##### 1. Poles of growth theory

Regional Economics Theory considers that growth can't appear in all places. At the first stage of economic development, due to limited fund, a country or a region focuses on developing one place that is most efficient. Due to economic cluster, the place grows rapidly and become a pole of growth so that economy becomes unbalanced in the country or region. Famous America economist Hirschman considers that unbalanced-developing strategy is the best way of regional economic development. When pole of growth achieves a pretty advanced level and becomes inefficient aggregation, economic growth will scatters through different channels. Finally, the whole regional economy achieves relative-balance development. It is called as 'Trickling-down Effect'. Besides, Hirschman considers that Poles of growth also may lead to 'Polarization Effect' that means pretty unbalanced regional economy. At earlier time, famous Sweden economist Karl Gunnar Myrdal had put forward the theories of 'Diffusion Effect' and 'Echo Effect'. He considers that the influence of 'Echo Effect' is more than that of 'Diffusion Effect'. If just using the power of market, the unbalanced development will become more and more serious in a region.<sup>6</sup>

##### 2. Poles of growth leads to 'Polarization Effect' in current Wenzhou

In the past several decades' years, Wenzhou government paid great attention on fostering strong poles of economic growth. For example, they invest a lot of money to help downtown economic development and Liushi low voltage apparatus development even though they are more prosperous than others places of Wenzhou originally. They ignore fostering weak poles of economic growth and new poles of economic growth. In fact, in the place of poles of economic growth, the economy is relatively prosperous so that the cost of land and labor is too high. Many corporations' development in these places has been limited due to high land cost. Besides, government doesn't provide favorable policies in others laggard places of Wenzhou.

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<sup>6</sup> <http://cedr.whu.edu.cn/cedrpaper/20042921440.pdf>

Therefore, many corporations have to move their manufactories outside Wenzhou, but not to the other places of Wenzhou.

In some laggard place of Wenzhou, Wenzhou government doesn't provide favorable policies and lay out proper infrastructure. So many industries haven't developed well and keep a relatively low level and there are few new industries appearing in these laggard places. Finally, the cost of land and labor is pretty low. In fact, the initial investment conditions in different places of Wenzhou are of no big differences, but nowadays the economic unbalance in Wenzhou has been enlarged.

The strong poles of growth don't scatter their prosperous economy to other laggard places. Corporations in strong poles of growth have to accept inefficient economic increase or move their manufactories outside Wenzhou. Therefore, the 'Tricking-down Effect' in Wenzhou doesn't appear obviously. Liyong considers that 'in order to develop mountainous area, it is important to foster poles of growth in these areas, including counties' and towns' poles of economic growth.'<sup>7</sup>

### 3. Professional logistics park benefits balanced development of Wenzhou's economy

Zhang Huanzhao considers 'city is commodities distribution center and processing center. It holds completed infrastructure, logistics equipments and information communication. The consumption is large and centralized in city. So it is important to develop logistics park near city and form a pole of growth.'<sup>8</sup> However, the situation in Wenzhou is far different with the city Zhang Huanzhao recounted. The major purpose of logistics parks in Wenzhou is to transport commodities outside Wenzhou, but not to distribute commodities to Wenzhou's downtown area. So the mode of Japan's logistics park is not suitable for Wenzhou.

In 2003, Wenzhou developing and planning committee and economic plan institute established a detailed plan of Wenzhou logistics center' development. They plan 10

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<sup>7</sup> [http://www.forumcn.com/inews/html/bzcjlw\\_1/hgjj\\_8/qyjj\\_46/2005-12/1135305651.php](http://www.forumcn.com/inews/html/bzcjlw_1/hgjj_8/qyjj_46/2005-12/1135305651.php)

<sup>8</sup> <http://logistics.nankai.edu.cn/bbs/topframeauthor.asp>

logistics parks, namely, Zhuangyuan'ao Logistics Park, Nanyue Logistics Park, Longwan Logistics Park, Qili Port Logistics Park, Panqiao Logistics Park, Baotian Logistics Park, Long'ao Logistics Park, Lucheng Logistics Park, Yueqing Logistics Park and Zhejiang Trading Logistics Park. A Majority of these logistics park are located in northern Wenzhou which is traditional pole of economic growth in Wenzhou. Even though these logistics parks will help local industries grow again, such as low voltage apparatus, clothing and show industries, compared with relative laggard area, the 'Inefficient aggregation Effect' in these developed area is obvious. It is easy to lead to 'Polarization Effect' or 'Echo Effect'. In fact, in relatively laggard area of Wenzhou, there are a lot of industries which have formed weak poles of economic growth. If government invests proper money to build logistics parks next to these industrial parks, it benefits the whole economic development.

The Professional logistics parks are always located near relevant industrial clusters. Industrial clusters are located in most counties of Wenzhou, so these professional logistics parks also will be located in majorities of counties of Wenzhou. Therefore, professional logistics parks are just suitable for the strategy of balanced economic development. In fact, logistics parks are an important part of poles of growth. From Figure 4.3 and Figure 4.4, I simplify Wenzhou's logistics structure and form the simply models. If we choose a transportation-mode logistics park, an inventory-mode logistics park and a trade-mode logistics park together, the completed professional services for industrial clusters can't be realized and the products flow will be very complicated. If we choose a professional logistics park to provide completed services for an industrial cluster, products flow can be reduced obviously and at the same time it will save a lot of cost and time of transportation.

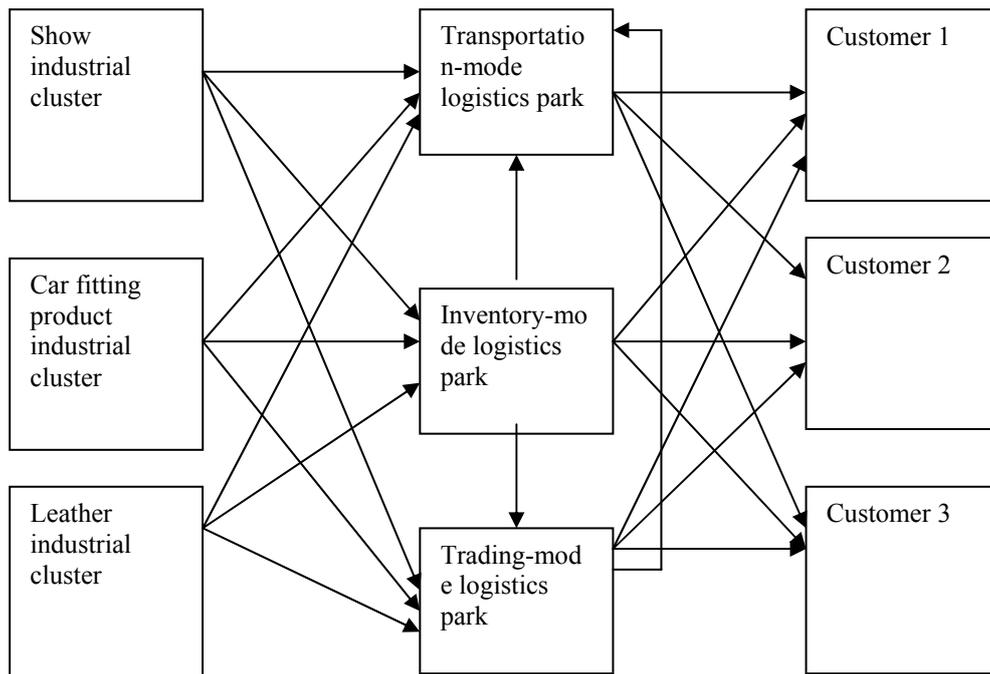


Figure 4.3 Product flow with different types of logistics parks  
 Source: Draw on my own

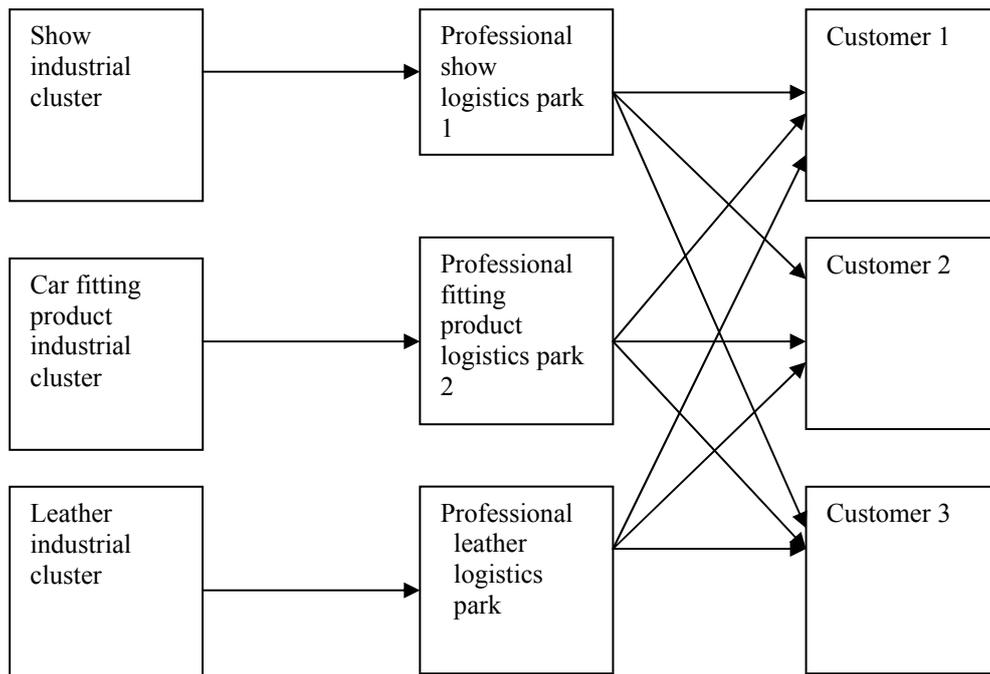


Figure 4.4 Product flow with professional logistics parks

Source: Draw on my own

In Figure 4.5 and Figure 4.6, the black rectangles represent the map of Wenzhou and ellipse of dashed represent poles of growth. It is obvious that mode of figure 4.6 benefits balanced Wenzhou's economy and mode of figure 4.5 will lead to unbalanced development. Some people may rebut that if we place three different types of logistics parks at three different areas, we also can achieve three poles of growth. In fact, it is impossible. Because if a logistics park is far away from a transportation pivot and an industrial cluster, it will be very inefficient.

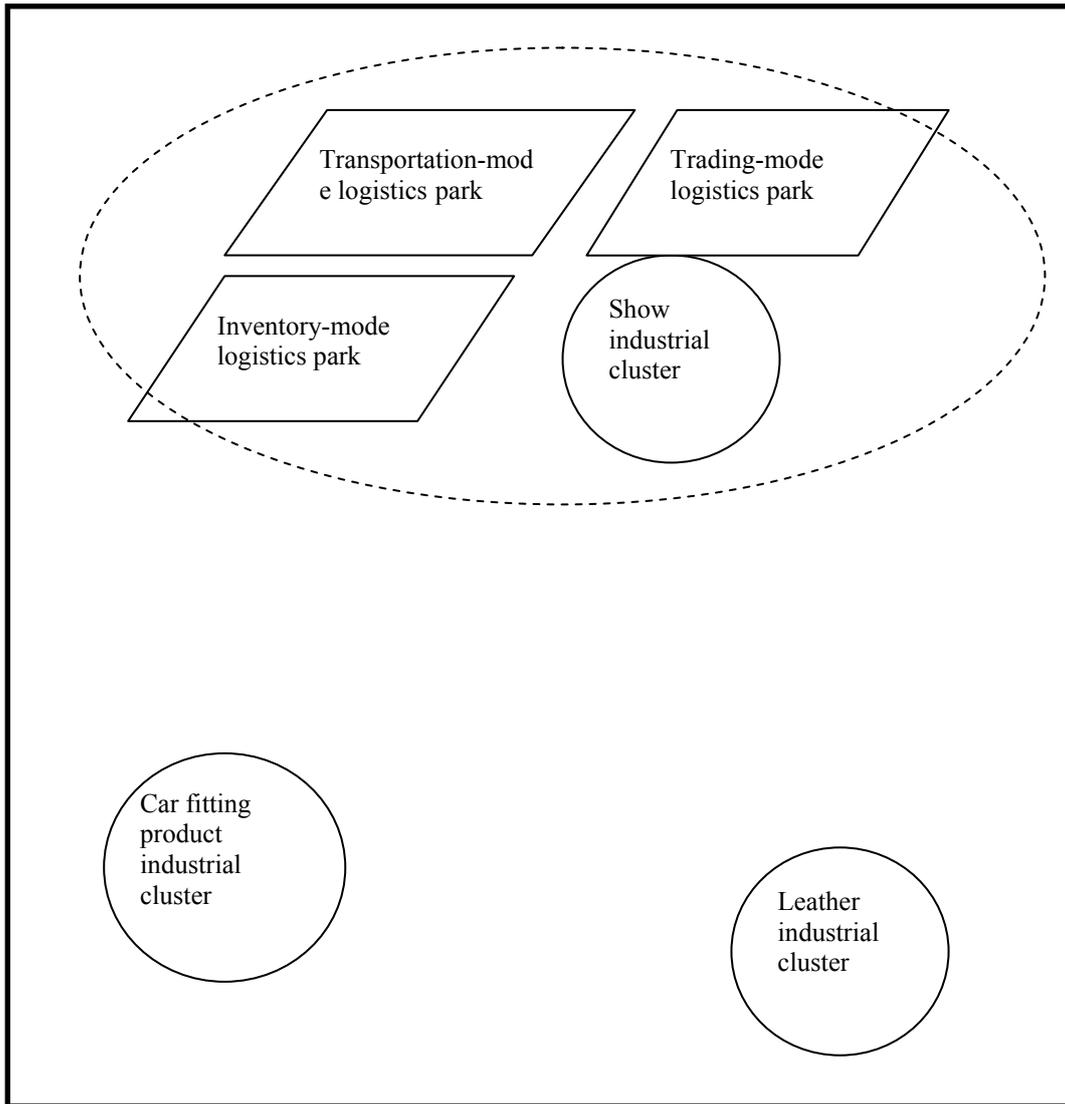


Figure 4.5 different types of logistics parks form one pole of growth  
Source: Draw on my own

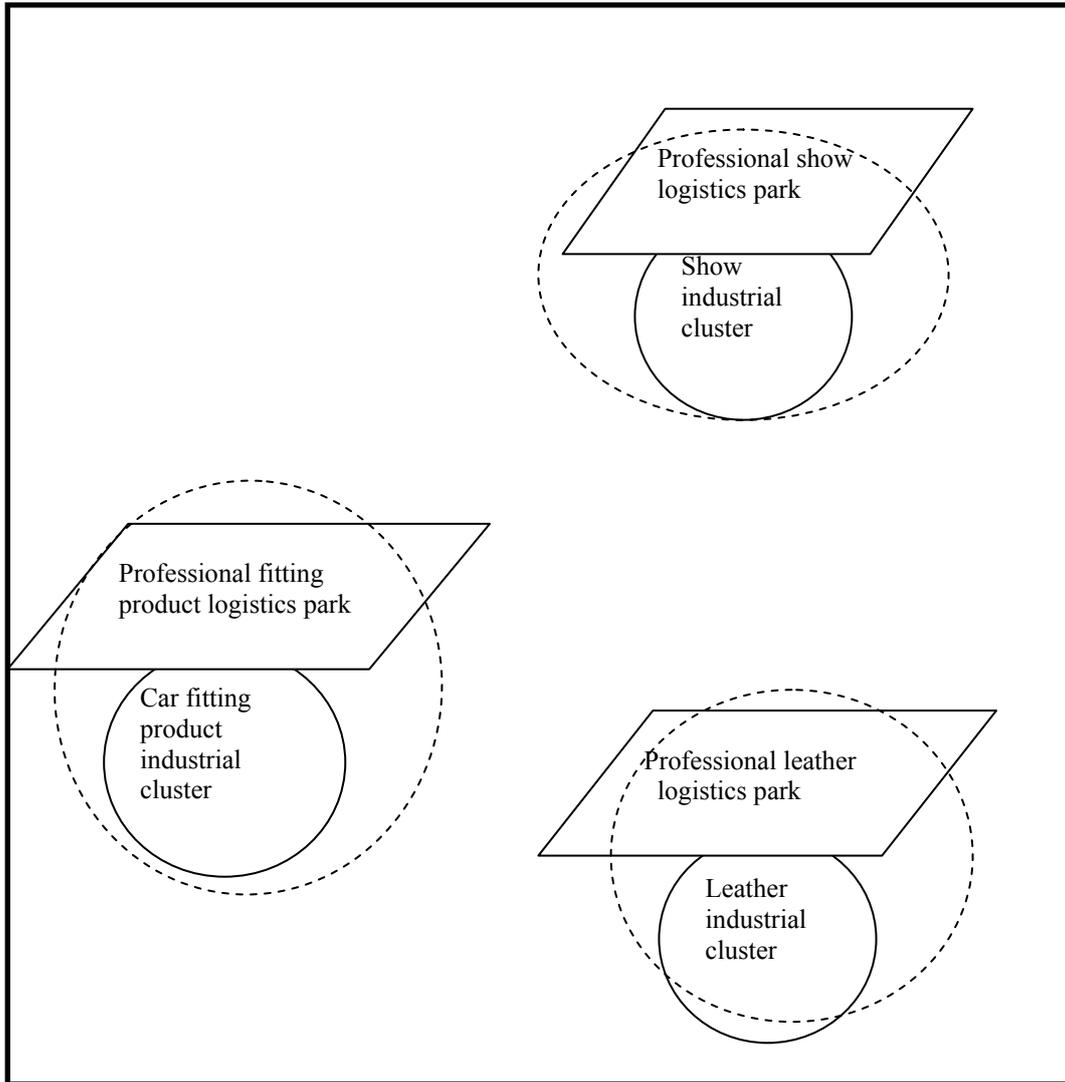


Figure 4.6 professional logistics parks form three poles of growth  
 Source: Draw on my own

#### 4.4 Quantitative analysis of building ‘professional logistics park’ in Wenzhou

The above analysis of building ‘professional logistics park’ in Wenzhou is a research as a whole. If we analyze whether or not logistics parks should be built and what types of logistics parks should be chosen for some specific industrial clusters, we should research with quantitative analysis more deeply. As for some small-size industrial clusters, it is inefficient for them to build specially professional logistics parks. The commodities in some industrial clusters don’t need extra-processing and

inventory service in logistics parks, so they also need not choose professional logistics services. For example, Wenzhou China Fastener City is the best manufacturing base in the world and accounts for 80% of market share in China, but the volume of fastener is small, and they don't need extra-processing and inventory service in logistics parks. A trading-mode logistics park is more suitable for them. In fact, they had formed a large professional trade center, whose function is some like the trading-mode logistics park. In the following dissertation, I will choose a specific case (China Leather City Case in Shuitou town) to analyze its logistics strategy with Analytic Hierarchy Process (AHP). The others industrial clusters also can use AHP to analyze their logistics strategy.

#### 4.4.1 Conception of Analytic Hierarchy Process

The Analytic Hierarchy Process (AHP) is a powerful and flexible decision making process to help people set priorities and make the best decision when both qualitative and quantitative aspects of a decision need to be considered. By reducing complex decisions to a series of one-on-one comparisons, then synthesizing the results, AHP not only helps decision makers arrive at the best decision, but also provides a clear rationale that it is the best. Designed to reflect the way people actually think, AHP was developed in the 1970's by Dr. Thomas Saaty, while he was a professor at the Wharton School of Business, and continues to be the most highly regarded and widely used decision-making theory.<sup>9</sup> There are 3 steps when using AHP modal. The first step is to structure the decision problem in a hierarchy. The second step is the comparison of the alternatives and the criteria. They are compared in pairs with respect to each element of the next higher level. It allows expressing the comparisons in verbal terms that are then translated in the corresponding numbers. As the last step, we synthesize the comparisons to get the priorities of the alternatives with respect to each criterion and the weights of each criterion with respect to the goal. The local priorities are then multiplied by the weights of the respective criterion. The results are

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<sup>9</sup> <http://www.expertchoice.com/customerservice/ahp.htm>

summed up to get the overall priority of each alternative.<sup>10</sup> Figure 4.7 shows the flow of AHP.

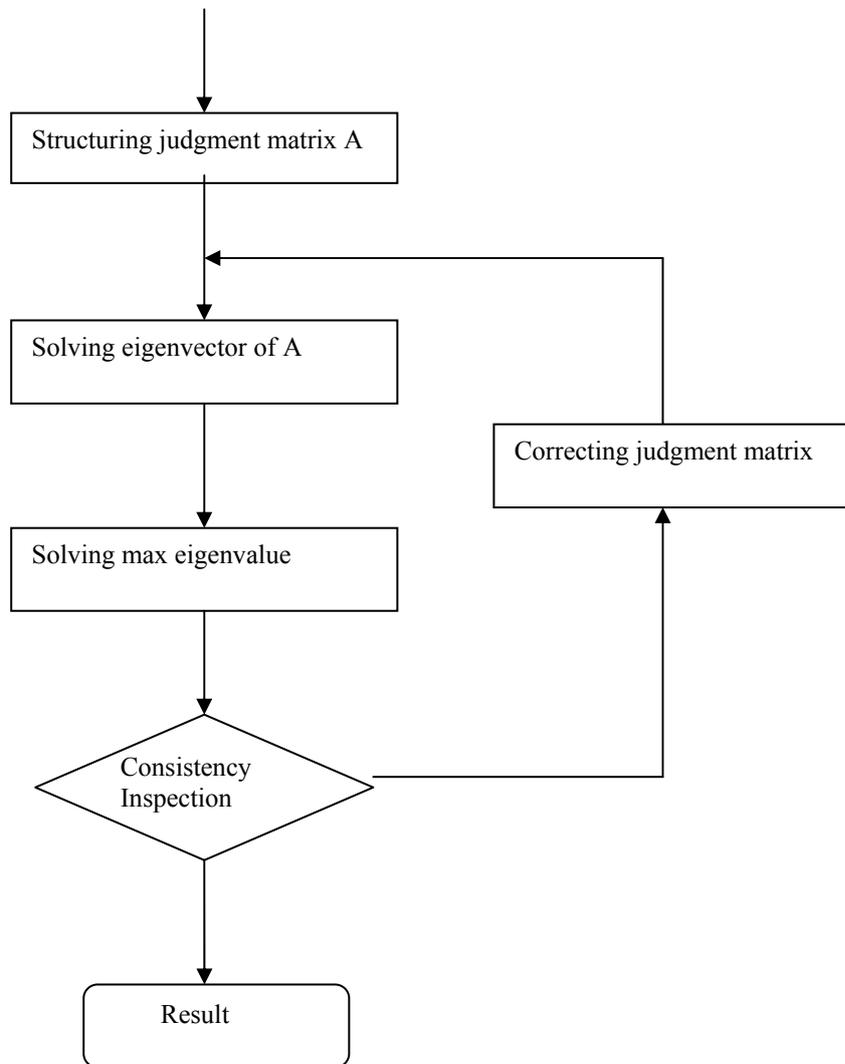


Figure 4.7 flow of AHP

Source: Yu Yingchuan.(2005). *The theory and practice of modern decision-making*. Science publishing house

<sup>10</sup> <http://www.isnar.cgiar.org/Fora/Priority/MeAnalit.htm>

#### 4.4.2 Processes of AHP

##### 1. Structuring the decision problem in a hierarchy

According to current layout of logistics parks in Wenzhou, among the 10 logistics parks, the Panqiao logistics park is most suitable for Shuitou leather industrial cluster. So as for logistics strategy of leather industrial cluster, there are three ways, namely, keeping current situation—on logistics park will be built (I name it as ‘unchanged strategy’ (US) in the dissertation), choosing Panqiao logistics park (PLP), and choosing professional leather logistics park (PLL). So in the following analysis of AHP, unchanged strategy, the Panqiao logistics park and the professional leather logistics park are the decision-making schemes. Table 4.1 shows characters of the three schemes. In some others industrial clusters, according to special situation, they may compare more types of logistics parks and then make final decision.

Table 4.1 the character of three types of decision-making schemes

	Professional Leather Logistics Park (PLLP)	Panqiao Logistics Park (PLP)	Unchanged Strategy (US)
Warehouse	Strong inventory function	Function of inventory is weaker than PLLP	Storing in themselves warehouse
Value added service (such as processing, assembling and sorting)	Provide professional value added services with scale efficiency	Few value added service. The major function is transportation and inventory.	Do these services by themselves or outsource them to a lot of scattered processing factories within the industrial cluster.
Transportation	Relatively efficient transportation	Completed and efficient transportation system with large scale.	A lot of scattered small-size transportation companies within the industrial cluster. The utilization rate of transportation tools is low. Market is in disorder.
Marketing function	It is an ideal position of marketing. Manufactories can build their exhibitions in PLLP and form a professional market	No marketing function	Weak marketing function.
Location	Near industrial cluster	Far away from industrial cluster	Within industrial cluster.

Source: Arrange on my own

General goal of decision-making schemes is to achieve maximum whole social benefit. The general goal also can be divided into three sub goals, namely, social benefit, economic benefit, and technical impact. Every sub goals are decided by many

complicated factors. As to Leather Industrial Cluster, social benefit is mostly decided by following five factors: 1.ability of relaxing traffic pressure; 2.ability of environment protection; 3.ability of contributing to Wenzhou economic balanced development; 4.cost of social general investment; 5.ability of regularizing market. Economic benefit is mostly decided by following five factors: 1.transportation cost; 2.risk cost; 3.inventory cost; 4.cost of value added services (such as processing, assembling and sorting); 5.transportation time. Technical impact is mostly decided by following three factors: 1.reliability; 2.degree of logistics operation difficulty; 3.policy and regulation. Figure 4.8 shows the framework of hierarchy structure.

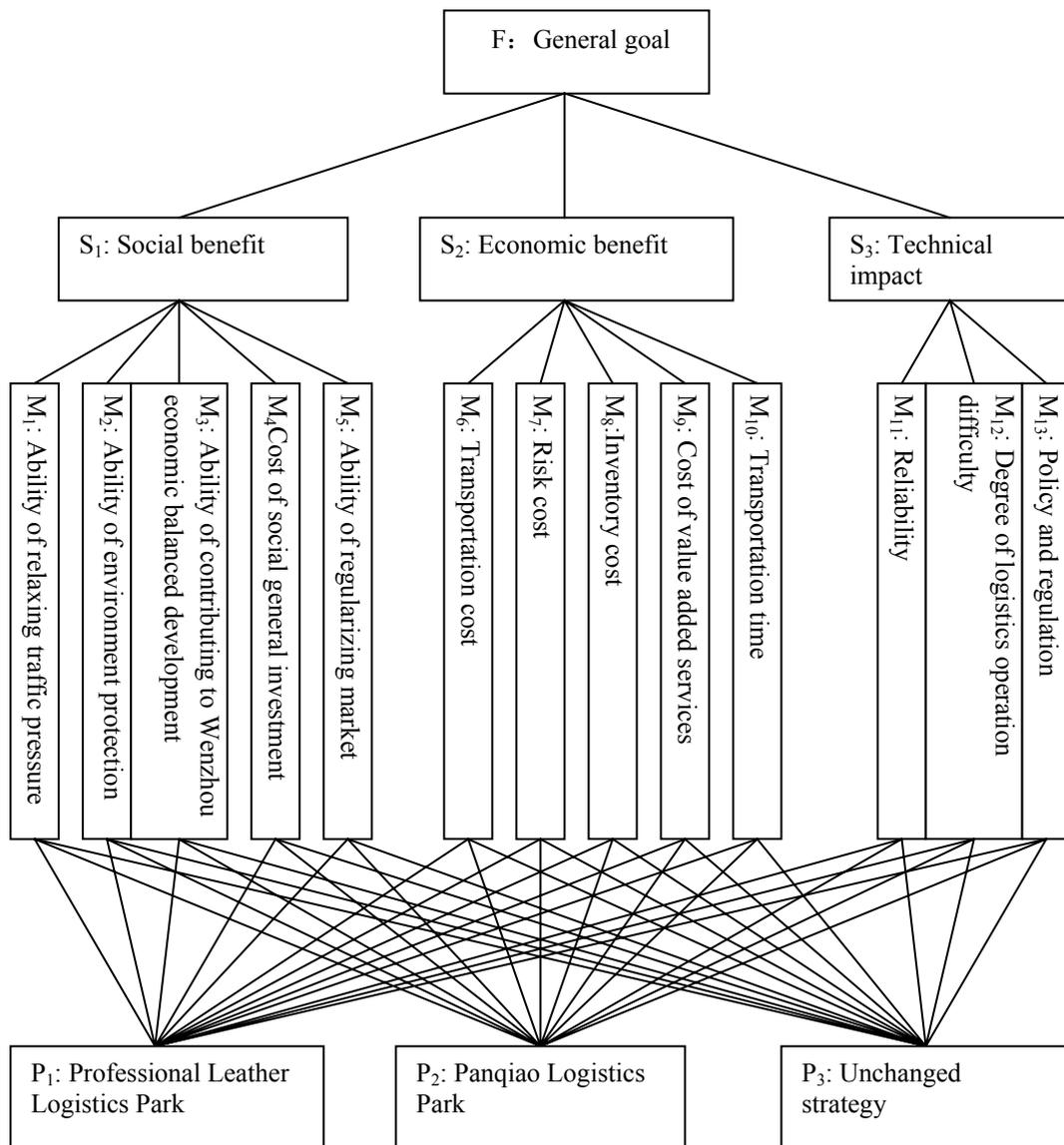


Figure 4.8 Framework of hierarchy structure

Source: Draw on my own

## 2. Analysis of judgment matrix F-S (F-general goal, S-sub goals)

### Structuring judgment matrix F-S

Through group pairwise comparison judgments, we get relative degree of importance of these sub goals to general goal. The pairwise comparison structures a matrix—a judgment matrix F-S (F-general goal, S-sub goals, S1-social benefit, S2-economic benefit, S3-technical impact) as follows.

$$A = \begin{bmatrix} S1/S1 & S1/S2 & S1/S3 \\ S2/S1 & S2/S2 & S2/S3 \\ S3/S1 & S3/S2 & S3/S3 \end{bmatrix}$$

Saty ever used 27 types of ways to make pairwise comparison, such as 1-3, 1-5, ..., 1-17, ... Etc., but he finally found scale 1-9 is not only simple, but also a good effect. The scale he choose is 1, 2, ..., 9 and their reciprocals 1/3, 1/5, ..., 1/9. When we make a quantitative comparison, we often have 5 obvious classes in our brain. The scale 1-9 can show easily as Table 3.2. ( Xia Yanhong, 2005) (define  $\alpha_{ij} = S_i/S_j$ )

Table 4.2 Saaty's scale of relative importance

Intensity of relative importance $\alpha_{ij}$	Definition
1	Equal importance
3	Weak importance (of one over the other)
5	Strong importance
7	Demonstrated importance over the other
9	Absolute importance
2,4,6,8	Intermediate values between

Source: <http://www.abo.fi/~rfuller/sda18.pdf>

### Solving eigenvector S of judgment matrix F-S

Eigenvector of judgment matrix can be solved through many ways. In the following dissertation, I will introduce Sum\|Product Method simply.

1>. Normalization of every columns of judgment matrix.

$$\bar{\alpha}_{ij} = \frac{\alpha_{ij}}{\sum_{k=1}^n \alpha_{kj}}, \quad (i,j = 1,2,\dots,n).$$

2>. Sum of every columns of normalizing judgment matrix.

$$\bar{S}_i = \sum_{j=1}^n \bar{\alpha}_{ij}, \quad (i = 1, 2, \dots, n).$$

3>. Normalizing  $\bar{S}_i$  and getting eigenvector S.

$$S = \frac{\bar{S}_i}{\sum_{j=1}^n \bar{S}_j}, \quad (i = 1, 2, \dots, n).$$

Finally, we get the eigenvector S of judgment matrix F-S.

### **Consistency Inspection of judgment matrix F-S.**

Because of complexity of objective problems and diversity of subjective judgment, it may lead to different results when people make pairwise comparison of large quantities of factors. For example, the importance of factors i, k and j are not much different, but the result may be conflicting--i is more important than j, j is more important than k, and k is more important than i. In fact, it is very difficult to get absolutely same result. Therefore, in order to judge whether decision-makers have made consistent pairwise comparison, we should inspect consistency of judgment matrix, that is, calculating coherence Index (CI) and coherence ratio (CR).

1>. Solving largest feature root of judgment matrix F-S.

$$\lambda_{\max} = \sum_{i=1}^n \frac{(AW)_i}{nW_i}$$

2>. Solving coherence index.

$$CI = \frac{\lambda_{\max} - n}{n - 1}.$$

3>. Solving coherence ratio.

$$CR = \frac{CI}{RI}.$$

RI is random index. We get the numbers in Table 4.3. If factors of pairwise comparison are large, the judgment consistency is weak. So we should reduce request of consistency. If factors of pairwise comparison are small, the judgment consistency is strong. So we should increase request of consistency.

Table 4.3 Random index

Dimensions (n)	1	2	3	4	5	6	7	8	9
RI	0.00	0.00	0.58	0.96	1.12	1.24	1.32	1.41	1.45

When  $CR < 0.1$ , we think that the judgment matrix satisfy consistency request. If  $CR \geq 0.1$ , we should correct judgment matrix again and then do same steps with above description.

### 3. Analysis of judgment matrix S1-M.

As for sub goal of social benefit, we can make pairwise comparison among these factors (M1. ability of relaxing traffic pressure; M2. ability of environment protection; M3. ability of contributing to Wenzhou economic balanced development; M4. cost of social general investment; M5. ability of regularizing market.).

$$A = \begin{bmatrix} M1/M1 & M1/M2 & M1/M3 & M1/M4 & M1/M5 \\ M2/M1 & M2/M2 & M2/M3 & M2/M4 & M2/M5 \\ M3/M1 & M3/M2 & M3/M3 & M3/M4 & M3/M5 \\ M4/M1 & M4/M2 & M4/M3 & M4/M4 & M4/M5 \\ M5/M1 & M5/M2 & M5/M3 & M5/M4 & M5/M5 \end{bmatrix}$$

According to same ways, we can get eigenvector, coherence index (CI) and coherence ratio (CR) of judgment matrix S1-M.

According to same ways, we also can get eigenvectors, coherence indexes, and coherence ratios of judgment matrix S2-M and judgment matrix S3-M.

#### 4. Solving weights of these 14 factors to general goal directly—judgment matrix F-M

The final eigenvector W of judgment matrix F-M:

$$W = S_1 \sum_{n=1}^5 M_n + S_2 \sum_{n=6}^{10} M_n + S_3 \sum_{n=11}^{13} M_n$$

S1: eigenvector of judgment matrix F-S1

S2: eigenvector of judgment matrix F-S2

S3: eigenvector of judgment matrix F-S3

M1-5: eigenvector of judgment matrix S1-M

M6-10: eigenvector of judgment matrix S2-M

M11-13: eigenvector of judgment matrix S3-M

#### 5. Analyzing importance of three decision-making schemes to those 14 factors.

As for the factor ‘ability of relaxing traffic pressure’ (M1), we can make pairwise comparison among these three decision-making schemes (P1: Professional Leather Logistics Park; P2: Panqiao Logistics Park; P3: Unchanged Strategy). Through pairwise comparison of three decision-making schemes, we can know their relative ability of relaxing traffic pressure. Judgment matrix M1-P of pairwise comparison:

$$A = \begin{bmatrix} P1/P1 & P1/P2 & P1/P3 \\ P2/P1 & P2/P2 & P2/P3 \\ P3/P1 & P3/P2 & P3/P3 \end{bmatrix}$$

With same way, we can get eigenvector and coherence ratio of judgment matrix M1-P.

With same way, we can get all of eigenvectors and coherence ratios of judgment matrixes M-P. Of course, all of judgment matrixes should make consistency inspection. If  $CR \cong 0.1$ , we should correct judgment matrixes until they accord with consistency.

## 6. General arrangement of hierarchy.

After consistency inspection, we can use normalized eigenvectors as arrangement weight of one hierarchy to its above hierarchy. The computing formula of weight of general arrangement is:

$$\sum_{j=1}^n \sum_{i=1}^m a_i b_j^i = 1.$$

ai: Weight of principle layer

bj: Weight of scheme layer

## 7. Consistency inspection of general arrangement.

If consistency inspection of general arrangement is ok, the analyzing results can be used as decision make. Otherwise, decision-makers should correct judgment matrix and analyze them again.

$$CI = \sum_{i=1}^m a_i CI_i ;$$

$$RI = \sum_{i=1}^m a_i RI_i ;$$

$$CR = \frac{CI}{RI}$$

CI: coherence index of general arrangement of hierarchy

RI: random index of general arrangement of hierarchy

CR: coherence ratio of general arrangement of hierarchy.

ai: normalized eigenvector of judgment matrixes S-M

#### 4.4.3 Computing general arrangement of decision-making schemes in Shuitou Leather Industrial Cluster

In Wenzhou, there are more than 10 industrial clusters, and conditions of every industrial cluster are very different. Every industrial cluster may have different alternative decision-making schemes. I can't make quantitative analysis of all of industrial clusters at short time. So I just take a typical case (Shuitou Leather Industrial Cluster Case) as a detail quantitative analysis. In fact, general studying theory of different industrial cluster is same. I make a questionnaire survey in China Leather City. Respondents are several local managers of manufactories and logistics corporations. The final weights of pairwise comparison are the average weights of all of questionnaires. If the average weight is not integer, I changed it into integer according to my view and keeping consistency of judgment matrix.

##### 1. Structuring judgment matrix F-S

Table 4.4 Judgment matrix F-S

A	S1	S2	S3	W
S1	1	1	3	0.429
S2	1	1	3	0.429
S3	1/3	1/3	1	0.143

Normalized eigenvector S of judgment matrix F-S is equal to:

[0.429, 0.429, 0.143] T

$\lambda_{\max} = 3$

CI = 0

Because it is three order matrix,

RI = 0.58

CR = CI/RI = 0 < 0.10.

Therefore, the judgment matrix of pairwise comparison satisfies the requirement of consistency, so the eigenvector is valid.

## 2. Structuring judgment matrix S1-M

Table 4.5 Judgment matrix S1-M

A	M1	M2	M3	M4	M5	W
M1	1	1/2	1/3	1	2	0.132
M2	2	1	1/2	2	4	0.250
M3	3	2	1	3	6	0.420
M4	1	1/2	1/3	1	2	0.132
M5	1/2	1/4	1/6	1/2	1	0.066

Normalized eigenvector S1 of judgment matrix S1-M is equal to:

[0.132, 0.250, 0.420, 0.132, 0.066] T

$\lambda_{\max} = 5.010$

CI = 0.002

Because it is five order matrix,

RI = 1.120

CR = CI/RI = 0.002 < 0.10.

Therefore, the judgment matrix of pairwise comparison satisfies the requirement of consistency, so the eigenvector is valid.

## 3. Structuring judgment matrix S2-M

Table 4.6 Judgment matrix S2-M

A	M6	M7	M8	M9	M10	W
M6	1	3	2	1/3	3	0.192
M7	1/3	1	1/2	1/9	1	0.061
M8	1/2	2	1	1/6	2	0.109
M9	3	9	6	1	9	0.577
M10	1/3	1	1/2	1/9	1	0.061

Normalized eigenvector S2 of judgment matrix S2-M is equal to:

[0.192, 0.061, 0.109, 0.577, 0.061] T

$\lambda_{\max} = 5.013$

CI=0.003

Because it is five order matrix,

RI=1.120

CR=CI/RI=0.003 < 0.10.

Therefore, the judgment matrix of pairwise comparison satisfies the requirement of consistency, so the eigenvector is valid.

#### 4. Structuring judgment matrix S3-M

Table 4.7 Judgment matrix S3-M

A	M11	M12	M13	W
M11	1	9	3	0.692
M12	1/9	1	1/3	0.077
M13	1/3	3	1	0.231

Normalized eigenvector S3 of judgment matrix S3-M is equal to:

[0.692, 0.077, 0.231] T

$\lambda_{\max} = 5.00$

CI=0

Because it is three order matrix,

RI=0.58

CR=CI/RI=0 < 0.10.

Therefore, the judgment matrix of pairwise comparison satisfies the requirement of consistency, so the eigenvector is valid.

#### 5. Solving weights of these 14 factors to general goal directly—judgment matrix F-M

The final eigenvector W of judgment matrix F-M:

$$\begin{aligned}
 W &= S_1 \sum_{n=1}^5 M_n + S_2 \sum_{n=6}^{10} M_n + S_3 \sum_{n=11}^{13} M_n \\
 &= [0.429*(0.132, 0.250, 0.420, 0.132, 0.066), 0.429*(0.192, 0.061, 0.109, 0.577, 0.061), 0.143*(0.692, 0.077, 0.231)] T \\
 &= \\
 &[0.057, 0.107, 0.180, 0.057, 0.028, 0.082, 0.026, 0.047, 0.248, 0.026, 0.099, 0.011, 0.033] T
 \end{aligned}$$

It means that:

Ability of relaxing traffic pressure M1 contributes 5.7% of total weights to the general goal;

Ability of environment protection M2 contributes 10.7% of total weights to the general goal;

Ability of contributing to Wenzhou economic balanced development M3 contributes 18.0% of total weights to the general goal;

Cost of social general investment M4 contributes 5.7% of total weights to the general goal;

Ability of regularizing market M5 contributes 2.8% of total weights to the general goal;

Transportation cost M6 contributes 8.2% of total weights to the general goal;

Risk cost M7 contributes 2.6% of total weights to the general goal;

Inventory cost M8 contributes 4.7% of total weights to the general goal;

Cost of value added services M9 contributes 24.8% of total weights to the general goal;

Transportation time M10 contributes 2.6% of total weights to the general goal;

Reliability M11 contributes 9.9% of total weights to the general goal;

Degree of logistics operation difficulty M12 contributes 1.1% of total weights to the general goal;

Policy and regulation M13 contributes 3.3% of total weights to the general goal.

From the normalized eigenvector of judgment matrix F-M, it is obvious that Wenzhou economic balanced development and cost of value added services are very important factors of achieving general goal. In above qualitative analysis, the professional logistics park can promote Wenzhou economic balanced development and provide professional and efficient value added services a lot. Therefore, from now on, the decision-making scheme of Professional Leather Logistics Park may be the best scheme to the Leather Industrial Cluster.

## 6. Structuring judgment matrix M1-P

Table 4.8 Judgment matrix M1-P

A	P1	P2	P3	W
P1	1	2	3	0.539
P2	1/2	1	2	0.297
P3	1/3	1/2	1	0.164

Normalized eigenvector M1 of judgment matrix M1-P is equal to:

$[0.539, 0.297, 0.164]^T$

$\lambda_{\max} = 3.009$

CI = 0.005

Because it is three order matrix,

RI = 0.58

CR = CI/RI = 0.008 < 0.10.

Therefore, the judgment matrix M1-P of pairwise comparison satisfies the requirement of consistency, so the eigenvector is valid.

## 7. Structuring judgment matrix M2-P

Table 4.9 Judgment M2-P

A	P1	P2	P3	W
---	----	----	----	---

P1	1	1	6	0.462
P2	1	1	6	0.462
P3	1/6	1/6	1	0.077

Normalized eigenvector M2 of judgment matrix M2-P is equal to:

[0.462, 0.462, 0.077] T

$\lambda_{\max} = 3.000$

CI = 0

Because it is three order matrix,

RI = 0.58

CR = CI/RI = 0 < 0.10.

Therefore, the judgment matrix M2-P of pairwise comparison satisfies the requirement of consistency, so the eigenvector is valid.

#### 8. Structuring judgment matrix M3-P

Table 4.10 Judgment matrix M3-P

A	P1	P2	P3	W
P1	1	8	3	0.682
P2	1/8	1	1/3	0.082
P3	1/3	3	1	0.236

Normalized eigenvector M3 of judgment matrix M3-P is equal to:

[0.682, 0.082, 0.236]T

$\lambda_{\max} = 3.002$

CI = 0.001

Because it is three order matrix,

RI = 0.58

CR = CI/RI = 0.001 < 0.10.

Therefore, the judgment matrix M3-P of pairwise comparison satisfies the requirement of consistency, so the eigenvector is valid.

## 9. Structuring judgment matrix M4-P

Table 4.11 Judgment matrix M4-P

A	P1	P2	P3	W
P1	1	1/2	4	0.315
P2	2	1	7	0.602
P3	1/4	1/7	1	0.082

Normalized eigenvector M4 of judgment matrix M4-P is equal to:

[0.315, 0.602, 0.082] T

$\lambda_{\max} = 3.002$

CI = 0.001

Because it is three order matrix,

RI = 0.58

CR = CI/RI = 0.002 < 0.10.

Therefore, the judgment matrix M4-P of pairwise comparison satisfies the requirement of consistency, so the eigenvector is valid.

## 10. Structuring judgment matrix M5-P

Table 4.12 Judgment matrix M5-P

A	P1	P2	P3	W
P1	1	1/2	6	0.334
P2	2	1	9	0.605
P3	1/6	1/9	1	0.061

Normalized eigenvector M5 of judgment matrix M5-P is equal to:

[0.334, 0.605, 0.061] T

$\lambda_{\max} = 3.009$

CI = 0.005

Because it is three order matrix,

RI = 0.58

CR = CI/RI = 0.008 < 0.10.

Therefore, the judgment matrix M5-P of pairwise comparison satisfies the requirement of consistency, so the eigenvector is valid.

#### 11. Structuring judgment matrix M6-P

Table 4.13 Judgment matrix M6-P

A	P1	P2	P3	W
P1	1	1/2	3	0.309
P2	2	1	5	0.581
P3	1/3	1/5	1	0.110

Normalized eigenvector M6 of judgment matrix M6-P is equal to:

[0.309, 0.581, 0.110] T

$\lambda_{\max} = 3.004$

CI = 0.002

Because it is three order matrix,

RI = 0.58

CR = CI/RI = 0.003 < 0.10.

Therefore, the judgment matrix M6-P of pairwise comparison satisfies the requirement of consistency, so the eigenvector is valid.

#### 12. Structuring judgment matrix M7-P

Table 4.14 judgment matrix M7-P

A	P1	P2	P3	W
P1	1	1/2	5	0.129
P2	2	1	1/2	0.277
P3	5	1/2	1	0.595

Normalized eigenvector M7 of judgment matrix M7-P is equal to:

[0.129, 0.277, 0.595] T

$\lambda_{\max} = 3.006$

CI = 0.003

Because it is three order matrix,

$$RI=0.58$$

$$CR=CI/RI=0.005 < 0.10.$$

Therefore, the judgment matrix M7-P of pairwise comparison satisfies the requirement of consistency, so the eigenvector is valid.

### 13. Structuring judgment matrix M8-P

Table 4.15 Judgment matrix M8-P

A	P1	P2	P3	W
P1	1	2	3	0.539
P2	1/2	1	2	0.297
P3	1/3	1/2	1	0.164

Normalized eigenvector M8 of judgment matrix M8-P is equal to:

$$[0.539, 0.297, 0.164] T$$

$$\lambda_{max} = 3.009$$

$$CI=0.005$$

Because it is three order matrix,

$$RI=0.58$$

$$CR=CI/RI=0.008 < 0.10.$$

Therefore, the judgment matrix M8-P of pairwise comparison satisfies the requirement of consistency, so the eigenvector is valid.

### 14. Structuring judgment matrix M9-P

Table 4.16 Judgment matrix M9-P

A	P1	P2	P3	W
P1	1	2	2	0.500
P2	1/2	1	1	0.250
P3	1/2	1	1	0.250

Normalized eigenvector M9 of judgment matrix M9-P is equal to:

$$[0.500, 0.250, 0.250] T$$

$$\lambda_{\max} = 3.000$$

$$CI = 0.000$$

Because it is three order matrix,

$$RI = 0.58$$

$$CR = CI/RI = 0 < 0.10.$$

Therefore, the judgment matrix M9-P of pairwise comparison satisfies the requirement of consistency, so the eigenvector is valid.

#### 15. Structuring judgment matrix M10-P

Table 4.17 Judgment matrix M10-P

A	P1	P2	P3	W
P1	1	1/2	2	0.297
P2	2	1	3	0.539
P3	1/2	1/3	1	0.164

Normalized eigenvector M10 of judgment matrix M10-P is equal to:

$$[0.297, 0.539, 0.164]^T$$

$$\lambda_{\max} = 3.009$$

$$CI = 0.005$$

Because it is three order matrix,

$$RI = 0.58$$

$$CR = CI/RI = 0.008 < 0.10.$$

Therefore, the judgment matrix M10-P of pairwise comparison satisfies the requirement of consistency, so the eigenvector is valid.

#### 16. Structuring judgment matrix M11-P

Table 4.18 Judgment matrix M11-P

A	P1	P2	P3	W
P1	1	5	1/2	0.319
P2	1/5	1	1/9	0.066
P3	2	9	1	0.615

Normalized eigenvector M11 of judgment matrix M11-P is equal to:

[0.319, 0.066, 0.615] T

$\lambda_{\max} = 3.001$

CI = 0.001

Because it is three order matrix,

RI = 0.58

CR = CI/RI = 0.001 < 0.10.

Therefore, the judgment matrix M11-P of pairwise comparison satisfies the requirement of consistency, so the eigenvector is valid.

#### 17. Structuring judgment matrix M12-P

Table 4.19 Judgment matrix M12-P

A	P1	P2	P3	W
P1	1	1/2	1/5	0.122
P2	2	1	1/3	0.230
P3	5	3	1	0.648

Normalized eigenvector M12 of judgment matrix M12-P is equal to:

[0.122, 0.230, 0.648] T

$\lambda_{\max} = 3.004$

CI = 0.002

Because it is three order matrix,

RI = 0.58

CR = CI/RI = 0.003 < 0.10.

Therefore, the judgment matrix M12-P of pairwise comparison satisfies the requirement of consistency, so the eigenvector is valid.

#### 18. Structuring judgment matrix M13-P

Table 4.20 Judgment matrix M13-P

A	P1	P2	P3	W
P1	1	1/2	3	0.292
P2	2	1	7	0.615

P3	1/3	1/7	1	0.093
----	-----	-----	---	-------

Normalized eigenvector M13 of judgment matrix M13-P is equal to:

[0.292, 0.615, 0.093] T

$\lambda_{\max} = 3.003$

CI = 0.001

Because it is three order matrix,

RI = 0.58

CR = CI/RI = 0.002 < 0.10.

Therefore, the judgment matrix M13-P of pairwise comparison satisfies the requirement of consistency, so the eigenvector is valid.

### 19. General arrangement of hierarchy

Table 4.21 Result of general arrangement of hierarchy

	M1	M2	M3	M4	M5	M6	M7	M8	M9
	0.057	0.107	0.180	0.057	0.028	0.082	0.026	0.047	0.248
P1	0.539	0.462	0.682	0.315	0.334	0.309	0.129	0.539	0.500
P2	0.297	0.462	0.082	0.602	0.605	0.581	0.277	0.297	0.250
P3	0.164	0.077	0.236	0.082	0.061	0.110	0.595	0.164	0.250

M10	M11	M12	M13	Weights of general arrangement	Arrangement of decision-making schemes
0.026	0.099	0.011	0.033		
0.297	0.319	0.122	0.292	0.459	1
0.539	0.066	0.230	0.615	0.306	2
0.164	0.615	0.648	0.093	0.235	3

### 20. Consistency inspection of general arrangement

Table 4.22 M, CI and RI in different judgment matrixes M-P

M1	M2	M3	M4	M5	M6	M7
0.057	0.107	0.180	0.057	0.028	0.082	0.026
CI1	CI2	CI3	CI4	CI5	CI6	CI7
0.005	0	0.001	0.001	0.005	0.002	0.003
RI1	RI2	RI3	RI4	RI5	RI6	RI7
0.58	0.58	0.58	0.58	0.58	0.58	0.58

M8	M9	M10	M11	M12	M13
0.047	0.248	0.026	0.099	0.011	0.033
CI8	CI9	CI10	CI11	CI12	CI13
0.005	0	0.005	0.001	0.002	0.001
RI8	RI9	RI10	RI11	RI12	RI13
0.58	0.58	0.58	0.58	0.58	0.58

$$CI = \sum_{i=1}^m a_i CI_i = 0.001423$$

$$RI = \sum_{i=1}^m a_i RI_i = 0.58$$

$$CR = \frac{CI}{RI} = 0.002453 < 0.1$$

Therefore, the result satisfies the requirement of consistency, so they can be used in analysis of decision-making.

## 21. Conclusion.

From the quantitative analysis, the professional leather logistics park is the best decision-making scheme (weight = 0.459), the Panqiao logistics park is the secondly best decision-making scheme (weight= 0.306) and the unchanged strategy is relative

bad decision-making scheme. The result is consistent with that of qualitative analysis. It further proves that professional logistics park is very suitable for Wenzhou's situation.

As for the others industrial clusters, decision-makers also can use the same ways to make quantitative analysis. Then, decision-makers analyze all of results synthetically and make a best decision-making for the strategy of the whole Wenzhou's logistics parks.

## **Chapter Five Research on Wenzhou logistics park's commercial mode**

### 5.1 Comparisons of domestic and overseas logistics park commercial modes

#### 5.1.1 Japan

Since 1960s, Japan had begun to develop logistics parks. Firstly, local governments draw up a municipal planning and choose a proper land as logistics base. Secondly, local governments sell this land to different types of industrial associations including storage association, logistics association, association of truck transportation, association of refrigerated warehouse, and so on. These associations raise funds with shareholding system from insiders to buy land and build logistics facilities. In the meantime, professional companies who are in charge of detail affairs will be founded. If they are in shortage of funds, government will provides long-term and low interest rate loan to them. Thirdly, government invest a lot of money on building relevant infrastructure around planning logistics parks so that it not only promotes development of logistics companies, but also increases value of land and real estate, which ensures return on investment for investors. Besides, government provides many favorite policies for companies who invest in logistics parks, such as Tax Preference Policy. Japan government pays much attention on legislation, economic means, information support, administrative intervention and unified management, which promote Japan's logistics healthy and efficient development.

As for total investment of logistics parks in Tokyo, central government, Tokyo local government and logistics corporations account for one third respectively. During building logistics parks in Tokyo, Japan Development Bank reduces interest rate of loan from 9% to 7.9%. Land price of logistics parks are only one sixth of general land

price in market. Total investment of Tokyo Peace Island Logistics Park is 57.2 billion yen. Central government accounts for 70%, Tokyo government accounts for 20% and logistics corporations only account for 10%.

### 5.1.2 Germany

Main mode of developing logistics parks in German is ‘Federal government being in charge of layout, local government being in charge of investment and corporations being in charge of operation and management.’ Development scheme of Bremen Logistics Park in German was put forward by German Logistics and communication institute. Then, Bremen government ratified the scheme. Before exploitation, the land of the logistics park is a saline land. State government bought these land of 200 hectares from local farmers with 6-8 DM per square meter. Bremer Wirtschaftsfoerderung GmbH (WFG) is in charge of infrastructure construction. Bremer Wirtschaftsfoerderung GmbH consists of members of economic department, communication department, customs and department of industry and commerce. WFG belongs to private enterprise. Employees who enter into the enterprise will lose position of civil servants. The main responsibility of WFG is to construct transportation system of ‘three connections and one leveling’ and relevant road and train infrastructure of logistics park. WFG is also in charge of inviting merchants and bringing in fund on behalf of state government. Corporations entering the logistics park are in charge of constructing logistics facilities and buildings. Revenue of selling and leasing land and tax, about 500 million DM, were invested in logistics park. Corporations entering the logistics park invested the other 500 million DM.

### 5.1.3 Other countries

Belgium government and France government support logistics parks development with funds. Belgium government provides 17.5%—25% of total investment of logistics parks. France central government not only subsidizes local government to develop logistics parks, but also provides favorite policies for corporations who enter

logistics parks. France central government provides 5-years free tax for corporations in logistics parks and 20 thousands subsidy per 20 employees. English government pays their attention on developing comprehensive logistics parks. Government is in charge of dealing with customs procedures, providing bonded warehouses, maintaining transportation facilities.

All in all, even though there is no unified and completed logistics law and regulation, administrators adopt active policies to encourage development of logistics parks.

#### 5.1.4 China

In china, there is also no specific logistics policy and regulation. Conditions in different places differ obviously. Pinghu Logistics Park was planned and built by government directly. Zhejiang Chuanghua Logistics Park is held by Chuanghua Group. It is a typical private logistics park.

### 5.2 Analysis of commercial modes of the logistics park

#### 5.2.1 Comparisons of two different types of commercial modes of logistics parks

Generally, the scale of logistics parks is large and there is only one logistics park in an area. So the local manufactories have to choose the logistics park as their logistics provider. It easily leads to monopoly. Besides, if Wenzhou builds professional logistics parks, they will provide professional logistics services and are hard to be replaced. It is easier to lead to monopoly. As for monopolistic logistics park, demand curve (D) and average return curve (AR) are same. Mode of monopoly price shows in following figure 5.1.

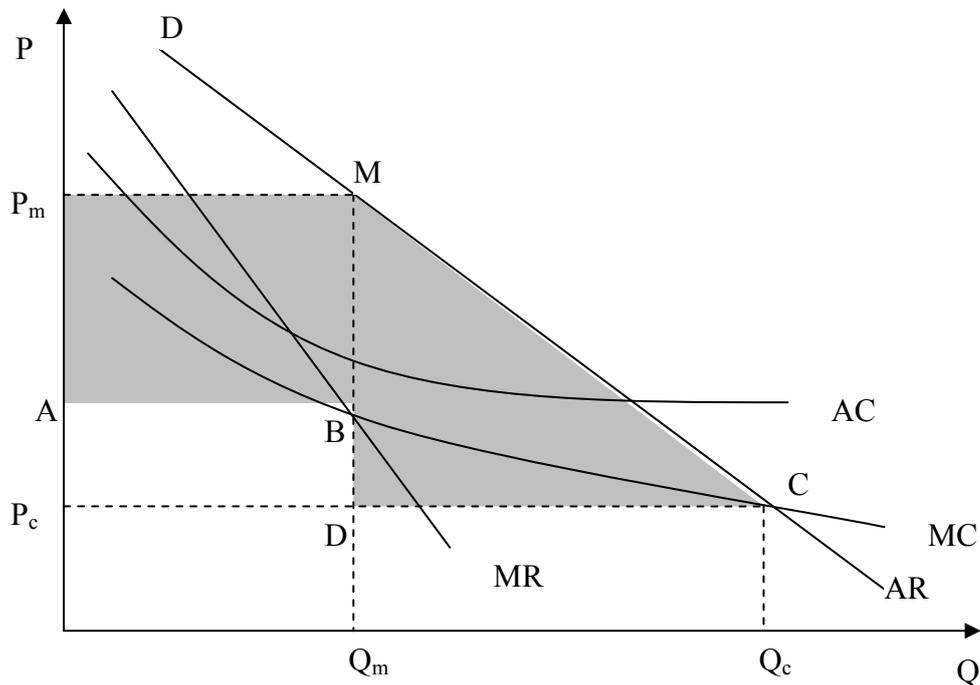


Figure 5.1 Monopoly pricing

Source: Duan Weichang, & Liu Kai. The character of public logistic center and commercial mode. *comprehensive transportation*,12,32-35.

Because the logistics park is monopolistic and held by private holders, they need not be afraid of new entrants. They will adopt monopoly-pricing  $P_m$ . At that time, Margin Return (MR) will equal Margin Cost (MC). So the supply will be controlled at  $Q_m$ . If it adopts monopoly-pricing  $P_m$ , social demand will decrease, the logistics park will gain maximum of profit, and loss of social welfare will reaches maximum. It is the best result that holders of the logistics park want. From Figure 5.1, Rectangle  $ABMP_m$  is producer's surplus. Triangle  $CDM$  is loss of social welfare. Monopoly leads to high price so that many manufactories operate logistics processes by themselves or choose another logistics park. If it is professional logistics park, there is no substituted logistics park. So many manufactories have to accept high price. Supply under monopoly pricing is far less than the best number of social demand. Holders of the logistics park earn largest producer's surplus (Profit) through increasing loss of social welfare (loss of public' interest). Besides, holders of the logistics park expend a lot of energies ton keeping their monopolistic status.

If logistics park is held by government, it will satisfies market demand, and price  $P = MC = P_c$ . The profit reaches minimum, but loss of social welfare reaches minimum. Supply under the pricing modal will satisfy best number of social demand and social benefit reaches maximum. It is the best result that government wants. Nevertheless, preconditions of the results are that government holds all of land and have enough fund to develop logistics parks and enough ability of management. In fact, it cannot be achieved. Generally, efficiency of government activities is low. Therefore, it is important to trade off the two modes.

### 5.2.2 Different types of investment mode in logistics parks

Duan Weichang considered that attribution of logistics parks could be decided by four factors, namely, land, regulation, fund and management.

That is,

$$C = f(L, R, F, M) \quad C \in [0, 1]$$

If  $C = 0$ , the logistics park is controlled completely by private operator.

If  $C = 1$ , the logistics park is controlled completely by government. (Gong Jin, 2005, pp. 32-35)

He considered there are 8 commercial modes of the logistics park showing table 5.1

Table 5.1 Comparisons of different types of commercial modes of logistics parks

Commercial mode	Land	Fund	Regulation	Management right	Publicity
BOO (build-own-operate)	Sell	Grantee	Price regulation	Grantee	Very weak
BBO (buy-build-operate)	Sell	Grantee	Price regulation	Grantee	Weak
LBO (lease-build-operate)	Lease	Lessee	Price regulation	Lessee	Weak
BOT (build-operate-transfer)	Sell	Builder	Price regulation	Lessee	Medium
BTO	Lease	Builder	Price	Developer	Medium

(build-transfer-operate)			regulation		
Joint venture	Build jointly	Joint venture		Together	Medium
Management outsourcing	Built by government	Exclusive investment		Contractor	Strong
State-owned exclusive investment	Built by government	Exclusive investment		Operated by government	Very strong

Source: Gong Jin, Huang Gongpu.(2005).How to develop logistic business in small-size transportation companies. *Comprehensive Transportation*,7,32-35.

### 5.3 Wenzhou' commercial mode of logistics park.

As for Wenzhou, there are several steps as follows: 1. Government should choose site of the logistics park with quantitative and qualitative analyses. 2. Local government sets down detailed layout of the logistics park. 3. Local government sells land to developers. 4. The developers build infrastructures of the logistics park according to government's layout. 5. The logistics park is divided into a lot of sections according to logistics park's functions. Then, the developers sell these sections to manufactories, logistics operators and investors. 6. Government promises to rent all of sections of the logistics with a certain rate of rent if they can not be sold. 7. Government regulates that rent rate of every sections of logistics park is not more than a certain rate that controlled by local government according to market conditions. Besides, government regulates compulsive policy of lease, that is, if manufactories or logistics operators continue to rent sites of logistics park, any people, including landlords, can not stop leasing their sites. 8. Government founds administration committee who is in charge of general management in the logistics park. The detail flow is shown in figure 5.2.

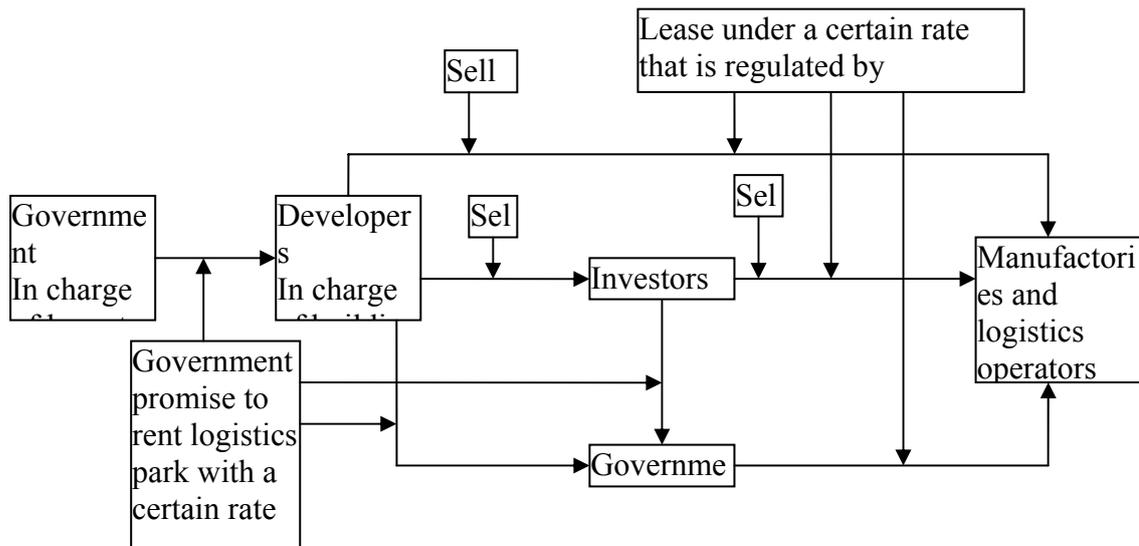


Figure 5.2 Wenzhou' commercial mode of logistics park

Source: Draw on my own

The reasons of adopting above commercial mode of the logistics park are as follows.

1. Shortage of state fund and abundance of folk capital in Wenzhou.

There is an idiom in Wenzhou: government cannot afford building a road for residents, but individual builds a road for himself. In 2005, Wenzhou' government invested 18.669 billion Yuan in constructing infrastructure. Nevertheless, fiscal revenue in Wenzhou is only 20.49 billion Yuan, including local fiscal revenue of 10.96 billion Yuan, even though Wenzhou's fiscal revenue achieves breakthrough in 2005. Obviously, the governmental financial deficit in Wenzhou is very serious. In the years between 2003 and 2007, Wenzhou government implemented '100 projects of 100 billion' and 'project of one-port and three-cities'. The total investment is 204 billions and 103 large-size projects will be built. These projects include port, airport, highway, electric power, hydraulic power, municipal layout and so on. It is evident that shortage of fund in Wenzhou is serious.

Nevertheless, scale of folk capital is 277 billion Yuan by the end of 2005. Currently, conditions of business become worse and worse, especially international business. A lot of commodities lost their international market due to high anti-dumping tax and trade quota. Besides, the market of real estate has been controlled by governmental

policies and regulations so more and more Wenzhou's folk capital have to drop out of real-estate market. There will be more and more unemployed capital. It is win-win if government can attract the unemployed capital to invest logistics parks.

## 2. Ensuring a certain return of investment of logistics parks.

Logistics Park belongs to high investment with low return and high investment risk. Few corporations are willing to enter into them. Besides, modern logistics idea is relatively new for investors of Wenzhou. They cannot invest a lot of money in a strange industry. Therefore, if government ensures a certain return of investment of logistics parks, it can attract a lot of folk capital. The way is that government promise to rent logistics parks with a minimum rate of rent.

## 3. Ensuring corporations to enter into logistics parks.

If manufactories and logistics operators invest a lot of money and facilities in logistics parks, Proprietor of logistics parks will unite to increase price. So manufactories and logistics operators will hesitate to invest too much money and facilities in rented logistics parks, which will restrict the development of logistics parks. Therefore, local government should carry out relevant policies to regulate maximum rate of rent. Manufactories and logistics operators take easy to make long-term strategies in logistics parks due to 'compulsive policy of lease'. There is a successful case of the compulsive policy of lease in Wenzhou. Local farmers hold all the land in China Leather City. In order to encourage manufacturers to make long-term investment in China Leather City, local government regulates a compulsive policy of lease with a maximum rate of rent. Local farmers cannot take back land if manufacturers continue to rent them.

## **Chapter Six Internal layout of professional logistics parks in Wenzhou**

### 6.1 The structure of professional logistics park

The professional logistics park mainly consists of value added area, exhibition area, warehouse, park and administration center.

#### 6.1.1 Value added area

The main operators in value added area are suppliers of products' value added service. These suppliers have provided professional value added service for local manufactories in their own sites before logistics park is built. As for these suppliers, they just change operation sites. They can use primary facilities so that the investment of facilities in a logistics park can be reduced a lot.

#### 6.1.2 Transportation system (park)

The government provides favorite policies to attract transportation corporations to enter into logistics parks. These transportation corporations keep operation themselves, but should be supervised by administration center. If transportation corporations centralize in the logistics park, manufacturers can get transportation information easier. Transportation corporations and manufacturers exchange information frequently, but easily. Therefore, it reduces lead time and heightens utilization rate of vehicles. Besides, government can supervise these vehicles easily. It is an efficient way to ensure traffic safety and prevent vehicles' operators from over loading.

### 6.1.3 Exhibition area

Corporations in Wenzhou are generally small-size or medium-size. They lack ability of marketing and forecasting market situation. Therefore, it is very common that products cannot be sold out in time. Besides, there are too many traders and agents between manufacturers and consumers. Traders and agents earn the major profit. The profit space for manufactures is pretty small. If establishing exhibition area in the logistics park, manufacturers can exhibit and sell their products in the area. A lot of products in Wenzhou's industrial clusters account for large market share in China, even in the world. Therefore, if these products' manufacturers establish their exhibition halls in the logistics park, it can attract a lot of buyers to visit and the professional commodities market will be formed. At that time, manufacturers can sell their commodities in the logistics park with very low sales cost. Besides, manufacturers in the exhibition area can combine into a distribution alliance to expand their commodities and market. When products are ordered at exhibition halls, they will be loaded directly at warehouses.

### 6.1.4 Warehouse

When manufactures contract with customers in exhibition area, the commodities can be transported directly into the warehouse, which reduce lead time obviously. Previously, warehouse is generally far away from value added area, so it wastes a lot of transportation cost and time. Currently, warehouse is close to value added area, so it saves a lot of transportation cost and time.

### 6.1.5 Administration center

Administration center is in charge of supervising operation of the logistics park and providing information service.

## 6.2 Case analysis—how to build Professional Leather Logistics Park?

Step ①: A truck loads cargo from manufactory 1, manufactory 2 and manufactory 3 and so on. It ensures full loading of the truck.

Step ②: Some cargo will be discharge at the area of drying leather.

Step ③: If some cargo has been dried at manufactories, they will be discharged directly at the area of surface modification.

Step ④: If some cargo has been dried and modified at manufactories, they will be discharged directly at the area of clipping, checkout, measuring and packaging.

Step ⑤: If some cargo is finished product, they will be discharged directly at warehouse. Besides, if semi-finished product has not been ordered, they will be storied at warehouse directly. So they will also be discharged directly at warehouse.

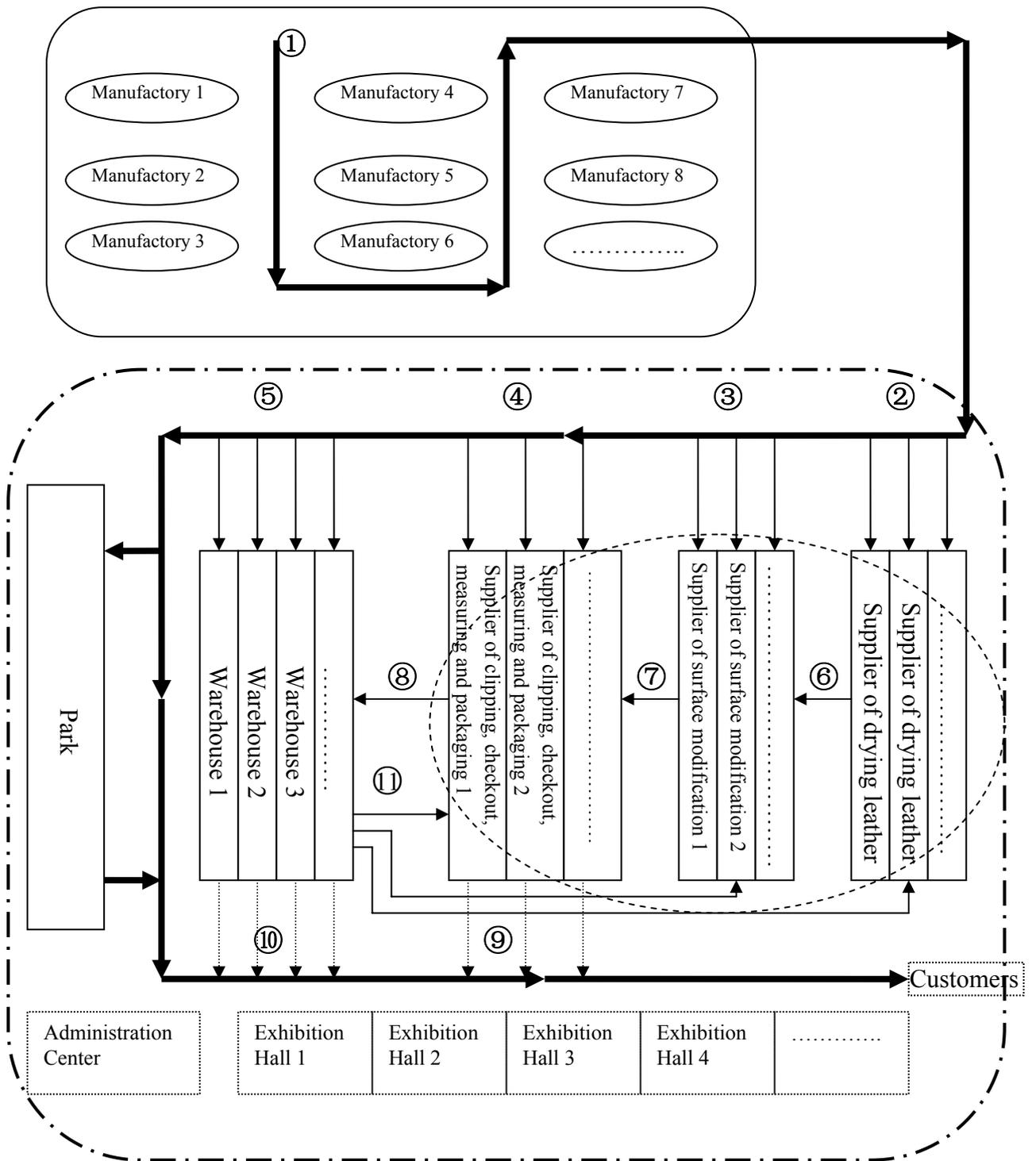
Step ⑥: When products are dried, they will be transferred to area of surface modification.

Step ⑦: When products are modified, they will be transferred to area of clipping, checkout, measuring and packaging.

Step ⑧: When products are finished after clipping, checkout, measuring and packaging, they will be stored at warehouses.

Step ⑨: If products are finished after clipping, checkout, measuring and packaging, and have been ordered, they will be loaded directly and transferred to customers.

Step ⑩: When finished products at warehouses are ordered, they will be loaded and transferred to customers. Because products of major manufactories are stored at same area, it ensures that trucks can be fully loaded.



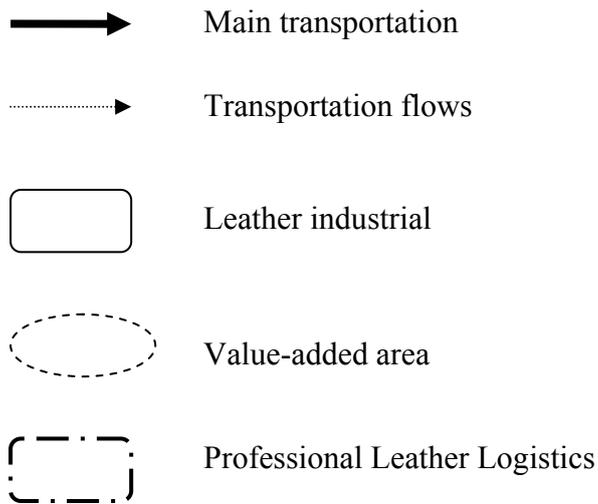


Figure 6.1 the internal layout of Professional Leather Logistics Park  
 Source: Draw on my own

Step ①: When the semi-finished products are ordered, they will be transferred to value-added area. After these semi-finished products are processed, they will be transported to customers.

The previous logistics flows, before the professional leather logistics park is built, are shown in Figure 6.2. They are relatively complicated.

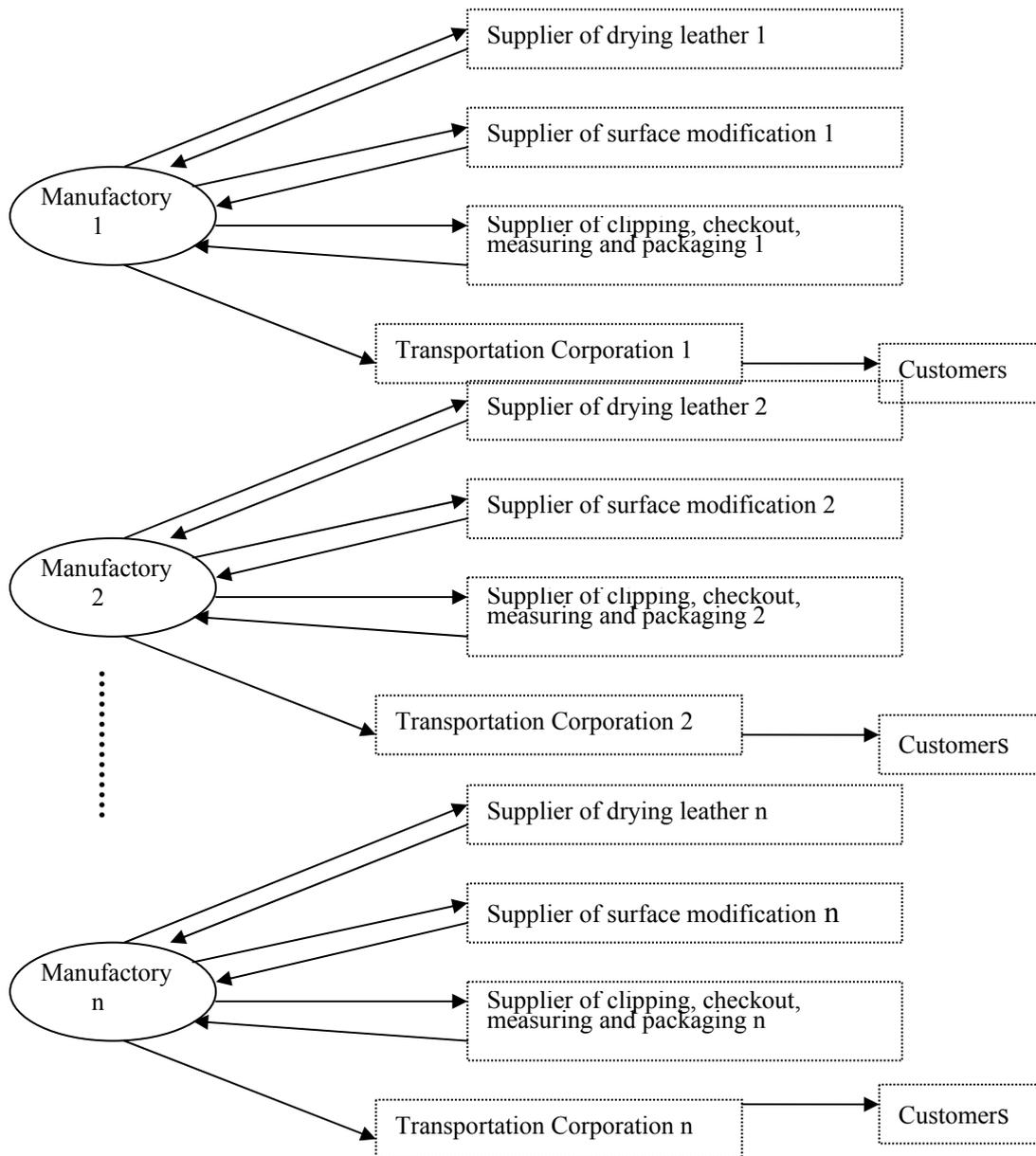


Figure 6.2 Previous modes of logistics flows

Source: Draw on my own

## **Chapter Seven Governmental behavior in solving the problems of implementing the professional- logistics-park' scheme**

There are a lot of problems that should be solved if the professional logistics park wants to be implemented successfully. Especially, the scheme of building the professional logistics park is not a completed market behavior, and the local government plays a very important role in the scheme. The governmental behavior will decide whether the professional logistics park can be implemented successfully or not to a certain extent.

### 7.1 Government should join the development of the logistics parks directly

Generally, a majority of efficient commercial things can be achieved through market mechanism, including development of the logistics park. If developing a logistics park through pure governmental behavior, it is easy to deviate from market law and lead to resource waste. Doctor Wangzuo, a famous logistics expert, vice general manager of investment department of Northern China Industry Company, regards that it is a thinking mode of planned economy to lay out and build logistics parks through government behavior. He thinks that when the market matures to a certain degree, the logistics park will come into being through market invisible hand.<sup>11</sup>

Nevertheless, through a pure market behavior, the development of a logistics park will experience a long-term fluctuation before it become mature. It may loss the best opportunity to develop the logistics park. The supply of logistics service generally delays their demand. Besides, the logistics parks and relevant infrastructure belong to

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<sup>11</sup> [http://www.fass.net.cn/fassNews/fass\\_readnews.asp?NewsID=1014](http://www.fass.net.cn/fassNews/fass_readnews.asp?NewsID=1014)

semi-public products, such as traffic system, public warehouse and public information platform. Therefore, pure market mechanism is hard to optimize these resources. It is necessary for administrators to supervise the development of the logistics parks. Furthermore, the activities of logistics service in the logistics parks not only hold internal economic efficiency (benefiting individuals and corporations), but also external economic efficiency (benefiting public). Under the market behavior, it will optimize internal economic efficiency and ignore external economic efficiency, even sacrifice external economic efficiency. Only government will represent public benefit and enlarge external economic efficiency. Therefore, the government plays a very important role in developing logistics parks.

All in all, it is very important for government to join in the development of the logistics parks. It is not a thinking of planned economy. It accords with current economic theory. The government should not only provide favorite policies for the development of the logistics parks, but also should join in the layout, building, management and supervision of the logistics parks directly. Of source, when the government joins in the development of the logistics park, it is very important to avoid blindness of governmental actions. Due to blindness of governmental actions in the past several years, it leads to more than 60% of logistics parks empty. It is very important to insure that the development of the logistics parks is suitable for the development of local economy through governmental behavior and to avoid that the development of the logistics parks deviate from the demand of local manufactories and logistics corporations due to blind governmental behavior.

7.2 Government should coordinate the development of the logistics parks among intra-city and inter-cities

Each professional logistics park depends on relevant industrial cluster. Some of industrial clusters often connect with each other. For example, the Manned-Leather Industrial Cluster and the Shoes Industrial Cluster have close business connection with each other. The Shoes Industrial Cluster is the biggest customer of the Manned-Leather Industrial Cluster. The demand of logistics service between the two

industrial clusters is very large. The layout of each professional logistics park should consider the layout of the others. Therefore, the government should consider whether the two professional logistics parks could incorporate into one. If not, how to select sites of the two logistics parks to insure the benefit of both sides to maximum. Besides, if the locations of two industrial clusters are very near and the characters of their logistics service are similar, the two industrial clusters can only build one professional logistics park serving for them, which can reduce cost through scale efficiency. Furthermore, in Wenzhou, one of the major factors of hindering the development of local economy is over and vicious competition within Wenzhou's corporations. Therefore, when government want to develop logistics parks, it is important to avoid vicious competition within Wenzhou's logistics parks.

The development of logistics parks is not an isolated action. Government should consider the competition and market from other cities. For example, Wenzhou's textile export to international market via Ningpo port, so the Wenzhou textile corporations may choose logistics service in Pingbo if they provide better service with lower price. Therefore, when government wants to develop a professional textile logistics park, they have to consider the competition from other cities' logistics parks. Besides, it is also important to consider the product source of other cities. If the professional logistics park in Wenzhou can provide good logistics service with reasonable price, many manufactories outside Wenzhou may choose the professional logistics park as their logistics suppliers.

### 7.3 Unifying governmental behavior among various governmental departments and coordinating governmental behavior with higher authorities

Modern logistics industry is a complex industry of cross-fields, cross-knowledge and cross-areas. In Wenzhou, the whole area are generally divided into many parts and managed by county governments respectively. They are hard to form integral and unified management of the whole area. Besides, there is no definite function and responsibility of the governmental departments. Therefore, when some affairs are beneficial, there are many governmental departments trying their best to supervise the

affairs. When some affairs are unprofitable, there is no governmental department willing to supervise the affairs. These lead to conditions of disordered management. The various functions and factors of the logistics parks relate to many administrative departments, including commerce department, transportation department, customs, industry and commerce department, tax affairs and so on. It is obvious that the confused supervision mode is hard to develop the logistics parks effectively and efficiently. Famous logistics expert professor Wang Zhitai thinks that the governmental supervision system has not changed basically. The risk is very high if investing a lot of money in logistics industry under department division.<sup>12</sup>

Furthermore, the development of Wenzhou's logistics only benefits the local economy to a certain degree. But the best decision-making is to benefit both local area's economy and whole country's economy to maximum. Therefore, it is important to coordinate decision-making with higher authorities. Besides, if the local government does not keep good relationship with higher authorities, some good schemes may not be executed due to disagreement of higher authorities. For example, in Zhejiang province, there is a unified developing strategy of logistics industry. But the Wenzhou's developing strategy of logistics industry is different from the Zhejiang. Therefore, it is very important to coordinate the strategy with province government.

#### 7.4 Avoiding monopolization

According to analysis mode of structure-conduct-performance in industrial economics, market efficiency is decided directly by its structure, especially the centralizing degree of sellers.<sup>13</sup> The more corporations in market, the fiercer competition and the better performance of corporations. If the sellers are pretty centralized, it is easy to lead to monopolization. The logistics park is a high-centralized industry, especially the professional logistics park, so it is easier to lead to monopolization. Therefore, it is a very important duty for administrators to avoid monopolization. In chapter five, I have stated that the professional logistics park should be divided into many parts according to functions, and then these parts are divided into many sub-parts again.

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<sup>12</sup> [http://www.investzj.com.cn/sanji.asp?id\\_forum=008019](http://www.investzj.com.cn/sanji.asp?id_forum=008019)

<sup>13</sup> [http://www.investzj.com.cn/sanji.asp?id\\_forum=008019](http://www.investzj.com.cn/sanji.asp?id_forum=008019)

Then, the manufactories and logistics corporations operate these sub-parts respectively, which form the intra-competition effectively.

## **Chapter Eight Conclusion**

As a whole, the dissertation can be divided into five parts. The first part is to analyze the necessity of building logistics parks in Wenzhou. The four reasons are as follows. 1. Rapid development of third part logistics needs modern logistics park. 2. Wenzhou holds modern traffic system, but the logistics service is pretty laggard. So it has limited the efficiency of traffic system. 3. Wenzhou is an international light industrial city. The tonnage of these international light industrial products per CNY is very big, so they are more dependent on logistics service. The characteristics of Wenzhou's enterprise is that both raw materials needed and selling market is outside Wenzhou and Wenzhou's economy is more and more dependent on international trade, so the logistics service is very complex and the demand of logistics service is high. It is very important to build logistics parks to provide these logistics service. Besides, the professional logistics parks can integrate Wenzhou's laggard logistics industry. 4. The logistics park is an effective way of industrial upgrade. Due to the decrease of return of investment in Wenzhou industries, the manufacturers have to search the source of the third profit. The logistics-park service just provides the opportunity for manufacturers to upgrade industries and to create new profit. The manufacturers can out source more and more logistics' value added service to the logistics parks and save the limited money to develop their core industries.

The second part is to analyze feasibility of building professional logistics parks in Wenzhou. 1. The professional logistics park is the end result of industrial cluster's development. The professional logistics park insures intra-integration of industrial cluster. Only an efficient integration of industrial cluster can achieve cluster-advantage to maximum. 2. A professional logistics park accords with humanity relationship in an industrial cluster. The professional logistics park is generally near to industrial cluster and they are easy to build potential credit with manufacturers. Nevertheless, the general logistics parks are often far away from industrial clusters. 3. Wenzhou's industrial clusters are located in various counties. So

the professional logistics parks are also located in various counties, which is very important to benefit balanced development of Wenzhou's economy. 4. I use the Analytic Hierarchy Process (AHP) to analyze the feasibility of building professional logistics parks in Wenzhou. I take the Wenzhou Leather City as an example. They are three types of decision-making schemes, namely, keeping current situation, choosing the Panqiao logistics park and choosing the professional leather logistics park. Through the Quantitative analysis, the professional leather logistics park is the best decision-making scheme (weight = 0.459), the Panqiao logistics park is the secondly best decision-making scheme (weight= 0.306) and the unchanged strategy is relative bad decision-making scheme.

The third part is to analyze the Wenzhou logistics park's commercial mode. The policies of regulating minimum and maximum rate of rent and compulsive lease are effective to attract investment and insure benefit of manufactories and logistics corporations.

The fourth part is to lay out the professional logistics parks. The fifth part is to analyze the problems of building the professional logistics parks and what the local government should do to solve these problems.

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