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NEW DEVELOPMENT PATTERN AND COORDINATION WITH ENVIRONMENT FOR GREAT SHANGHAI

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BASTRACT: The urban construction of Shanghai will come into a new area since China has deciared to exploit and open Pudong. Based on the analysis on economic development of China and the world, the developmental strategy for Shanghai should take the following contents into consideration: 1) Shanghai should be built into one of the most important intemational and modern supercity in Asian-Pacifie Region. 2) Shanghai should keep the position of the largest economic center of China and important port city for international trade. 3) Shanghai should be taken as growth pole of the Changjiang River Delta. According to the consideratlons mentioned above, the spatial distribution patten and the management of environment are discassed.

KEY WORDS: developmental strategy, development pattern, environment management, Shanghai

The development of modern cities especially supercities is the focus of the world, scientists also pay attention to those regional and intergrated environmental problems which happen in the process of urban development.

The 1990s is a very important period for the economic development of China. Shanghai is the largest economic centre of China and a significant international city in the Western Pacific Region. Urban construction for modernization of Shanghai will come into a new area since China has declared to exploit Pudong and to open Pudong. The strategies for development, the spatial distribution pattern and the management of environment are the three major contents to be discussed in this article.

I. THE STRATEGIC THINKING ON THE DEVELOPMENT OF GREAT SHANGHAI

Based on the analysis of economic development of China and the world, the development strategy for Shanghai should take the following contents into consideration.

1. Shanghai Should Be Built into One of the Most Important International and Modern Supercity in Asian-Pacific Region

Shanghai is located at the international ocean course of the Weatern Pacific Region, the range from Shanghai to Tokyo, to Seoul, to Hong Kong and to Manila are almost the same, so Shanghai is the transportation hub of the region. Shanghai is also located at the joint area of the developed regions of China and the mouth of the Changjiang (Yangtze) River. It has accessible ocean and land transportation, advantageous geographical location and broader eoconomic development in Asian-Pacific Region, draw on the experience of modern construction of supercities such as Tokyo, Hong Kong and Seoul. The planning for the further development of Shanghai must be high standard and multiple levels, and apply new distribution pattern. The comprehensive strategy could be defined as "developing Pudong, fishing Shanghai, serving the whole nation, and openning to the outside world". According to the planning policy and construction of Pudong, many domestic and foreign scholars think that the extensive exploitation of Pudong is to build Pudong into a new Shanghai just as Tokyo extensively exploiting Tama area. It can be forecasted that Shanghai will become a supercity with a population of 10 million, only second to Tokyo in the Western Pacific Region in the next century.

Shanghai has many favourable conditions to become an international supercity. To serve the fast growth of economy and further openness to the world, China will need an international supercity supercity to act as a tie between China and the world, Shanghai is the only city which has proper economic capacity, international position and industrial base in the mainland[1]. Shanghai has decided to built a free-trace area in Waigaoqiao, in which foreign currencies are permitted to be kept totally by the enterprises, foreign currencies are also permitted to flow freely in the region. It is a totally internationalized area. Pudong is an open urban area, joint ventures take large proportion, its international finance and trade enhance the strength of Shanghai in the world. Foreign enterprises can open department store and supermarket and other tertiary industries. The economy of old urban districts has changed into export-oriented types. Its export proportion of products is in the lead among supercities in China. Therefore, the free trade area, the open Pudong and the export-oriented old urban districts will make Shanghai into an international city.

2. Shanghai Should Keep the Position of the Largest Economic Center of China and Important Port City for International Trade

The main area of Shanghai has 10 districts (excluding Baoshan and Minhang districts), its area is 280.5 km^2, its population is 7. 04 million. In the main area, the inner city has an area of 149 km^2 and a population of 6.39 million. Industrial output in the main area is 62 billion yuan. Freight volume of Shanghai port is 148 million tons, which ranks the sixth in the world[2].

Shanghai has been the largest economic center and seaport for half a century. Its productivity and industrial output rank the first in China. In 1990, GNP per capita of the nation is 1,800 yuan, but it is 4,900 yuan in Shanghai. National average productivity is 2,850 yuan, but in Shanghai, it is 6650 yuan. Tax income by each worker is 4,800 yuan in the country, but it is 9,500 yuan in Shanghai. Although the proportion of major economic index of Shanghai to the country decreased in recent years (Table 1), its absolute output has increased, Shanghai is still very important in China. Shanghai lies at the east of the developed the Changjiang River Delta, it is also the largest trading port of the Changjiang River basin. Shanghai has an economic hinterland of about 1.8 million km^2, no other supercities in the Western Pacific Region has such a large hinter. The population of the Changjiang River basin is 420 million. This basin posseses rich resources, dense cities and towns. Industry in the basin distributes along cetain axis, there are more than 30 large and medium port cities, they can distribute goods of Shanghai port by transportation coorperation. A port city group, taking Shanghai as the center, will form in the Changjiang River Delta.

Table 1 Proportion of major economic indexes of Shanghai to the nation

Index	1978	1985	1988	1991
GNP	7.8	5.6	4.5	4.6
National income	8.1	5.8	4.6	4.4
Agriculture -industry output	9.4	6.7	6.2	5.8
Industry output	12.6	9.9	7.5	7.2
Export volume	29.7	12.3	8.3	8.1
Local financial income	14.9	9.7	5.9	5.8
Retail turnover	13.9	4.3	4.2	4.3
Freight volume	40.1	36.2	30.3	31.4

3. Take Shanghai as Growth Pole, Promote Economic Development of the Changjiang River Basin

Shanghai has been the growth pole of Yangtze River Delta since 1930s. Shanghai was

the largest center of finance, trade in the Far East, at that time and promoted integrated development of the Changjiang River Delta. The openness and exploitation of Pudong, combined with economic capacity of old urban districts, make Shanghai the growth pole for the Changjiang River basin in 1990s.

The spread channels of Shanghai to the Changjiang River basin are the Changjiang River and railroads. In addition, new railroads and higways along the Changjiang River are planned to build. Nantong, Zhangjianang, Jiangyin, Zhenjiang, Yangzhou, NanJing, Ma'anshan, Wuhu, Tongling, Anqing, Jiujiang and Wuhan, cooperating with Shanghai, form a port-city system in the middle and lower reaches of the Changjiang River, Shanghai spreads economic development to riparian region of the Changjiang River (Fig.1). Along Beijing-Shanghai railroad, Shanghai-Hangzhou railroad, Zhejiang-Jiangxi railroad, Anhui-Jiangxi railroad, 20 cities, including Shanghai, Hefei, Nanchang and Xuzhou, form an urban system, spread economic development to other regions outside the Changjiang River Delta. Shanghai can also act as the growth pole through coastal channel. In the coastal regions fom Lianyungang to Ningbo, the economic development is also affected by Shanghai. Cities in the coastal axis can be built into the eastern bridgehead group of Europe-Asia Bridge, they can also form a deep-water seaport group. Up to now, the coastal channel did not give full play to function, so did the interregional cooperation in the coastal region and the advantageous condition of seaport group. Industrial structure in many cities are similiar. According to the open policy and the trend of internationalization of Shanghai, the function of coastal channel is very important. In recent years, Guangdong, Fujian, Shandong and Liaoning become more and more important in export and attraction of foreign capitals. Shanghai can enhance its ability to attract foreign investment only by cooperation with those coastal cities.

The choice of industry and patterns of regional distrbution of industry should also help Shanghai act as the growth pole[3]. Shanghai can be built into a center of finance, trade, information, real estate, and other tertiary industries in the Western Pacific Region, the level of industry should be similiar to that of Tokyo, Hong Kong and Seoul. In the adjustment of manufacturing industries, many traditional industres should be moved out because of their low economic efficiency and serious pollution. It is the new and high technology industries with high rise in value that should be developed. The leading industry of Shanghai, except aviation industry, spaceflight industry and military industry should be as developed and flourishing as that of developed conutries.Then, Shanghai will maintain strong competition ability in the international market.

II. NEW URBAN PATTERN FOR THE DEVELOPMENT OF SHANGHAI

1. Emphasize Modern Function of CBD in Urban Center, Maintain the Strong Position as Central city in China.

All international supercities pay special attention to the construction of urban center, such as Shinjukn, Jinza in Tokyo, Downtown Area in Hong Kong, finance commerce districts in southern Manhattan of New York. These urban centers are all international,

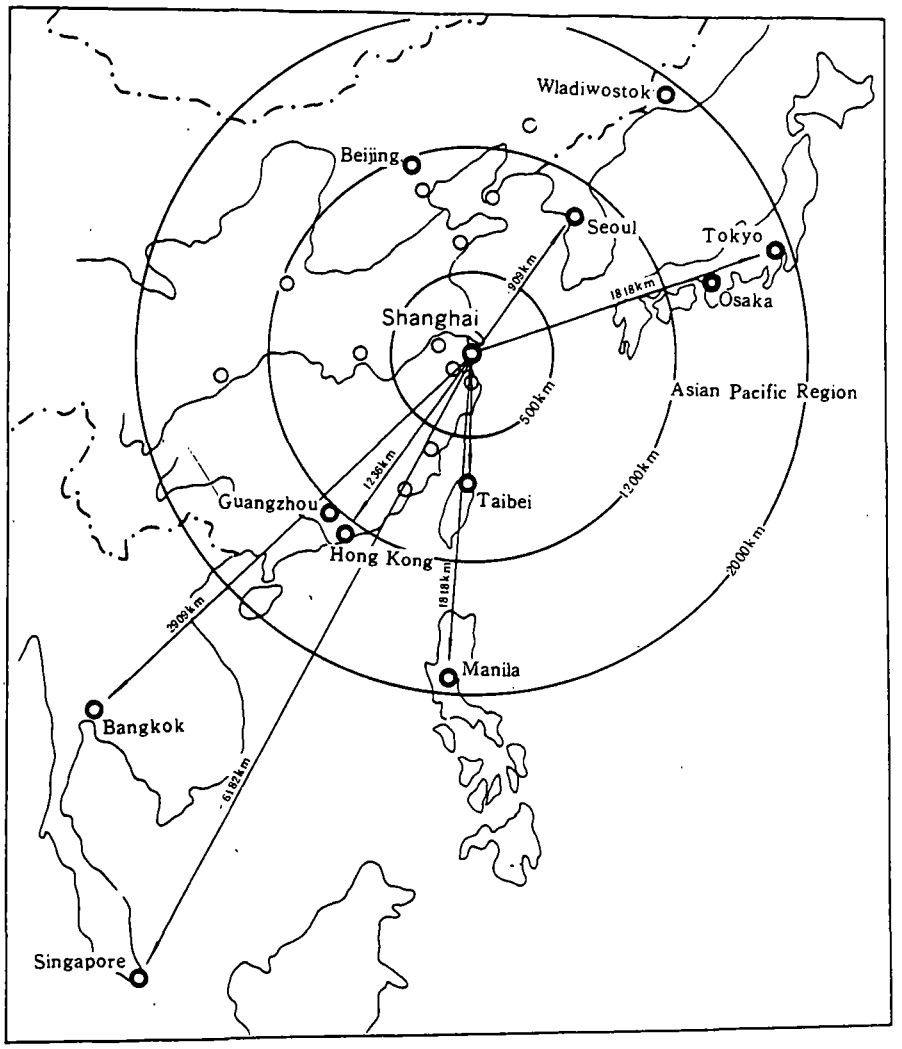

Fig.1 The location of Shanghai

they can have effect on economic development of other countries.

In this international and informational society, multiple relations among supercities are developed extensively, international economic centers, gradually become regional even international networks, modern functions of urban centers area intensified by extensive exploitation and space expansion.

In the reconstruction of old urban districts and exploitation of Pudong, the constuction of central commerce and finance districts should be emphasized. Nanjing Street, Huaihai Street, Waitan of Shanghai and Lujiazhui of Pudong can be built into mod-

ern and high-standard CBD, priority should be given to the development of information, exhibition, coference, administration and management, tourist, commerce and entertainment in CBD[4]. Comprehensive high-standard planning should be made for space, function, construuction quality, environmental capacity and urban transportation system in CBD. These ways can help Shanghai to maintain the strong position as the central city in China. The exploitation of Pudong should make use of the advantageous locatin in the Western Pacific Region, adjust urban function of Shanghai, reinforce its function of polarization and openness and regional cooperation, give full play to comprehensive funct ion of Shanghai as an international city (Fig.2).

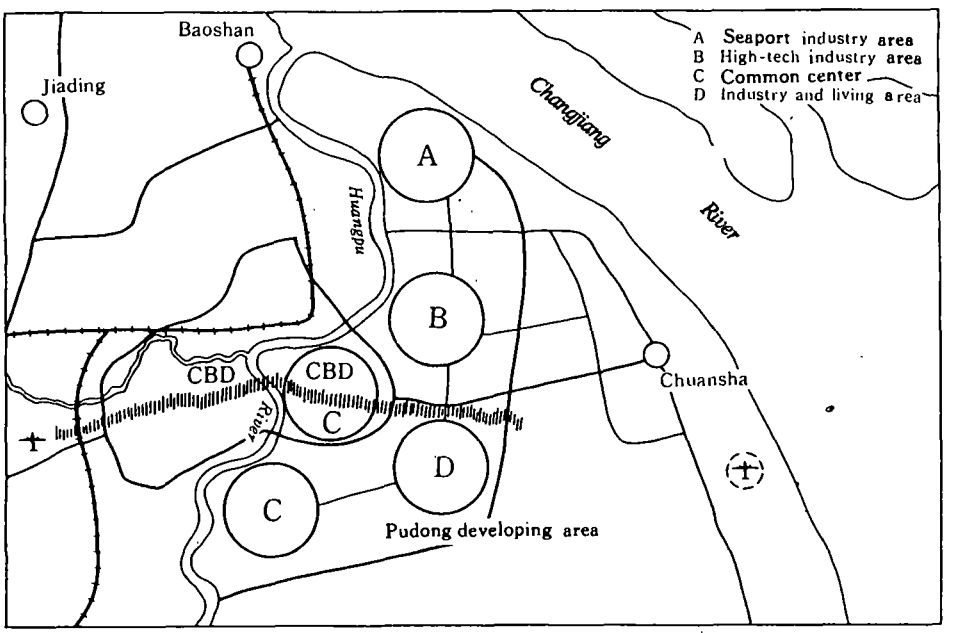

Fig.2 The urban function of Shanghai and a new transportation system

2. Organize New and Modern Transportation System

Modern transportation system is an important means to promote urban economic development and to improve living quality. Nowadays, traffic congestion is serious in old urban districts. In inner city, road area per capita is limited, but vehicle amount is large. Shanghai has 190,000 motorized vehicles and 5 million non-motorized vehicles (mainly bicycles), vehicles from other provinces are as more as 20,000 each month. But road area per capita is only 1.60 m^2, it rank the last among supercities in China. This index is also lower than that of Tokyo(10 m^2), that of New York (28 m^2) and that of London (26 m^2). Shanghai has an urban population of 7.5 million, its circulating population is about 500,000, all these cause heavy traffic and low speed of transportation.

To promote the modernization of Shanghai, it is necessary to reorganize a new transportation system. Investigation shows that daily travelling frequency is 1.79, it will reach 2.24 in 2000 and 2.38 in 2020. In Pudong, it will be 2.36 in 2000 and 2.80 in 2020. If we calculate with the standard of 2020, and plus 500,000 circulating population, the daily population will be as more as 8.12 million. Current transportation system can not bear this traffic volume at all, so transportation system of Shanghai should be adjusted, inner beltway and ouuter beltway and outer beltway must be constructed first. Main urban roads and beltways should use grade separation, bicycles must be restricted to enter regions with heavy traffic. In addition, Shanghai could construct multiple transportation system in oredr to disperse population. Now, Shanghai is building No.1 subway. This subway is as long as 14.60 km, it goes from New Shanghai Station to New Longtan Station. This line has 12 stations, its total investment is 2.54 billion yuan. it will be completed by 1994. 7 more subways will also be build in the next 20 years. These 176 km long subways can shift 3.5 million passengers from ground to underground. Now, commuter population faces the heaviest traffic so it is very important for economic development and living to increase commuter speed. To develop transportation and to optimize urban area structure, road area per capita should be increased[5].

The transportation conditions in and out Shanghai should be improved because circulating population and transit vehicles are large. It is also the n ed to improve investment environmemt. Shanghai must also develop air transportation. In addition to reconstructing Hongqiao Airport a new international airport must also be constructed in the southern part of Pudong. Passenger traffic of those airports is 3 million now, it will come to 7.20 million in 1995 and 12 million in 2000.

Transportation condition from old urban districts to Pudong is satisfied, but there are no high-speed transportation lines from central city to satellite cities. It is one of the reasons why satellite cities have only low attraction. New high-standard transportation lines should be built between central city and satellite cities in the future.

3. Coordinate the Development of Old Urban Districts, Pudong and Satellite Cities, Optimize Urban Area Structure of Shanghai

The urban area structure of Shanghai is irrational, land use distribution violates the distribution pattern of land price, industeial enterprises surround the inner city, land use structure is not reasonable, urban land use specialization degree is generally low. It is important for Shanghai to optimize urban area structure.

The contents to optimize urban area structure in old urban districts, in Pudong and in satellite cities are different. In old urban districts, the main work is to move out the traditional and backward industries and to disperse part of over-densed population in order to improve living quality and environmental quality of inner city. The main city of Shanghai

has a population of 7.04 million in the area of 280.45 km^2, but 6.39 million people gather in the inner city which has an area of 149 km^2. This unequal distribution of population shows the great potential for population disperse. What causes this unequilibrium is that industrial enterprises concentrate in inner city and attract employers, in addition, commercial network and center are limited outside the inner city. For example, Yangpu district accounts for 19.8% of the total urban area and 13.4% of the total urban population, but it has only very limited municipal-level commercial center and volume of business, these are only low-level commercial service. But in Nanjing Street, the 1.48 km street provide 1/ 9 of volume of business in Shanghai, daily circulating population in this street is up to 1.1 million[6]. Therefore, Shanghai must fairly distribute municiple-level commercial centers in order to increase attraction of regions outside the inner city. Meanwhile, industrial enterprises now distribute in CBD must be moved out by administrative methods or by high land use charge. These means will shift out employment opportunities and then disperse population.

Regional specialization degree is high in Pudong, construction and planning conditions are good, its urban area structure can be optimized. But Pudong must pay attention to the coordination with old urban districts. On the one hand, the exploitation of Pudong must depend on economic bases and technological strength of old urban districts, on the other hand, Pudong should provide a spatial environment for the reconstruction, population disperse and moving out of industrial enterprises in old urban districts. According to its planned scale, Pudong can hold 500,000-800,000 more people from inner city. This may be the best way to disperse population of inner city because this will not cause population return as occurred after 1976. This migration also provide a driving force for the development of Pudong because of the migration of technical forces (Fig.3).

Shanghai has constructed satellite cities, such as Jinshanwei petrol-chemical industry city, Minhang new and high technology development zone, Baoshan iron-steel industry city, Jiadin automobile industry city etc. These satellite cities have had solid economic bases, but they ignored the construction of living facilities, so they only attract limited population. Up to now, they have only a population of 300,000, which account for 9.5% Of the total population of the main city. In further development, these satellite cities must construct their own living facilities, provide favourable exploitation policies and emphasize environmental protection, increase their attraction on population. The average rational population scale of each satellite city will be about 250,000, its average area will be about 30 km^2, its living facilities are relatively complete and reach the standard of modern city.[7]

Based on the above urban structure, the great Shanghai will be formed in the fuuture, it consists of old urban districts, Pudong and all the satellite cities. Its population will reach 10 million, its urban area will be 500-550 km^2. Among them, the old urban districts have a population of 6 million by dispersing part of its current population, population in Pudong will be 2 million, population in all the satellite cities, industrial districts and countytowns will be 2 million in total. This will help Shanghai to form an optimal urban area structure.

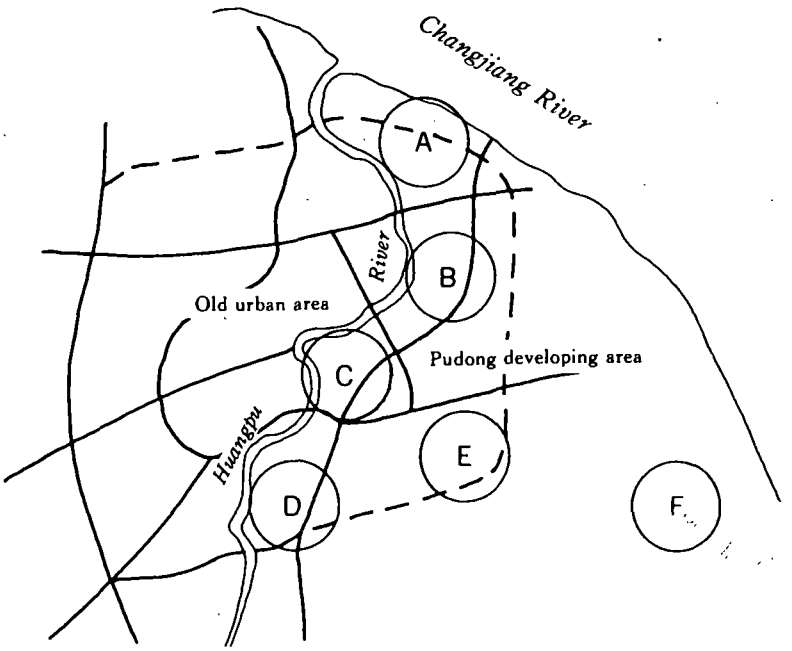

Fig.3 The urban renewal of Shanghai

A. Waigaoqiao port area; B. Jingqiao industrial area; C. Urban centre; D. Comprehensive industrial and trade area; E. Exported processing area; F. New airport

III. THE REGION ENVIRONMENT COULD BE GRADUALLY IMPROVED IN THE PROCESS OF ECONOMIC DEVELOPMENT IN SHANGHAI

Due to historical reasons, the urban environmental construction has been long neglected in the process of Shanghai urban development, which caused backward urban infrastructure and serious pollution, and retarded the sustainable urban growth. In the 1990s Shanghai rejuvenation and Pudong cxploration are the strategic parts of Chinese economic development. On the one hand, the rapid economic developmnent and population growth will put bigger pressure on the backward urban imfrastructure and polluted environment, on the other hand, it brings an excellent opportunity for readjusting the territorial structure of Shanghai City and improving the environment.

1. The Present Situation and Problems of Shanghai Urban Environment

1.1 Excessively high density of population in old urban area with narrow space

The central city with 10 districts in Shanghai covers an area of 280 km^2, but has a population of 7.04 million, with the population density of 25,104 persons/ km^2, while the pop-

ulation densiy in the old urban area reaches 42900 persons per km^2. This made Shanghai a hihgly concentrated city not only natinally but also internationally. (The population density in Paris is 20,848 persons per km^2, only 9,109 persons per km^2 in New York).

In addition to the regional urban population, Shanghai has a biggest floating population reaching 2 milions in 1990. The ever increasing population density made the urban environmental quality at risk.

1.2 The backward and inadequate urban infrastructure

Due to social and historial reasons, the urban infrastructure has been seriously inadequate.The urban space per capita in central city is only about $24m^2$, road area per capita $1.6m^2$, garden area per capita $0.9m^2$, and the living area per capita is also below the national average.(See Table 2)

Table 2. The urban infrastructure level in Shanghai and other super cities

	Shanghai	Bijing	Tianjing	Tokyo	NewYork	Paris
Road area per capita m^2/ p	1.6	3.4	1.7	10	28	11
Garden area per capita m^2/ p	0.6	2.1	0.7	2.6	21	14
Population density p/ km^2	25104	6667		13672	9190	19450

1.3 Environmental pollution in old urban area with inadequate purification capacities

The industrial waste water discharge amount was 3.62 million tons per day in Shanghai in 1989, the waste gas 99 million per day, which severely aggravate environmental quality in Shanghai. During the 1960s and 1970s, the stinking days of the Huangpu River were about 60 days, which reached nearly 200 days in 1980s. The environmental protection measures were far behind the increasing pollution. The purification capacity of urban waste water was only 0.21 million tons in 1986, about 5% of total amount of waste water.

1.4 Unreasonable territorial structure

There distributed 8 industrial districts, 70 industrial streets and over thousands factories in the central city of Shanghai at present. The industrial land use is mixed with residential area, and several thousands of factories are located mostly in old urban area, causing severe environmental problens, and are resistant to reorganization.

2. To Improve the Urban Environment of Shanghai

Exploring Pudong provides a good opportunity for readjusting the land use strcture and improving the urban environment in old urban area. Besides, a series of macropolicies

since the reform are decisive for foundemental changes in dominant industrial strategy causing serious urban environment problems, The key measures to improve the urban environment in Shanghai in 1990s could be as follows:

2.1 To form gradually new CBD with developed financial and service indust ries

The municipal government is planning to set up a new financial and trade center in Lujiazui of Pudong. Connecting with the old urban center, this new center is to be the modern CBD of Shanghai in the 21th century. Lujiazui center signifies the exploration of Pudong and readjustment of industrial structure. The service industry will be more important in carrying other industries to develop. And the exploitation of Lujiazui center will improve foundementally the 3 basic problems of Shanghai transportation, i.e.the traffic congestion in highway system, the situation of north-south transportation and trans-river transportation.

The planning CBD covers an area of 2.6-2.8 km^2, in which the service industry accounts for 40%. The new CBD can not only metigate the population pressure in old center, and change drastically the industrial structure, but also improve the road system to integrate the old and new centre into a organic entity. Thus it is the key part of Shanghai rejuvenation.

2.2 To disperse gradually the industries and population in town center

During the process of new CBD construction, it is planned to disperse more than 100 polluted factories inside the cycle of Zhongshan Road as well as the most factories and a part of houses in the inner cycle area. The exploration of Pu
persing factories and be equipped with purification devices. Jiangwan Pantegon, Minghang and Wujing can also be the districts for dispersing factories and population. But it should be careful not to cause the diffusion of population in the process of dispersing.

2.3 To set up the mechanism of urban land use self-adjustment and promote the optimization of industrial structure

By the way of introducing the mechanism of paid use of urban land and make the differential land rent as part of the production cost of enterprises, the factories with large land use and low profit will be forced to move to the suburban area. It is also important for enterprises to shake off their administrative relations to become a free-market enterprises with profit motive. To be consistant with the role of Shanghai as a financial and trade center, the technology-intensive enterprises should be promoted by technology transfer and technological innovation. Thus the industrial structure could be optimized in the transition from "speedy type" to "efficiency type" enterprises. And the resource and energy consuming coefficient can be decreased. Together with the legislation of environment, the industrial pollution can be reduced drastically.

2.4 To set up the purification facilities and urban green belt

Considering the limits of fiscal income, the present target is to discharge waste water into the Changjiang River and the future one is to set up waste water purification facilities.

12 second-class purification facilities have been set up with a capacity of 0.4 million tons, about 10% of the total. The main task at present is to set up 4 collecting and discharging systems of waste water,i.e.the west district discharging system, the combined discharging system, south discharging system and Zhonggang discharging system, to channel the polluted water to the Changjiang River and the East China Sea. The daily discharge amount can reach 3.85 million ton, which could basically resolve the pollution problem. In the future, purification facilities can be set up on the discharge mouth. In addition to the purification facilities, the ecological balance belt can also be set up around the city, just like the green belt of great London, to improve and adjust the urban environment of Shanghai.

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