CHINESE GEOGRAPHICAL SCIENCE
Volume 2, Number 2, pp.97–113, 1992
Science Press, Beijing, China

THE INDUSTRIAL STRUCTURE AND DISTRIBUTION OF THE BOHAI–YELLOW SEA RIMLAND OF CHINA IN THE 1990S

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ABSTRACT: The Bohai–Yellow Sea Rimland (BYSR) is situated along the coast of theBohai Sea and the Yellow Sea in the northeast of China, covering Liaoning, Hebei, and Shandong provinces, and Tianjin and Beijing municipalities. It has a land area of 491,000 square kilometers, 5.1 percent of the country's total, and a population of 196 million, 17.9 percent of the total. The region is not only the political and cultural center, but also the most important economic center in North China. This paper analyses current status and major problems of industrial structure and distribution of BYSR. According to the national plan, the main goal in the coming decade is: by constantly improving economic structure, economic quality and efficiency, to double the gross national product(GNP), and to raise living standards to a satisfactory level. To realize this goal, agriculture, energy, transportation, some important raw material of industries, and infrastructure should be strengthened, and the engineering industry be improved to change the imbalance of basic industry and manufacturing industry. There should be a rational regional division of labor by way of adjusting industrial allocation and making full use of each area's advantages. By the year 2000, BYSR should become a well–developed base of agriculture, industry, and high technology, with heavy and chemical industries as the major sector, coordinatively developing light industry.

KEY WORDS: industrial structure; industrial distribution; the Bohai–Yellow Sea Rimland(BYSR)

I. AN ANALYSIS OF CURRENT STATUS OF INDUSTRIAL STRUCTURE AND DISTRIBUTION OF THE BOHAI–YELLOW SEA RIMLAND OF CHINA

The Bohai–Yellow Sea Rimland (BYSR) is situated along the coast of Bohai Sea and Yellow Sea in the northeast of China, covering Liaoning, Hebei, and Shandong provinces, and Tianjin and Beijing municipalities. It has a land area of 491,000 square kilometers, 5.1 percent of the country's total, and a population of 196 million, 17.9 percent of the total. The region is not only the political and cultural center, but also the most important economic center in Northern China.

1. Resource Foundation for Industry

With its favorable physical, social, and historical conditions, BYSR has become one of the most economically advanced regions in China. First, it is located in an important geographical position as the crossroads of Northeast, North, and East China, the most important part of the whole country, with 19 main railway lines and over 20 main highways. It possesses 28 percent of China's total oil and gas pipelines, seven main coastal ports, half of the berths for ships over 10,000 tons, and 12 large–and medium–sized airports. All these constitute a transportation network with a wide direct linkage to the vast hinterland. Second, it has advantageous physical conditions. With hills behind and the sea in front, BYSR has a full range of geomorphological categories, with 42 percent of plain areas, and a coastline of 5,800 km, 31.6 percent of the country's total. The rather high salinity in the surface sea water of the offshore area offers desirable conditions for developing marine aquaculture. The climatic conditions are suitable for diverse crops like wheat, cotton, corn, and peanuts, and fresh and dry fruits. However, the shortage of water resources is a major disadvantage in BYSR. Although a lot of rivers join into the sea here, the total surface water runoff is limited, with per capita water runoff below 1/ 5 of the country's average. The groundwater supply accounts for only 6.8 percent of the country's total.

BYSR is very rich in mineral resources, particularly in key minerals. The reserves of iron ore, oil, and natural gas are 44.37, and 24 percent of China'total, respectively; valuable minerals like gold and diamonds, and nonmetal minerals like magnetite, natural sulfur, talc, limestone, refractory clay, etc. are also of importance in the country. It has a rather centralized distribution of large exploitation industries such as the Anshan–Benxi Iron Ore Mine, the East Hebei Iron Ore Mine, the Shengli Oil Field, the Liaohe Oil Field, and the coal mines of Kailuan, Fengfeng, Yanzhou–Jining, Zaozhuang–Tengnan, etc.

BYSR is fairly rich in intelligence resources. There are 252 colleges and universities and 2,314,000 scientific and technological workers, accounting for 23.44 and 23.9 percent, respectively, of the country's total. This facilitates the development of a knowledge–intensive industry and the realization of an advanced industrial structure.

Since the founding of the People's Republic of China, BYSR has been one of the major industrial regions, and an important area of agricultural production in the country. In 1988, the region's original value of fixed industrial assets and GNP were 279.3 and 317.9 billion yuan, respectively; about 26.3 and 22.7 percent of the country's total. Its per capita GNP was 26.9 percent higher than the country's average level. Obviously, BYSR holds a decisive position in China's economy with great potential for future development (Table 1).

2. Industrial Structure and Distribution in BYSR

2.1 Basic Features of Current Industrial Structure

1) BYSR has a comparatively advanced secondary industry and a recently developing tertiary industry. As an important industrial base with a high level of industrialization in China, BYSR contributed 25.2 percent of the country's gross industrial output in 1988, 26.5 percent of the total original value of fixed assets, and 24 percent of the country's industrial work force. The per capita industrial output, per capita value of fixed net assets, and the number of industrial workers per thousand population were 44, 47, and 34 percent above the country's average, respectively. The tertiary industry has had rapid growth in the last decade, with 7.4 percent increase in output value and a larger proportion of the work force (Table 2).

2) It has a comprehensive development of agriculture and light and heavy industries, with heavy industry as the pillar. The proportion of agriculture/ light industry/ heavy industry changed from 18.5:31.2:50.3 in 1979 to 18.65:36.83:44.52 in 1988.

3) Large- and medium-sized industrial enterprises play a significant role in the economy. In 1988, there were 2,849 large- and medium-sized industrial enterprises, accounting for 26.7 percent of the country's total, and their original value of fixed assets were 28.2 percent of the total.

4) An open economic pattern is forming. The coastal opening zone of BYSR consists of five coastal cities: Tianjin, Dalian, Qingdao, Qinhuangdao, and Yantai, 16 municipalities under the authority of the local prefecture, and 54 counties. Among them Tianjin and Dalian have progressed most, with more foreign investment and higher technical levels.

2.2 Current Industrial Distribution

Influenced and limited by the physical and social conditions, the region is characterized by the following features in spatial pattern.

1) There are integrated agricultural production bases of grain and cotton on the North China Plain. The major products include wheat, corn, cotton, peanuts (27, 34, 42, and 45 percent of the nation's total, respectively), apples, pears, grapes, seafood, etc.

2) The largest metallurgical industry in China has been set up in BYSR on the basis of its rich iron-ore resources. The region processes 20 percent of the nation's nonferrous metals. Because of energy shortage and resource exhaustion, proper adjustment of this industry

needs to be considered.

Table 1 Indicators of BYSR's economy by province (1988)

Item	GNP (bil. yuan)	National income (bil. yuan)	Per capita GNP (yuan)	Per capita national income (yuan)	Gross value of Indu. & Agri. output (bil. yuan)
BYSR					
Amount	317.9	270	1,622	1,377	577
% a	22.7	22.9		24.0	
Liaoning					
Amount	81.4	69.4	2,131	1,810	153.2
% a	5.8	5.9		5.4	
% b	25.6	25.7		26.4	
Rank c	5	5	4	4	4
Hebei					
Amount	66	56.7	1,139	979	91.1
% a	4.7	4.8	3.9		
% b	20.8	21.0	16.3		
Rank c	8	8	15	15	10
Shandong					
Amount	103.5	91.5	1,284	1,135	195
% a	7.4	7.8	8.1		
% b	20.8	21.0	16.3		
Rank c	3	2	10	10	2
Beijing					
Amount	41	30.2	3,795	2,791	62.1
% a	2.9	2.6	2.6		
% b	12.9	11.2	10.8		
Rank c	14	15	2	2	15
Tianjin					
Amount	25.9	22.1	3,075	2,623	72
% a	1.9	1.9	3.0		
% b	8.2	8.2	12.6		
Rank c	22	22	3	3	14

a: The percentage to the country's total.

b: The percentage to BYSR's total.

c: The rank order in the country.

3) The region has established many energy bases. The Shengli and Liaohe oil fields, as

the second and third largest oil producers in China, have been exploited rather completely. The output of crude oil in 1988 was 56.9 MTs, 41.5 percent of the country's total. There has been intensive coal exploitation in central Liaoning, southeast Hebei, and southwest Shandong, with an output in 1988 of 175 MTs, 17.9 percent of the total in the country, though these coal reserves are only 4.9 of China's total.

Table 2 Composition of GDP in BYSR

	GDP (mil. yuan)		Primary industry %		Secondary industry %		Tertiary industry %	
	1978	1988	1978	1988	1978	1988	1978	1988
Country	368764	968525	28.40	27.30	48.60	47.00	23.00	25.70
BYSR	88657	228244	20.80	21.93	60.74	52.25	18.64	25.82
Beijing	11776	29810	6.16	9.02	80.18	53.96	23.71	37.02
Tianjin	8567	19223	6.09	10.09	69.61	61.46	24.31	28.44
Hebei	19837	46383	28.52	24.59	50.46	48.99	21.03	26.48
Liaoning	23806	58516	14.52	17.41	72.54	58.05	12.95	24.54
Shandong	24671	47322	32.44	32.06	50.03	46.65	17.20	21.92

Note: GDP is based on 1980 prices.

4) Large-scale bases of engineering and electronic industry have been developed. The major products include machine tools, heavy machinery, and equipment for metallurgy, mining, the chemical industry, and power generation, with Shenyang, Beijing, Tianjin, Dalian, and Jinan as main producers. Transportation machinery in Dalian, Beijing, Jinan, Tianjin, and Tangshan, and electronic industry in Beijing and Tianjin are also important in the region.

5) It has large-scale chemical industry bases, using local resources in petroleum, natural gas, and sea slat. Tianjin, Dalian, Beijing, Liaoning, Zibo, and Jinzhou account for high percentages of the country's total production.

6) Textile and food industry bases have been [illegible] with the rich agricultural resources and technical strength. The total textile output in 1988 was 44 billion yuan, 23 percent of the country's total, with cotton, wool, and synthetic fibers as major materials.

7) The distribution of major regions and zones in BYSR are as follows:

(a) Beijing-Tianjin-Tangshan region. As the core area with the strongest economic power in BYSR, its leading industries are iron and steel, engineering and electronics, textiles, and chemicals, accounting for 36 percent of BYSR's total value.

(b) Central and south Liaoning. This is the second most important region, with complete bases of iron and steel, engineering, petroleum refining, and chemical industries.

(c) Jinan-Qingdao railway belt. It covers 18 percent of BYSR's industrial output, with

petroleum, textile, and chemical industries as major sectors, quite developed engineering and nonferrous metallurgical industries, and a relatively well-coordinated development between heavy and light industry.

2.3 Basic Features of the Provincial / Municipal Industrial Structure

The economic growth rate of the provinces/ municipalities in BYSR increased greatly after 1949. Beijing in the 1950s-1970s and Shandong in the 1980s were particularly impressive, with various growth rates over China's average level. An analysis of the sectoral structure of provincial/ municipal industry leads to the following points:

1) Both Beijing and Tianjin have a relatively complete manufacturing system, with major sectors of engineering and electronics, chemicals, metallurgy, textiles, and food processing. However, Beijing is stronger in the metallurgical, petrochemical, and tertiary industries, while Tianjin has a more developed textile and salt-based chemical industry.

2) Liaoning and Hebei, both rich in iron ore and nonmetallurgical minerals, have set up large iron and steel, chemical, energy, and building materials industries. Liaoning has a powerful, integrated heavy industrial system with basic machinery manufacturing, while Hebei is more developed in textiles.

3) Shandong, with the richest energy resources and the strongest agriculture in BYSR, has coordinated development of light and heavy industries. Its rapid and steady growth in the last decade make it rank as the country's second province in gross industrial and agricultural output value.

3. Major Problems in Industrial Structure and Distribution

The development of tertiary industry is still not comparable to the regional economic growth. The regional industrialization is almost the highest in China, but its tertiary industry is just about the national average. Transportation and communications, information, finance, commerce, and other service industries move on slowly, and further development is badly needed.

The industrial technological level needs further improvement. Scientific research and technology have not closely combined with production, and there is slow development of high technology in microelectronic industry, ecological projects and new materials. A lot of enterprises are still using poor equipment of the 1950s or 1960s, causing waste of materials. Transformation of technology will continue to be very difficult in the future.

Energy and transportation have become the bottleneck of economic growth. Energy shortage is becoming a more and more serious problem with the growth of heavy and energy-intensive industries. Railway transportation is under heavy pressure from the growing traffic in interregional goods and passengers. Seaports and highway systems are also facing difficulties.

Water resources shortage is a serious problem. Per capita water resources in the region

is about 517 cubic meters, 1/ 5 of the national average. Many industrial cities, including Beijing, Tianjin, Shenyang, Anshan, and Qingdao are suffering from serious water shortage. The growing industrial and domestic water consumption is resulting in a bigger gap between water supply and demand, which restricts urban and economic development.

The spatial industrial distribution is unbalanced within the provinces. For example, the overconcentration of industry in central Liaoning has caused enormous goods problems, such as the flow of, especially coal, tight water supply, and environmental pollution, though south and west Liaoning have great potential to develop industries. In Shandong, two-thirds of the industrial output is concentrated in the six cities along the Jinan-Qingdao railway, though its western and southern parts are rich in resources. Hebei's industrial bases are mainly located in the south and the east, with other are as much less developed. There are also some poor mountain areas in BYSR.

II. PERSPECTIVE OF INDUSTRIAL STRUCTURE AND DISTRIBUTION IN BOHAI-YELLOW SEA RIMLAND IN THE 1990S

According to the national plan, the main goal in the coming decade is: by constantly improving economic structure, economic quality, and efficiency, to double the GNP, and to raise living standards to a satisfactory level. To realize this goal, agriculture, energy, transportation, some important raw material industries, and infrastructure should be strengthened, and the engineering industry be improved to change the imbalance of basic industry and manufacturing industry. There should be a rational regional division of labor by way of adjusting industrial allocation and making full use of each area's advantages. By the year 2000, BYSR should become a well-developed base of agriculture, industry, and high technology, with heavy and chemical industry as the major sector, and harmonious development of light industry.

1. Tentative Ideas for Industrial Structural Adjustment

We have mentioned the emphasis on BYSR's industrial development in this decade. Meanwhile, BYSR should set up some new industries, properly arrange the import and export structure and products, restrict industries and products not suitable to the region, and speed up the pace of technical innovation. Business organizations need to adjust themselves to form a coordinated system according to each sector's optimum scale and specialization.

In the 1990s, BYSR will maintain an annual growth rate (7 percent) over the national average. It is predicted that by the year 2000, its GNP will reach 764 billion yuan (1989 prices). The proportion of the three industries will change greatly in the last ten years of the century due to enhanced technology, improved productivity, and labor transfer from rural to urban areas (Table 3).

Table 3 The predicted composition and growth rate of GNP in BYSR*

	Year	China	BYSR	Beijing	Tianjin	Hebei	Liaoning	Shandong
GNP	1989	1578	363	46	28	77	92	120
(bil. yuan)	1995	2265	545	64	41	447	137	187
	2000	3062	764	84	46	165	190	269
Primary	1989	26.8	21.1	8.4	10.5	25.6	15.4	29.9
industry	1995	23.2	20.6	8.4	10.4	23.2	12.7	24.7
%	2000	20.2	18.8	8.2	10.2	21.3	10.2	22.4
Secondary	1989	46.7	53.1	55.3	62.1	48,9	59.2	48.2
industry	1995	47.9	51.3	52.8	59.8	49.0	58.4	50.0
%	2000	48.8	51.1	50.2	57.6	49.5	56.9	61.1
Tertiary	1989	26.5	25.8	36.2	27.4	25.5	25.4	21.9
industry	1995	28.9	27.9	38.8	29.8	27.8	28.9	25.3
%	2000	31	30	41.6	32.2	29.2	32.9	26.5
Growth	GNP	6.2	7	5.7	6.3	7.2	6.8	7.6
rate	Primary	3.7	4.3	3.5	3.7	5.4	3.4	4.2
1989–	Secondary	6.6	6.9	5	5.8	7.2	6.6	8.2
2000**	Tertiary	7.7	8.9	7	8	8.7	9.1	10.2

Source: Statistical Yearbook of China, 1989. Statistical Press of China, Beijing: 1990. Index is calculated in current price.

* Predicting value is based on national–regional Macroeconomic Model System from State Information Center, which simultaneously referenced each province and city's data.

** Growth rate is calculated on comparable price, index value in 1995 and 2000 is on 1989 price.

1.1 Primary Industry

In the 1990s, the production of grain, cotton, and vegetable oils should have stable growth, with planned development of fruits, animal husbandry, and aquatic production. It is necessary to popularize water–saving agriculture, the use of plastic covering, a variety of crops, northern dry–farming agriculture, and technological innovation.

1.2 Secondary Industry

The gross industrial output value in BYSR is predicted to be over 1593 billion yuan by the year 2000, with heavy and light industries representing 52.7 and 47.3 percent, respectively.

The iron and steel industry should be further developed, focusing on high–quality rolled steel of low–energy consumption to replace imported steels, and the expansion of strip steel and special pipe industries.

The solution of the energy problem in BYSR lies in increasing imports from adjacent areas, intensifying resource exploitation within the area, and reducing energy consumption.

To increase the proven coal resources, we should further tap the latent production power of old coal mines in addition to exploring new fields. While emphasizing the production of oil, we need to encourage the use of natural gas.

The engineering industry should be oriented towards developing large-scale equipments for mining, metallurgy, electricity transmission and transformation, chemical production, power generation, and precision and computerized machine tools. Major efforts will be devoted to raising the technological level of machinery products and producing standardized spare parts.

The electronic industry should be directed towards developing high-grade, advanced, and precise products to help upgrade the regional and even the national industrial structure. Major products should be macro-medium-micro electronic computers and peripheral devices, surveying instruments, electronic elements and devices, and communications apparatus. Marketable consumer electronic products need to be developed in a planned way.

The chemical industry should emphasize deep processing and comprehensive utilization, particularly in the petrochemical and agriculture-supporting chemical industries. Salt-based chemical industry, coal-chemistry, rubber-processing and the pharmaceutical industry should be actively developed. More attention should be paid to exploiting chemical resources and to adopting new technologies widely.

It is important to develop the textile industry to upgrade quality and replace old products with the new generation. Technological innovation in existing enterprises is necessary to adjust product structure and to enhance the capacity of dyeing and printing textiles. While taking advantage of cotton resources, the production of synthetic fibers should be increased properly.

The research and development (R & D) of high technological engineering, computers, information science, marine engineering, new materials and new energy resources, remote-sensing, laser, and other new sectors of the economy.

Apart from developing the industries and production facilities described above, some products such as low-quality general engineering and electronic products, high-electricity-consuming products, high-grade consumer goods with raw material shortages and other products with backward production modes, seriously wasting resources and polluting the environment, should be firmly restricted.

1.3 Tertiary Industry

Special attention should be paid to the improvement of technology and education, as well as to commerce, banking, insurance, tourism.

The 78 opening cities, enjoying various preferential treatments, should take full advantage of them and effectively develop international trade and technological exchanges, with a focus on contracting business for overseas projects and international tourism.

2. Industrial Structure by Provinces / Municipalities

Beijing. Being the capital of China, Beijing exerts a strong attraction on personnel, funds, and technology. Suffering from a water shortage that will be intensified in the 1990s, it should develop capital- and technology-intensive industries with less water and energy consumption. The development of tertiary industry needs to be reinforced for a coordinated production and service system.

The electronic industry should develop consumer goods and invest in products like telecommunications devices, computer microelectronics, and electronic elements and devices. The development of the engineering industry should emphasize digital machine tools, light automobiles, internal-combustion engines, turbogenerators, printing machinery, and communications and transportation engineering. With a resident population of more than 10 million, a floating population over 1 million, and many foreign visitors, Beijing has a huge consumer market for developing light and textile industries.

Tianjin. For development and structural adjustment in the 1990s, Tian jin should focus on the upgrading of technical levels for the existing textile and engineering industries, with emphasis on automobiles, marine chemicals, petrochemicals, electronics, and communications. The weak point of tertiary industry should be strengthened. As one of the 14 open coastal cities, Tianjin needs to improve its foreign affairs inefficiency and quality. Other departments should also conform with the needs of international exchanges and connections.

Hebei Province. In the 1990s, the emphasis should be on the development of agriculture, mining, power generation, and industries of iron and steel, chemicals, textiles, and building materials. The province should also expand irrigation networks to ameliorate low- and medium-yield farming land, and should rigidly control the diversion of cultivated land to other uses. With its superior mineral resources, its iron and steel industry should emphasize technological innovation and the expansion of existing plants, and an increase of product variety and quality. Its chemical industry can develop oil refining, synthetic fibers, pharmaceuticals, and a salt-based chemical industry. New technology and variety need to be developed to allow the upgrading of the general level of the textile industry.

Liaoning Province. It is the most important heavy industry base in China. Liaoning's developmental emphasis in the 1990s should be on agriculture, petrochemicals, iron and steel, energy, chemical products, building materials, high-tech industries, and tertiary industry. Its industrial development should be a technological transformation of old industrial bases to reach the 1980s' world level in technology infrastructure, production arts, main products, and business management. With the construction of new industrial projects, a comprehensive system will be set up with petrochemicals, engineering, and the steel industry as the mainstay, and a bigger portion for light and textile industries. For the less developed agriculture, it is necessary to construct reservoirs, upgrade fields of low-and-medium yields, explore bases for commodity foods, and reclaim wilderness to raise food production

of the province to 350 kilograms per capita. The development of cash crops, animal husbandry, and fisheries will provide more material for light industry and more nonstaple food for urban people.

Shandong Province. The primary industry in Shandong plays an important role in the whole country. In the 1990s, the priority should be on the production of grain, cotton, and vegetable oils, which are estimated to have an annual output of 37 MT, 1.4 MT and 2.2 MT respectively by the year 2000. Meanwhile, fruits, animal husbandry, and aquatic products should be further developed. The energy industry needs to further develop coal, oil, and electricity production. It is necessary to speed up the exploration for coal and oil fields to maintain a steady growth in production. By 1995, the output of crude oil should be over 40 million tons. The chemical industry in Shandong has strong industrial ties. Petrochemicals and the agriculture-orieted chemical industry should be emphasized, with stable growth of salt-chemical and basic chemical industry, and active development of fine- and coal-chemical industries. Engineering industries should emphasize the development of digital machine tools, high-quality agricultural machinery, electricity-generation sets, diesel engines, and electricity transmission and transportation equipment. The textile industry should develop synthetic fibers by stringent control of the expansion of cotton spinning capacity, and upgrade weaving, knitting, dyeing, and clothing toward deeper processing. The province also has potential to develop a food-processing industry.

3. Allocation of Key Industrial Construction in BYSR

There will be large-scale construction projects in the following key industries:

3.1 Energy Industry

1) Oil industry. BYSR is one of the richest oil production bases in China, and the Shengli Oil Field has the greatest developmental potential. The East Hebei Oil Field, a newly discovered one, will be able to produce 1.5 million tons yearly. The exploitation of the Liaohe Oil Field will help to maintain a stable level of production in the region in the meantime.

2) Coal industry. The four big mining bases are southwest Shandong, Handan and Kailuan in Hebei and central Liaoning, with 70 percent of the region's proven reserves and production. In the next decade, southwest Shandong will initiate large-scale coal-mining projects in the Yanzhou-Jining and Zaozhuang-Tengxian coal fields, with a yearly output of up to 40 million tons. In Handan region, the Fengfeng and Handan coal mines will be enlarged, with four new mines built in Kailuan. Central Liaoning will exploit the Tiefa and Shenyang coal fields, with an annual output of 45 million tons in the 1990s.

3) Power industry. There are four ways to construct thermal power plants in the region: (a) key power plants will be built along the coastline from Dandong to Shijiusuo; (b)new power stations should be set up for consumption in the economic centers with rail-

way transportation of coal from Shanxi; (c) some power plants will be built on the spot of mining areas with a large amount of low-quality coal and adequate water resources; and (d) some thermo electric plants of moderate capacity will be set up in large and medium-sized cities with a heavy heat load.

3.2 Raw Materials Industries

1) Iron and steel industry. There will be intensive and extensive development, that is, a further exploration of production potential and the building of new plants. There will be a major expansion of old plants in Liaoning's Anshan and Benxi Iron and Steel Company, the former need to improve the ore-mining and rolling process, and the latter, steel-melting and steel-rolling. There are three proposed locations for the new plant, Wangtan in east Hebei, Bayuquan in Liaoning, and Shijiusuo in Shandong, and Wangtan is believed to be the best location for East Hebei Iron and Steel Works, also a good place for a large deep-water port. A 77.2 km long railway from Tuozitou to Wangtan port and a highway from Tangshan to Wangtan have been completed. The Tangshan Port in Wangtan, with berths of annual handling capacity of 5,000-10,000 tons is also under construction.

2) Chemical industry. BYSR has considerable capacity for a marine chemical industry. The production scale of old chemical plants with sea salt as the raw material should be properly regulated, with an effort to improve production techniques and maximize resource utilization. New soda ash plants in Shandong and Hebei should reach their designed annual output of 600,000 tons as soon as possible. The large-scale petrochemical production bases of Yanshan in Beijing and Zibo in Shandong, which have a yearly ethylene production of 300 thousand tons each, should emphasize technical renovation and adding downstream projects. Other plants like Fushun, Dagang, and Liaoyang should increase ethylene production to 110 thousand tons.

3) Building materials industry. The region is China's largest producer of building materials, with well-developed production of plate glass, cement, and ceramics. East Hebei Plant in Tangshan, Yaohua Glass Works in Qinhuangdao, and Tangshan Ceramics Factory are famous manufacturers. Further efforts should be on improving product quality and variety and developing new stained-glass and plastic ceramic products, so as to build the region into an important exporter of building materials.

3.3 Manufacturing Industries

1) Automobile industry. The Shenyang and Beijing-Tianjin regions in BYSR, and the Changjiang (Yangtze) River delta are three major light vehicle production bases in China. BYSR should develop its automobile industry in the following ways. First, a new car production line should be built in the Tianjin Automobile Works. Second, a production base of light passenger and freight vehicles should be set up on the basis of the five dominant enterprises (Golden Cup Group and Double-House Group in Shenyang, Beijing Automobile Works, Beijing No. 2 Automobile Works, and Tianjin Automobile Works). Third, the production scale of heavy trucks in Jinan should be enlarged. Fourth, because of its location

being adjacent to Jilin Province, one of the two complexes of the automobile industry in China, the region should actively develop the production of spare parts to establish a car assembly base for ocean-transit business in the coastal area after the year 2000.

2) Shipbuilding industry. Dalian and Tianjin are two important bases in the country paralleled with Shanghai and Guangzhou. Along with the development of China's ocean shipping and the transfer of the world shipbuilding industry to developing countries, BYSR has a very promising future in this field, with the following aspects for future development: (a) to complete the construction of the 200,000 ton shipyard in Dalian by the turn of the century, and to expand the variety of ships built in Dalian and Bohai, including ocean steamers, tankers and container ships; (b) to manufacture ocean going ships over 10,000 dead weight ton, offshore passenger and freight ships and dredging ships in Tianjin and (c) to build various relevant equipment for offshore oil exploration, such as drill and auxiliary ships in Dalian.

3) Industrial equipment manufacturing. Holding an important position in producing major technical equipment in China, the region's engineering industry needs to make breakthrough in key technology, improve the composition of products, and produce complete sets of equipment.

4) Electronic industry and household appliance industry. It should expand the production of capital goods for the electronic industry, including electronic computers and their peripheral equipment, integrated machinery-electronic products and system engineering technologies, and electronic information systems and automatic equipment for office work. It should also intensify the production of consumer electronic products and household electronic appliances. The enterprises should coordinate among themselves to make technical breakthrough in producing key components, such as integrated circuits.

3.4 Tourist Industry

1) Tourist resorts construction. The region has three major historical-architectural complexes that attract tourists from all over the world: the Great Wall and Forbidden City in Beijing, the Summer Resorts and Eight Temples in Chengde, Hebei, and the Confucian Temple and Confucian Mansion in Qufu, Shandong.

2) Health resort construction. With the favorable physical environment of Dalian, Qinhuangdao, Beidaihe, Yantai, Weihai, and Qingdao, the region can develop a lot of sunbathing and seaside summer resorts.

4. Allocation of Major Development Regions

BYSR's major development regions can be classified into four types based on resources and developmental strategy (Table 4).

Central Liaoning. It includes five cities: Shenyang, Anshan, Benxi, Fushun, and Liaoyang. Further development should take place in increasing raw material production

through technical renovation in engineering industry and supplementary construction of mining areas, so as to build the region into the biggest heavy industry base in China.

Table 4 Development plan for the key areas

Type	Area	Major resources	Development strategy	Key industry	Growth rate
I	Beijing–Tianjin–Tangshan; Central Liaoning	Strong economic basis, metallurgical and energy minerals	Heighten industrial level, industrial structure	Renovation of traditional industries, development of newly rising industry & tertiary industry	Relatively high
II	Liaohe R. Delta; North Shandong	Oil, uncultivated land	Resource exploitation on a large scale	Oil industry, integrated agriculture	High
III	Central Shandong; Central & South Hebei	Moderate economic development, local mineral resources	Deepen industrial structure comprehensive development	Diversified industries	High
IV	Jiaodong Peninsula	Location and transportation, special industrial structure	Export–oriented economy	Light & textiles, fishery, fruit farming	Relatively high

Liaohe River Delta. It includes two cities of Yingkou and Panjin. The construction of the Panjin Chemical Industrial Plant will link with other chemical factories in Jinzhou, Jinxi, Anshan, and Liaoyang to become a regional chemical industry complex. Jinzhou will develop export–oriented light and textile industries and a consumer electronics industry. Agriculture development should be strengthened in the delta.

Beijing–Tianjin–Tangshan region. Besides Beijing, Tianjin, and Tanggu, the region also includes the cities of Tangshan and Qinhuangdao, and Langfang Prefecture of Hebei Province. Besides development in industries with good bases and resource potential such as iron and steel, petrochemicals, marine chemicals, and building materials, the region should also

enhance the development of technology-intensive industry and tertiary industry, especially the engineering and electronic industries, as well as commerce, services, and tourism. To improve people's living standard, various high-and medium-grade consumer goods need to be produced in textiles, foodstuffs, household electronic appliances, stationery, and sports goods.

Central and South Hebei. It includes Baoding, Shijiazhuang, Xingtai, and Handan. The region ought to develop into a grain and cotton production base of high and stable yields, and develop suburban agriculture on the outskirts of Beijing. Technological transformation in the years ahead should be emphasized in view of the low technical level of the region.

East Shandong. It includes four cities: Qingdao, Yantai, Weihai, and Weifang. Major efforts should be devoted to the expansion of Qingdao, Yantai, and Longkou ports to become an important export-oriented economic base.

Central Shandong. It includes two cities of Jinan and Tai'an. With abundant iron ore and salt resources, it should expand and complete the iron and steel industry in Jinan and Laiwu, and build a salt-based chemical industry in Tai'an. Technical transformation and developing new products in engineering and electronic industries should be continued. Tourism in Jinan and Mount Tai needs to be well explored.

North Shandong. It includes Zibo and Dongying cities and Huimin Prefecture. Oil and gas exploitation, petroleum processing, and chemical industries will remain the leading sector of the economy in the future, with stable production of oil and gas. The agricultural exploitation of the Huanghe(Yellow) River Delta will make the area become an agricultural base with grain, animal products, and fish as the main products.

5. Industrial Development Direction of Major Port-Cities and Construction of the Economic and Technological Development Zones

Dalian. As an excellent natural seaport in northern China, its yearly handling capacity has reached 48.53 million tons. With the double-track railway of Shenyang-Dalian, widely radiated highways and express highways, its inland transport system is also quite developed. With this advantage for a trade economy, Dalian should strive to construct an export base, with marine products and fruits as the main agricultural and sideline products and industrial products like clothes, knitwear, shell carving, glass utensils, and aviation kerosene.

Dalian Economic and Technical Development Zone, with a planned area of 20 km^2, is 33km southeast of Jinzhou town, and specializes in electronics, engineering, petrochemicals, building materials, and medical apparatus and instruments. As one of the best developed districts in China, 40 percent of its products reach a world or national advanced level, with foreign-invested enterprises, investment volume and exported products accounting for 50 percent of the district's total.

Qinhuangdao. It is a famous port city and summer resort in North China. Qinhuangdao Economic and Technical Development Zone has a planned area of 1.9 km^2. Now the infrastructure in the initial area (0.62 sq.km) has been built up. Besides glass processing, the chief industry here, it should develop power, food, drinks and textile industries, also precision machinery, apparatus and instruments, and knowledge-intensive industries.

Tianjin. Adjacent to the Tianjin New Port, Tianjin Economic and Technical Development Zone is located in Tanggu District, 50 km to the west of the downtown, with an planned area of 33km^2, one of the biggest in the 14 opened coastal cities. Now the industrial district is basically completed and some residential areas are built up. Many high-tech industrial enterprises, such as computers, electronic components, communications apparatus, marine exploration, and biological sciences, have begun operation. Some traditional industrial products, such as machinery, clothes, foods, bicycles, building materials, and chemical products, are also exported abroad on a large scale. For future development, the district should, on the one hand, continually pay attention to the renewal of the traditional industrial equipment and products, and on the other hand, foster the development of newly rising industries.

Yantai. Yantai is a light industrial city, with food, textiles, tailoring, chemical plastics, machinery, and electronic industries as the dominators. In the future, the city should further foster the key industries, such as engineering (with leading products of refrigeration equipment, machine-tool accessories, basic electronic components, automation apparatus, and instruments), the food and textiles industries, and the chemical industry (with polyamine resin material production at the lead).

Yantai Economic and Technical Development Zone, with a planned area of 20 km^2, is 10 km away from the town center. An area of 3 km^2has now been developed with infrastructure and residential areas. It is oriented to light industry, electronic apparatus, fine chemicals, and new material industries.

Qingdao. Qingdao is a quite developed city with light industry predominating. In the coming decade, it should further develop an export-oriented system of light and textile industries, improve product quality and increase export of knit sports-shirts, silk embroidery, high-quality handmade carpets, embroidered towel coverlets, Tsingtao beer, wine, etc. The production of some competitive products in the rubber, electronics, chemicals, and machinery industries should be enlarged properly.

Qingdao Economic and Technical Development Zone is located in Huangdao District, 2.3 nautical miles away from the old downtown (80 km by land route), with a total planned area of 15 km^2. Preparation should be made for building Qingdao New Port, and shifting its industrial distribution to Huangdao step by step. Since 1985, many enterprises have been put into operation. The investment environment will be further improved with the completion of Qingdao New Port and the Qingdao-Huangdao Highway. It should also give consideration to the development of tourism, commerce, services, and agriculture-husbandry.

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