THE DEVELOPMENT OF WATER TRANSPORTATION IN CHINA

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In the vast territory of China, there are a long coastline, and also a large number of rivers and lakes which make up an extensive network of inland water transportation. There are 8 provinces along the coastline of more than 18000 kilometers. Most of the coast is ice-free all the year round. The total length of the rivers whose valleys cover an area of over 100 square kilometers is about 430000 kilometers. China is one of the countries in the world which possess the favourable geography for developing water transportation.

At the beginning of the fifties, there were only 119 main berths with a total berthing length of about 20000 meters along the whole coastal provinces(not including Taiwan Province), including 61 terminals for 10000 tons seagoing vessels, and about 100 sets of handling machines. The total handling capacity in one year was only 10,000,000 tons.

Technical reform and capital construction of sea port terminals began in 1951. In north China, Tanggu Harbour was put into operation in October of 1952. This Project was then one of the most important. After that, Huangpu Harbour and Lianyun harbour were enlarged one after another. And in 1957, Zhanjiang Harbour was completed.

From 1951 to 1966, the total berthing length of the coastal harbours was thirty-three thousand meters with 260 berths, among which were 81 deep-water ones. And the handling capacity per year was 80.84 million tons. The whole investment in harbour construction was 750 million yuan(RMB).

However, the harbour construction came to halt from 1967 to 1972 and the harbour operations were quite abnormal. The handling capacity of coastal harbours was below that of 1966.

The forcus of our national economy was shifted to the hinterland. Serious delay in the handling of ship and cargo ocurred.

With the restoration of China's legal status in the U.N. in 1973, international exchanges between China and other countries increased and foreign trade expanded. And harbour construction became the focal point of the national economy. From 1973 to 1981, 55 deep-water berths were built or rebuilt, which meant that approximately six berths came into being each year. The handling capacity of the newly-built harbours was 100 million tons at that period. The first deep-water terminal for 50 thousand-ton vessels and 100 thousand-ton vessels of our country were put into service. For example, the terminal of oil export for 100 thousand-ton vessels was built in Dalian and the terminals of unloading minerals for 100 thousand-ton vessel was completed in Beilun Harbour of Ningpo.

In the early 80s, a new economic policy of opening door to the outside world and giving flexibility to home economy was adopted by our country, Meanwhile the construction of harbours was at its prime. According to sixth five-year plan, 132 deep-water berths are to be accomplished from 1981 to 1985, which provide handling capacity of 100 million tons; thus, the total handling capacity of the coastal harbours amounted to 317 million tons in 1985. The targets specified in the Sixth five-year plan can be fulfilled. The coastal harbours will take on new looks and will be among the ranks of the advanced harbours of the world.

In 1985, 33 deep-water berths are to be completed, which are all situated at the coastal open cities. These berths include modern container terminals and large coal export terminals which are badly needed by our country, such as three deep-water container terminals in Tianjin Xingang(December 1985), one deep-water container terminal in Wharf No. 9 of Shanghai Harbour(December 1985), one deep-water container terminals in Huangpu Harbour, Guangzhou(October 1985), and two deep-water coal export terminals in Shiju Harbour, Shandong.

The policy of opening door and reforming economy is our long-term national policy. The special economic Zones together

with the 14 open cities along the coast will play a pivotal role in the strategic scheme to combine imports with domestic industries and to combine the development of the coastal area with that of the hinterland, so that our whole national economy can be vitalized and the four modernization be speeded up. That is why the importance of harbour construction has been recognized to a larger extent and the development of harbours has been regarded as one of the keylinks in the national economy.

On the basis of the survey, we might well predict that by 1990 the handling capacity of the coastal harbours will be 500 million tons. During the period of the seventh five-year plan, more than 110 deep-water berths are to be built, and so are the about 30 medium-sized berths. Accordingly, 29 berths will be completed each year on an average. Thus, by 1990 there will be as many as 540 or more berths along the coast, out of which are 310 deep-water berths.

Harbours are of immense significance in our national economy. And it is inevitable that the harbour construction should leap forward in the next fifteen years. It is predicted that by 2000 the handling capacity of the main harbours can be as great as 650 or 700 million tons with 600 deep-water berths.

As an introduction to inland water transportation, we would like first of all to give a brief account of the main rivers in China. There are the Heilongjiang river and the Songhuajiang river in the North-east, the Pearl(the Zhujiang)river in the South, the Yangtze River, the Yellow River(the Huanghe River) and the Huaihe River which flow transversely from the western mountainous areas to the east coast. The Grand Canal (Beijing-Hangzhou Canal), the Mingjiang River, the Jialingjinag River, the Hanjiang River are all tributaries that flow either northwards or southwards.

By the end of 1979, navigable waterways covered a total length of 107,800 km which is 46% more than that in 1950. The volume of cargo traffic reached 321 million tons and 54500 million ton-km of turnover, equivalent to 11.58 times and 11.64 times respectively that of 1950.

The Characteristics of The Major Rivers in China

River's Name	Area of Valley (1000 km^2)	Length (km)	Annual Flow (billion m^3)
1.Yangtze	1,800.0	6,300	921.0
2.Heilongjiang	1,840.0	3,420	270.9
3.Xijiang	355.0	2,176	245.0
4.Mingjiang	133.5	793	90.5
5.Sonhuajiang	527.0	1,662	76.0
6.Yuanjiang	90.4	1,060	67.7
7.Jialingjiang	159.8	1,119	67.2
8.Ganjiang	80.9	744	64.0
9.Xiangjiang	94.0	817	63.4
10.Hanjiang	174.0	1,532	54.1
11.Huanghe	752.0	5,463	46.6
12.Huaihe	186.0	1,000	32.8

The Yangtze River is the longest river in China, and is the third longest river in the world. The total course is 6,300 kms, of which 3,638 kms are navigable. It is the most important artery for inland water transportation in China. There are more than 900 lakes in China. The Dongting Lake, the Poyang Lake, the Tai Lake and the Hongze Lake are known as the four largest ones. The numerous rivers and lakes criss-crossing the land have formed a natural network of water transportation. Many important cities such as Chongqing, Wuhan, Nanking, Shanghai, Harbin, Guangzhou and Hangzhou are all located on the banks of rivers. Inland water transport in some provinces like Jiangsu and Guangdong is the main transport means and traffic volume of passengers and cargoes by this means covers more than 60% of the total traffic volume.

According to a general survey made in 1979, the mileage of navigable inland waterways totalled 107,800 kilometers of which about 57,000 kilometers have a water depth of one meter

and over 20,000 kilometers are navigable for 100-ton vessels or more. There are about 300 river ports with an annual handling capacity of 100,000 tons.

In 1983, the cargo handled by inland waterways amounted to 330 million tons, 70,600 million ton-kilometers and the number of passengers was 260 million. (Here we only refer to the traffic volume of vessels operated by river transportation enterprises, not including the traffic volume of vessels operated by other industrial enterprises and boats of rural areas.) These figures show that our water transportation volume has increased 13 and 11 times more than that in 1950. In this respect, our country holds the third place next to the U.S.A. and U.S.S.R.

The main types of barges operating in the rivers of China are: 50 ton, 100 ton, 300 ton, 500 ton, and 1,000-5,000 ton barges. The major freights are coal, petroleum, ores, iron and steel, sand, stone and other construction materials and so on.

The Yangtze River, the largest river in China, has about 700 tributaries of various length. It covers a valley area of about 1,800,000 square kilometers. The Yangtze River Basin is abundant in natural resources and is an economically developed region in China. It is of great importance to our national.

Since 1950, large-scale channel regulation work, including blasting and dredging, has been carried out on the upper reache of the Yangtze River between Chongqing and Yichang so that navigation channels have been deepened and broadened, and navigation conditions have been remarkablly improved. At present, 1,000 ton barges can go all the year round. The first stage of construction of a two-step multi-purpose hydro electric station is underway. The Gezhouba Dam which was put into operation in July 1981, is a pilot project for the future the Yangtze Gorges project. It was commissioned to power generation and navigation.

Maintenance dredging has been carried out on the middle and lower reaches of the Yangtze River for many years in order to maintain and increase the size of the navigation channel. Passenger-cargo river vessels of 3,000 tons and tankers and iron-ore barges of 5,000 tons can sail up to Wuhan. The channel

below Nanking can accomodated sea-going vessels of 15,000 tons and tankers of 24,000 tons.

The CSA—Changjiang(Yangtze River) Shipping Authority—has established 25 major port authorities and 105 wharfs along the main shipping channels of the river. They are responsible for the transportation business of freight and passengers. In 1952 along the whole river, there were only 106 berths with a total berthing length of about 5,700 meters, 74,000 square meters of effective storage area with a storage capacity of 158,000 tons, and 7 sets of handling machines. The total handling capacity accomplished during the year of 1952 was 8,710,000 tons.

Technical reform and the construction for port terminals began in 1951 step by step. In the past 30 years, an investment of more than 4,000,000,000 yuan (RMB) equivalent to about 15% of the total investment of CSA has been allocated for port construction and development. Compared with that in 1952, the number of berths is increased by 4 times, the total length is increased by 3.70 times. The number of handling machines has increased. It was nearly one piece for each port in 1952, but now it is more than 120 pieces for each port. In 1980, the port freight handling capacity was ten times more than that in 1952. The average cargo handling capacity of each pier has been increased from 82,000 tons in 1952 to 207,000 tons. The cargo handling capacity of Nanking Port is the greatest and the next is the port of Wuhan.

The difference in water levels between flood and dry seasons in the ports is comparatively large. It is the largest on the upper reaches and gradually diminishes toward the ports on the lower reaches. The maximum annual difference is 32.21m. in Chongqing ; 15.81m. in Wuhan; 7.70m. in Nanking and 5.21m. in Jiangyin. This difference in water level has imposed great complexity and difficulties on determining the design of landing facilities and the cargo handling technology as well as selecting the freight handling facilities.

The wharves and quays along the upper and middle reaches of the Yangtze River are mostly of the pontoon type with sloping landing stages. The typical cargo handling technique is: floating handling facilities $\rightleftharpoons$ cable car(or belt conveyor) $\rightleftharpoons$

storage yard or warehouse. The capacity of floating crane for bulk solids is 180 tons per hour; Recently, the more efficient continous chain unloader for sand (catenary chain-bucket ship unloader) was used at first in Wuhan Port this year, the capacity of which is 500 tons per hour. Chain type continous unloader will be used widely for unloading coal, sand and iron-ore in the future at the ports of Yangtze River.

The Grand Canal originating from Beijing in the north runs a total length of 1,747 kilometers and passes through the city of Tianjin and the Provinces of Hebei, Shandong, Jiangsu and Zhejiang and finally terminates at Hangzhou in the south. In 1980, the traffic volume of the canal between Xuzhou and the Yangtze River has increased to more than 17 million tons. At the southern part of the Grand Canal from Zhenjiang to Hangzhou, ships go back and forth like shuttles and it is busy that in one or two minutes there would be a barge train passing through it, and at some sections of the canal, signal lights have to be established to give control over traffic movement. In 1979, the traffic volume reaches 36 million tons.

The Grand Canal flows through many important and famous cities such as Xuzhou, Yangzhou, Suzhou and Hangzhou; it also links several important harbours such as Tianjin, Lianyungang, Shanghai and Zhenghai; it joints five important rivers of China, such as the Hai River, the Huanghe River, the Huaihe River, the Yangtze River and the Qiantangjiang River and also interlaces with many railway lines. Therefore, the Grand Canal is playing an important role in the formation and development of an extensive network of water transport.

IWT in China did make some progress. However, since all the problems related to multi-purpose utilization of water resource, general arrangement of the intermodal system and the development of a network of water transport system etc. have not been properly dealt with, the situation of river transport is not able to meet with the demands of the four modernizations. IWT have not been brought into full play. In order to bring about the modernization of IWT, several aspects are worthwhile reviewing and studying.

The above comments are put forward with analysis information of water transport. In this respect, China has accumulated experiences of more than 30 years. We believe that, on the basis of thorough review including the practice in port, and traffic management etc. China's water transportation will surely make greater strides in world trade and in the national economy.