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STAFF APPRAISAL REPORT

NINGBO AND SHANGHAI PORTS PROJECT

SHANGHAI PORT

CHINA

November 16, 1988

Transport and Energy Operations Division
Country Department III
Asia Regional Office

CURRENCY EQUIVALENTS
(as of July 1988)

Currency name	=	Renminbi (RMB)
Currency unit	=	Yuan (Y)
US$1.00	=	Y 3.70
US$0.27	=	Y 1.00
US$270,270	=	Y 1,000,000

FISCAL YEAR

January 1 to December 31

MEASUREMENT EQUIVALENTS

Metric System		British/US System
1 meter (m)	=	3.281 feet
1 square meter (m^2)	=	10.764 square feet
1 cubic meter (m^3)	=	35.315 cubic feet
1 kilometer (km)	=	0.621 mile
	=	0.5396 nautical mile
1 ton-km	=	0.621 ton-mile
1 ton	=	2,204 pounds
1 hectare (ha)	=	2.469 acres

PRINCIPAL ABBREVIATIONS AND ACRONYMS USED

AAPRC	-	Audit Administration of the People's Republic of China
ADT	-	Average Daily Traffic
CHC	-	Cargo Handling Corporation
CIECC	-	China International Engineering Consultancy Corporation
cif	-	Cost, insurance and freight
COSCO	-	China Ocean Shipping Corporation
CNTIC	-	China National Technical Import Corporation
dwt	-	Deadweight tons
ERR	-	Economic Rate of Return
FYP	-	Five Year Plan
GOC	-	Government of China
LRMC	-	Long Run Marginal Cost
MLW	-	Mean Low Water
MOC	-	Ministry of Communications
MOF	-	Ministry of Finance
MR	-	Ministry of Railways
NPV	-	Net Present Value
SHB	-	Shanghai Harbor Bureau
SHS	-	Shanghai Harbor Superintendency
nrt	-	Net registered ton
PBC	-	People's Bank of China
SEZ	-	Special Economic Zone
SPC	-	State Planning Commission
teu	-	Twenty-foot equivalent unit

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NINGBO AND SHANGHAI PORTS PROJECT

SHANGHAI PORT

Loan and Project Summary

Borrower:	People's Republic of China.
Beneficiaries:	Ningbo Port Authority and Shanghai Harbor Bureau
Amount:	$76.4 million equivalent: $30.0 million for Ningbo and $46.4 million for Shanghai.
Terms:	Twenty years, including five years of grace, at the standard variable interest rate.
Relending Terms:	Out of the proceeds of the loan, $46.4 million equivalent would be onlent by the Government to SHB under a subsidiary loan agreement with a 20-year term, including 5 years of grace, at an interest rate of 6.2% p.a. The foreign exchange risk and the commitment fees would be borne by SHB.
Project Objectives:	The principal objective of the project is to assist the Government in its efforts to improve operations, relieve congestion and increase the handling capacity in the ports subsector. The project would provide for infrastructure development at two key ports in China, modern equipment needed to operate the new facilities, as well as technical assistance and training to strengthen the ports' management, improve operating capabilities, and address long term aspects of port development.
Project Description:	The proposed project includes developments at Shanghai port which consist of: (a) the construction of general and multipurpose terminals at Baoshan and Guangang comprising eight berths each; (b) the construction of two coal handling berths at Zhujiamen; (c) the reconstruction of four berths at the Minsheng terminal; (d) the construction of an 80,000-ton capacity grain silo; (e) the acquisition of cargo handling equipment; (f) a study to develop a port costing and management information system framework to help China's ports in establishing cost-based tariffs; (g) a review of the Master Plan of Shanghai port by a panel of experts; and (h) the

carrying out of a number of measures to improve the efficiency and safety of the port.

Risks: The only possible risk in the project is that it may be delayed in the course of construction. On the basis of preparations already made by SHB, this risk is not considered to be a serious one.

Estimated Project Cost (Shanghai Port):	Local	Foreign	Total
		(US$ million)	
Civil works	81.5	125.7	207.2
Equipment	7.1	38.6	45.7
Technical assistance and training	0.6	2.7	3.3
Subtotal	89.2	167.0	256.2
Contingencies			
Physical	0.6	1.2	1.8
Price	1.1	5.2	6.3
Total Project Cost	90.9	173.4	264.3

Financing Plan (Shanghai Port):			
Bank loan	-	46.4	46.4
Port/Government	90.9	125.4	216.3
Japan and others /a	-	1.6	1.6
Total	90.9	173.4	264.3

Estimated Disbursements (Shanghai Port):

Bank FY	1989	1990	1991	1992	1993
			(US$ million)		
Annual	11.6	10.7	13.0	7.8	3.3
Cumulative	11.6	22.3	35.3	43.1	46.4

Economic Rate of Return (Shanghai Port): 18%

Maps: IBRD 20746 and 20747

/a Inclusive of US$0.7 million from Cr. 1664-CHA.

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NINGBO AND SHANGHAI PORTS PROJECT

SHANGHAI PORT

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This report is based on the findings of pre-appraisal and appraisal missions which visited Shanghai in October 1987 and March-April 1988, respectively. The appraisal mission comprised Messrs. M. S. Parthasarathi (Economist), Kek Choo Chung (Port Operations Specialist), S.M.L. van der Meer (Port Engineer/Consultant), Billy Cheng (Financial Analyst/Consultant), Andrew Zador (Bulk Handling Specialist/Consultant), G. U. Fortunati (Environment Specialist/Consultant) and Cai Chengzhang.

TABLES

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SHANGHAI PORT PROJECT [1]

I. THE TRANSPORT SECTOR

1.1 Chinese policy statements repeatedly identify transportation and energy shortages as the two most critical bottlenecks in the economy. The rapid growth of China's economy in recent years has stimulated an increasing demand for the shipment of commodities of all sorts, and for passenger travel as well. Efforts to reduce waste within the transport system (for example, by eliminating cross-hauling of the same commodity, increasing the processing of raw materials before shipment, and increasing the intensity of road and waterway utilization) are certainly desirable, and are being pursued. More fundamentally, however, the Government's strategy for solving transportation shortages will have to rely on an expansion of the system's capacity, by increasing the productivity of existing facilities wherever possible and by building new facilities where necessary.

A. Traffic

1.2 Freight Traffic. Domestic freight transported in 1986 by all modes reached 1,383 billion ton-km, representing an 8% increase over 1985 and an average annual growth rate since 1952 of almost 9%, consistently higher than the growth of domestic product. By the year 2000, domestic freight traffic could be in the range of 3,000 billion ton-km. The modal split has moved toward a more balanced use of modes, with the railways' dominant share of 82% in 1952 reduced to 63% by 1986.

1.3 Passenger traffic reached 459 billion passenger-km (p-km) in 1986, up 7% over 1985 and representing an average annual growth rate of 11% since 1978 and almost 9% since 1952. This illustrates the increasing demand for travel as income grows. It is likely that this growth would have been even more rapid if it had not been constrained by the limited capacity of the transport sector, particularly the railways, to offer more passenger services. Railways are the major passenger carrier, handling 56% of the traffic in 1986. Despite the rapid growth of passenger traffic in recent years, the mobility of the Chinese people is still much lower than that of people in countries with comparable income levels. By the turn of the century, passenger traffic may well reach about 1,500 billion p-km per year.

1/ The Shanghai Port Project is a component of a proposed project (Ningbo and Shanghai Ports Project), the other component being for Ningbo Port. The Shanghai component is referred to in this report as the Project.

B. Investment

1.4 Over the period 1953-85, some Y 154 billion, or 14% of all new investments under central government control, went to transport. In comparison with other countries, annual levels of transport investment appear to have been on the low side, a factor contributing to transport now being a bottleneck to economic development. For example, by 1983, 30 million tons of coal had accumulated in Shanxi Province for lack of transport, and some of this stockpiled coal was destroyed by spontaneous combustion. Despite a recent policy of curtailing production to match available transport, the volume of coal stockpiled in Shanxi has again begun increasing. Rural areas are short of transport, both for agriculture and for other rural enterprises. In the ports, lack of proper handling facilities is hampering trade in bulk commodities such as fertilizers, cement and grain. In the coming decades, a much larger investment effort will be needed in transport if these bottlenecks are to be overcome.

C. Land Transport Systems

1.5 The railway system, in 1986, consisted of some 52,000 route-km, of which about 10,600 km are double or multiple-track and 4,430 km are electrified. The network is served by 12,270 locomotives, 314,540 freight cars and 22,140 passenger coaches. At present, 61% of tractive power is still steam, 33% diesel and 6% electric. Freight traffic density averages 16.7 million net ton-km per route-km which is the second highest freight density in the world after the Soviet Union, and nearly twice that of the United States. Freight traffic reached 877 billion t-km in 1985. Growth averaged 5.6% p.a. since 1978, and reached 7.8% in 1986. Three-quarters of all freight traffic involves ten commodities including coal, timber, iron and steel, grain and construction materials. The passenger traffic density of 4.9 million passenger-km per route-km is now the world's highest. In 1986 1.1 billion passengers were carried. The average annual increase since 1978 has been 10%. Despite some possible rationalization in the transport of raw materials and heavy industrial outputs, there is no question but that the transport demand for the major commodities will continue to grow rapidly. Thus, although its share of the total is expected to decrease, rail traffic will continue to grow, requiring massive investments in line capacity, motive power and rolling stock well into the future.

1.6 The highway system comprised about 962,800 km in 1986, of which about 204,000 km were asphalt paved, about 758,800 km, gravel and sand paved. Despite impressive expansion of the road network since 1949, when only some 80,000 km of motorable roads existed, the roads in China today are inadequate because: (a) pavement strength and quality are poor; (b) there are many thousand kilometers of extremely rough macadam-surfaced roads carrying in excess of 300 average daily traffic (ADT); (c) congestion is severe near cities, due to the mixing of slow and fast moving traffic; and (d) there are gaps of about 4,000 km in major national roads linking large cities and provincial capitals. The road network and road transport in China today can therefore only be characterized as underdeveloped. Road maintenance, however, is well organized and currently absorbs much of the attention and resources of the provincial and other local road authorities. Except in western China, the

Except in western China, the highway network is still very much a system of feeder roads to the railways. Nevertheless, motor traffic has reportedly grown at a very high overall annual average of 15% on the national highways since 1978.

D. Transport Issues and Objectives in the 1980s

1.7 The transport system has been severely taxed by the pace of recent economic development and capacity constraints are evident in all modes. Coal transportation is a particularly serious case because of its significance for energy supply and hence for industrial growth. At present, transport is a greater constraint on the supply of energy than coal mine development. China also needs to substantially expand its port and waterway facilities to relieve the growing constraint to external trade caused by inadequate berth capacity and container handling capability. There is need for dramatically expanded road transport, to serve a multiplicity of needs, including access to and from ports. Increasing specialization and rapid growth of light manufactures has created an urgent demand for better road transport and integrated intermodal (IIM) services. Road transport will also be called upon to meet a growing share of the demand for passenger transportation from an increasingly mobile population.

1.8 China's Seventh Five-Year Plan (7th FYP, 1986-90) recognizes all these sectoral needs. By the end of the Plan period, freight traffic is projected to be 45% higher than in 1985, and passenger traffic 60% higher, with a greater share of the increase falling on road transport. To meet these needs, substantial investments are envisioned, especially in new rail lines, double-tracking and electrification of existing lines, new highways, and more berths at deep-water ports. The Plan also proposes to secure efficiency gains in transportation from operational improvements; these include the development of integrated intermodal transportation networks, in particular for coal transportation and for import/export trade, and technological improvements such as container-handling facilities and intermodal transport terminals. To facilitate these developments, the Plan envisions significant institutional changes in the sector, including an extension of the policy of separating the functions of government from those of operating enterprises and delegating greater authority to the latter (recently begun in the ports subsector). Continuing adjustment of the prices charged for transportation services is expected to assist the funding of investments in the sector from internally generated resources.

1.9 The Bank subscribes to the Government's objectives for development of the transport sector, and is supporting its initiatives with both financial and technical assistance. Three railway projects (Loans 2394-CHA, 2540-CHA, 2678/Cr. 1680-CHA) have assisted the expansion of capacity on key routes and the manufacture of electric locomotives, passenger coaches and signalling equipment; a Fourth Railway Project, approved by the Executive Directors on June 23, 1988, provides for strategic studies for technological modernization, as well as expansion of line capacities and manufacturing facilities. Four highway projects (Loan 2539/Credit 1594-CHA, Loan 2811/Credit 1792 and two additional projects approved by the Executive Directors on June 9, 1988) involve the construction or improvement of both national and rural roads.

Port-related activities are described in paras 2.21-2.22. Besides these subsector-specific operations, the Bank has recently begun to assist the Government in the conduct of strategic studies and implementation of projects of a wider nature: a review of the utilization of water transport was completed in 1987, a comprehensive transportation study for Guangdong Province is in progress, and a provincial transport sector project is under preparation for Jiangsu Province which includes highway and inland waterway improvements.

II. THE PORTS SUBSECTOR

2.1 China has 15 major deep-water ports; six of these (Shanghai, Dalian, Qingdao, Qinhuangdao, Huangpu and Tianjin) handle over 80% of the total traffic. Shanghai, with 102 berths, is one of the ten largest ports in the world. In 1987 it handled 128 million tons of cargo and more than 12 million passengers. Ningbo Port, which is close to Shanghai, is one of China's few natural deep-water ports, and is the only deep-water port on China's mid-eastern seaboard. There are also many minor ports along China's 2,000-km coastline and 110,000 kms of navigable waterways.

A. Port Traffic

2.2 In comparison with other developing countries, China's port traffic is low in relation to the size of its economy. However, it is now growing rapidly following the opening of the economy to foreign trade: between 1977 and 1986 traffic at the 15 major ports more than doubled to 344 million tons. Tonnages of domestic and foreign cargoes are increasing about equally, but foreign traffic is growing at a faster rate. Foreign trade is expected to continue growing in step with the economy as a whole; the Seventh Five-Year Plan envisions total port traffic reaching 500 million tons by 1990, which will be more than 50% higher than the 1985 volume. About one third of total traffic is coal which mainly moves from northern coal loading ports for distribution through ports on the south and east coasts. Bottlenecks in coal transport are seen as a major constraint to continued rapid economic growth. Other bulk and semi-bulk cargoes also feature prominently in water-borne traffic. These include iron ore, grain, fertilizer, construction materials, timber and cement. General cargo usually comprises between 10% and 20% of the traffic at the major ports.

2.3 Introduction of cargo unitization has only just begun, and the future potential for growth in unitized cargo movements (containers, pallets, etc.) is very large. In 1986, total port container traffic was 620,000 teu (twenty-foot equivalent units). In the first eight months of 1987, total containerized cargo amounted to 3.3 million tons, and this represented a 21% increase over the same period in 1986. Presently, there are 21 ports which handle containers and altogether there are 13 specialized container berths with a total throughput capacity of over 1 million teu.

B. Organization and Management

2.4 One of the most important challenges facing the management of China's ports is how the ports are going to adapt to changing circumstances brought about by the economic reforms. While the reforms were first initiated in China in 1979, the port sector has only recently begun to be affected when the Ministry of Communications (MOC) started the process of port decentralization in 1984. Key ingredients of the reforms in the port sector will be self-financing of port operations and investments from internal cash generation, and increasing competition among ports for cargo. Prior to the reforms, MOC set tariffs, allocated cargo, provided grant financing for major investments, covered any deficits, and received all of the surpluses generated by the ports. Presently, only a portion of the total cargo is allocated; tariffs for unallocated cargo are allowed to be set competitively within a narrow band, and profits are retained by the ports and are subject to taxes. The tax arrangements however, tend to be ad hoc (usually fixed lump sum payments), and are apparently based on the needs of individual ports to retain surpluses. In the future, the government plans to progressively reduce controlled allocation of traffic, reform tariffs and taxation policies, and eliminate grant financing of investments.

2.5 The first port to be decentralized was Tianjin under a "Pilot System Reform" introduced in 1984 in which the primary leadership of the port was tranferred from MOC to the local government. This has meant that the port received a great degree of autonomy in management, investment planning and control over its finances. As part of the decentralization arrangement, Tianjin port also was exempted from paying any profits tax up to the year 1990. In 1986, the ports of Shanghai and Dalian were also decentralized with somewhat modified provisions regarding taxes and grant financing of investments. They are required to pay a fixed lump sum tax, require MOC approval of large investments, and will receive some grant financing through 1990. Huangpu port was similarly decentralized, though specific provisions were again slightly different. All of the remaining ports under MOC control are to be decentralized by the end of 1988.

2.6 The main objectives of this program of decentralization are to develop the capability and initiative of the ports' local managements, and to increase co-ordination between port development and the development plans of the region served by a port. Further, it is expected that the need to be financially self-sufficient and to compete for cargo will encourage efficiency in the ports sub-sector. Recent comments by Chinese leaders have expressed satisfaction with the program in general, and while it is still too early to evaluate the different models adopted, it appears that future policy will tend to be more even handed and uniform in its treatment of various ports. Key elements of that policy will relate to taxation, tariffs and the financing of investments, and in order to develop efficient policies in these areas, there is a need to improve the information available on port operations, costs and finances. In support of the Government's initiatives in this area, the Bank is assisting MOC in conducting a number of studies including research on alternative organizational forms employed in other countries and development of port costing systems (para. 2.20).

C. Operations and Maintenance

2.7 All major ports in China operate around the clock with a three-shift system, but operations are increasingly hampered by congestion inside the port areas. One major factor contributing to congestion is over-aged and outmoded equipment; another is excessive reliance on break-bulk cargo handling methods which have been replaced in most major ports of the world by various forms of cargo unitization (containers, pallets, etc.). Another factor is a lack of adequate hinterland transport capacity at most of China's major ports. In addition, the tariff structure is distorted (paras. 2.15-2.20) and fails to provide incentives for efficient utilization of existing facilities. In particular, the current port tariff does not encourage the efficient use of limited port storage facilities or the use of more efficient unitized cargo handling techniques.

2.8 Port congestion peaked in 1985 when average ship delays for foreign trade vessels were as high as 11 days. This improved somewhat in 1986 as a result of government restrictions on imports, but port congestion is beginning to increase again. These expensive ship delays can be traced to a number of deficiencies in addition to the lack of an adequate number of berths. Poor documentation procedures and inadequate information systems in the ports often lead to delays caused by documents not being available in time, and/or the port not having the right equipment available when a ship is ready to start loading/discharging cargo.

2.9 There is also a need to rationalize cargo movements. In many of the southern and eastern ports, a large proportion of the traffic involves ship-to-ship or ship-to-barge transfers, some of which could be avoided by direct movements between smaller ports through the use of modern sea-going barges capable of operating on both coastal routes and inland waterways. MOC has begun efforts to rationalize traffic flows, and as part of the proposed Ningbo Port Project, a study of cargo and shipping movements in the mid-eastern region will be undertaken.

2.10 Efforts are under way to improve the productivity of port operations. Recently, the ports of Shanghai and Dalian have each retained consultants to review their operations, identify weaknesses and recommend improvements. At the ports of Ningbo, Xiamen and Shanghai, the Bank has similarly mounted major reviews of operations and maintenance, and has agreed with these ports on action plans to improve performance within a reasonable time frame. The problems with productivity in China's ports, however, have less to do with poor operational practices, and are more related to the lack of adequate specialized facilities. As a result bulk cargoes are often being handled inefficiently at break-bulk facilities. Container handling capacity is well below the potential for containerized cargo, and little attention has been given to achieving productivity improvements through cargo unitization. There is a clear need to improve the availability of specialized bulk handling facilities and to increase the level of cargo unitization for break-bulk cargoes.

2.11 Excessive reliance on break-bulk handling has resulted in berth productivity levels for general cargo often being as low as 50% of that

achievable with unitized cargo handling. Whereas in foreign trade some progress has been made through containerization, in the domestic trade little has been achieved to date. Palletization of break-bulk cargo and through movement of pallets are feasible and cost-effective means for increasing unitization of domestic break-bulk cargo, and savings would result both from improved productivity and from reductions in cargo damage and loss. The problems to be overcome however are both technological and institutional, with the latter being perhaps the more critical. MOC has initiated efforts to introduce through pallet concepts with a pilot scheme to be implemented between Guangdong Province and Hainan Island. Lessons learned there, especially concerning the organization of through transport movements, will benefit not only the introduction of through pallets in the domestic trades, but also the through movement of containers in foreign trade. It must, however, be emphasized that many of the initiatives needed are beyond the power of the ports: for instance the need for tariff reform (para. 2.18), and the coordination of other entities, such as freight forwarders, involved in the through movement of cargo.

2.12 Inadequate rail and road links in a number of the ports hinder the smooth flow of cargo through the ports, cause congestion in port storage facilities, and increase costs to shippers. The proper interfacing of different transportation modes is an aspect of port development which is now receiving the urgent attention of MOC; however, only road connections are within MOC's own jurisdiction, while railways are the responsibility of the Ministry of Railways (MR). MR is itself facing a serious shortage of capacity, and the coordination of its own priority projects with those of MOC is important.

2.13 Each major port has its own maintenance works and port equipment is kept serviceable, although much of the equipment suffers frequent breakdowns because of age. The most serious maintenance problem is siltation at the estuarine ports and this requires considerable routine dredging. Some of the dredging may be excessive and could be reduced through hydrographic work to provide a better understanding of estuarine flows.

D. Investment Priorities and Technology

2.14 In the 7th FYP, Government proposes to invest over ¥ 10 billion in the port subsector. Major investments include 120 deep water berths and 80 smaller ones, which together with other improvements would increase deep-water harbor capacity to 500 million tons by 1990, more than 50% above that in 1985. One of the Government's priorities for the 7th FYP is to update technology. For ports, this will involve in particular: (a) palletization and containerization of break-bulk cargo; (b) specialized handling equipment for bulk cargo, the majority of which is now mixed with general cargo handling, resulting in low efficiency; and (c) computerization of documentation flow and management information.

E. Tariffs

2.15 The structure and level of port tariffs are determined jointly by the MOC and the State Price Bureau. The present tariff structure was set up

in 1978 (and was revised in 1985 for foreign trade vessels) on the basis of a somewhat arbitrary allocation of costs to the different port services. The structure also reflects all the distortions inherent in the prices of the different factor inputs. As a first step in rationalizing tariffs, the MOC has agreed to undertake a port costing study with the assistance of the Bank (para. 2.20).

2.16 There are two tariffs in China's ports, one for foreign trade and another, lower one for domestic trade. In foreign trade, it is understood that foreign ships pay the published harbor dues and charges while Chinese ships (COSCO) pay lower rates. About 80% of all Chinese cargo is carried in vessels owned or operated by the China Ocean Shipping Company (COSCO), which is controlled directly by MOC. In national terms, port tariffs paid by COSCO are little more than a transfer payment between two parts of MOC. Tariff rates could be set for efficiency objectives, but instead they seem to reflect the relative financial strengths of COSCO and the ports and their different investment requirements. By contrast, rates for foreign vessels seem to be set on the basis of what the market will bear. A 40% increase was effected in February 1985, but there was no increase in the lower rates charged for domestic vessels.

2.17 There are no shipping conference rates for Chinese ports and the ports only rarely pay demurrage charges for ship waiting. Charter contracts usually include an allowance for ship waiting time, but these charges are paid by the cargo owner, not by the port. Recently, however, ports have been signing despatch agreements with ship operators guaranteeing a certain turn around time, with demurrage charges payable by the port if the time is exceeded or premiums payable by the ship if it is handled faster. Usually the premiums far exceed the demurrage charges.

2.18 Tariff reform is necessary both to assure the future financial health of the ports and to ensure that port tariffs provide incentives for efficient utilization of port assets. In many instances the present tariff structure is inefficient on both counts. For instance, the relative prices for handling break-bulk cargo, palletized cargo and container cargo do not reflect costs and actually discourage shippers from the introduction of more efficient unitized cargo handling technology. Also, relatively low port storage charges encourage shippers to over-utilize port storage facilities thereby causing congestion in the ports. Therefore, in approaching port tariff reform it is important to focus not only on the level of tariffs but also on the structure.

2.19 Existing tax agreements between the ports and the Ministry of Finance are due to expire in 1990, and future tax and tariff policies are presently under review. In order to establish new tax and tariff policies which will ensure both the financial health of the ports and the efficient utilization of port facilities, there is an immediate need to improve the information available on port operations and finances. In a number of areas, the information systems now in place are inadequate. Ports have an insufficient awareness of the cost of providing specific services and the adequacy of depreciation funds and other funds needed to cover future liabilities. Further, in view of the elimination of grant financing and the

large investments planned for China's ports (to accommodate increased trade flows and recent large increases in domestic transport demand), future financial liabilities of the ports are likely to increase rapidly. For the above reasons, it is now especially important for the Government and port managers to pay special attention to costing port operations, managing their finances, and assuring the long term viability of investments.

2.20 To address the need for an accurate and uniform system of costing at the ports, the Bank has undertaken discussions with MOC on measures to improve management information systems. Terms of reference for developing a Port Costing and Management Information System (PCMIS) were discussed and agreed with MOC, which will be responsible for system development (Annex 5). This effort is to be funded by a grant from the Japanese Government. After the system has been developed under MOC's auspices, it will be tried on a pilot basis at selected ports before adoption at all ports.

F. The Role of the Bank

2.21 The Bank has supported, and will continue to support, the Government's objective of expanding capacity and improving productivity in the ports. The first lending operation in the subsector (Three Ports Project, Ln. 2207-CHA) financed additional container handling capacity in Shanghai, Huangpu and Tianjin and a coal terminal at Huangpu. The second (Tianjin Port Project, Ln. 2689-CHA) is financing the construction of eleven additional berths at Tianjin for timber, construction materials and general cargo. The third, Huangpu Port Project (Ln. 2877/Cr. 1845), finances the construction of five additional berths in the Xinsha area of Huangpu port for coal, iron ore, bulk fertilizer and general cargo. The fourth, Dalian Port Project (Ln.2907/Cr.1875), finances the construction of a new terminal at Dayao Bay for container and break-bulk cargo.

2.22 Earlier Bank port projects supported management systems improvement with project components addressing computer development, technical studies, training, and containerization of cargo. The work of Bank missions has also been instrumental in developing Chinese expertise in the economic evaluation of investment projects, and in updating various aspects of port operations. A study component in the project will help determine the most economic pattern of development for the various ports in mid-eastern China, including, in particular, Shanghai and Ningbo.

G. Experience in Past Lending

2.23 Construction of the Three Ports Project (for Shanghai, Tianjin and Huangpu) was completed one year later than envisaged at appraisal. There was a considerable foreign exchange cost saving under the project as a result of bids being lower than expected, and $55 million of the original loan of $124 million was cancelled. The project was problem free. For Shanghai, this project was limited to providing equipment for two container berths. The Tianjin Port Project ($130 million) was approved in April 1986. Implementation is on schedule. Loan Agreements on the Huangpu Port Project and the Dalian Port Project were signed recently, and implementation is on schedule.

2.24 A number of studies in the port and shipping subsectors have been initiated under previous Bank projects. These include a containerization study which was completed by the Comprehensive Transport Research Institute in 1985. Recent investments in container facilities have benefited from the insights provided by this effort. Studies included under ongoing port projects include an "Intermodal Cargo Distribution Study" as part of the Huangpu Port Project (in the south) and a similar effort to be undertaken in the Dalian Port Project (in north China).

III. THE PORT OF SHANGHAI

A. Location and Facilities

3.1 The Port of Shanghai, one of the ten largest ports in the world, is the largest port in mainland China, and the primary gateway to Eastern and Central China. Because of its location at the confluence of the Huangpu and Yangtze Rivers, it allows sheltered water access to the dense network of inland waterways in the region, a major factor in its attractiveness as a transportation hub.

3.2 The port is situated on the banks of the lower Huangpu River, which flows into the Changjiang (Yangtze River) at Wusong, about 90 km from the mouth of the Changjiang. The entrance to the Huangpu river from the Changjiang is protected by the Wusong groin to keep sediment away from the entrance. The Changjiang entrance channel is subject to heavy siltation and is maintained to a controlling depth of 7 meters below MLW by dredging. The annual dredging volume is of the order of 20 million cubic meters. The tides are semi-diurnal with an average range of about 2.7 meters. These conditions limit entry to the port to vessels with a maximum draft of 9.5 meters. Vessels with a greater draft have to be lightened at the Luhashan anchorage at the Changjiang estuary entrance. Lightening takes place by means of an anchored 100,000 dwt bulk carrier equipped with ship unloaders/loaders.

3.3 The Shanghai Harbor Bureau (SHB) owns 102 berths, 50 of which have a depth alongside of 8 to 10.5 meters. The berths, totalling over 14 km in length, are located along both banks of the Huangpu river, all within the Shanghai urban area. The city of Shanghai surrounds the port on both sides of the river, thus severely constraining any expansion of the port at its present location. The berths are operated by 12 "handling companies" (stevedoring districts) and a passenger terminal company. In addition, SHB operates a large number of mooring buoys in the Huangpu river, many of which are used for mid-stream lightering operations.

3.4 With the exception of District 7, which specializes in bulk coal handling, the districts handle a variety of cargo types and may be considered multipurpose terminals. Of the 102 berths, 20 are specially equipped for dry bulk handling and four are equipped to handle containers. The remaining berths are used for semi-dry bulk, break-bulk general cargo and passenger operations. Twenty of the berths date back to the 1920-40 period and are in poor condition. Some 30 berths would need major upgrading to be operationally adequate.

3.5 The port employs a great variety of equipment from very old to quite modern ones and of many different makes. Modern, high capacity ship unloaders, fast conveyors and stacker-reclaimers may service one berth, while the neighboring berth may have small cranes, short, sectional conveyors, and a very small storage area equipped with outdated machinery. The port is planning gradually to phase out older, inefficient equipment but is hampered in this effort by antiquated depreciation policies for equipment and a general reluctance to write off obsolete equipment.

3.6 The port has about 1,400,000 m^2 of storage space, of which some 370,000 m^2 is covered. Much of this space is in poor condition. The average storage area availability of 14,000 m^2 per berth is inadequate for efficient cargo operations. Unfortunately, the port's location in the built-up urban area of Shanghai precludes enlargement of existing storage areas.

B. Hinterland

3.7 Geographically the hinterland of the port includes the provinces of Anhui, Hubei, Hunan, Jiangsu, Jiangxi, Zhejiang and the municipality of Shanghai. This area accounts for some 38% of China's industrial and agricultural output, 25% of its population, but only 10% of its land area. However, a small area within 200 km from the port accounts for over 90% of the port's traffic and the Shanghai Municipality alone for 70%. This is the port's real economic hinterland.

3.8 Some 70% of cargo moving to and from the hinterland uses water transport, either the inland canals or the Changjiang. The major transport corridors to the larger hinterland are the Changjiang, the Shanghai-Hangzhou corridor in Zhejiang province, and the Shanghai-Changzhou corridor in Jiangsu province. The latter two corridors are served by road and rail as well as by barge.

3.9 Both the railway and highway in these corridors are, however, congested and their connections with the port are very inadequate. Of the 12 port districts, only 3 districts on the West Bank have rail connection. Access by road also is poor because most port traffic must transit city streets and, while over half the port's cargo is handled on the East Bank of the Huangpu river, cross river traffic is restricted to a single tunnel and a number of ferry crossings. Truck traffic, particularly to and from berths on the East Bank, is subject to substantial delays. Construction of additional fixed river crossings now underway and planned will alleviate the trucks delay problem somewhat. However, road and rail access can only become efficient as the port gradually moves out of the city, as envisioned in the port's master plan.

C. Traffic

3.10 Total traffic handled by the port of Shanghai increased from 55 million tons in 1976 to 128 million tons in 1987, an average annual growth of over 8%. Traffic handled by SHB in that year amounted to some 100 million tons, while 28 million tons were handled by cargo user terminals. In addition, SHB handled about 13.0 million passengers in that year. Coal accounted

for 38% of the port's total cargo. Other bulk cargo such as petroleum (9%), iron ore (9%) and grain (6%) were significant elements in port traffic. General cargo amounted to some 14.5 million tons (11%), including 224,000 TEU of containerized cargo. About 70% of the total cargo was inbound and 80% was domestic cargo.

3.11 Total Shanghai port traffic is projected to increase to a total of 142 million tons by 1990 and 197 million tons by the year 2000. Of this, SHB expects to handle 113 million tons and 165 million tons in 1990 and 2000 respectively, an average increase of 4.0% p.a. This forecast takes into account anticipated traffic development in the neighboring ports of Ningbo, Nantong and Zhangjiagang. Coal, ores, construction materials and general cargo traffic are expected to grow faster than the average rate. General cargo in containers is projected to grow very rapidly, at an average annual rate of more than 15% from the 1987 volume of 2.2 million tons. Details are given in Table 3.1.

D. Operations

3.12 Operations at the port of Shanghai are characterized by the predominance of bulk operations, with coal accounting for almost 40% of all cargo handled. Other operational characteristics of the port are the limitation on vessel size (maximum draft 9.5 m) and the large proportion of cargo (70%) moving to and from the hinterland by water transport. Port operations are hampered by insufficient ship berthing and cargo storage capacity, inadequate rail and road connections and obsolete cargo handling equipment at many terminals. In spite of these conditions, the port has achieved very high rates of throughput per berth, albeit at the cost of excessive vessel and cargo delays and, at times, significant traffic diversion. Berth occupancy factors are 80 to 90% and ship time in port averages 3.4 days per vessel overall and 10.3 days for foreign trade vessels.

3.13 In cooperation with a Bank mission of port specialists that visited the port in October 1987, SHB has identified a number of measures to be taken to improve the flow of cargo through the port. Many of these measures are procedural and operational in character and require joint action by SHB and port-related government and other agencies and enterprises. As a result, they will take time to design and implement. Longer term measures will be pursued under the review of the Master Plan by a panel of experts, agreed to be undertaken as part of the project (see Annex 3 for Terms of Reference). A number of short-term measures, which are under SHB's control, have been agreed and also form part of the project (see Annex 4 on Proposed Action Plan).

E. Environment

3.14 The port and city of Shanghai have developed together along the banks of the Huangpu river. Today, the Municipality of Shanghai covers some 61,100 km^2 and has a total population of 12 million. The "built-up" area of the City covers some 150 km^2 and has a population of over 6 million. Port facilities are located in the city on both banks of the Huangpu river, up to its confluence with the Changjian, and occupy 14 km of waterfront. A review of the environmental protection program of SHB by Bank consultants in October

1987 and March 1988 showed that the port administration is sensitive to the need to minimize the adverse environmental impact of its operations and has an adequate program in place. The contribution by the port to the environmental problems of Shanghai are very small in relation to those of industry, power and households. The Huangpu river, which serves as the main source of drinking water for Shanghai, is heavily polluted since it serves also as a drain for a substantial part of the City's industrial and human waste: it receives about one million cubic meters of waste water daily from the 12 million residents and 9,000 factories in the city. Major improvements in waste water disposal are under way as part of a Bank-financed sewerage project (Ln. 2794/Cr. 1779-CH).

3.15 The port contributes marginally to this pollution, mainly through accidental oil spills and spillage of coal and other bulk cargo (fertilizer); these are most likely to occur during mid-stream cargo operations. Port management is conscious of pollution and safety requirements and has taken a number of steps to protect the environment from its activities. Areas in which improvements are needed have been discussed with SHB and appropriate actions have been included in the agreed Action Plan (Annex 4).

F. Management and Organization

3.16 The port of Shanghai has a two-tier organizational structure: SHB which incorporates all central functions organized as departments, and a group of port-owned operating units organized as corporations or companies (see charts). Since 1986, SHB, which is administratively responsible for the operation and development of the port, has been under the dual jurisdiction of Shanghai Municipality and the Ministry of Communications (MOC). Prior to 1986, it was a local unit of MOC. SHB's new charter, approved by Shanghai Municipality, was reviewed by the Bank and found satisfactory. SHB is now charged with implementing a policy of financial self-sufficiency and must support both its operations and investments from internal cash generation. SHB employs a total of some 54,000 staff, of whom 1,200 are engineers, technicians, and around 9,000 are managers and administrative staff.

(a) Shanghai Harbor Bureau

3.17 SHB is responsible for the management and operation of port-related facilities, and for the planning, design and construction of port facilities. It manages all common user wharves and docks, buoys, anchorages and other facilities engaged in serving the transportation of passengers and goods. It is charged with the collection of various harbor, construction, service, and transportation fees, and enforcement of laws and regulations affecting the port, which are not under the control of the Harbor Superintendency. SHB is responsible for coordinating its development planning with the Master Development Plan of the Municipality of Shanghai and the government's five-year and annual operating plans.

(b) Port Districts and Corporations

3.18 The individual enterprises (including districts), which make up the second tier of the port organization, replicate most of the organizational activities of SHB, and are usually organized into four departments and supporting divisions. The relationship between the districts and SHB is defined in contracts which determine, inter alia, allocations of cargo, distribution of district level profits, and productivity targets.

(c) Shanghai Harbor Superintendency

3.19 The Shanghai Harbor Superintendency (SHS), a department of MOC, is responsible for ship movements, ship safety and channel maintenance, and is organized along these principal functions. SHS has a total staff of 3,000, of whom 1,700 are assigned to channel maintenance, and the remainder are engaged in ship movement and harbor traffic control. On average, there are some 6,000 vessels in the harbor on any day. The ship movement control system is managed by five control stations linked by telephone, while communications with ships are carried out by radio telephone. SHS has jurisdiction over ship movements along the East China coast (23°N to 35°N) and maintains all navigational aids in this area.

(d) Quality Control Commission

3.20 A quality control commission has been set up under SHB, charged with setting performance standards and targets. The work of the commission is divided into six categories: operational decision making; production-dispatching; technical assurance; capital construction development; training and services; and personnel motivation. After setting targets, the commission has to obtain approval from the staff and workers' congress, an elected body, before submitting the targets to the Port Director. During the year, information on performance is fed back and targets are revised every six months.

(e) Four Port Commission

3.21 The four major regional ports--Shanghai, Ningbo, Nantong and Zhangjiagang--have established a commission to coordinate cargo allocation and future port development. The commission is organized under the auspices of the Shanghai Economic Zone Planning Office.

G. Planning, Budgeting, Accounting and Audit

3.22 The long-term development plan of the port of Shanghai is prepared by SHB and submitted to the MOC and the State Planning Commission (SPC) for approval. Since decentralization in 1986 when it came under the jurisdiction of Shanghai Municipality, the port's development projects need the approval of the Municipality also. It is not the intention of the Municipality to exercise more control over the port but to ensure that the port's development fits into the city's Master Plan and also to support the port's development, for example, through the provision of access roads. SHB prepares the annual budget which is then submitted for approval to Shanghai Municipality.

3.23 SHB operates an accrual-based accounting system and follows accounting procedures laid down by the MOF. Its chart of accounts and the form of its financial statement (income statement and balance sheet) are as prescribed by MOC for the ports. Consolidated statements are prepared annually for SHB and its subordinate enterprises and, with the addition of a funds flow statement, these will be acceptable to the Bank for the purposes of financial reporting.

3.24 SHB's capital construction accounts for new construction are kept separately from those of the subordinate operating enterprises. Replacement of assets is also not included in the fixed assets accounts of the operating enterprises. The source of funds for capital construction and for purchase of equipment are the following:

- Self-support fund (from SHB surpluses),
- Special funds (from government),
- World Bank loans,
- Local loans (from construction bank), and
- Japanese loans (through China Investment and Trust Co.).

The loans are used on a current account basis and are shown only in the capital construction accounts.

3.25 On completion of a project, the assets together with the corresponding loan and interest during construction, if any, are transferred to the operating enterprise's accounts. No profit or loss is made on the construction of physical facilities or the purchase of equipment.

3.26 Besides the internal audit procedures applied by the port and the subordinate enterprises, external audit of SHB was done till 1986 by the State Audit Administration (SAA). Since decentralization, the audit of the port's accounts has been carried out by the Auditing Bureau of the Shanghai Municipality (under the guidance of the State Audit Administration). This is acceptable to the Bank as an independent external auditor. At negotiations, assurances were obtained from SHB that it will submit no later than six months after the end of each financial year: (i) its audited financial statements to the Bank covering all its subordinate enterprises, and (ii) audited accounts of the project expenditures.

IV. THE PROJECT

A. Project Objectives

4.1 The objectives of the proposed project are to help the port of Shanghai increase its cargo handling capacity and efficiency in the short-term and lay the basis for a sound long-term strategy for the port to serve the large and growing transportation needs of its hinterland. The project would help increase cargo handling capacity and efficiency by (a) providing equipment for two general purpose terminals (Baoshan and Guangang) and a coal terminal (Zhujiamen) now under construction, together with the equipment needed to operate them, and (b) rehabilitating, equipping and expanding the

capacity of the Minsheng grain terminal. Most importantly, it would help lay the basis for a sound long-term strategy for the future development of port facilities at Shanghai through the carrying out of a comprehensive review by a panel of experts of the Master Plan for the port of Shanghai recently completed by SHB. (Annex 1 contains a list of documents available in the Project File.)

4.2 For the last several years, the Shanghai Harbor Bureau has been working on the preparation of a master plan for the long-term development of the port. A master plan document entitled "General Layout Projection of the Port of Shanghai" dated February 1988 was made available to the Bank at the time of project appraisal. The general thrust of the physical development, i.e. away from the center of the city and the Huangpu river toward the Changjiang and Hangzhou Bay, had been discussed with previous Bank missions and endorsed by the Bank. In view, however, of the magnitude and far-reaching consequences for the future of Shanghai and its economic hinterland of the investment decisions to be made, it was agreed that the Master Plan would be reviewed by a panel of experts to be established and chaired jointly by the Bank and the Shanghai Harbor Bureau. Terms of Reference for this review were agreed during appraisal and are attached as Annex 3. The review is expected to provide the basis for further financial assistance from the Bank in the development of the port of Shanghai.

B. Description of Main Project Items

4.3 The proposed project consists of:

(a) the construction of a multi-purpose terminal at Baoshan, consisting of eight berths, three of which would be designed to handle containers;

(b) the construction of an eight-berth general cargo terminal at Guangang;

(c) the construction of two coal handling berths at Zhujiamen;

(d) the reconstruction and rehabilitation of four berths at the Minsheng grain terminal;

(e) the construction of an 80,000-ton capacity grain silo;

(f) the acquisition of cargo handling equipment for (a), (b), (c) and (e) above, including container cranes for the Baoshan terminal and bulk coal and grain handling equipment for the Znujiamen and Minsheng terminals, respectively;

(g) the carrying out of a study to develop a port costing and management information system to enable China's ports to monitor costs and introduce a more rational, cost-based tariff structure (para. 2.20 and Annex 5);

(h) the carrying out of a review by a panel of experts of the Master Plan prepared by SHB under terms of reference agreed between SHB and the Bank (Annex 3); and

(i) the carrying out of a number of measures designed to improve the efficiency and safety of the port, according to a Plan of Action agreed between SHB and the Bank (Annex 4).

4.4 The Baoshan terminal will be located 25 km from the city of Shanghai on the south bank of the Changjiang, 4 km west of its confluence with the Huangpu river. The total wharf length will be 1,408 m divided into six berths for ocean-going ships (includng three for handling container ships), and two for handling river barges, smaller boats and vessels. The depth of water would vary from 4 m to 9.4 m. The terminal will have a storage area of 202,700 square meters, about one half of it for containers.

4.5 The Guangang terminal will be located 18 km upstream of the city on the Huangpu river. The total length of berth for ocean-going ships will be 1,450 m, with a cargo storage area of 224,000 square meters, in addition to which 1,070 m of wharf length is to be provided for river barges. The terminal will handle ocean-going general cargo ships as well as river barges. The Zhujiamen coal terminal will be situated in Pudong at the lower reaches of the Huangpu river 13 km from the center of the city. The terminal will be 303 m long: the unloading berth will be 208 m long and the loading berth 95 m long, with two storage yards of 30,000 m^2 each. The water depth will be 10 m and the terminal will handle 4 million tons of coal each year.

4.6 The four-berth grain terminal at Minsheng is located on the east bank about 21 km from the Wusong entrance to the Shanghai harbor. The existing dilapidated facilities will be torn down and reconstructed to include four new berths, storage yards and an 80,000-ton capacity grain silo. The water depth will be 10 m with a total berth length of 738 m. Of the four berths, one will handle bagged rice, one bagged sugar and the other two grain in bulk. The total capacity of the terminal will be 5.3 million tons.

4.7 The principal element in the agreed plan of action is the review of the port's master plan by a panel of experts constituted by SHB with Bank agreement. The panel began work in late September 1988 and is expected to complete its work in September 1989. The plan of action also includes a number of measures to improve operations, maintenance and the environment. The proposed training program will provide training to managers, technicians and workers in modern port operating techniques that will be necessary to operate efficiently the new facilities to be developed at Baoshan, Guangang, Zhujiamen and Minsheng under the project.

C. Ecology and Environment

4.8 The project will not adversely affect the existing ecology of the port of Shanghai and its environs. The designs of all four terminals incorporate features to reduce the level of pollution now associated with similar operations. In Guangang, which is upstream and close to the source of water supply for the city, the design includes features for the treatment of

the waste water that would be generated by the terminal which would render the effluent harmless. At Minsheng, the new grain handling facilities will greatly reduce the dust and noise pollution associated with the current operations. At Zhujiamen, elaborate provisions have been incorporated in the design of the coal handling facilities to keep coal dust pollution to a minimum, while allowing the closing down of an antiquated, coal dust generating operation at the No. 2 terminal. At negotiations, understanding was reached with SHB that all environmental measures incorporated in the project designs will be implemented as proposed.

D. Cost Estimates

4.9 The total project cost is estimated at Y 1,002.06 million, with a direct and indirect foreign exchange component of Y 661.39 million, or US$173.41 million. Project cost estimates are detailed in Tables 4.1-4.5 and are summarized below:

SUMMARY OF PROJECT COST ESTIMATES /a
(July 1988 Prices)

	Local	Foreign	Total	Local	Foreign	Total	Foreign as % of Total	% of Total Project Cost
	--- (RMB Y million) ---			---------- (US$ million) ----------				
Civil works	301.85	464.96	766.81	81.58	125.66	207.24	61	78
Equipment	26.19	142.93	169.12	7.08	38.63	45.71	89	18
Subtotal	328.04	607.89	935.93	88.66	164.29	252.95	66	96
Tech. assistance and training	2.18	10.06	12.24	0.59	2.72	3.31	82	1
Base Cost	330.22	617.95	948.17	89.25	167.01	256.26	66	97
Physical contingency	2.13	4.43	6.56	0.58	1.20	1.77	68	1
Price contingency	8.32	39.01	47.33	1.10	5.20	6.31	82	2
Subtotal	10.45	43.44	53.89	1.68	6.40	8.08	79	3
Total	340.67	661.39	1,002.06	90.93	173.41	264.35	66	100

/a The project is exempt from taxes and duties.

Implementation of the project has already begun and civil works for Baoshan, Guangang and Zhujiamen are well advanced and cost estimates for these are

Implementation of the project has already begun and civil works for [illegible]han, Guangang and Zhujiamen are well advanced and cost estimates for these are based on the prices of contracts already awarded. These contract prices are not subject to variation. Estimates of the cost of civil works at Minsheng are based on preliminary designs; a physical contingency of 10% has been provided. Price contingencies have been allowed for the civil works at Minsheng and for all equipment included in the project. Price contingencies for local costs assume increases of 7% for 1989 and 6.5% per year for 1990 and thereafter. Price contingencies for foreign costs assume annual increases of 3% for 1989 and 1990 and of 4% for 1991 and thereafter. The technical assistance and training will involve some 300 staff-months of specialists' services. Equipment to be procured under the project (with estimated costs) is listed in Tables 4.2-4.5.

E. Financing

4.10 Financing for the project will be provided as follows:

(in US$ million)

Item	Total Cost	Proposed Bank Loan	Second TCC (Cr. 1664)	Govt/ SHB	Other
Civil Works	210.91	2.00	-	208.91	-
Equipment	50.13	43.70	-	6.43	-
Technical Assistance and Training	3.31	0.70	0.72	1.03	0.86
Total	264.35	46.40	0.72	216.37	0.86

4.11 The Bank loan will be made to the People's Republic of China and will be used to finance the foreign exchange cost of civil works for the silo at the Minsheng terminal, the procurement of equipment for all terminals under the Project, and the provision of technical assistance and training. The foreign costs of the panel of experts to review the Master Plan will be met from the Second Technical Cooperation Credit (Cr. 1664-CH), and those for the study of port costing and management information system will be financed by a grant from the Japanese Government. The remaining foreign costs and all local costs would be financed by the Government and SHB. The proceeds of the loan will be onlent to SHB, in accordance with GOC's established policy for on-lending to enterprises in the ports subsector, at 6.2% for 20 years, with a grace period of five years. Signature of a subsidiary loan agreement satisfactory to the Bank is a condition of loan effectiveness.

F. Status of Preparation

4.12 Civil works at the Baoshan, Guangang and Zhujiamen terminals are underway. Construction of the Baoshan terminal began in July 1986, the Zhujiamen terminal in October 1986, and the Guangang terminal in July 1987. Work at the Zhujiamen terminal is scheduled for completion by December 1988, and at Baoshan and Guangang by December 1990. The design of improvements for the Minsheng terminal is being undertaken by SHB, and construction is expected to begin in October 1989 and to be completed by March 1992. The silo at the Minsheng terminal will, however, be operational by December,1991.

4.13 Specifications for cargo handling equipment and bidding documents for their procurement are being prepared by SHB. Bid documents for the procurement of cargo handling equipment are expected to be available by November 1988.

G. Implementation

4.14 Implementation of the project elements pertaining to Shanghai port is the responsibility of SHB, under the overall supervision of the MOC Capital Construction Department. MOC will be responsible for carrying out the study for developing the framework for a port costing and management information system, and an assurance to this effect was obtained during negotiations. SHB will be assisted by the China International Engineeering Consulting Corporation in the design of the grain silo at Minsheng and in supervision of construction, with suitable expatriate experts in key areas as required. Civil works and equipment installation in respect of the grain silo at Minsheng are scheduled for completion by December 1991. Cargo handling equipment for Baoshan, Guangang and Zhujiamen is expected to be supplied in the next two years. The schedule of implementation is shown in Annex 6. This schedule is based on the assumption that the proposed loan will become effective by February 1989; the loan closing date will be December 31, 1993.

4.15 The civil works contracts for the Baoshan, Guangang, Minsheng (except for the silo) and Zhujiamen terminals were awarded through local bidding procedures. The remaining civil works (Minsheng silo) will be implemented by contract awarded through international competitive bidding (ICB). Equipment for the Minsheng terminal and other cargo handling equipment also will be procured through ICB, except for the equipment listed in Table 4.6 which will be purchased through LIB and local procurement procedures. This latter equipment is required for the operation of the terminals now under construction, where some berths will become operational commencing from December 1988. In view of the time factor, SHB believes this to be the most efficient and economical way of procuring such equipment, with international contractors or suppliers allowed to participate in all domestic procurement. Advanced contracting for some items had already been undertaken and retroactive financing up to $4.2 million has been agreed upon for these items following Bank review of the actual procedures used to ensure that Bank guidelines had been complied with. Some small items to be agreed with the Bank and amounting to less than US$200,000 per contract, and aggregating less than US$1,000,000 would be procured under contracts awarded after evaluation

and comparison of quotations solicited from at least three qualified suppliers under procedures acceptable to the Bank. All other contracts will be subject to the Bank's prior review of procurement documentation and proposed contract awards.

H. Procurement

4.16 Procurement would be carried out as follows:

Item	ICB	LCB	Other	Total Cost
		(US$ million)		
Civil works	4.00 (2.00)	206.91 (-)	-	210.91 (2.0)
Equipment	43.34 (36.91)	3.01 (3.01)	3.78 (3.78)	50.13 (43.70)
Technical assistance and training	-	-	3.31 (0.70)	3.31 (0.70)
Total	47.34 (38.91)	209.92 (3.01)	7.09 (4.48)	264.35 (46.40)

Note: Figures in parenthesis are the amounts which will be financed by the proposed Bank loan. All figures include estimated physical and price contingencies.

4.17 The civil works contract for the silo at the Minsheng terminal estimated at $4.0 million will be awarded through ICB. The other civil works contracts at the four terminals were awarded through local procedures and are being financed entirely by SHB (US$206.91 million). Prequalification of contractors will be carried out for the civil works contract to be awarded under ICB. Qualifying domestic contractors for such works will receive a preference in bid evaluation of 7.5% of the total contract cost.

4.18 Most of the equipment (US$43.34 million) will be procured through ICB. Bids offering domestically manufactured goods and equipment will receive a preference in bid evaluation of 15% of the c.i.f. price or the import duty, whichever is lower. Some small items to be agreed with the Bank and amounting to not more than US$1.0 million would be procured under contracts awarded after evaluation and comparison of quotations solicited from at least three qualified suppliers under procedures acceptable to the Bank. Items or groups of items, estimated to cost not more than US$7.5 million in total (including contingencies), may be procured on the basis of international bidding by direct invitation and competitive bidding advertised locally in accordance with procedures satisfactory to the Bank. Equipment and materials which SHB

plans to procure following local bidding procedures (including prudent shopping) will only be financed from the Bank loan if a review demonstrates that procurement procedures used were in conformity with the Bank's Guidelines. Consultants for the technical assistance and training components will be recruited in accordance with Bank Guidelines for the use of consultants.

I. Disbursement

4.19 Disbursement from the proceeds of the loan will cover: (a) 100% of the foreign costs of equipment or 100% of the local ex-factory costs, and 75% of the cost of other items procured locally; (b) 50% of the total costs of civil works for the silo at Minsheng, and (c) 100% of the costs of technical assistance and training. Disbursement will be made against full documentation except for small contracts for equipment and materials worth less than US$200,000 each, and technical assistance and training, which will be disbursed against statements of expenditure (SOE). Supporting statements for the SOEs will be kept in the office of SHB and will be available for inspection by Bank supervision missions. A schedule of estimated quarterly disbursements is shown in Table 4.7; it follows the disbursement profile of port projects in China. The loan closing date is December 31, 1993. A special account with an authorized allocation of US$3.0 million (approximating 4 months' expenditures) will be set up to enable SHB to handle small disbursements directly and promptly. To expedite project implementation, SHB has made arrangements for purchasing about US$4.2 million of equipment and steel structure. Retroactive financing of these items (from October 1, 1987) is included in the loan.

J. Reporting

4.20 SHB will send the Bank a bi-annual progress report; a draft outline for such reports is presented in Annex 7. During negotiations, agreement was reached on the outline of the progress report and the exact timing of its submission to the Bank. Upon completion of the project, the Government and SHB will prepare a project completion report for Bank review and approval.

V. ECONOMIC EVALUATION

A. Introduction

5.1 Based on the congestion currently being experienced in Shanghai port's facilities and the forecast increase in future traffic, the economic analysis primarily focuses on the benefits from relieving congestion in the port. These benefits will derive principally from savings in ship and cargo time in port. In addition, through the introduction of improved cargo handling technology, the project will produce benefits by way of reduced cargo handling costs, particularly on the two berths for handling grain imports at Minsheng.

B. Port Facilities Expansion Plan

5.2 Under the Seventh Five Year Plan (7FYP), the port's capacity is to be upgraded through:

(a) construction of 18 new berths at Baoshan, Guangang, and Zhujiamen, with a total capacity of 10 million tons; and

(b) rehabilitation of 13 existing berths, to increase their capacity by 4.5 million tons.

The proposed project comprises the 18 new berths and the rehabilitation of four berths, and the economic analysis is limited to these components of the investments under the 7FYP.

5.3 Construction of the 18 new berths was begun in 1986, and will be completed in 1990. The berths are expected to become operational in early 1991. Details on berth types and capacities are shown below:

SHANGHAI PORT: 7FYP NEW BERTH CONSTRUCTION

District	Number of Berths	Type of Berth	Capacity per berth (per annum)
Boashan	1	Container	52,000 TEUs
	1	Timber	440,000 tons
	4	Multipurpose	250,000 tons
	2	Barge berths	-
Zhujiamen	1	Coal loading)	2,200,000 tons
	1	Coal unloading)	
Guangang	8	Multipurpose	250,000 tons
Minsheng	1	Bulk grain unloading)	3,300,000 tons
	1	Bulk grain loading)	
	1	Bagged rice	1,200,000 tons
	1	Bagged sugar	800,000 tons

The capacity estimates are generally based on about 90% berth occupancy, which would be above the economically optimal capacity when ship waiting costs are taken into account.

C. Future Traffic

5.4 The proposed project will provide facilities to handle break-bulk, container, timber, coal, and foodgrain traffic. The volume of cargo handled by SHB is projected to grow at only 4% p.a., from 100 million tons in 1987 to 165 million tons in the year 2000. This reflects a deliberate government

policy to divert cargo from Shanghai to other ports in the region in order to relieve the serious congestion in the port facilities at Shanghai. Coal traffic is projected to grow at only 3.0% p.a. and timber at 2.1% p.a. However, break-bulk traffic is projected to grow at 7.8% p.a. and containerized traffic at 15% p.a. Grain traffic is expected to grow only modestly, at around 1% p.a. Details of the traffic forecasts involved in the economic evaluation are shown in Table 5.1 and summarized below:

SHANGHAI PORT TRAFFIC FORECAST
(million tons)

	1987	1990	1995	2000	Average Growth (% p.a.)
Total Cargo	100.0	103.0	121.0	137.0	4.0
of which:					
Coal	39.0	40.0	40.0	55.2	3.0
Timber	4.3	5.1	5.3	5.5	2.1
Break-bulk	14.5	29.4	32.0	34.2	7.8
Container	2.5	4.6	8.3	12.0	15.0
Foodgrains	5.7	5.6	5.9	6.4	1.0

D. Impact on Operations

5.5 With the exception of container facilities, Shanghai port will face severe congestion in all of its facilities by the early 1990s without the investments planned under this project. The container facilities will begin to experience heavy congestion from the mid-1990s.

5.6 With the project, congestion in break-bulk, container and timber berths is unlikely to occur until the late 1990s. Coal facilities, however, will continue to face congestion, even with the additional berth, though the extent of congestion will be less. The rehabilitated and improved grain handling facilities will significantly reduce the cost of grain handling, while eliminating loss and damage in handling. The table below summarizes the impact of the project on port congestion in Shanghai:

PROJECT IMPACT ON PORT CONGESTION -
YEAR IN WHICH 90% BERTH UTILIZATION OCCURS

	Break-bulk	Container	Coal	Timber
Without Project	1987	1990	1989	1989
With Project	1995	1995	1995	2000

Operational parameters used in the economic evaluation are given in Tables 5.2(a) to 5.2(e).

E. Costs and Benefits

Project Costs

5.7 For this analysis, all inputs and outputs have been evaluated in constant July 1988 economic prices. Financial cost estimates were converted to economic costs by "shadow" pricing major cost components and by applying aggregate conversion factors estimated in previous Bank studies. Price contingencies, taxes and duties are excluded. For traded goods, c.i.f. prices of imports and f.o.b. prices of exports were used in estimating the cost of material and equipment, with adjustments for the cost of inland transportation. The official exchange rate in March 1988 was used to convert foreign currencies to Yuan. Conversion factors for various cost categories have been estimated in two ways:

(a) For major items such as wharf construction, handling equipment and reclamation and consolidation, by separately "shadow" pricing each cost component; and

(b) for minor items such as utilities, auxiliary buildings and ancillary facilities, by applying aggregate conversion factors estimated in previous Bank studies.

Conversion factors for major items are close to one; the overall for the project is 1.05. The factors derived for the various cost items have been applied to the table of annual project expenditures to obtain the stream of project economic costs (Table 5.3).

Project Benefits

5.8 The proposed project will yield quantifiable benefits in the form of savings in cargo handling costs, ship time, and cargo time (Table 5.4). In the case of foodgrains, there would also be savings in the form of reduction in loss and damage. In addition, there will be benefits from reduced environmental pollution, particularly in the case of coal and grain handling, which are not quantified.

5.9 Savings in Cargo Handling Cost. Some savings are expected from handling general cargo over the new berths, compared with existing berths, but these will be relatively small. However, without the project, the only way to handle general cargo traffic in excess of available berth capacity would be through more costly lightering. SHB estimates lightering costs to be 3 to 4 times normal handling costs. Detailed estimates of handling cost savings are shown in Table 5.5. Lightering has been assumed for cargo tonnage in excess of berth capacity at 95% occupancy, at a cost three times that of normal handling. Substantial savings in the cost of handling grain at Minsheng are expected.

5.10 Savings in handling costs have been converted to economic benefits by "shadow" pricing the main cost components of normal handling and of lightering. Conversion factors of 1.05 for berth handling and 1.1 for lightering were used. These factors were estimated in a previous Bank study for the Tianjin Port Project.

5.11 Savings in Ship Time. These include both reductions in ship time waiting for berth and at berth due to improved cargo handling. Estimates of ship waiting time with and without the project are shown in Tables 5.4 (a)-(e). Ship costs in port are based on the ship cost model developed by the Bank, updated to reflect recent world market prices. The annualized ship resale value plus operating costs have been used to calculate project benefits. The annual resale value of ships has been assumed to reflect the presently depressed state of the shipping industry; it gives a slightly lower rate of return than the annualized replacement value of ships.

5.12 Savings in Cargo Time. Savings in ship time apply also to cargo: the benefit is interest saved on the value of cargo. For domestic cargo, the marginal source of working capital would be loans from PBC at 6.5-7.5% interest. For foreign cargo, the higher foreign exchange working capital needed would require more foreign borrowing, and it is assumed that this would be at China's marginal cost of capital of around 12%. Roughly 80% of all cargo passing through Shanghai is in domestic trade. Interest savings have, therefore, been calculated assuming an average rate of interest of 8.0% p.a.

5.13 Total project benefits for the items discussed above are presented by year in Table 5.6. The major part of project benefits would be in ship time savings. These would accrue first to ship owners and could be passed on to cargo owners. As the vast majority of ships calling at Shanghai are either Chinese owned (COSCO) or Chinese operated, it is expected that 90% of the project benefits will accrue to China directly.

F. Overall Evaluation and Sensitivity Analysis

5.14 Table 5.7 (a)-(e) set out the rate of return calculations for the various project components; Table 5.7 (f) shows the rate of return on the entire project. The "base case" rate of return is 18% for the project as a whole, with ERRs ranging from 15% for the break-bulk facilities at Baoshan to 33% for the timber facilities, 21% for the coal berths, 15% for container berths, and 30% for the grain facilities at Minsheng. The sensitivity of the economic returns and the Net Present Value (NPV) of the project to variations in costs and benefits is summarized as follows:

	ERR	NPV (@ 12% discount rate (Y million)
Base case	18.2	414
15% increase in cost	15.5	375
15% reduction in benefits	15.0	313
15% increase in cost combined with 15 reduction in benefits	12.4	273
1-year project delay	15.2	378

5.15 The only foreseeable risk in the project is that it may be delayed in the course of construction. On the basis of preparations already made by SHB and its past record, this risk is not considered to be a serious one.

VI. FINANCIAL ANALYSIS

A. Past Results

6.1 SHB's financial results for 1984-87 are shown in the Table 6.1; the salient points are summarized below:

	1984	1985	1986	1987
Net revenue (Y million) /a	402.8	547.1	601.3	627.9
Operating profit (Y million)	234.0	344.7	349.9	343.9
Net profit after taxes (Y million)	22.9	44.6	255.5	234.6
Operating ratio	42.0	37.0	42.0	45.0
Return on assets employed (%) /b	-	45.0	42.0	38.0

/a Excluding taxes
/b At historical costs

6.2 Tariff rates for foreign trade ships in all Chinese ports were increased in 1985 and SHB's net revenue and operating profit improved as a result. In 1986 and 1987, it deteriorated slightly because of a small change in the traffic pattern in favor of the less profitable domestic traffic. Otherwise, the growth of earnings was driven mainly by traffic volume, while operating costs have been carefully controlled, rising during the last three years by little more than the rate of inflation. Unit costs of handling at Shanghai are among the lowest of the major Chinese ports. The jump in net

profit in 1986 was a function of the change in SHB's tax liability, which went down that year as part of the Government's policy of decentralization, including shifting the major responsibility for financing new investments to SHB.

B. Present Financial Position

6.3 At the end of 1987, SHB's financial condition was very sound. Current assets substantially exceeded current liabilities, with almost half of current assets in the form of cash. The salient points of the balance sheet (Table 6.2) are as follows:

	Y million
Fixed assets	965
Current assets	301
Special fund assets	366
Total Assets	1,632
Equity	880
Long term debt	85
Current liabilities	219
Special funds	448
Total Liabilities	1,632

6.4 Long-term debt comprises only the Bank loan (Loan 2207) for the Three Ports Project. The low (9%) debt content in total capitalization reflects the Government policy prior to 1986, in which funding for capital expenditure was provided by the Government exclusively in the form of grant. In 1986, SHB was given considerable scope to finance capital expenditure from retained earnings. The income tax and adjustment tax, to which its profit had previously been subject, were cancelled. For the remainder of the 7th FYP, SHB will pay a flat Y 72.5 million p.a. in lieu of income tax. The remainder of its profit will be applied to repayment of loans, special funds contribution and capital expenditure.

C. Future Financial Performance

6.5 Financial projections suggest that SHB is unlikely to have to resort to local loan funds to finance its planned capital expenditures--at least through 1990, the last year for which detailed expenditure estimates are available. For the period 1986-90 (7th FYP), SHB's financing plan is as follows:

	Y million
Internal funds	1,640.3
IBRD loan	216.1
Other grants and credits	2.6
Total	1,859.0
Less: Special Fund Expenditure	583.2
Loan repayment	2.5
Working capital change	19.4
Capital expenditure	1,253.9

6.6 Although the availability of adequate cash flow for capital expenditure gives no cause for concern at this point, SHB nevertheless will have to take responsibility for the direction of its own future financial affairs to a much greater degree than in the past, when most of the profit was handed over to the Government and capital expenditures were financed by Government grants. During negotiations, assurances were obtained from SHB that it will continue to conduct its financial affairs so as to cover all its costs of operations (including depreciation) from operating revenue, and to meet from internally generated funds all its financial obligations including debt service, remittances to the Government, and allocation to special funds.

VII. AGREEMENTS REACHED AND RECOMMENDATIONS

7.1 During loan negotiations, an assurance was obtained from the Government of China that it will onlend the proceeds of the Bank loan to SHB on terms and conditions satisfactory to the Bank (para. 4.11).

7.2 During negotiations, understanding was reached with GOC that it will utilize the proceeds of the Japanese grant to meet the foreign cost of the development of a port costing and management information system and an assurance was obtained that MOC will carry out the study in accordance with terms of reference agreed with the Bank (para. 4.11).

7.3 Assurances were be obtained from SHB on the following:

(a) review of the Master Plan of the port of Shanghai based on the agreed Terms of Reference (para. 3.13);

(b) an Action Plan to improve the efficiency and environmental condition of the port (para. 3.13);

(c) submission to the Bank of its audited financial statements covering all its subordinate enterprises, including audited accounts of the project expenditures, not later than six months after the end of each financial year (para. 3.26);

(d) employment of expatriate experts acceptable to the Bank to assist in the supervision of the construction of the grain silo (para. 4.7); and

(e) satisfactory management of its finances (para. 6.6).

7.4 An understanding was reached with SHB that it will implement the environmental measures incorporated in the design of the project (para. 4.8).

7.5 Approval of the loan agreement by China's State Council and the conclusion of a subsidiary loan agreement between the Government and SHB, are conditions of loan effectiveness (para. 4.11).

7.6 Subject to the above, the proposed project provides a suitable basis for providing financing of US$46.4 million equivalent for SHB as part of a Bank loan of $76.4 million equivalent to the People's Republic of China for 20 years, including five years of grace, at the standard variable interest rate.

CHINA

SHANGHAI PORT PROJECT

Documents Available in Project File

1. The Introduction of the Project of Boashan Stevedoring District.
2. Brief Introduction of the Project of Shanghai Harbour Zhujiamen Coal Terminal.
3. Introduction of the Project of Guangang Handling District.
4. The Report on Wharf Conditions in Minsheng Stevedoring District.
5. Plan for the Reconstruction Project of Minsheng Stevedoring Corporation.
6. Explanation of the Additional Project of Building a New Silo at Minsheng.
7. Harbour Regulations of the Port of Shanghai.
8. General Layout Projection of Port of Shanghai.

ANNEX 2

CHINA

SHANGHAI PORT PROJECT

Training Program

1. Shanghai Harbor Bureau (SHB) employs about 54,000 personnel. Management constitutes about 15% (8,100); technicians and skilled workers make up approximately another 35% (19,000). Management staff, technicians and skilled workers are usually university, college or technical school graduates.

2. SHB is responsible for the training of its staff. Training is provided through on-the-job training, by technical schools and colleges in China and, to a lesser extent, at overseas institutions and ports. As the port progresses towards more technologically based operations increased training of its staff in more sophisticated port operation and management techniques has become necessary. The training requirements, resulting from the development of port terminals at Baoshan, Guangang, Zhujiamen and Minsheng, have been estimated as follows:

	Container	General purpose	Bulk handling	Total
	(number of personnel)			
Management	150	100	150	400
Technicians	150	150	100	400
Workers	500	1,000	500	2,000
Services	100	180	120	400
				3,200

3. Over the time span of the Project, training will be scheduled as under:

	Number of personnel
1989	300
1990	800
1991	800
1992	1,300
	3,200

4. Whilst considerable training will be undertaken within China and in traditional form, increasing use of institutions and ports overseas, especially for the management grade, will be resorted to. Equipment suppliers will provide the necessary technical training in the use/operation and maintenance of equipment, and stevedores will be trained on the job. Training at overseas ports and institutions is estimated at 120 man months, made up of:

Management, 40 persons, one month each - 40 m/m;
Technicians, 60 persons, one month each - 60/m/m; and
Workers, 20 persons, one month each - 20 m/m.

The total cost of training under the Project is estimated at US$700,000, of which the foreign cost is estimated at US$600,000.

CHINA

SHANGHAI PORT PROJECT

Terms of Reference for the Expert Panel to be Established by the World Bank and the Shanghai Harbor Bureau to Review the Master Plan of Shanghai Port

Introduction

1. The Port of Shanghai has embarked on an extensive program of investments initiated under China's 7th Five Year Plan (FYP) and extending to the 9th FYP (1995-2000). The program calls for upgrading 30 of the 98 existing berths and building approximately 60 additional berths. Implementation of this program is planned on the following schedule:

	Berth Upgrading	New Berths
7th Five Year Plan	13	16
8th Five Year Plan	12	20
9th Five Year Plan	6	20

Under the 7th FYP, construction of new facilities at Baoshan, Guangang and Zhujiamen has been initiated and is expected to be completed by 1990. SHB is now making economic, technical, engineering, etc. preparation and plans for new berth construction to be carried out in the 8th and 9th Five-Year Plans.

2. In order to guide and rationalize future investments, SHB has prepared a Master Plan for the Development of Shanghai Port. The Master Plan document was submitted to the World Bank for review in March 1988. A detailed table of contents of the Master Plan document is attached. In discussions between SHB and the World Bank, both parties agreed on the necessity to arrange an expert panel to review the Master Plan so as to provide the basis for further financial assistance from the World Bank to SHB, possibly in the form of a sector loan.

3. The Panel will be chaired jointly by the World Bank and the Shanghai Harbor Bureau. It will have an Executive Secretary who will have the authority and responsibility to coordinate the work of the panel members. Continuity in the service of the panel members is vital and every effort will be made to ensure it.

Scope of Responsibilities

4. The Panel will review the master plan with a view to ensuring: that it is adequate for the foreseen needs of Shanghai Port to the year 2000 and several years beyond; that it is well integrated with both the development plan for the city of Shanghai and regional development plans; that the investments proposed are economically justified and are technically feasible; that the plan is environmentally acceptable, and is responsive to the environmental problems presently associated with the port; that institutional development and port operational needs are adequately addressed in the plan; that the increase in inland physical distribution capabilities is adequate to the needs; and that the role and functions of the Port of Shanghai in the international container trade are defined.

5. The Panel will review the methodology and results of economic and engineering investigations that have been carried out in support of the plan. Where additional investigations are required, the Panel will prepare terms of reference for such investigations, review study proposals, monitor the technical aspects of studies, and review reports and recommendations. On the basis of these reviews, the Panel will make specific recommendations on any needed modifications to the Master Plan. In discharging its responsibilities, the Panel will maintain close liaison with MOC, Shanghai Municipality, and the Shanghai Economic Zone Planning Office.

Specific Areas to be Considered by the Panel

6. In reviewing the Master Plan, the Panel will specifically consider the following aspects:

(a) the traffic forecast to the year 2000 and several years beyond for the Port of Shanghai and for the ports of Ningbo, Nantong and Zhanjiagang to determine whether the forecasts for each port and for port traffic in the region as a whole are coordinated and the allocation of traffic among the ports is appropriate, and takes due account of likely future changes in Asian shipping patterns and vessel technology, including the penetration of containers and other forms of cargo unitization for general cargo, liquid bulk, dry bulk and refrigerated cargoes;

(b) the hinterland connections to the port by inland waterways, road and rail transport to determine their adequacy and whether planned investments in transport infrastructure in the region are well coordinated with the port master plan;

(c) land use by the port, in particular existing facilities in the city center locations, to determine whether the eventual distribution of port facilities in and around the city is the most appropriate use of land, and whether the potential handling capacities of the existing terminals and opportunities to carry out future port activities outside of congested urban areas have been fully examined in the master plan;

(d) environmental impact of the port on the city of Shanghai, to determine whether current problems associated with the port such as air and water pollution, traffic congestion, safety hazards of conducting dangerous cargo operation in close proximity to populated areas, have been adequately addressed in the master plan;

(e) operational efficiency of current and proposed port facilities, in particular whether scale economies available from specialization of cargo terminals for the handling of specific bulk commodities are taken full advantage of in the master plan, and whether such economies would allow either a reduction in the total number of new berths envisaged or the phasing out of some of the old berths located in busy downtown areas, or both;

(f) the organizational structure of the port and the institutional development necessary to support its future activities, in particular the need to implement improved management information systems, cargo documentation and control procedures, customs facilitation, operational documentation and control procedures, operational planning procedures, maintenance procedures and financial controls;

(g) manpower development of managerial, technical and other staff to determine whether adequate attention has been paid to training requirements in the master plan;

(h) the technical and engineering feasibility of proposed facilities and the adequacy of background studies that have been conducted in support of the master plan including alternative site locations, oceanographic and hydrographic studies, model tests, cost/benefit analyses, layouts, approaches, type of structures and the foundation and soil consolidation conditions at proposed sites. Special attention is to be given to the controlling depths for navigation as affected by siltation, current and wave action and the associated dredging requirements, and the subjects for further studies shall be identified; and

(i) strategic planning for the port: is it a continuous process based on a clear definition of the future role of the port in the regional economy and the priorities placed on servicing specific industries and commodity movements, are investment plans consistent with the strategic objectives of the port, and are they properly conceived in terms of economic feasibility and the financial viability of the port.

Fields of Expertise to be Represented on the Panel

7. The Panel shall include experts in the following fields:

(a) port planning and operations;

(b) coastal and hydraulic engineering, soil mechanics and port engineering;

(c) regional development, urban planning and transport economics;

(d) environmental engineering;

(e) port finances, management information and controls; and

(f) training.

Administration and Reporting

8. Panel members will travel to China twice for discussions and for onsite investigations. It is estimated that the visits will each be of about four weeks' duration; each visit will be preceded by approximately a two-week preparation period, and will be followed by approximately a four-week report writing period. During the first visit the Panel will conduct an initial review of the master plan, will identify areas requiring further investigation, and will prepare the necessary TORs for such investigations. The second visit will be scheduled for three to six months later, during which time the additional investigations recommended will be completed by SHB as far as possible. In the second visit the Panel will review the results of the above investigations and any modifications to the master plan which have been proposed in the interim. The Panel will then present its final report endorsed by the two co-chairmen to SHB and the World Bank. Only two formal reports will be required. Both should be in the nature of summary reports, with the exact format and scope to be decided by the Panel.

9. The Panel will keep SHB, the World Bank and the Government of China informed in writing of matters arising from its duties which it considers important. SHB will arrange for the distribution of such memoranda internally and to the Government as appropriate.

Schedule

10. The exact scheduling of the Panel's work and the specific reports and memoranda will be left to the Panel. The following key dates are provided for guidance only:

(a)	Establishment of the Panel	September 1988
(b)	Commencement of Panel's work in Washington together with co-Chairmen and Chinese counterparts	September 1988
(c)	First field visit by Panel	October 1988
(d)	First report	December 1988
(e)	Completion of additional investigations	April 1988
(f)	Second field visit	June 1989
(g)	Final report	September 18, 1989

Undertakings of SHB

11. SHB undertakes to provide the following:

(a) a suite of offices to accommodate the Panel members during their visits to China;

(b) English translations of the master plan document and any other supporting documents relevant to the work of the Panel;

(c) interpreters to accompany Panel members during site visits, meetings and interviews; and

(d) appropriate Chinese counterpart staff.

ANNEX 3
Attachment

Contents of Master Plan to be Reviewed by the Expert Panel Established by the World Bank and the Shanghai Harbor Bureau

CHINA

SHANGHAI PORT PROJECT

Proposed Action Plan

A. Master Plan Review

1. The Action Plan agreed between SHB and the Bank has as its main focus a comprehensive review of the Master Plan for the Port of Shanghai, prepared by SHB. This review, by a panel of experts, jointly chaired by the Bank and SHB, is expected to provide the basis for further financial assistance from the Bank (see TOR, Annex 2). (The panel was set up in Sept. 1988 and will complete its work in Sept. 1989).

2. A number of more immediate operational and maintenance improvements and improvements in the storage of dangerous goods, identified during previous Bank missions, have also been agreed and are listed below. These will be implemented by December 1989.

B. Operational Improvements

1. To relieve congestion in the storage facilities of various stevedoring districts, SHB should:

   (a) increase the trucking capacity of the Shanghai Harbor Cargo Evacuation Company;

   (b) increase cargo handling capacity at the Jiangwan inland cargo terminal by providing additional cargo handling equipment, especially for containers; and

   (c) increase further the punitive storage rent for cargo lying in the districts' warehouses/storage areas after the first 10 days.

2. SHB should request the Shanghai Public Security Bureau to issue additional truck licenses to the Shanghai Harbor Cargo Evacuation Company.

3. Cargo receiving and dispatching should operate on the same schedule as berth operations to reduce congestion in sheds and storage areas.

4. Ship delays: Causes of ship delays after completion of service should be identified and appropriate action should be taken to remove them and thus expedite ship departures.

C. Maintenance Improvements

1. Civil Works: Review the repair criteria and implement needed reductions in degradation thresholds for the initiation of repair work.

2. Equipment: Retire obsolete equipment with a view to reducing spares and inventory requirements. Implement a strict preventive maintenance program and a spares and supplies inventory management system. Pay particular attention to high wear-and-tear items, such as conveyor belts and wire ropes, and examine the need to substitute imported for domestic items which experience frequent failures.

D. Dangerous Goods Storage

1. Store low flashpoint cargo outdoors.

2. Apply a progressively increasing storage rent for dangerous goods to have them moved out quickly and to minimize quantity in storage in the port.

3. Large posters should indicate nature of material stored under cover.

4. For toxic material spill, an emergency clean-up plan must be prepared.

5. Firefighting personnel and port workers must be regularly trained in appropriate response to incidents involving different types of dangerous cargo.

CHINA

DEVELOPMENT OF A PORT COSTING AND MANAGEMENT INFORMATION SYSTEM

TERMS OF REFERENCE

I. BACKGROUND

1. One of the most important issues facing the management of China's ports is how the ports are going to adapt to changing circumstances brought about by the economic reforms. While the reforms were first initiated in China in 1979, the ports sector has only recently begun to be impacted, after the Ministry of Communications (MOC) started the process of port decentralization in 1986. Key ingredients of the reforms in the port sector will be self-financing of port operations and investments from internal cash generation, and increasing competition among ports for cargo. Prior to the reforms, MOC set tariffs, allocated cargo, provided grant financing for major investments, covered any deficits, and received all of the surpluses generated by the ports. Presently, only a portion of the total cargo is allocated, tariffs for unallocated cargo are allowed to be set competitively within a narrow band, and profits are retained by the ports subject to taxes (which arrangements tend to be ad hoc, with usually fixed lump sum tax payments, based on the needs of individual ports to retain surpluses). In the future, the government plans to progressively reduce controlled allocation of traffic, reform tariffs and taxation policies, and eliminate grant financing of investments.

2. Tariff reform is necessary not only to assure the future financial health of the ports, but it is also equally important to ensure that port tariffs provide the right incentives for efficient utilization of port assets. In many instances the present price structure is inefficient. For instance the relative prices for handling break-bulk cargo, palletized cargo and container cargo do not reflect costs and actually discourage shippers from introduction of more efficient unitized cargo handling technology. Also, relatively low port storage charges encourage shippers to over-utilize port storage facilities thereby causing congestion in the ports. Therefore, in approaching port tariff reform it is important to focus not only on the level of tariffs but also on the structure, i.e. the relative prices established by the tariff structure.

3. Existing tax agreements between the ports and the Ministry of Finance are due to expire in 1990, and future tax and tariff policies are presently under review. In order to establish new tax and tariff policies which will ensure both the financial health of the ports and the efficient utilization of all port facilities, there is an immediate need to improve the information available on port operations and finances. In a number of areas, the information systems now in place are inadequate. Ports have an insufficient awareness of the cost of providing specific services and the adequacy of depreciation funds and other funds needed to cover future liabilities. Further, in view of the elimination of grant financing and the large investments planned for China's ports (to accommodate increased trade

flows and recent large increases in domestic transport demand), future financial liabilities of the ports are likely to increase rapidly. For the above reasons, it is now essential to provide the government and port managers with effective tools for costing port operations, managing their finances, and for assuring the long term viability of investments.

4. Development and implementation of a Port Costing and Management Information System (PCMIS) will enable MOC, MOF and the ports to better assess the financial health of ports, and to better evaluate alternative taxation and pricing policies. PCMIS will also allow port management to exercise greater control over costs by isolating the costs of various port operations, equipment, facilities and organizational units, and monitoring cost variances from planned or budgeted allocations of funds.

II. PCMIS DEVELOPMENT OBJECTIVES

5. PCMIS development and implementation will address the following objectives:

(a) Provide China's ports with a computer based commercial accounting system which captures fully the capital and operating costs of the port, disaggregated to a sufficiently detailed set of cost centers to allow effective management control over costs;

(b) Establish a computer based management information system which provides port management with key operational productivity data on a regular basis in order to allow increased management control over efficiency in port operations;

(c) Establish methods for allocating costs to various revenue categories to calculate both average costs and marginal costs in order to allow comparison of the cost structure with the price (or tariff) structure, thereby enabling development of efficient pricing strategies; and

(d) Provide the capability to make financial projections in the form of pro-forma financial statements based on varying scenarios of future traffic, tariff structures, costs, investments and tax policies, in order to analyze future financial viability of ports and their subsidiary enterprises.

III. PCMIS DEVELOPMENT STRATEGY

6. PCMIS will be developed and implemented in four phases as described below.

Phase I - System Definition Study:

This study will establish the requirements for PCMIS. It will be carried out by a small team of Chinese and foreign experts over a three month period which will include field visits to three ports in China and meetings with MOC, MOF and SPC officials. The output of Phase I will be the study report and an Invitation for Proposals (IFP) for the design and development of PCMIS.

Phase II - Evaluation of Alternative Systems:

Based on the IFP produced in Phase I, proposals will be invited internationally for the design and development of PCMIS. Three management information systems for ports will be selected for final evaluation. A team of experts from China will visit ports using these systems and will assess the applicability of each system to the needs of China's port sector. One of the proposals submitted will be selected for award of a contract covering Phase III of PCMIS development.

Phase III - System Design and Development:

The contractor selected in Phase II will design and develop the computer programs and associated manuals for PCMIS implementation in collaboration with a local institution (see para. 12).

Phase IV - Training and Implementation at Four Selected Ports:

MOC will designate four ports for initial implementation of PCMIS. Port personnel will be trained in the use of PCMIS software, and the system will be installed on computer systems at each port. Further, port managers will also need to be trained in modern management techniques in order to enable them to fully utilize the potential of PCMIS.

7. These Terms of Reference (TOR) set out the responsibilities, scope of work, staffing and organizational arrangements for the execution of the System Definition Study and preparation of the IFP (Phase I above).

IV. SCOPE OF WORK (FOR PHASE I)

8. The System Definition Study should cover the following:

(a) Review of management (MIS), operating (OIS) and financial (FIS) information and port costing systems presently in use in four typical ports in China;

(b) Port organization structures and financial and other reporting requirements, including external relationships with local and central government agencies, and internal relationships between port enterprises and headquarters;

(c) The necessary level of disaggregation in terms of cost and revenue centers to allow effective management control over costs and for costing specific port services;

(d) Means by which data will be collected, and associated data recording formats;

(e) Information needs of management (MIS, OIS & FIS) and the standard reports to be generated periodically by PCMIS; and

(f) Organizational and manpower requirements, including training, for implementation and maintenance of PCMIS.

9. Based on the results of the above Systems Definition Study, the study team will prepare a detailed IFP, to which the study report itself will be attached. The IFP will invite proposals internationally for PCMIS design and development (Phase III above).

V. PROJECT ORGANIZATION AND STAFFING

10. A Task Force will be established by the Finance Bureau of MOC to guide and oversee PCMIS development. The Task Force will include representatives of MOC, MOF, the State Pricing Bureau, the World Bank and senior Chinese port executives with experience in the fields of financial management, port operations, and information systems, as well as a Chinese expert in microeconomics and public utility pricing. In addition, the Task Force will include an international expert on the economic theory of port pricing. Specific responsibilities of the Task Force would include reviewing the reports produced during PCMIS development, evaluation of alternative proposed systems (Phase II), and designating the ports for initial implementation of PCMIS.

11. A Study Team for the Phase I System Definition Study will be established and will report to the Task Force. The Study Team will consist of three or four international specialists in the fields of port financial management, port operations, computer information systems and the economics of port pricing. Three or four local counterpart staff will work with the experts during Phase I. Man-power requirements for the Phase I System Definition Study are described below.

	Man-Months Required	
	Local Staff	Foreign Staff
Financial Management	2	2
Port Economics	2	2
Port Operations	2	2
Information Systems	2	2
	8	8

VI. COLLABORATION WITH LOCAL INSTITUTIONS

12. With a view to maximizing the institutional development possibilities of this project, a local institution will be selected to collaborate closely with PCMIS development efforts. In the longer term, this institution will undertake further development of PCMIS to serve emerging needs of China's port sector for advanced information systems. Potential collaborating institutions will be identified by the Task Force and an institution will be selected in the early stages of the project.

CHINA

PORT COSTING AND MANAGEMENT INFORMATION SYSTEMS STUDY

ESTIMATED BUDGET

		US$
Phase I		
Port Management/Information Systems Specialist	3 mos @ $10,000	30,000
Port Management/Financial Systems	3 mos @ $10,000	30,000
Economist	2 mos @ $10,000	20,000
Port Operations Specialist	2 mos @ $10,000	20,000
Airfares: 6 @ $2,750		16,500
Per Diem: 5 x 30 @ $130		19,500
Secretarial Assistance		5,000
Communications, Miscellaneous		1,000
		142,000
Phase II		
Airfares: 10 Chinese Technical Specialists @ $2,750		27,500
Per Diem: 10 x 30 days @ $150		45,000
		72,500
Phase III		
Senior Information Systems Specialist	12 mos @ $10,000	120,000
Systems Analyst/Programmer	48 mos @ $ 5,000	240,000
Documentation Specialist	6 mos @ $ 5,000	30,000
Technical Translator	12 mos @ $ 5,000	60,000
Airfares: 6 x $2,750		16,500
Per Diem: 6 x 20 x $100		12,000
		478,500
Phase IV		
Port Management Specialist	4 mos @ $10,000	30,000
Financial Analyst	3 mos @ $10,000	30,000
Information Systems Specialist	3 mos @ $10,000	30,000
Airfares: 4 @ $2,750		11,000
Per Diem: 3 persons x 90 days @ $50		13,500
		114,500
CONTINGENCY ALLOWANCE PHASE I - IV		52,500
GRAND TOTAL: PHASE I - IV		860,000

CHINA

SHANGHAI PORT PROJECT

Implementation Schedule

I.	**Baoshan Terminal**	
	A. Completion of civil works:	
	Berths No. 5-8	December 1988
	Berths No. 1-4	December 1990
	B. Equipment:	
	1. Completion of tender documents	April 1988
	2. Invitation of bids	November 1988
	3. Receipt of bids	January 1989
	4. Evaluation of bids	April 1989
	5. Award of contracts	July 1989
	6. Completion of delivery	December 1990
II.	**Zhujiamen Terminal**	
	A. Completion of civil works	December 1988
	B. Equipment:	
	1. Completion of tender documents	April 1988
	2. Invitation of bids	November 1988
	3. Receipt of bids	January 1989
	4. Evaluation of bids	March 1989
	5. Award of contracts	May 1989
	6. Completion of delivery	December 1989
III.	**Guangang Terminal**	
	A. Completion of civil works	December 1990
	B. Equipment:	
	1. Completion of tender documents	April 1988
	2. Invitation of bids	November 1988
	3. Receipt of bids	Jaunary 1989
	4. Evaluation of bids	April 1989
	5. Award of contracts	July 1989
	6. Completion of delivery	March 1991

IV. Minsheng Terminal

A. Civil works:

1. Completion of tender documents	June 1989
2. Invitation of bids	October 1989
3. Receipt of bids	February 1990
4. Evaluation of bids	April 1990
5. Award of contracts	June 1990
6. Completion of construction	December 1991

B. Equipment:

Same as for civil works.

CHINA

SHANGHAI PORT PROJECT

Outline of Semi-Annual Progress Reports

1. The purpose of these reports is to provide information on significant events which occurred during the reporting period, together with an evaluation of progress achieved and the prospects of future progress. To this end, the information contained in the reports should cover at least the following aspects of the project:

(a) physical work accomplished during the reporting period;

(b) a comparison of the actual progress of construction at the end of the reporting period with the original forecast of progress at that date;

(c) actual or contemplated material deviations from the original plans or schedules, except that any such changes which would require prior consultation with the Bank should be reported immediately and subsequently included in the next report;

(d) other changes, events or conditions which would materially delay the construction of the project or increase its cost; and

(e) the expected dates of completion of the principal physical elements of the project.

2. Construction progress should be reported on all the main physical components of the project as follows:

A. Preparatory work

B. Civil works

- Wharf and causeways
- Reclamation
- Pavement
- Utilities, railways, and roadways
- Power supply
- Telecommunications

C. Supervision of construction

D. Consultant's activities and effectiveness.

3. Progress on procurement of the port and cargo handling equipment should be mentioned with particular reference to the:

- Bidding process,
- Manufacturing/supply, and
- Testing and operation.

4. Information contained in the reports relating to the review of the Master Plan and the development of the port and operational information system should cover:

- the selection of consultants,
- the work of the consultants and
- their effectiveness.

5. Reports submitted to the Bank group should include project expenditures and disbursements and a comparison of actuals with estimates, and reasons for deviation, if any.

6. Particulars of port traffic that is actually handled during the reporting period, disaggregated by commodity, so that the appraisal estimates and forecasts can be checked and updated, should be included in the reports.

Text of the Report

The text of the report should describe the work performed on each major item during the reporting period, following the headings given above. Where appropriate the text should include explanations of and comments the following.

(a) Actual or expected material deviations from the original (or amended) plan/design or implementation schedule.

(b) Actual or expected difficulties or delays, any measures taken or planned to correct them, and the probable effects on the implementation schedule.

(c) Expected changes in the completion date of any major part of the project or the project as a whole.

(d) Actual or expected delays in delivery of major items of equipment. Reasons for such delays should be given, and their possible effects on the implementation schedule should be estimated.

(e) Numbers in the work force including the Construction Management Bureau, consultants and contractors.

(f) Any actual or expected event or condition which may affect the cost of the project.

(g) Any unusual occurrences affecting the progress of the project.

Drawings

Drawings showing the plan and sections of the wharf and causeways should be included. Construction progress should be indicated on the drawings by color or other markings.

Construction Schedule

A bar chart should show separately scheduled and actual progress on each of the principal features. Simplified CPM or PERT diagrams, which may present a more comprehensive picture of the schedule and progress than the chart, may be used if necessary.

Table 3.1

CHINA

[illegible] PORT

Port Traffic (1981-2000) /_1

('000 tons)

	Actual												Forecast								
	1981			1983			1985			1986			1987			1990			1995			2000		
	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total
Coal																								
Foreign	13	12	25	27	8	35	320	8	328	467	3	470	171	0	171	610	0	610	892	0	892	1,362	0	1,362
Domestic	16,874	8,280	25,154	19,498	8,673	28,171	23,547	10,452	33,999	26,170	11,187	37,357	28,274	11,395	39,669	37,597	10,918	48,515	47,998	11,457	59,455	60,209	13,794	74,003
Total	16,887	8,292	25,178	19,525	8,681	28,207	23,867	10,460	34,326	26,637	11,190	37,826	28,445	11,395	39,840	38,207	10,918	49,125	48,890	11,457	60,347	61,571	13,794	75,366
Petroleum products																								
Foreign	0	1	1	0	1	1	0	1	1	1	1	2	0	1	1	0	1	1	0	1	1	0	2	2
Domestic	12	1	13	10	1	11	11	1	12	11	1	12	12	1	13	14	1	15	15	1	16	17	1	18
Total	12	2	14	10	2	12	11	2	13	12	2	14	12	2	14	14	2	16	15	2	17	17	3	19
Metallic ores																								
Foreign	1,491	5	1,496	1,992	3	1,995	3,434	1	3,435	4,611	1	4,612	5,635	0	5,635	3,398	0	3,398	4,770	0	4,770	5,721	0	5,721
Domestic	551	1,521	1,072	239	1,947	2,186	845	2,806	3,651	1,333	2,673	4,028	1,885	3,256	5,141	3,485	436	3,921	5,796	446	6,242	5,903	454	6,357
Total	1,042	1,526	3,568	2,231	1,950	4,181	4,279	2,807	7,087	5,944	2,674	8,639	7,520	3,256	10,795	6,883	436	7,319	10,566	446	11,012	11,624	454	12,078
Iron and steel																								
Foreign	1,049	334	1,383	2,889	227	3,116	7,011	71	7,082	6,505	83	6,588	6,255	86	6,341	8,626	87	8,713	9,895	125	9,220	9,898	102	10,000
Domestic	2,750	715	3,465	2,686	1,060	3,744	2,190	2,233	4,423	2,246	2,856	5,102	2,570	2,656	5,226	2,004	3,015	5,019	2,995	3,085	5,180	2,154	3,351	5,505
Total	3,799	1,049	4,848	5,575	1,287	6,862	9,201	2,304	11,505	8,751	2,939	11,691	8,825	2,742	11,567	10,630	3,102	13,732	11,190	3,210	14,400	12,032	3,333	15,365
Construction materials																								
Foreign	5	13	18	1	9	10	10	10	20	15	11	26	0	0	0	0	0	0	0	0	0	0	0	0
Domestic	5,899	726	6,625	6,598	992	7,590	8,284	778	9,062	10,150	1,139	11,289	8,868	985	9,853	10,456	871	11,327	12,683	981	13,664	14,984	1,181	16,165
Total	5,904	739	6,643	6,599	911	7,509	8,294	788	9,081	10,165	1,150	11,315	8,868	985	9,853	10,456	871	11,327	12,683	981	13,664	14,984	1,181	16,165
Cement																								
Foreign	192	294	486	274	34	308	443	13	456	306	12	318	360	9	369	593	9	662	713	9	722	881	9	890
Domestic	86	78	164	140	130	290	201	65	266	420	76	496	343	77	420	235	78	313	240	88	348	300	127	427
Total	278	372	651	414	164	598	644	78	724	726	88	814	643	86	728	828	87	915	981	89	1,070	1,181	136	1,317
Timber																								
Foreign	865	0	865	2,492	1	2,493	3,294	0	3,294	2,107	2	2,109	1,885	0	1,885	2,962	0	2,962	3,121	0	3,121	3,451	0	3,451
Domestic	738	597	1,335	504	1,422	1,926	425	1,539	1,964	299	1,005	1,304	257	857	1,114	392	1,351	1,743	446	1,382	1,828	454	1,498	1,952
Total	1,603	597	2,199	2,996	1,423	4,419	3,719	1,539	5,258	2,406	1,007	3,413	2,142	857	2,999	3,354	1,351	4,705	3,567	1,382	4,949	3,905	1,498	5,403
Nonmetallic ores																								
Foreign	132	264	396	231	137	368	116	253	369	111	192	303	171	317	488	174	348	522	178	357	535	182	363	545
Domestic	663	304	967	609	456	1,065	733	255	1,018	1,159	277	1,436	1,654	343	1,997	1,986	366	2,352	3,344	383	3,727	3,587	409	3,996
Total	795	568	1,364	840	593	1,434	871	508	1,380	1,270	469	1,740	1,825	660	2,485	2,160	714	2,873	3,522	740	4,262	3,769	772	4,541
Chemical fertilizers																								
Foreign	1,258	3	1,261	1,378	1	1,379	999	2	1,001	741	2	743	1,165	0	1,165	958	0	958	1,043	0	1,043	1,226	0	1,226
Domestic	20	797	817	86	932	1,018	43	728	773	44	635	679	34	600	634	0	654	654	0	714	714	0	833	833
Total	1,278	800	2,078	1,464	933	2,397	1,044	730	1,774	785	637	1,422	1,199	600	1,799	958	654	1,612	1,043	714	1,757	1,226	833	2,061
Salt																								
Foreign	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Domestic	1,127	460	1,587	1,135	480	1,615	1,195	546	1,741	1,214	547	1,761	1,028	471	1,499	1,367	444	1,731	1,366	464	1,810	1,390	472	1,862
Total	1,127	460	1,587	1,135	480	1,615	1,195	546	1,741	1,214	548	1,762	1,028	471	1,499	1,367	444	1,731	1,366	464	1,810	1,390	472	1,862
Grain																								
Foreign	2,630	198	2,828	2,633	24	2,274	1,177	000	1,811	1,923	598	2,521	1,842	557	2,399	2,047	479	2,526	2,185	508	2,693	2,361	545	2,906
Domestic	1,165	2,027	3,192	1,113	1,074	2,987	1,286	1,277	2,563	1,677	2,026	3,703	1,999	1,842	3,341	1,438	1,612	3,050	1,516	1,694	3,210	1,580	1,871	3,451
Total	3,795	2,225	6,019	3,146	2,115	5,261	2,463	1,911	4,374	3,600	2,624	6,224	3,341	2,399	5,740	3,485	2,091	5,576	3,701	2,202	5,903	3,941	2,416	6,357
Others																								
Foreign	2,943	1,931	4,874	2,479	2,181	4,660	4,040	2,110	6,150	3,853	3,064	6,917	3,941	2,956	6,897	5,576	3,311	8,887	6,420	4,681	11,101	7,810	6,357	14,167
Domestic	1,437	1,984	3,421	1,653	1,755	3,410	1,511	2,820	4,331	1,672	4,260	5,932	1,799	3,984	5,783	1,960	3,398	5,358	3,388	4,119	7,507	4,904	4,995	9,899
Total	4,380	3,895	8,276	4,134	3,936	8,070	5,551	4,930	10,480	5,525	7,324	12,849	5,740	6,940	12,680	7,536	6,709	14,246	9,808	8,800	18,609	12,714	11,352	24,066
Total																								
Foreign	10,578	3,053	13,633	13,796	2,643	16,439	20,844	3,103	23,949	20,640	3,970	24,610	21,385	3,926	25,311	26,944	4,233	29,179	28,417	5,681	34,098	32,892	7,458	40,350
Domestic	31,122	17,470	48,592	34,293	19,432	53,725	40,295	23,500	63,795	46,417	26,682	73,099	48,283	26,667	74,950	60,874	23,144	84,018	78,695	24,806	103,501	95,462	28,988	124,450
Total	41,700	20,525	62,225	48,089	22,075	70,164	61,141	26,603	87,744	67,057	30,652	97,709	69,668	30,593	100,001	85,818	27,379	113,197	107,112	30,487	137,599	128,354	36,446	164,800
Est. Dry Bulks /_2	26,731	11,140	35,871	27,416	11,738	39,154	32,833	14,334	47,167	38,057	14,892	52,949	42,165	15,791	57,956	52,153	12,521	64,674	60,265	13,116	81,381	82,822	15,501	98,324
Est. Liquid Bulks	12	2	14	10	2	12	11	2	13	12	2	14	12	2	14	14	2	16	15	2	17	17	3	19
Est. General Cargo:																								
Foreign	4,862	2,479	7,341	7,861	2,660	10,521	14,335	2,827	17,162	12,680	3,761	16,241	12,081	3,599	15,680	17,160	3,877	21,041	18,636	5,314	23,950	21,159	7,084	28,243
Domestic	12,095	6,904	18,999	12,862	8,075	20,877	13,942	9,446	23,388	16,588	11,997	28,585	15,370	11,001	26,371	16,485	10,979	27,464	20,196	12,035	32,231	20,356	13,888	38,244
Total	16,957	9,383	26,340	20,663	10,735	31,398	28,277	12,267	40,564	29,988	15,758	44,746	27,451	14,600	42,051	33,649	14,856	48,505	38,832	17,349	56,201	45,515	20,942	66,457
Of which:																								
a. Containerizable cargo /_3																								
Foreign	2,943	2,426	5,369	2,479	2,457	4,936	4,040	2,759	6,799	3,853	3,677	7,530	3,941	3,522	7,463	5,576	3,799	9,375	6,420	5,198	11,618	7,810	6,911	14,721
Domestic	2,708	4,866	7,574	3,014	4,691	7,705	3,043	4,890	7,933	3,813	6,197	10,010	3,675	6,503	10,178	3,633	5,742	9,375	5,172	6,607	11,779	6,784	7,828	14,612
Total	5,651	7,292	12,943	5,493	7,148	12,641	7,083	7,649	14,732	7,666	10,674	18,340	7,616	10,025	17,641	9,209	9,541	18,750	11,592	11,805	23,397	14,594	14,739	29,333
Contain. Penetration (%)																								
Foreign	61	91	81	163	182	171	271	282	272	292	253	272	312	282	302	332	332	332	402	402	402	452	452	452
Domestic																102	102		153	153		202	202	
Est. loaded container traffic																								
High																2,315	1,904	4,219	3,344	3,070	6,414	4,071	4,476	9,547
Low	182	230	412	399	453	852	1,078	766	1,844	1,115	901	2,016	1,226	991	2,217	1,952	1,330	3,282	2,568	2,079	4,647	3,315	3,110	6,425
Total container traffic:																								
High																2,770	2,285	5,063	4,013	3,684	7,697	5,045	5,411	11,456
Low	182	230	412	399	453	852	1,078	766	1,844	1,115	901	2,016	1,226	991	2,217	2,342	1,596	3,938	3,082	2,495	5,577	4,218	3,732	7,950
b. Est. total break bulks traffic																								
High	16,775	9,153	25,928	20,264	10,282	30,546	27,219	11,501	38,720	27,873	14,857	42,730	26,225	13,649	39,834	31,667	13,526	45,223	36,264	13,290	51,554	42,000	17,832	59,832
Low	16,775	9,153	25,928	20,264	10,282	30,546	27,219	11,501	38,720	27,873	14,857	42,730	26,225	13,649	39,834	31,334	12,952	44,286	33,488	14,299	47,787	40,644	16,246	56,910

Notes: 1. Traffic handled by SPA only.
2. Cargoes included in dry bulk are: Coal (all), Metallic ores (all), Cement (foreign-in), Nonmetallic ores (all), Chemical Fertilizers (foreign-in), Salt (domestic-all), Grain (foreign-in).
3. Containerizable cargo includes: Cement (foreign-out; domestic-all), Chemical Fertilizer (foreign-out; domestic-all), Salt (foreign-all), Grain (foreign-out; domestic-all), Others (all).
4. All figures are rounded.

Sources: Shanghai Port Authority, MRC, Bank staff.

Jun-88

CHINA

SHANGHAI PORT PROJECT

Project Cost Summary

	Y'000			US$'000			Loan (US$'000)	Loan as % of total base cost
	Local	Foreign	Total	Local	Foreign	Total		
Civil Works								
Baoshan	130,000	194,997	324,997	35,135	52,702	87,837	-	-
Guangang	119,958	179,931	299,889	32,421	48,630	81,051	-	-
Zhujiamen	30,488	45,732	76,220	8,240	12,360	20,600	-	-
Minsheng	21,400	44,300	65,700	5,784	11,973	17,757	2,000	0.8
Subtotal	301,846	464,960	766,806	81,580	125,665	207,245	2,000	0.8
Equipment /a								
Baoshan	2,590	55,241	57,831	700	14,930	15,630	14,510	5.5
Guangang	771	30,673	31,440	210	8,290	8,500	7,210	2.7
Zhujiamen	22,829	16,017	38,846	6,170	4,329	10,499	4,280	1.6
Minsheng	-	40,996	40,996	-	11,080	11,080	15,300	5.8
Subtotal	26,190	142,927	169,117	7,000	38,629	45,709	41,300	15.6
Technical Assistance and Training	2,183	10,064	12,247	590	2,720	3,310	700	0.3
Total Base Cost	330,219	617,951	948,170	89,250	167,014	256,264	44,000	16.6
Physical contingency	2,130	4,430	6,560	578	1,197	1,775	1,197	0.5
Price contingency	8,321	39,009	47,330	1,108	5,199	6,307	1,203	0.5
GRAND TOTAL	340,670	661,390	1,002,060	90,936	173,410	264,346	46,400	17.6

/a Equipment financed by the loan are listed at Tables 4.2 to 4.5.

Table 4.2

CHINA

SHANGHAI PORT PROJECT

Equipment for Baoshan Terminal (to be Financed by Bank Loan)

Cost Estimates (US$'000)

	No.	Local	Foreign	Total	Loan
Container quay crane	1	300	3,000	3,300	3,000
Rubber-tired cranes	4	280	2,700	2,980	2,700
Container trucks	12		600	600	600
Tractors	8		320	320	320
Forklifts (36t)	2		640	640	640
Forklifts (25t)	6		1,560	1,560	1,560
Forklifts (16t)	2		200	200	200
Forklifts (10t)	2		120	120	120
Forklifts (2.5t)	25		500	500	500
Mobile cranes	4		720	720	720
Weighing scale	2	20	140	160	140
Tugboat components /a			3,410	3,410	3,410
Misc. cargo handling items			600	600	600
Total		600	14,510	15,110	14,510

/a Already ordered. To be retroactively financed.

Table 4.3

CHINA

SHANGHAI PORT PROJECT

Equipment for Guangang Terminal (to be Financed by Bank Loan)

Cost Estimates (US$'000)

	No.	Local	Foreign	Total	Loan
Container crane	1		370	370	370
Mobile crane (55t)	1		400	400	400
Mobile cranes (28t)	3		540	540	540
Multipurpose crane	1		2,500	2,500	2,500
Bulldozer/trimmers	2		60	60	60
Steel structure /a	1	100	600	700	600
Forklifts (16t)	1		100	100	100
Forklifts (10t)	4		240	240	240
Forklifts (6t)	10		400	400	400
Forklifts (2.5t)	6		150	150	150
Container trucks	9		450	450	450
Tractors	15		600	600	600
Measuring equipment	1 set		200	200	200
Miscellaneous equipment			600	600	600
Total		100	7,210	7,310	7,210

/a Already ordered. To be retroactively financed.

Table 4.4

CHINA

SHANGHAI PORT PROJECT

Equipment for Zhujiamen Terminal (to be Financed by Bank Loan)

Cost Estimates (US$'000)

	No.	Local	Foreign	Total	Loan
Bucket wheel unloader	1	-	2,500	2,500	2,500
Belt conveyor	641m	-	700	700	700
Stacker-reclaimer	1	-	900	900	900
Bulldozers /a	3	-	180	180	180
Total			4,280	4,280	4,280

/a Already ordered. To be retroactively financed.

Table 4.5

CHINA

SHANGHAI PORT PROJECT

Equipment for Minsheng Terminal (to be Financed by Bank Loan)

Cost Estimates (US$'000)

	No.	Local	Foreign	Total	Loan
Continuous ship unloaders (1,000t/h)	2	-	6,000	6,000	6,000
Belt conveyors	590m	-	2,165	2,165	2,165
Weighing machines	2	-	300	300	300
Grain bagging devices	3	-	165	165	165
Grain elevators (1,200t/h)	2	-	1,020	1,020	1,020
Magnetic metal remover	2	-	80	80	80
Pest control devices	2	-	70	70	70
Sugar weighing scales (400t/h)	2	-	220	220	220
Sugar bagging and scales (100t/h)	5	-	450	450	450
Filter and duster	2	-	200	200	200
Sugar mixer	1	-	35	35	35
Electrical controls	-	-	750	750	750
Spare parts	-	-	545	545	545
Steel	-	-	3,300	3,300	3,300
Total		-	15,300	15,300	15,300

Table 4.6

CHINA

SHANGHAI PORT PROJECT

Equipment to be Procured under Local Competitive Bidding and Other Procedures

Item	No.	Estimated costs (US$'000) Local	Foreign	Total
Forklifts (2.5t) /a	25	-	500	500
Steel structure (Guangang) /b	1	100	600	700
Stacker-reclaimer /a	1	-	900	900
Belt conveyors /a	-	-	700	700
Bulldozers /b	3	-	180	180
Tugboat components /b		-	3,410	3,410
Weighing scales /a	2	20	140	160
Total		120	6,430	6,550

/a Local competitive bidding.

/b Already ordered. To be retroactively financed.

Table 4.7

CHINA

SHANGHAI PORT PROJECT

Cumulative Disbursements Schedule /a

Years from approval	IBRD fiscal year and quarter	Estimated cumulative disbursements $ million	Estimated cumulative disbursements %	Cumulative disbursement profile for port projects in China
Year 1				
2nd half	03/31/89	3.25	7	
	06/30/89	8.35	18	18
Year 2				
1st half	09/30/89	11.60	25	
	12/31/89	14.85	32	32
2nd half	03/31/90	18.56	40	
	06/30/90	22.27	48	48
Year 3				
1st half	09/30/90	25.52	55	
	12/31/90	29.23	63	63
2nd half	03/31/91	32.48	70	
	06/30/91	35.26	76	76
Year 4				
1st half	09/30/91	37.58	81	
	12/31/91	38.51	83	83
2nd half	03/31/92	40.83	88	
	06/30/92	43.15	93	93
Year 5				
1st half	09/30/92	45.00	97	
	12/31/92	46.40	100	100

/a Loan effectiveness 03/01/89.

Table 5.1

CHINA

SHANGHAI PORT PROJECT

Traffic Handled by The Port/_1

('000 tons)

	1985	1986	1987	1990	1991	1992	1993	1994	1995	2000
Est. Dry Bulks:										
Coal	34,327	37,827	39,840	49,125	51,189	53,339	55,580	57,915	60,347	75,365
Others	12,840	15,122	18,096	15,551	16,519	17,548	18,641	19,802	21,034	22,958
Subtotal	47,167	52,949	57,936	64,676	67,708	70,887	74,221	77,717	81,381	98,323
Est. Liquid Bulks	13	14	14	16	16	16	16	16	17	20
Est. containerized cargo (Loaded)	1,844	2,016	2,217	3,282	3,518	3,771	4,043	4,334	4,647	6,625
Est. General cargo:										
Timber	5,258	3,413	2,999	4,705	4,753	4,801	4,850	4,899	4,949	5,403
Of which: Berth operation	1,195	776	682	1,070	1,081	1,092	1,103	1,114	1,125	1,228
Mid-stream operation /_2	4,063	2,637	2,317	3,635	3,672	3,709	3,747	3,785	3,824	4,175
Break bulks	33,462	39,317	36,835	40,518	41,668	42,851	44,067	45,318	46,605	54,429
Of which: Large berth operation	14,803	17,393	16,295	17,924	18,433	18,956	19,494	20,048	20,617	24,078
Small berth operation /_3	5,872	6,900	6,464	7,111	7,313	7,520	7,734	7,953	8,179	9,552
Mid-stream operation /_2	12,787	15,024	14,076	15,483	15,922	16,375	16,839	17,317	17,809	20,799
Subtotal	38,720	42,730	39,834	45,223	46,421	47,652	48,917	50,217	51,554	59,832
Total Traffic Handled by SPA	87,744	97,709	100001	113,197	117,663	122,326	127,197	132,284	137,599	164,800
Total container traffic (in '000 TEU)	184.4	201.6	221.7	393.8	422.2	452.6	485.2	520.2	557.6	795.0

Notes: 1. Excludes traffic handled at berths which are not included in the economic analysis.
2. Estimated based on available berth capacity.
3. Traffic handled at smaller berths (under 500 dwt vessels).

Sources: Shanghai Port Authority and Bank staff.

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Table 5.2(a)

CHINA

SHANGHAI PORT PROJECT

Operational Parameters Assumed for Economic Evaluation

(Break Bulk Berths)

	Existing mixed use berths	Existing break bulk berths	Proposed mixed use berths
Berths (number)	15	14	12
Cranes per berth (number)	5	3	2
Average crane productivity per hour (tons)	35	22	57
Average working hours per day (hours)	17	17	17
Throughput capacity per berth (tons/day)	2,975	1,122	1,938
Berth operating days per year (days)	320	320	320
Maximum berth utilization (%)	95	95	95
Maximum annual capacity per berth ('000 tons)	904	341	589
Ship arrivals (scheduled/unscheduled)	Unscheduled	Unscheduled	Unscheduled
Average ship size (DWT)	12,000	12,000	15,000
Average shipment size (ton)	7,500	7,500	7,500
Cargo value (Yuan/ton)	1,800	1,800	1,800
Average daily ship cost in port (Yuan/day)	13,320	13,320	13,320
Unloading/loading cost (Yuan/ton) /_1	3.20	3.20	3.20

Notes:

(i) theoretical daily berth capacity = cranes per berth x average crane productivity per hour x average working hours per days.

(ii) theoretical annual berth capacity = theoretical daily berth capacity x berth operating days per year.

(iii) maximum annual capacity per berth = theoretical annual berth capacity x maximum berth utilization.

/_1. Figures in the table are the costs for normal berth handling. If cargo traffic exceeds 95% berth occupancy rate, additional cargo will be handled by lightering at roughly three times the costs for normal berth handling.

/_2. For lightering operations, throughput capacity is taken as 50% of normal berth throughput capacity.

Sources: Shanghai Port Authority and Bank staff.

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Table 5.2(b)

CHINA

SHANGHAI PORT PROJECT

Operational Parameters Assumed for Economic Evaluation

(Container Berth)

	Existing Container berths	Proposed Container berth
Berths (number)	4	1 /_1
Cranes per berth (number)	1.50	1
Average crane productivity per hour (TEUs) /_1	20	25
Average working hours per day (hours)	16.3	16.3
Throughput capacity per berth (TEUs/day)	489 /_2	408
Berth operating days per year (days)	320	320
Maximum berth utilization (%)	50	50
Maximum annual capacity per berth ('000 TEUs)	78.2	65.2
Ship arrivals (scheduled/unscheduled)	Scheduled	Scheduled
Average ship size (DWT)	1,000 /_3	1,000
Average shipment size (TEU)	700	700
Cargo value (Yuan/TEU)	20,000	20,000
Average daily ship cost in port (Yuan/day)	37,740	37,740
Unloading/loading cost (Yuan/TEU) /_4	140.00	140.00

Notes:

(i) theoretical daily berth capacity = cranes per berth x average crane productivity per hour x average working hours per days.

(ii) theoretical annual berth capacity = theoretical daily berth capacity x berth operating days per year.

(iii) maximum annual capacity per berth = theoretical annual berth capacity x maximum berth utilization.

/_1. One TEU = 10.00 tons.

/_2. For lightering operation, throughput capacity is taken as 50% of normal berth throughput capacity.

/_3. Equivalent to 13,400 dwt per ship.

/_4. Figures in the table are the costs for normal berth handling. If cargo traffic exceeds 95% berth occupancy rate, additional cargo will be handled by lightering at roughly three times the costs for normal berth handling.

Sources: Shanghai Port Authority and Bank staff.

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Table 5.2(c)

CHINA

SHANGHAI PORT PROJECT

Operational Parameters Assumed for Economic Evaluation

(Timber Berth)

	Existing timber berths	Proposed timber berth
Berths (number)	4	1
Cranes per berth (number)	1.25	2
Average crane productivity per hour (tons)	35	45
Average working hours per day (hours)	16.3	16.3
Throughput capacity per berth (tons/day)	713	1,467
Berth operating days per year (days)	320	320
Maximum berth utilization (%)	95	95
Maximum annual capacity per berth ('000 tons)	217	446
Ship arrivals (scheduled/unscheduled)	Scheduled	Scheduled
Average ship size (DWT)	17,000	9,000
Average shipment size (ton)	12,000	7,500
Cargo value (Yuan/ton)	500	500
Average daily ship cost in port (Yuan/day)	13,320	12,210
Unloading/loading cost (Yuan/ton) /_1	1.30	1.40

Notes:

(i) theoretical daily berth capacity = cranes per berth x average crane productivity per hour x average working hours per days.

(ii) theoretical annual berth capacity = theoretical daily berth capacity x berth operating days per year.

(iii) maximum annual capacity per berth = theoretical annual berth capacity x maximum berth utilization.

/_1. Figures in the table are the costs for normal berth handling. If cargo traffic exceeds 95% berth occupancy rate, additional cargo will be handled by lightering at roughly three times the costs for normal berth handling.

/_2. For lightering operations, throughput capacity is taken as 50% of normal berth throughput capacity.

Sources: Shanghai Port Authority and Bank staff.

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Table 5.2(d)

CHINA

SHANGHAI PORT PROJECT

Operational Parameters Assumed for Economic Evaluation

(Coal Berth)

	Existing Coal Berths		Proposed Coal berth
	Without Project	With Project	
Berths (number)	10	9	2 /_1
Cranes per berth (number)	2.50	2.50	2
Average crane productivity per hour (tons)	365	390	420
Average working hours per day (hours)	17.0	17.0	17.0
Throughput capacity per berth (tons/day)	15,513	16,575	14,280
Berth operating days per year (days)	320 /_2	320	320
Maximum berth utilization (%)	95	95	95
Maximum annual capacity per berth ('000 tons)	4,716	5,039	4,341
Ship arrivals (scheduled/unscheduled)	Unscheduled	Unscheduled	Unscheduled
Average ship size (DWT)	10,000	10,000	21,000
Average shipment size (ton)	10,000	10,000	21,000
Cargo value (Yuan/ton)	110	110	110
Average daily ship cost in port (Yuan/day)	30,340	30,340	30,710
Unloading/loading cost (Yuan/ton) /_3	1.30	1.30	1.30

Notes:

(i) theoretical daily berth capacity = cranes per berth x average crane productivity per hour x average working hours per days.

(ii) theoretical annual berth capacity = theoretical daily berth capacity x berth operating days per year.

(iii) maximum annual capacity per berth = theoretical annual berth capacity x maximum berth utilization.

/_1. Exclude one additional smaller berth, which is for bargo loading basically.

/_2. For lightering operation, throughput capacity is taken as 50% of normal berth throughput capacity.

/_3. Figures in the table are the costs for normal berth handling. If cargo traffic exceeds 95% berth occupancy rate, additional cargo will be handled by lightering at roughly three times the costs for normal berth handling.

Sources: Shanghai Port Authority and Bank staff.

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Table 5.2(e)

CHINA

SHANGHAI PORT PROJECT

Operational Parameters Assumed for Economic Evaluation

(Grain Berths)

	Existing grain berths	Proposed grain berth
Berths (number)	2	2
Unloader per berth (number)	3	3
Average unloader productivity per hour (tons)	200	480
Average working hours per day (hours)	17	17
Throughput capacity per berth (tons/day)	10,200	24,480
Berth operating days per year (days)	320	320
Maximum berth utilization (%)	95	95
Maximum annual capacity per berth ('000 tons)	3,101	7,442
Ship arrivals (scheduled/unscheduled)	Unscheduled	Unscheduled
Average ship size (DWT)	20,000	20,000
Average shipment size (ton)	20,000	20,000
Cargo value (Yuan/ton)	400	400
Average daily ship cost in port (Yuan/day)	16,280	16,280
Unloading/loading cost (Yuan/ton) /_1	4.00	2.50

Notes:

(i) theoretical daily berth capacity = cranes per berth x average crane productivity per hour x average working hours per days.

(ii) theoretical annual berth capacity = theoretical daily berth capacity x berth operating days per year.

(iii) maximum annual capacity per berth = theoretical annual berth capacity x maximum berth utilization.

/_1. Figures in the table are the costs for normal berth handling. If cargo traffic exceeds 95% berth occupancy rate, additional cargo will be handled by lightering at roughly three times the costs for normal berth handling.

/_2. For lightering operations, throughput capacity is taken as 50% of normal berth throughput capacity.

Sources: Shanghai Port Authority and Bank staff.

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Table 5.3(a)

CHINA

SHANGHAI PORT PROJECT

Economic Project Cost

	Financial Cost						Conversion	Economic Cost		
	Local	Foreign	Total	Local	Foreign	Total	factor for	Local	Foreign	Total
	US$ '000			RMB '000			local /_1	RMB '000		
A: Civil Works /_2										
Baoshan (6):										
Timber (1)	5,856	8,784	14,640	21,667	32,501	54,168	1.09	23,617	32,501	56,118
Container (1)	5,856	8,784	14,640	21,667	32,501	54,168	1.09	23,617	32,501	56,118
General cargo (4)	23,423	35,134	58,557	86,665	129,996	216,661	1.09	94,465	129,996	224,461
Subtotal	35,135	52,702	87,837	130,000	194,997	324,997		141,699	194,998	336,697
Guangang- General cargo (8)	32,421	48,630	81,051	119,958	179,931	299,889	1.09	130,754	179,931	310,685
Zhujiamen- Coal (2)	8,240	12,360	20,600	30,488	45,732	76,220	1.09	33,232	45,732	78,964
Minsheng- Grain (2)	5,784	11,973	17,757	21,401	44,300	65,701	1.09	23,327	44,300	67,627
Total	81,580	125,665	207,245	301,847	464,960	766,807		329,012	464,961	793,973
B: Equipment										
Baoshan (6):										
Timber (1)	159	3,644	3,803	588	13,483	14,071	1.18	694	13,483	14,177
Container (1)	459	5,944	6,403	1,698	21,993	23,691	1.18	2,004	21,993	23,997
General cargo (4)	82	5,342	5,424	303	19,765	20,068	1.18	358	19,765	20,123
Subtotal	700	14,930	15,630	2,589	55,241	57,830		3,056	55,241	58,297
Guangang- General cargo (8)	110	8,290	8,400	407	30,673	31,080	1.18	480	30,673	31,153
Zhujiamen- Coal (2)	6,170	4,329	10,499	22,829	16,017	38,846	1.18	26,938	16,017	42,955
Minsheng- Grain (2)	-	11,080	11,080	-	40,996	40,996	1.18	-	40,996	40,996
Total	6,980	38,629	45,609	25,825	142,927	168,752		30,474	142,927	173,401
C. Tech. assistance and training	590	2,720	3,310	2,183	10,064	12,247	3.93	8,579	10,064	18,643
D. Physical contingency	577	1,197	1,774	2,135	4,429	6,564		2,135	4,429	6,564
E. Total (18):										
Timber (1)	6,048	12,579	18,627	22,376	46,543	68,919	1.04	24,816	46,576	71,392
Container (1)	6,348	14,879	21,227	23,486	55,053	78,539	1.03	26,126	55,086	81,212
General cargo (12)	56,429	99,209	155,638	208,788	367,074	575,862	1.04	232,113	367,469	599,582
Coal (2)	14,508	17,142	31,650	53,681	63,426	117,107	1.05	60,675	62,341	123,016
Grain (2)	6,394	24,402	30,796	23,659	90,284	113,943	1.03	26,470	90,909	117,379
Grand Total	89,727	168,211	257,938	331,990	622,380	954,370	1.04	370,200	622,381	992,581

/_1: These aggregate conversion factors are based on detailed estimates of conversion factors made at nearby Chinese ports.

/_2: Number in parentheses are number of berths.

CHINA

SHANGHAI PORT PROJECT

Economic Project Cost

('000 RMB)

	1986			1987			1988			1989			1990			1991			1992			1993			Total		
	Local	Foreign	Total	Local	Foreign	Total	Local	Foreign	Total	Local	Foreign	Total	Local	Foreign	Total	Local	Foreign	Total	Local	Foreign	Total	Local	Foreign	Total	Local	Foreign	Total
Financial Cost:																											
Timber	1,617	3,362	4,979	3,800	7,903	11,703	6,875	14,300	21,175	5,950	12,377	18,327	4,135	8,601	12,736	0	0	0	0	0	0	0	0	0	22,376	46,543	68,919
Container	1,697	3,977	5,674	3,988	9,348	13,336	7,216	16,915	24,131	6,245	14,640	20,885	4,340	10,174	14,514	0	0	0	0	0	0	0	0	0	23,436	55,053	78,539
General cargo	15,084	26,519	41,603	35,452	62,330	97,782	64,149	112,781	176,930	55,520	97,610	153,130	38,583	67,833	106,416	0	0	0	0	0	0	0	0	0	208,788	367,074	575,862
Coal	3,733	4,410	8,143	14,086	16,643	30,729	32,397	38,279	70,676	3,465	4,094	7,559	0	0	0	0	0	0	0	0	0	0	0	0	53,681	63,426	117,107
Grain	0	0	0	0	0	0	0	0	0	1,296	4,944	6,240	1,868	7,130	8,998	10,671	40,720	51,391	7,622	29,086	36,708	2,202	8,404	10,606	23,659	90,284	113,943
Total	22,131	38,268	60,399	57,326	96,224	153,550	110,637	182,275	292,912	72,476	133,665	206,141	48,926	93,738	142,664	10,671	40,720	51,391	7,622	29,086	36,708	2,202	8,404	10,606	331,990	622,380	954,370
Economic Cost:																											
Timber	1,675	3,483	5,158	3,936	8,186	12,122	7,122	14,813	21,935	6,163	12,821	18,984	4,283	8,910	13,193	0	0	0	0	0	0	0	0	0	23,179	48,213	71,392
Container	1,755	4,112	5,867	4,124	9,666	13,790	7,462	17,490	24,952	6,457	15,138	21,595	4,488	10,520	15,008	0	0	0	0	0	0	0	0	0	24,286	56,926	81,212
General cargo	15,705	27,611	43,316	36,912	64,898	101,810	66,792	117,427	184,219	57,807	101,631	159,438	40,172	70,627	110,799	0	0	0	0	0	0	0	0	0	217,388	382,194	599,582
Coal	3,921	4,632	8,553	14,797	17,483	32,280	34,032	40,210	74,242	3,640	4,301	7,941	0	0	0	0	0	0	0	0	0	0	0	0	56,390	66,626	123,016
Grain	0	0	0	0	0	0	0	0	0	1,335	5,093	6,428	1,924	7,345	9,269	10,993	41,948	52,941	7,852	29,963	37,815	2,268	8,657	10,925	24,372	93,006	117,378
Total	23,056	39,838	62,894	59,769	100,233	160,002	115,408	189,940	305,348	75,402	138,984	214,386	50,867	97,402	148,269	10,993	41,948	52,941	7,852	29,963	37,815	2,268	8,657	10,925	345,615	646,965	992,580

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Table 5.3(b)

Table 5.4(c)

CHINA

SHANGHAI PORT PROJECT

Cargo Handling Without And With Proposed Berths

(Break Bulk Berths)

	1985	1986	1987	1990	1991	1992	1993	1994	1995	2000
A. TRAFFIC DEMAND ('000 TONS) /1	14,863	17,393	16,295	17,924	18,433	18,956	19,494	20,048	20,617	24,078
B. WITHOUT PROJECT										
Existing Mixed Use Berths					/2	/2	/2	/2	/2	/2
1. Berths (number)	15	15	15	15	15	15	15	15	15	15
2. Traffic ('000 tons)	10,949	12,865	12,053	13,257	13,634	14,021	14,419	14,828	15,249	17,809
3. Annual ship berth days required	3,680	4,324	4,051	4,456	4,582	4,713	4,847	4,984	5,126	5,986
4. Annual ship berth days available	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800
5. Berth occupancy rate (%)	77	90	84	93	(95)	(95)	(95)	(95)	(95)	(95)
6. Waiting time queuing factors	0.06	0.30	0.14	0.59	0.78	0.78	0.78	0.78	0.78	0.78
7. Annual total ship port days:										
a. Actual ship berth days	3,680	4,324	4,051	4,456	4,560	4,560	4,560	4,560	4,560	4,560
b. Ship waiting days	221	1,297	567	2,649	3,744	3,744	3,744	3,744	3,744	3,744
c. Ship lightering days	0	0	0	0	46	306	574	848	1,132	2,052
Total ship port days	3,901	5,621	4,618	7,085	8,350	8,610	8,878	9,152	9,436	11,156
Existing Break Bulk Berths					/2	/2	/2	/2	/2	/2
1. Berths (number)	14	14	14	14	14	14	14	14	14	14
2. Traffic ('000 tons)	3,854	4,528	4,242	4,667	4,799	4,933	5,075	5,220	5,368	6,269
3. Annual ship berth days required	3,435	4,036	3,781	4,160	4,277	4,398	4,523	4,652	4,784	5,587
4. Annual ship berth days available	4,480	4,480	4,480	4,480	4,480	4,480	4,480	4,480	4,480	4,480
5. Berth occupancy rate (%)	77	90	84	93	(95)	(95)	(95)	(95)	(95)	(95)
6. Waiting time queuing factors	0.37	0.53	0.16	0.64	0.85	0.85	0.85	0.85	0.85	0.85
7. Annual total ship port days:										
a. Actual ship berth days	3,435	4,036	3,781	4,160	4,256	4,256	4,256	4,256	4,256	4,256
b. Ship waiting days	240	1,332	605	2,662	3,008	3,008	3,008	3,008	3,008	3,008
c. Ship lightering days	0	0	0	0	42	284	534	792	1,056	2,662
Total ship port days	3,675	5,368	4,386	6,822	8,106	8,548	8,598	8,856	9,120	10,726
Total ship port days										
a. Actual ship berth days	7,115	8,360	7,832	8,616	8,816	8,816	8,816	8,816	8,816	8,816
b. Ship waiting days	461	2,629	1,172	5,291	7,552	7,552	7,552	7,552	7,552	7,552
c. Ship lightering days	0	0	0	0	88	590	1,108	1,640	2,188	5,514
Total ship port days	7,576	10,989	9,004	13,907	16,456	16,958	17,476	18,008	18,556	21,882
C. WITH PROJECT										
Existing Mixed Use Berths										
1. Berths (number)	15	15	15	15	15	15	15	15	15	15
2. Traffic ('000 tons)	10,949	12,865	12,053	13,257	10,319	10,120	10,607	10,703	11,007	12,856
3. Annual ship berth days required	3,680	4,324	4,051	4,456	3,469	3,402	3,498	3,598	3,700	4,321
4. Annual ship berth days available	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800	4,800
5. Berth occupancy rate (%)	77	90	84	93	72	71	73	75	77	90
6. Waiting time queuing factors	0.06	0.30	0.14	0.59	0.02	0.01	0.02	0.03	0.04	0.22
7. Annual total ship port days:										
a. Actual ship berth days	3,680	4,324	4,051	4,456	3,469	3,402	3,498	3,598	3,700	4,321
b. Ship waiting days	221	1,297	567	2,629	69	34	70	108	148	951
c. Ship lightering days	0	0	0	0	0	0	0	0	0	0
Total ship port days	3,901	5,621	4,618	7,085	3,538	3,436	3,568	3,706	3,848	5,272
Existing Break Bulk Berths										
1. Berths (number)	14	14	14	14	14	14	14	14	14	14
2. Traffic ('000 tons)	3,854	4,528	4,242	4,667	3,632	3,562	3,663	3,767	3,874	4,525
3. Annual ship berth days required	3,435	4,036	3,781	4,160	3,237	3,175	3,265	3,357	3,453	4,033
4. Annual ship berth days available	4,480	4,480	4,480	4,480	4,480	4,480	4,480	4,480	4,480	4,480
5. Berth occupancy rate (%)	77	90	84	93	72	71	73	75	77	90
6. Waiting time queuing factors	0.07	0.33	0.16	0.64	0.03	0.01	0.02	0.02	0.03	0.18
7. Annual total ship port days:										
a. Actual ship berth days	3,435	4,036	3,781	4,160	3,237	3,175	3,265	3,357	3,453	4,033
b. Ship waiting days	240	1,332	605	2,662	97	32	65	67	104	726
c. Ship lightering days	0	0	0	0	0	0	0	0	0	0
Total ship port days	3,675	5,368	4,386	6,822	3,334	3,207	3,330	3,424	3,557	4,759
Proposed Mixed Use Berths										
1. Berths (number)					10	12	12	12	12	12
2. Traffic ('000 tons)					4,982	5,274	5,424	5,578	5,736	6,499
3. Annual ship berth days required					2,313	2,721	2,799	2,878	2,960	3,457
4. Annual ship berth days available					3,200	3,840	3,840	3,840	3,840	3,840
5. Berth occupancy rate (%)					72	71	73	75	77	90
6. Waiting time queuing factors					0.03	0.01	0.02	0.02	0.03	0.18
7. Annual total ship port days:										
a. Actual ship berth days					2,313	2,721	2,799	2,878	2,960	3,457
b. Ship waiting days					69	27	56	58	89	622
c. Ship lightering days					0	0	0	0	0	0
Total ship port days					2,382	2,748	2,855	2,936	3,049	4,079
Total ship port days										
a. Actual ship berth days	7,115	8,360	7,832	8,616	9,019	9,298	9,562	9,833	10,113	11,811
b. Ship waiting days	461	2,629	1,172	5,291	233	93	191	233	341	2,299
c. Ship lightering days	0	0	0	0	0	0	0	0	0	0
Total ship port days	7,576	10,989	9,004	13,907	9,254	9,391	9,753	10,066	10,454	14,110

Notes: (i) annual ship berth days required = traffic/theoretical daily capacity per berth.
(ii) annual ship berth days available = number of berths x berth operating days per year.
(iii) berth occupancy rate = annual ship berth days required / annual ship berth days available.
(iv) waiting time queuing factors are from Port Development, UNCTAD 1970, and Berth Throughput, UNCTAD, 1978.
(v) annual ship waiting days = annual ship berth required x waiting time queuing factors.

/1: Includes containerized foreign and domestic (in/out); excluding traffic at small berths and old-stream operation.
/2: Traffic would exceed the practical capacity of these berths. For the purpose of the economic evaluation it has been assumed that ways will be found, e.g., through lightering, to move the traffic through the port with waiting times not exceeding those corresponding to 95% berth occupancy rate.

Sources: Shanghai Port Authority and Bank staff.

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Table 5.4(b)

CHINA

SHANGHAI PORT PROJECT

Cargo Handling Without And With Proposed Berths

(Container Berth)

	1985	1986	1987	1990	1991	1992	1993	1994	1995	2000
A. TRAFFIC DEMAND ('000 TEUs) /_1	184.4	201.6	221.7	393.8	422.2	452.6	485.2	520.2	557.6	795.0
B. WITHOUT PROJECT										
Existing Container Berths										/_2
1. Berths (number)	4	4	4	4	4	4	4	4	4	4
2. Traffic ('000 TEUs)	184.4	201.6	221.7	393.8	422.2	452.6	485.2	520.2	557.6	795.0
3. Annual ship berth days required	377	412	453	805	863	926	992	1,064	1,140	1,626
4. Annual ship berth days available	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280
5. Berth occupancy rate (%)	29	32	35	63	67	72	78	83	89	(95)
6. Waiting time queuing factors	0.00	0.00	0.01	0.08	0.11	0.15	0.28	0.46	0.85	2.08
7. Annual total ship port days:										
a. Actual ship berth days	377	412	453	805	863	926	992	1,064	1,140	1,216
b. Ship waiting days	0	0	5	64	95	139	278	489	969	2,662
c. Ship lightering days	0	0	0	0	0	0	0	0	0	820
Total ship port days	377	412	458	869	958	1,065	1,270	1,553	2,109	4,698
C. WITH PROJECT										
Existing Container Berths										/_2
1. Berths (number)	4	4	4	4	4	4	4	4	4	4
2. Traffic ('000 TEUs)	184.4	201.6	221.7	393.8	349.0	375.0	402.0	431.0	461.0	658.0
3. Annual ship berth days required	377	412	453	805	714	767	822	881	943	1,346
4. Annual ship berth days available	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280
5. Berth occupancy rate (%)	29	32	35	63	56	60	64	69	74	(95)
6. Waiting time queuing factors	0.00	0.00	0.01	0.08	0.02	0.04	0.06	0.09	0.13	1.50
7. Annual total ship port days:										
a. Actual ship berth days	377	412	453	805	714	767	822	881	943	1,216
b. Ship waiting days	0	0	5	64	14	31	49	79	123	1,920
c. Ship lightering days	0	0	0	0	0	0	0	0	0	260
Total ship port days	377	412	458	869	728	798	871	960	1,066	3,396
Proposed Container Berth										/_2
1. Berths (number)					1	1	1	1	1	1
2. Traffic ('000 TEUs)					73	78	83	89	97	137
3. Annual ship berth days required					180	190	204	219	237	336
4. Annual ship berth days available					320	320	320	320	320	320
5. Berth occupancy rate (%)					56	59	64	68	74	(95)
6. Waiting time queuing factors					0.02	0.04	0.06	0.09	0.13	1.50
7. Annual total ship port days:										
a. Actual ship berth days					180	190	204	219	237	304
b. Ship waiting days					4	8	12	20	31	480
c. Ship lightering days					0	0	0	0	0	64
Total ship port days					184	198	216	239	268	848

Notes: (i) annual ship berth days required = traffic/theoretical daily capacity per berth.
(ii) annual ship berth days available = number of berths x berth operating days per year.
(iii) berth occupancy rate = annual ship berth days required / annual ship berth days available.
(iv) waiting time queuing factors are from Port Development, UNCTAD 1978, and Berth throughput, UNCTAD, 1978.
(v) annual ship waiting days = annual ship berth required x waiting time queueing factors.

/_1. Includes foreign, domestic (in/out), loaded and empty containers.
/_2. Traffic would exceed the practical capacity of these berths. For the purpose of the economic evaluation it has been assumed that ways will be found, e.g., through lightering, to move the traffic through the port with waiting times not exceeding those corresponding to 95% berth occupancy rate.

Sources: Shanghai Port Authority and Bank staff.

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Table 5.4(c)

CHINA

SHANGHAI PORT PROJECT

Cargo Handling Without And With Proposed Berths

(Timber Berth)

	1985	1986	1987	1990	1991	1992	1993	1994	1995	2000
A. TRAFFIC DEMAND ('000 TONS) /1	1,195	776	682	1,070	1,081	1,092	1,103	1,114	1,125	1,228
B. WITHOUT PROJECT										
Existing Timber Berths										
1. Berths (number) /3	/2 4	4	4	/2 4	/2 4	/2 4	/2 4	/2 4	/2 4	/2 4
2. Traffic ('000 tons)	1,195	776	682	1,070	1,081	1,092	1,103	1,114	1,125	1,228
3. Annual ship berth days required	1,676	1,088	957	1,501	1,516	1,532	1,547	1,562	1,578	1,722
4. Annual ship berth days available	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280
5. Berth occupancy rate (%)	(95)	85	75	(95)	(95)	(95)	(95)	(95)	(95)	(95)
6. Waiting time queuing factors	2.08	0.55	0.21	2.08	2.08	2.08	2.08	2.08	2.08	2.08
7. Annual total ship port days:										
a. Actual ship berth days	1,216	1,088	957	1,216	1,216	1,216	1,216	1,216	1,216	1,216
b. Ship waiting days	2,662	598	201	2,662	2,662	2,662	2,662	2,662	2,662	2,662
c. Ship lightering days	920	0	0	570	600	632	662	692	724	1,012
Total ship port days	4,798	1,686	1,158	4,448	4,478	4,510	4,540	4,570	4,602	4,890
C. WITH PROJECT										
Existing Timber Berths										
1. Berths (number)	/2 4	4	4	/2 4	4	4	4	4	4	4
2. Traffic ('000 tons)	1,195	776	682	1,070	714	721	728	736	743	811
3. Annual ship berth days required	1,676	1,088	957	1,501	1,001	1,011	1,021	1,032	1,042	1,137
4. Annual ship berth days available	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280
5. Berth occupancy rate (%)	(95)	85	75	(95)	78	79	80	81	81	89
6. Waiting time queuing factors	2.08	0.55	0.21	2.08	0.19	0.21	0.23	0.26	0.26	0.60
7. Annual total ship port days:										
a. Actual ship berth days	1,216	1,088	957	1,216	1,001	1,011	1,021	1,032	1,042	1,137
b. Ship waiting days	2,662	598	201	2,662	190	212	235	268	271	682
c. Ship lightering days	920	0	0	570	0	0	0	0	0	0
Total ship port days	4,798	1,686	1,158	4,448	1,191	1,223	1,256	1,300	1,313	1,819
Proposed Timber Berth										
1. Berths (number)					1	1	1	1	1	1
2. Traffic ('000 tons)					367	371	375	378	382	417
3. Annual ship berth days required					250	253	256	258	260	284
4. Annual ship berth days available					320	320	320	320	320	320
5. Berth occupancy rate (%)					78	79	80	81	81	89
6. Waiting time queuing factors					0.19	0.21	0.23	0.26	0.26	0.15
7. Annual total ship port days:										
a. Actual ship berth days					250	253	256	258	260	284
b. Ship waiting days					48	53	59	67	68	43
c. Ship lightering days					0	0	0	0	0	0
Total ship port days					298	306	315	325	328	327

Notes: (i) annual ship berth days required = traffic/theoretical daily capacity per berth.

(ii) annual ship berth days available = number of berths x berth operating days per year.

(iii) berth occupancy rate = annual ship berth days required / annual ship berth days available.

(iv) waiting time queuing factors are from Port Development, UNCTAD 1978, and berth throughput, UNCTAD 1983.

(v) annual ship waiting days = annual ship berth days required x waiting time queueing factors.

/1: Includes berth operation only.

/2: Traffic would exceed the practical capacity of these berths. For the purpose of the economic evaluation it has been assumed that ways will be found, e.g., through lightering, to move the traffic through the port with waiting times not exceeding those corresponding to 95% berth occupancy rate.

Sources: Shanghai Port Authority and Bank staff.

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CHINA

Table 5.4(d)

SHANGHAI PORT PROJECT

Cargo Handling Without And With Proposed Berths

(Coal Berth)

	1985	1986	1987	1990	1991	1992	1993	1994	1995	2000
A. TRAFFIC DEMAND ('000 tons) /_1	34,327	37,827	39,840	49,125	51,189	53,339	55,580	57,915	60,347	75,365
B. WITHOUT PROJECT										
Existing Coal Berths				/_2	/_2	/_2	/_2	/_2	/_2	/_2
1. Berths (number)	10	10	10	10	10	10	10	10	10	10
2. Traffic ('000 tons)	34,327	37,827	39,840	49,125	51,189	53,339	55,580	57,915	60,347	75,365
3. Annual ship berth days required	2,213	2,438	2,568	3,167	3,300	3,438	3,583	3,733	3,890	4,858
4. Annual ship berth days available	3,200	3,200	3,200	3,200	3,200	3,200	3,200	3,200	3,200	3,200
5. Berth occupancy rate (%)	69	76	80	(95)	(95)	(95)	(95)	(95)	(95)	(95)
6. Waiting time queuing factors	0.01	0.03	0.06	0.80	0.80	0.80	0.80	0.80	0.80	0.80
7. Annual total ship port days:										
a. Actual ship berth days	2,213	2,438	2,568	3,040	3,040	3,040	3,040	3,040	3,040	3,040
b. Ship waiting days	22	73	154	2,560	2,560	2,560	2,560	2,560	2,560	2,560
c. Ship lightering days	0	0	0	254	520	796	1,086	1,386	1,700	3,636
Total ship port days	2,235	2,511	2,722	5,854	6,120	6,396	6,686	6,986	7,300	9,236
C. WITH PROJECT										
Existing Coal Berths				/_2	/_2	/_2	/_2	/_2	/_2	/_2
1. Berths (number)	10	10	10	9	9	9	9	9	9	9
2. Traffic ('000 tons)	34,327	37,827	39,840	41,231	42,964	44,768	46,649	48,609	50,650	63,255
3. Annual ship berth days required	2,213	2,438	2,568	2,488	2,592	2,701	2,814	2,933	3,056	3,816
4. Annual ship berth days available	3,200	3,200	3,200	2,880	2,880	2,880	2,880	2,880	2,880	2,880
5. Berth occupancy rate (%)	69	76	80	86	90	94	(95)	(95)	(95)	(95)
6. Waiting time queuing factors	0.01	0.03	0.06	0.13	0.28	0.63	0.72	0.72	0.72	0.72
7. Annual total ship port days:										
a. Actual ship berth days	2,213	2,438	2,568	2,488	2,592	2,701	2,736	2,736	2,736	2,736
b. Ship waiting days	22	73	154	323	726	1,702	2,074	2,074	2,074	2,074
c. Ship lightering days	0	0	0	0	0	0	156	394	640	2,160
Total ship port days	2,235	2,511	2,722	2,811	3,318	4,403	4,966	5,204	5,450	6,970
Proposed Coal Berth				/_2	/_2	/_2	/_2	/_2	/_2	/_2
1. Berths (number) /_3				2	2	2	2	2	2	2
2. Traffic ('000 tons)				7,894	8,225	8,571	8,931	9,306	9,697	12,110
3. Annual ship berth days required				553	576	600	625	652	679	848
4. Annual ship berth days available				640	640	640	640	640	640	640
5. Berth occupancy rate (%)				86	90	94	(95)	(95)	(95)	(95)
6. Waiting time queuing factors				0.13	0.28	0.63	0.72	0.72	0.72	0.72
7. Annual total ship port days:										
a. Actual ship berth days				553	576	600	608	608	608	608
b. Ship waiting days				72	161	378	461	461	461	461
c. Ship lightering days				0	0	0	34	88	142	480
Total ship port days				625	737	978	1,103	1,157	1,211	1,549

Notes: (i) annual ship berth days required = traffic / theoretical daily capacity per berth.
(ii) annual ship berth days available = number of berths x berth operating days per year.
(iii) berth occupancy rate = annual ship berth days required / annual ship berth days available.
(iv) waiting time queuing factors are from Port Development, UNCTAD 1978, and Berth throughput, UNCTAD 1985.
(v) annual ship waiting days = as Berth throughput, UNCTAD 1973, UN, New York, page 33.

/_1. Includes foreign, domestic (in/out).
/_2. Traffic would exceed the practical capacity of these berths. For the purpose of the economic evaluation it has been assumed that ways will be found, e.g., through lightering, to move the traffic through the port with waiting times not exceeding those corresponding to 95% berth occupancy rate.
/_3. Includes one berth for 1,000 ton-class ship.

Sources: Shanghai Port Authority and Bank staff.

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Table 5.4(e)

CHINA

SHANGHAI PORT PROJECT

Cargo Handling Without And With Proposed Berths

(Grain Berths)

	1985	1986	1986	1990	1991	1992	1993	1994	1995	2000
A. TRAFFIC DEMAND ('000 TONS)	4,374	6,224	5,740	5,576	5,640	5,705	5,770	5,836	5,903	6,357
B. WITHOUT PROJECT										
Existing Grain Berths		/_1								/_1
1. Berths (number)	2	2	2	2	2	2	2	2	2	2
2. Traffic ('000 tons)	4,374	6,224	5,740	5,576	5,640	5,705	5,770	5,836	5,903	6,357
3. Annual ship berth days required	429	610	563	547	553	559	566	572	579	623
4. Annual ship berth days available	640	640	640	640	640	640	640	640	640	640
5. Berth occupancy rate (%)	67	(95)	88	85	86	87	88	89	90	(95)
6. Waiting time queuing factors	0.62	4.34	2.68	2.00	2.23	2.46	2.68	2.91	3.14	4.34
7. Annual total ship port days:										
a. Actual ship berth days	429	608	563	547	553	559	566	572	579	608
b. Ship waiting days	266	2,778	1,509	1,094	1,233	1,375	1,517	1,665	1,818	2,778
c. Ship lightering days	0	4	0	0	0	0	0	0	0	30
Total ship port days	695	3,390	2,072	1,641	1,786	1,934	2,083	2,237	2,397	3,416
C. WITH PROJECT										
Proposed Grain Berths		/_1								
1. Berths (number)	2	2	2	2	2	2	2	2	2	2
2. Traffic ('000 tons)	4,374	6,224	5,740	5,576	5,640	5,705	5,770	5,836	5,903	6,357
3. Annual ship berth days required	429	610	563	547	553	559	236	238	241	260
4. Annual ship berth days available	640	640	640	640	640	640	640	640	640	640
5. Berth occupancy rate (%)	67	(95)	88	85	86	87	37	37	38	41
6. Waiting time queuing factors	0.62	4.34	2.68	2.00	2.23	2.46	0.04	0.04	0.05	0.06
7. Annual total ship port days:										
a. Actual ship berth days	429	608	563	547	553	559	236	238	241	260
b. Ship waiting days	266	2,778	1,509	1,094	1,233	1,375	9	10	12	16
c. Ship lightering days	0	4	0	0	0	0	0	0	0	0
Total ship port days	695	3,390	2,072	1,641	1,786	1,934	245	248	253	276

Notes: (i) annual ship berth days required = traffic/theoretical daily capacity per berth.
(ii) annual ship berth days available = number of berths x berth operating days per year.
(iii) berth occupancy rate = annual ship berth days required / annual ship berth days available.
(iv) waiting time queuing factors are from Port Development, UNCTAD 1978 and berth throughput, UNCTAD 1973.
(v) annual ship waiting days = annual ship berth days required x waiting time queueing factors.

/_1: Traffic would exceed the practical capacity of these berths. For the purpose of the economic evaluation it has been assumed that ways will be found, e.g., through lightering, to move the traffic through the port with waiting times not exceeding those corresponding to 95% berth occupancy rate.

Sources: Shanghai Port Authority and Bank staff.

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Table 5.5(a)

CHINA

SHANGHAI PORT PROJECT

Load/unloading Cost Savings

Break Bulk Berths

		1991	1992	1993	1994	1995	2000
A. Taffic demand ('000 tons)		18,433	18,956	19,494	20,048	20,617	24,078
B. Berth capacity at 95% occupancy rate ('000 tons)							
Without project		18,334	18,334	18,334	18,334	18,334	18,334
With project		24,224	25,402	25,402	25,402	25,402	25,402
C. Traffic handling ('000 tons)							
Without project	Berth	18,334	18,334	18,334	18,334	18,334	18,334
	Lightering	99	622	1,160	1,714	2,283	5,744
	Total	18,433	18,956	19,494	20,048	20,617	24,078
With project	Berth	18,433	18,956	19,494	20,048	20,617	24,078
	Lightering	0	0	0	0	0	0
	Total	18,433	18,956	19,494	20,048	20,617	24,078
D. Loading/unloading costs (Yuan million)							
Without project	Berth	61.60	61.60	61.60	61.60	61.60	61.60
	Lightering	1.05	6.57	12.25	18.10	24.11	60.66
	Total	62.65	68.17	73.85	79.70	85.71	122.26
With project	Berth	61.93	63.69	65.50	67.36	69.27	80.90
	Lightering	0.00	0.00	0.00	0.00	0.00	0.00
	Total	61.93	63.69	65.50	67.36	69.27	80.90
E. Net loading/unloading savings (Yuan million)		0.72	4.48	8.35	12.34	16.44	41.36

Notes: 1. The conversion factors for handling cost are: (a) At berth 1.05; and (b) Lightering 1.10.
2. Lighterting costs are taken to be three times handling costs at berth.

Table 5.5(b)

CHINA

SHANGHAI PORT PROJECT

Load/unloading Cost Savings

Container Berth

		1991	1992	1993	1994	1995	2000
A. Traffic demand ('000 TEUs)		422.2	452.6	485.2	520.2	557.6	795.0
B. Berth capacity at 95% occupancy rate ('000 TEUs)							
Without project		594.3	594.3	594.3	594.3	594.3	594.3
With project		656.3	718.2	718.2	718.2	718.2	718.2
C. Traffic handling ('000 TEUs)							
Without project	Berth	422.2	452.6	485.2	520.2	557.6	594.3
	Lightering	0.0	0.0	0.0	0.0	0.0	200.7
	Total	422.2	452.6	485.2	520.2	557.6	795.0
With project	Berth	422.2	452.6	485.2	520.2	557.6	718.2
	Lightering	0.0	0.0	0.0	0.0	0.0	76.8
	Total	422.2	452.6	485.2	520.2	557.6	795.0
D. Loading/unloading costs (Yuan million)							
Without project	Berth	62.06	66.53	71.32	76.47	81.97	87.36
	Lightering	0.00	0.00	0.00	0.00	0.00	61.82
	Total	62.06	66.53	71.32	76.47	81.97	149.18
With project	Berth	62.06	66.53	71.32	76.47	81.97	105.58
	Lightering	0.00	0.00	0.00	0.00	0.00	23.65
	Total	62.06	66.53	71.32	76.47	81.97	129.23
E. Net loading/unloading savings (Yuan million)		0.00	0.00	0.00	0.00	0.00	19.95

Notes: 1. The conversion factors for handling cost are: (a) At berth 1.05; and (b) Lightering 1.10.
2. Lighterting costs are taken to be three times handling costs at berth.

Sources: Shanghai Port Authority and Bank staff.

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Table 5.5(c)

CHINA

SHANGHAI PORT PROJECT

Load/unloading Cost Savings

Timber Berths

		1991	1992	1993	1994	1995	2000
A. Taffic demand ('000 tons)		1,081	1,092	1,103	1,114	1,125	1,228
B. Berth capacity at 95% occupancy rate ('000 tons)							
Without project		868	868	868	868	868	868
With project		1,314	1,314	1,314	1,314	1,314	1,314
C. Traffic handling ('000 tons)							
Without project	Berth	868	868	868	868	868	868
	Lightering	213	224	235	246	257	360
	Total	1,081	1,092	1,103	1,114	1,125	1,228
With project	Berth	1,081	1,092	1,103	1,114	1,125	1,228
	Lightering	0	0	0	0	0	0
	Total	1,081	1,092	1,103	1,114	1,125	1,228
D. Loading/unloading costs (Yuan million)							
Without project	Berth	1.18	1.18	1.18	1.18	1.18	1.18
	Lightering	0.91	0.96	1.01	1.06	1.10	1.54
	Total	2.09	2.14	2.19	2.24	2.28	2.72
With project	Berth	1.49	1.51	1.52	1.54	1.55	1.69
	Lightering	0.00	0.00	0.00	0.00	0.00	0.00
	Total	1.49	1.51	1.52	1.54	1.55	1.69
E. Net loading/unloading savings (Yuan million)		0.60	0.63	0.67	0.70	0.73	1.03

Notes: 1. The conversion factors for handling cost are: (a) At berths 1.05; and (b) Lightering 1.10.
2. Lightering costs are taken to be three times handling costs at berth.

Sources: Shanghai Port Authority and Bank staff.

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Table 5.5(d)

CHINA

SHANGHAI PORT PROJECT

Load/unloading Cost Savings

Coal Berths

		1990	1991	1992	1993	1994	1995	2000
A. Taffic demand ('000 tons)		49,125	51,189	53,339	55,580	57,915	60,347	75,365
B. Berth capacity at 95% occupancy rate ('000 tons)								
Without project		47,160	47,160	47,160	47,160	47,160	47,160	47,160
With project		49,692	49,692	49,692	49,692	49,692	49,692	49,692
C. Traffic handling ('000 TONs)								
Without project	Berth	47,160	47,160	47,160	47,160	47,160	47,160	47,160
	Lightering	1,965	4,029	6,179	8,420	10,755	13,187	28,205
	Total	49,125	51,189	53,339	55,580	57,915	60,347	75,365
With project	Berth	49,125	49,692	49,692	49,692	49,692	49,692	49,692
	Lightering	0	1,497	3,647	5,888	8,223	10,655	25,673
	Total	49,125	51,189	53,339	55,580	57,915	60,347	75,365
D. Loading/unloading costs (Yuan million)								
Without project	Berth	64.37	64.37	64.37	64.37	64.37	64.37	64.37
	Lightering	8.43	17.28	26.51	36.12	46.14	56.57	121.00
	Total	72.80	81.65	90.88	100.49	110.51	120.94	185.37
With project	Berth	67.06	67.83	67.83	67.83	67.83	67.83	67.83
	Lightering	0.00	6.42	15.65	25.26	35.28	45.71	110.14
	Total	67.06	74.25	83.48	93.09	103.11	113.54	177.97
E. Net loading/unloading savings (Yuan million)		5.74	7.40	7.40	7.40	7.40	7.40	7.40

Notes: 1. The conversion factors for handling cost are: (a) At berths 1.05; and (b) Lightering 1.10.
2. Lightering costs are taken to be three times handling costs at berth.

Sources: Shanghai Port Authority and Bank staff.

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Table 5.5(e)

CHINA

SHANGHAI PORT PROJECT

Load/unloading Cost Savings

Grain Berths

		1993	1994	1995	2000
A. Traffic demand ('000 tons)		5,770	5,836	5,903	6,357
B. Berth capacity at 95% occupancy rate ('000 tons)					
Without project		6,202	6,202	6,202	6,202
With project		14,884	14,884	14,884	14,884
C. Traffic handling ('000 tons)					
Without project	Berth	5,770	5,836	5,903	6,202
	Lightering	0	0	0	155
	Total	5,770	5,836	5,903	6,357
With project	Berth	5,770	5,836	5,903	6,357
	Lightering	0	0	0	0
	Total	5,770	5,836	5,903	6,357
D. Loading/unloading costs (Yuan million)					
Without project	Berth	24.23	24.51	24.79	26.05
	Lightering	0.00	0.00	0.00	2.05
	Total	24.23	24.51	24.79	28.10
With project	Berth	24.23	24.51	24.79	26.70
	Lightering	0.00	0.00	0.00	0.00
	Total	24.23	24.51	24.79	26.70
E. Net loading/unloading savings (Yuan million)		0.00	0.00	0.00	1.40

Notes: 1. The conversion factors for handling cost are: (a) At berth 1.05; and (b) Lightering 1.10.
2. Lightewring costs are taken to be three times handling cost at berth.

Sources: Shanghai Port Authority and Bank staff.

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Table 5.6

CHINA

SHANGHAI PORT PROJECT

Economic Benefits Summary

Total Project

(Y million)

	1990	1991	1992	1993	1994	1995	2000
Break Bulk Berths							
Ports: Loading/unloading savings		0.72	4.48	8.35	12.34	16.44	41.36
Ships port days savings		95.93	100.79	102.87	105.79	107.92	103.52
Cargo port days savings		51.32	54.88	[illegible]	59.39	61.49	65.15
Less: Benefits accruing to foreigners (10%)		14.80	16.02	[illegible]	17.75	18.59	21.00
Subtotal		133.17	144.13	151.31	159.77	167.26	189.03
Container Berth							
Ports: Loading/unloading savings		0.00	0.00	0.00	0.00	0.00	19.95
Ships port days savings		1.74	2.60	6.91	13.36	29.25	17.13
Cargo port days savings		0.45	0.62	1.46	2.71	5.79	4.42
Less: Benefits accruing to foreigners(10%)		0.22	0.32	0.84	1.61	3.50	4.15
Subtotal		1.97	2.90	7.53	14.46	31.54	37.35
Timber Berths							
Ports: Loading/unloading savings		0.60	0.63	0.67	0.70	0.73	1.03
Ships port days savings		40.14	40.05	39.90	39.59	39.80	36.91
Cargo port days savings		9.85	9.87	9.86	9.82	9.88	9.69
Less: Benefits accruing to foreigners (10%)		5.06	5.06	5.04	5.01	5.04	4.76
Subtotal		45.53	45.49	45.39	45.10	45.37	42.87
Coal Berths							
Ports: Loading/unloading savings	5.74	7.40	7.40	7.40	7.40	7.40	7.40
Ships port days savings	73.13	62.38	30.43	18.31	18.53	18.94	21.18
Cargo port days savings	1.28	1.09	0.46	0.21	0.20	0.19	0.14
Less: Benefits accruing to foreigners(10%)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Subtotal	80.15	70.87	38.29	25.92	26.13	26.53	28.72
Grain Berths							
Ports: Loading/unloading savings				0.00	0.00	0.00	1.40
Ships port days savings				29.92	32.38	34.90	51.12
Cargo port days savings				6.95	7.58	8.23	12.35
Other savings				5.77	5.84	5.90	6.36
Less: Benefits accruing to foreigners (10%)				4.26	4.58	4.90	7.12
Subtotal				38.38	41.22	44.13	64.11
Total	80.15	251.54	230.81	268.53	286.68	314.83	362.08

Sources: Shanghai Port Authority and Bank staff.

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CHINA

SHANGHAI PORT PROJECT

Economic Rate of Return (ERR) and Sensitivity Analysis

Break Bulk Berths

(Million Yuan)

(20 years)

Year	Base Case: Capital invest.	Base Case: Maint-enance	Base Case: Total Costs	Base Case: Total Bene-fits	Base Case: Net Cash Flow	Case 1: Costs (+15%)	Case 1: Benefits	Case 1: Net Cash Flow	Case 2: Costs	Case 2: Benefit s (-15%)	Case 2: Net Cash Flow	Case 3: Costs (+15%)	Case 3: Benefits (-15%)	Case 3: Net Cash Flow	Case 4: Costs	Case 4: Benefits (Delay 1 year)	Case 4: Net Cash Flow
1986	43.32		43.32		(43.32)	49.82		(49.82)	43.32		(43.32)	49.82		(49.82)	43.32		(43.32)
1987	101.81		101.81		(101.8)	117.08		(117.08)	101.81		(101.81)	117.08		(117.1)	101.81		(101.81)
1988	184.22		184.22		(184.2)	211.85		(211.9)	184.22		(184.2)	211.85		(211.9)	184.22		(184.22)
1989	159.44		159.44		(159.4)	183.36		(183.4)	159.44		(159.4)	183.36		(183.4)	159.44		(159.44)
1990	110.80		110.80		(110.8)	127.42		(127.42)	110.80		(110.80)	127.42		(127.4)	110.80		(110.80)
1991		41.97	41.97	133.17	91.2	48.27	133.17	84.90	41.97	113.19	71.22	48.27	113.19	64.9	41.97		(41.97)
1992		41.97	41.97	144.13	102.2	48.27	144.13	95.86	41.97	122.51	80.54	48.27	122.51	74.24	41.97	133.17	91.20
1993		41.97	41.97	151.31	109.3	48.27	151.31	103.04	41.97	128.61	86.64	48.27	128.61	80.34	41.97	144.13	102.16
1994		41.97	41.97	159.77	117.80	48.27	159.77	111.50	41.97	135.80	93.83	48.27	135.80	87.53	41.97	151.31	109.34
1995		41.97	41.97	167.26	125.29	48.27	167.26	118.99	41.97	142.17	100.20	48.27	142.17	93.90	41.97	159.77	117.80
1996		41.97	41.97	171.61	129.64	48.27	171.61	123.34	41.97	145.87	103.90	48.27	145.87	97.60	41.97	167.26	125.29
1997		41.97	41.97	175.97	134.00	48.27	175.97	127.70	41.97	149.57	107.60	48.27	149.57	101.30	41.97	171.61	129.64
1998		41.97	41.97	180.32	138.35	48.27	180.32	132.05	41.97	153.27	111.30	48.27	153.27	105.00	41.97	175.97	134.00
1999		41.97	41.97	184.68	142.71	48.27	184.68	136.41	41.97	156.97	115.00	48.27	156.97	108.70	41.97	180.32	138.35
2000		41.97	41.97	189.03	147.06	48.27	189.03	140.76	41.97	160.68	118.71	48.27	160.68	112.41	41.97	184.68	142.71
2001		62.96	62.96	189.03	126.07	72.40	189.03	116.63	62.96	160.68	97.72	72.40	160.68	88.28	62.96	189.03	126.07
2002		62.96	62.96	189.03	126.07	72.40	189.03	116.63	62.96	160.68	97.72	72.40	160.68	88.28	62.96	189.03	126.07
2003		62.96	62.96	189.03	126.07	72.40	189.03	116.63	62.96	160.68	97.72	72.40	160.68	88.28	62.96	189.03	126.07
2004		62.96	62.96	189.03	126.07	72.40	189.03	116.63	62.96	160.68	97.72	72.40	160.68	88.28	62.96	189.03	126.07
2005		62.96	62.96	189.03	126.07	72.40	189.03	116.63	62.96	160.68	97.72	72.40	160.68	88.28	62.96	189.03	126.07
2006		62.96	62.96	189.03	126.07	72.40	189.03	116.63	62.96	160.68	97.72	72.40	160.68	88.28	62.96	189.03	126.07
2007		62.96	62.96	189.03	126.07	72.40	189.03	116.63	62.96	160.68	97.72	72.40	160.68	88.28	62.96	189.03	126.07
2008		62.96	62.96	189.03	126.07	72.40	189.03	116.63	62.96	160.68	97.72	72.40	160.68	88.28	62.96	189.03	126.07
2009		62.96	62.96	189.03	126.07	72.40	189.03	116.63	62.96	160.68	97.72	72.40	160.68	88.28	62.96	189.03	126.07
2010		62.96	62.96	189.03	126.07	72.40	189.03	116.63	62.96	160.68	97.72	72.40	160.68	88.28	62.96	189.03	126.07
Total	599.59	1049.3	1648.9	3547.6	1898.7	1896.2	3547.6	1651.32	1648.89	3015.44	1366.55	1896.2	3015.44	1119.2	1648.9	3358.5	1709.6
					ERR = 14.6 %			ERR = 12.0 %			ERR = 11.6 %			ERR = 9.1 %			ERR = 12.2 %

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Table 5.7(a)

CHINA

SHANGHAI PORT PROJECT

Economic Rate of Return (ERR) and Sensitivity Analysis

Container Berth

(Million Yuan)

(20 years)

Year	Base Case: Costs: Capital invest.	Base Case: Costs: Maint-enance	Base Case: Costs: Total	Base Case: Total Bene-fits	Base Case: Net Cash Flow	Case 1: Costs (+15%)	Case 1: Benefits	Case 1: Net Cash Flow	Case 2: Costs	Case 2: Benefit s (-15%)	Case 2: Net Cash Flow	Case 3: Costs (+15%)	Case 3: Benefits (-15%)	Case 3: Net Cash Flow	Case 4: Costs	Case 4: Benefits (Delay 1 year)	Case 4: Net Cash Flow
1986	5.87		5.87		(5.87)	6.75		(6.75)	5.87		(5.87)	6.75		(6.75)	5.87		(5.87)
1987	13.79		13.79		(13.79)	15.86		(15.86)	13.79		(13.79)	15.86		(15.86)	13.79		(13.79)
1988	24.95		24.95		(24.95)	28.69		(28.69)	24.95		(24.95)	28.69		(28.7)	24.95		(24.95)
1989	21.60		21.60		(21.6)	24.84		(24.8)	21.60		(21.6)	24.84		(24.8)	21.60		(21.60)
1990	15.00		15.00		(15.0)	17.25		(17.3)	15.00		(15.0)	17.25		(17.3)	15.00		(15.0)
1991		5.68	5.68	1.97	(3.7)	6.53	1.97	(4.6)	5.68	1.67	(4.0)	6.53	1.67	(4.9)	5.68		(5.7)
1992		5.68	5.68	2.90	-2.78	6.53	2.90	-3.63	5.68	2.47	-3.21	6.53	2.47	(4.06)	5.68	1.97	(3.71)
1993		5.68	5.68	7.53	1.85	6.53	7.53	1.00	5.68	6.40	0.72	6.53	6.40	(0.13)	5.68	2.90	(2.78)
1994		5.68	5.68	14.46	8.78	6.53	14.46	7.93	5.68	12.29	6.61	6.53	12.29	5.76	5.68	7.53	1.85
1995		5.68	5.68	31.54	25.86	6.53	31.54	25.01	5.68	26.81	21.13	6.53	26.81	20.28	5.68	14.46	8.78
1996		5.68	5.68	35.89	30.21	6.53	35.89	29.36	5.68	30.51	24.83	6.53	30.51	23.98	5.68	31.54	25.86
1997		5.68	5.68	40.25	34.57	6.53	40.25	33.72	5.68	34.21	28.53	6.53	34.21	27.68	5.68	35.89	30.21
1998		5.68	5.68	44.60	38.92	6.53	44.60	38.07	5.68	37.91	32.23	6.53	37.91	31.38	5.68	40.25	34.57
1999		5.68	5.68	48.96	43.28	6.53	48.96	42.43	5.68	41.61	35.93	6.53	41.61	35.08	5.68	44.60	38.92
2000		5.68	5.68	37.35	31.67	6.53	37.35	30.82	5.68	31.75	26.07	6.53	31.75	25.22	5.68	48.96	43.28
2001		8.52	8.52	37.35	28.83	9.80	37.35	27.55	8.52	31.75	23.23	9.80	31.75	21.95	8.52	37.35	28.83
2002		8.52	8.52	37.35	28.83	9.80	37.35	27.55	8.52	31.75	23.23	9.80	31.75	21.95	8.52	37.35	28.83
2003		8.52	8.52	37.35	28.83	9.80	37.35	27.55	8.52	31.75	23.23	9.80	31.75	21.95	8.52	37.35	28.83
2004		8.52	8.52	37.35	28.83	9.80	37.35	27.55	8.52	31.75	23.23	9.80	31.75	21.95	8.52	37.35	28.83
2005		8.52	8.52	37.35	28.83	9.80	37.35	27.55	8.52	31.75	23.23	9.80	31.75	21.95	8.52	37.35	28.83
2006		8.52	8.52	37.35	28.83	9.80	37.35	27.55	8.52	31.75	23.23	9.80	31.75	21.95	8.52	37.35	28.83
2007		8.52	8.52	37.35	28.83	9.80	37.35	27.55	8.52	31.75	23.23	9.80	31.75	21.95	8.52	37.35	28.83
2008		8.52	8.52	37.35	28.83	9.80	37.35	27.55	8.52	31.75	23.23	9.80	31.75	21.95	8.52	37.35	28.83
2009		8.52	8.52	37.35	28.83	9.80	37.35	27.55	8.52	31.75	23.23	9.80	31.75	21.95	8.52	37.35	28.83
2010		8.52	8.52	37.35	28.83	9.80	37.35	27.55	8.52	31.75	23.23	9.80	31.75	21.95	8.52	37.35	28.83
Total	81.21	142.00	223.21	639.9	415.74	256.69	639.0	382.26	223.21	543.13	319.92	256.69	543.13	286.44	223.21	601.6	378.39
				ERR =	15.4 %		ERR =	13.5 %		ERR =	13.2 %		ERR =	11.3 %		ERR =	13.4 %

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Table 5.7(b)

CHINA

SHANGHAI PORT PROJECT

Economic Rate of Return (ERR) and Sensitivity Analysis

Timber Berths

(Million Yuan)

(20 years)

Year	Base Case: Costs: Capital invest.	Base Case: Costs: Maint-enance	Base Case: Costs: Total	Base Case: Total Bene-fits	Base Case: Net Cash Flow	Case 1: Costs (+15%)	Case 1: Benefits	Case 1: Net Cash Flow	Case 2: Costs	Case 2: Benefit s (-15%)	Case 2: Net Cash Flow	Case 3: Costs (+15%)	Case 3: Benefits (-15%)	Case 3: Net Cash Flow	Case 4: Costs	Case 4: Benefits (Delay 1 year)	Case 4: Net Cash Flow
1986	5.16		5.16		(5.16)	5.93		(5.93)	5.16		(5.16)	5.93		(5.93)	5.16		(5.16)
1987	12.12		12.12		(12.12)	13.94		(13.94)	12.12		(12.12)	13.94		(13.94)	12.12		(12.12)
1988	21.94		21.94		(21.9)	25.23		(25.2)	21.94		(21.9)	25.23		(25.2)	21.94		(21.94)
1989	18.98		18.98		(19.0)	21.83		(21.8)	18.98		(19.0)	21.83		(21.8)	18.98		(18.98)
1990	13.19		13.19		(13.2)	15.17		(15.17)	13.19		(13.19)	15.17		(15.17)	13.19		(13.19)
1991		5.00	5.00	45.53	40.5	5.75	45.53	39.78	5.00	38.70	33.70	5.75	38.70	33.0	5.00		(5.00)
1992		5.00	5.00	45.49	40.5	5.75	45.49	39.74	5.00	38.67	33.67	5.75	38.67	32.92	5.00	45.53	40.53
1993		5.00	5.00	45.39	40.4	5.75	45.39	39.64	5.00	38.58	33.58	5.75	38.58	32.83	5.00	45.49	40.49
1994		5.00	5.00	45.10	40.10	5.75	45.10	39.35	5.00	38.34	33.34	5.75	38.34	32.59	5.00	45.39	40.39
1995		5.00	5.00	45.37	40.37	5.75	45.37	39.62	5.00	38.56	33.56	5.75	38.56	32.81	5.00	45.10	40.10
1996		5.00	5.00	44.87	39.87	5.75	44.87	39.12	5.00	38.14	33.14	5.75	38.14	32.39	5.00	45.37	40.37
1997		5.00	5.00	44.37	39.37	5.75	44.37	38.62	5.00	37.71	32.71	5.75	37.71	31.96	5.00	44.87	39.87
1998		5.00	5.00	43.87	38.87	5.75	43.87	38.12	5.00	37.29	32.29	5.75	37.29	31.54	5.00	44.37	39.37
1999		5.00	5.00	43.37	38.37	5.75	43.37	37.62	5.00	36.86	31.86	5.75	36.86	31.11	5.00	43.87	38.87
2000		5.00	5.00	42.87	37.87	5.75	42.87	37.12	5.00	36.44	31.44	5.75	36.44	30.69	5.00	43.37	38.37
2001		7.50	7.50	42.87	35.37	8.63	42.87	34.24	7.50	36.44	28.94	8.63	36.44	27.81	7.50	42.87	35.37
2002		7.50	7.50	42.87	35.37	8.63	42.87	34.24	7.50	36.44	28.94	8.63	36.44	27.81	7.50	42.87	35.37
2003		7.50	7.50	42.87	35.37	8.63	42.87	34.24	7.50	36.44	28.94	8.63	36.44	27.81	7.50	42.87	35.37
2004		7.50	7.50	42.87	35.37	8.63	42.87	34.24	7.50	36.44	28.94	8.63	36.44	27.81	7.50	42.87	35.37
2005		7.50	7.50	42.87	35.37	8.63	42.87	34.24	7.50	36.44	28.94	8.63	36.44	27.81	7.50	42.87	35.37
2006		7.50	7.50	42.87	35.37	8.63	42.87	34.24	7.50	36.44	28.94	8.63	36.44	27.81	7.50	42.87	35.37
2007		7.50	7.50	42.87	35.37	8.63	42.87	34.24	7.50	36.44	28.94	8.63	36.44	27.81	7.50	42.87	35.37
2008		7.50	7.50	42.87	35.37	8.63	42.87	34.24	7.50	36.44	28.94	8.63	36.44	27.81	7.50	42.87	35.37
2009		7.50	7.50	42.87	35.37	8.63	42.87	34.24	7.50	36.44	28.94	8.63	36.44	27.81	7.50	42.87	35.37
2010		7.50	7.50	42.87	35.37	8.63	42.87	34.24	7.50	36.44	28.94	8.63	36.44	27.81	7.50	42.87	35.37
Total	71.39	125.00	196.4	874.93	678.5	225.9	874.93	649.03	196.39	743.69	547.30	225.9	743.69	517.8	196.4	832.06	635.7
				ERR =	32.7 %		ERR =	29.3 %		ERR =	28.8 %		ERR =	25.5 %		ERR =	26.9 %

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Table 5.7(c)

CHINA

SHANGHAI PORT PROJECT

Economic Rate of Return (ERR) and Sensitivity Analysis

Coal Berths

(Million Yuan)

(20 years)

Year	Base Case: Costs: Capital invest.	Base Case: Costs: Maint-enance	Base Case: Costs: Total	Base Case: Total Bene-fits	Base Case: Net Cash Flow	Case 1: Costs (+15%)	Case 1: Benefits	Case 1: Net Cash Flow	Case 2: Costs	Case 2: Benefit s (-15%)	Case 2: Net Cash Flow	Case 3: Costs (+15%)	Case 3: Benefits (-15%)	Case 3: Net Cash Flow	Case 4: Costs	Case 4: Benefits (Delay 1 year)	Case 4: Net Cash Flow
1986	8.55		8.55		(8.55)	9.83		(9.83)	8.55		(8.55)	9.83		(9.83)	8.55		(8.55)
1987	32.28		32.28		(32.28)	37.12		(37.12)	32.28		(32.28)	37.12		(37.12)	32.28		(32.28)
1988	74.24		74.24		(74.24)	85.38		(85.38)	74.24		(74.24)	85.38		(85.4)	74.24		(74.24)
1989	7.94		7.94		(7.9)	9.13		(9.1)	7.94		(7.9)	9.13		(9.1)	7.94		(7.94)
1990		8.61	8.61	80.15	71.5	9.90	80.15	70.3	8.61	68.13	59.5	9.90	68.13	58.2	8.61		(8.6)
1991		8.61	8.61	70.87	62.3	9.90	70.87	61.0	8.61	60.24	51.6	9.90	60.24	50.3	8.61		(8.6)
1992		8.61	8.61	38.29	29.68	9.90	38.29	28.39	8.61	32.55	23.94	9.90	32.55	22.65	8.61	70.87	62.26
1993		8.61	8.61	25.92	17.31	9.90	25.92	16.02	8.61	22.03	13.42	9.90	22.03	12.13	8.61	38.29	29.68
1994		8.61	8.61	26.13	17.52	9.90	26.13	16.23	8.61	22.21	13.60	9.90	22.21	12.31	8.61	25.92	17.31
1995		8.61	8.61	26.53	17.92	9.90	26.53	16.63	8.61	22.55	13.94	9.90	22.55	12.65	8.61	26.13	17.52
1996		8.61	8.61	26.03	17.42	9.90	26.03	16.13	8.61	22.13	13.52	9.90	22.13	12.23	8.61	26.53	17.92
1997		8.61	8.61	25.53	16.92	9.90	25.53	15.63	8.61	21.70	13.09	9.90	21.70	11.80	8.61	26.03	17.42
1998		8.61	8.61	25.03	16.42	9.90	25.03	15.13	8.61	21.28	12.67	9.90	21.28	11.38	8.61	25.53	16.92
1999		8.61	8.61	24.53	15.92	9.90	24.53	14.63	8.61	20.85	12.24	9.90	20.85	10.95	8.61	25.03	16.42
2000		12.92	12.92	28.72	15.80	14.86	28.72	13.86	12.92	24.41	11.49	14.86	24.41	9.55	12.92	24.53	11.61
2001		12.92	12.92	28.72	15.80	14.86	28.72	13.86	12.92	24.41	11.49	14.86	24.41	9.55	12.92	28.72	15.80
2002		12.92	12.92	28.72	15.80	14.86	28.72	13.86	12.92	24.41	11.49	14.86	24.41	9.55	12.92	28.72	15.80
2003		12.92	12.92	28.72	15.80	14.86	28.72	13.86	12.92	24.41	11.49	14.86	24.41	9.55	12.92	28.72	15.80
2004		12.92	12.92	28.72	15.80	14.86	28.72	13.86	12.92	24.41	11.49	14.86	24.41	9.55	12.92	28.72	15.80
2005		12.92	12.92	28.72	15.80	14.86	28.72	13.86	12.92	24.41	11.49	14.86	24.41	9.55	12.92	28.72	15.80
2006		12.92	12.92	28.72	15.80	14.86	28.72	13.86	12.92	24.41	11.49	14.86	24.41	9.55	12.92	28.72	15.80
2007		12.92	12.92	28.72	15.80	14.86	28.72	13.86	12.92	24.41	11.49	14.86	24.41	9.55	12.92	28.72	15.80
2008		12.92	12.92	28.72	15.80	14.86	28.72	13.86	12.92	24.41	11.49	14.86	24.41	9.55	12.92	28.72	15.80
2009		12.92	12.92	28.72	15.80	14.86	28.72	13.86	12.92	24.41	11.49	14.86	24.41	9.55	12.92	28.72	15.80
2010		12.92	12.92	28.72	15.80	14.86	28.72	13.86	12.92	24.41	11.49	14.86	24.41	9.55	12.92	28.72	15.80
Total	123.01	228.22	351.23	684.9	333.70	403.92	684.9	281.01	351.23	582.18	230.95	403.92	582.18	178.26	351.23	576.1	224.83
				ERR =	21.3 %		ERR =	17.0 %		ERR =	16.3 %		ERR =	12.0 %		ERR =	10.1 %

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Table 5.7(d)

CHINA

SHANGHAI PORT PROJECT

Economic Rate of Return (ERR) and Sensitivity Analysis

Total Project

(Million Yuan)

Year	Base Case: Capital invest.	Base Case: Costs: Maint-enance	Base Case: Costs: Total	Base Case: Total Bene-fits	Base Case: Net Cash Flow	Case 1: Costs (+15%)	Case 1: Benefits	Case 1: Net Cash Flow	Case 2: Costs	Case 2: Benefit s (-15%)	Case 2: Net Cash Flow	Case 3: Costs (+15%)	Case 3: Benefits (-15%)	Case 3: Net Cash Flow	Case 4: Costs	Case 4: Benefits (Delay 1 year)	Case 4: Net Cash Flow
1986	62.90		62.90		(62.90)	72.34		(72.34)	62.90		(62.90)	72.34		(72.34)	62.90		(62.90)
1987	160.00		160.00		-160.0	184.00		(184.00)	160.00		(160.00)	184.00		-184.0	160.00		(160.00)
1988	305.35		305.35		-305.4	351.15		(351.15)	305.35		(305.35)	351.15		(351.2)	305.35		(305.35)
1989	214.39		214.39		(214.4)	246.55		(246.6)	214.39		(214.4)	246.55		(246.6)	214.39		(214.39)
1990	148.26	8.61	156.87	80.15	(76.7)	180.40	80.15	(100.3)	156.87	68.13	(88.7)	180.40	68.13	(112.3)	156.87		(156.9)
1991	52.94	61.26	114.20	251.54	137.3	131.33	251.54	120.2	114.20	213.81	99.6	131.33	213.81	82.5	114.20	80.15	(34.1)
1992	37.82	61.26	99.08	230.81	131.73	113.94	230.81	116.87	99.08	196.19	97.11	113.94	196.19	82.25	99.08	251.54	152.46
1993	10.93	65.37	76.30	268.53	192.23	87.75	268.53	180.78	76.30	228.25	151.95	87.75	228.25	140.50	76.30	230.81	154.51
1994		65.37	65.37	286.68	221.31	75.18	286.68	211.50	65.37	243.68	178.31	75.18	243.68	168.50	65.37	268.53	203.16
1995		65.37	65.37	314.83	249.46	75.18	314.83	239.65	65.37	267.61	202.24	75.18	267.61	192.43	65.37	286.68	221.31
1996		65.37	65.37	324.28	258.91	75.18	324.28	249.10	65.37	275.64	210.27	75.18	275.64	200.46	65.37	314.83	249.46
1997		65.37	65.37	333.73	268.36	75.18	333.73	258.55	65.37	283.67	218.30	75.18	283.67	208.49	65.37	324.28	258.91
1998		65.37	65.37	343.18	277.81	75.18	343.18	268.00	65.37	291.70	226.33	75.18	291.70	216.52	65.37	333.73	268.36
1999		65.37	65.37	352.63	287.26	75.18	352.63	277.45	65.37	299.74	234.37	75.18	299.74	224.56	65.37	343.18	277.81
2000		69.68	69.68	362.08	292.40	80.13	362.08	281.95	69.68	307.77	238.09	80.13	307.77	227.64	69.68	352.63	282.95
2001		96.01	96.01	362.08	266.07	110.41	362.08	251.67	96.01	307.77	211.76	110.41	307.77	197.36	96.01	362.08	266.07
2002		96.01	96.01	362.08	266.07	110.41	362.08	251.67	96.01	307.77	211.76	110.41	307.77	197.36	96.01	362.08	266.07
2003		98.07	98.07	362.08	264.01	112.78	362.08	249.30	98.07	307.77	209.70	112.78	307.77	194.99	98.07	362.08	264.01
2004		98.07	98.07	362.08	264.01	112.78	362.08	249.30	98.07	307.77	209.70	112.78	307.77	194.99	98.07	362.08	264.01
2005		98.07	98.07	362.08	264.01	112.78	362.08	249.30	98.07	307.77	209.70	112.78	307.77	194.99	98.07	362.08	264.01
2006		98.07	98.07	362.08	264.01	112.78	362.08	249.30	98.07	307.77	209.70	112.78	307.77	194.99	98.07	362.08	264.01
2007		98.07	98.07	362.08	264.01	112.78	362.08	249.30	98.07	307.77	209.70	112.78	307.77	194.99	98.07	362.08	264.01
2008		98.07	98.07	362.08	264.01	112.78	362.08	249.30	98.07	307.77	209.70	112.78	307.77	194.99	98.07	362.08	264.01
2009		98.07	98.07	362.08	264.01	112.78	362.08	249.30	98.07	307.77	209.70	112.78	307.77	194.99	98.07	362.08	264.01
2010		98.07	98.07	362.08	264.01	112.78	362.08	249.30	98.07	307.77	209.70	112.78	307.77	194.99	98.07	362.08	264.01
Total	992.59	1635.0	2627.6	6769.2	4141.7	3021.7	6769.2	3747.5	2627.6	5753.9	3126.3	3021.7	5753.9	2732.2	2627.6	6407.2	3779.6
				ERR =	18.2 %		ERR =	15.5 %		ERR =	15.0 %		ERR =	12.4 %		ERR =	15.2 %

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Table 5.7(E)

CHINA

SHANGHAI PORT PROJECT

Economic Rate of Return (ERR) and Sensitivity Analysis

Grain Berths

(Million Yuan)

(20 years)

Year	Base Case Costs Capital invest.	Base Case Costs Maint-enance	Base Case Costs Total	Base Case Total Bene-fits	Base Case Net Cash Flow	Case 1 Costs (+15%)	Case 1 Benefits	Case 1 Net Cash Flow	Case 2 Costs	Case 2 Benefit s (-15%)	Case 2 Net Cash Flow	Case 3 Costs (+15%)	Case 3 Benefits (-15%)	Case 3 Net Cash Flow	Case 4 Costs	Case 4 Benefits (Delay 1 year)	Case 4 Net Cash Flow
1989	6.43		6.43		(6.4)	7.39		(7.4)	6.43		(6.4)	7.39		(7.4)	6.43		(6.43)
1990	9.27		9.27		(9.3)	10.66		(10.66)	9.27		(9.27)	10.66		(10.66)	9.27		(9.27)
1991	52.94		52.94		(52.9)	60.88		(60.88)	52.94		(52.94)	60.88		(60.9)	52.94		(52.94)
1992	37.82		37.82		(37.8)	43.49		(43.49)	37.82		(37.82)	43.49		(43.49)	37.82		(37.82)
1993	10.93	4.11	15.04	38.38	23.3	17.30	38.38	21.08	15.04	32.62	17.58	17.30	32.62	15.32	15.04		(15.04)
1994		4.11	4.11	41.22	37.11	4.73	41.22	36.49	4.11	35.04	30.93	4.73	35.04	30.31	4.11	38.38	34.27
1995		4.11	4.11	44.13	40.02	4.73	44.13	39.40	4.11	37.51	33.40	4.73	37.51	32.78	4.11	41.22	37.11
1996		4.11	4.11	48.13	44.02	4.73	48.13	43.40	4.11	40.91	36.80	4.73	40.91	36.18	4.11	44.13	40.02
1997		4.11	4.11	52.12	48.01	4.73	52.12	47.39	4.11	44.30	40.19	4.73	44.30	39.57	4.11	48.13	44.02
1998		4.11	4.11	56.12	52.01	4.73	56.12	51.39	4.11	47.70	43.59	4.73	47.70	42.97	4.11	52.12	48.01
1999		4.11	4.11	60.11	56.00	4.73	60.11	55.38	4.11	51.10	46.99	4.73	51.10	46.37	4.11	56.12	52.01
2000		4.11	4.11	64.11	60.00	4.73	64.11	59.38	4.11	54.49	50.38	4.73	54.49	49.76	4.11	60.11	56.00
2001		4.11	4.11	64.11	60.00	4.73	64.11	59.38	4.11	54.49	50.38	4.73	54.49	49.76	4.11	64.11	60.00
2002		4.11	4.11	64.11	60.00	4.73	64.11	59.38	4.11	54.49	50.38	4.73	54.49	49.76	4.11	64.11	60.00
2003		6.17	6.17	64.11	57.94	7.10	64.11	57.01	6.17	54.49	48.32	7.10	54.49	47.39	6.17	64.11	57.94
2004		6.17	6.17	64.11	57.94	7.10	64.11	57.01	6.17	54.49	48.32	7.10	54.49	47.39	6.17	64.11	57.94
2005		6.17	6.17	64.11	57.94	7.10	64.11	57.01	6.17	54.49	48.32	7.10	54.49	47.39	6.17	64.11	57.94
2006		6.17	6.17	64.11	57.94	7.10	64.11	57.01	6.17	54.49	48.32	7.10	54.49	47.39	6.17	64.11	57.94
2007		6.17	6.17	64.11	57.94	7.10	64.11	57.01	6.17	54.49	48.32	7.10	54.49	47.39	6.17	64.11	57.94
2008		6.17	6.17	64.11	57.94	7.10	64.11	57.01	6.17	54.49	48.32	7.10	54.49	47.39	6.17	64.11	57.94
2009		6.17	6.17	64.11	57.94	7.10	64.11	57.01	6.17	54.49	48.32	7.10	54.49	47.39	6.17	64.11	57.94
2010		6.17	6.17	64.11	57.94	7.10	64.11	57.01	6.17	54.49	48.32	7.10	54.49	47.39	6.17	64.11	57.94
2011		6.17	6.17	64.11	57.94	7.10	64.11	57.01	6.17	54.49	48.32	7.10	54.49	47.39	6.17	64.11	57.94
2012		6.17	6.17	64.11	57.94	7.10	64.11	57.01	6.17	54.49	48.32	7.10	54.49	47.39	6.17	64.11	57.94
Total	117.39	102.80	220.19	1173.6	953.5	253.3	1173.6	920.4	220.2	997.4	777.4	253.3	997.6	744.3	220.2	1109.5	889.3
				ERR =	30.0 %		ERR =	26.7 %		ERR =	26.2 %		ERR =	23.1 %		ERR =	24.8 %

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Table 5.7(e)

CHINA

Table 6.1

SHANGHAI HARBOR BUREAU

Income Statement
(Year ending 31 December)

	Actual				Forecast					(Y million)
	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Traffic ('000 tons)	73,627	81,829	91,136	99,400	95,888	99,378	103,000	105,163	107,371	109,626
Revenue										
Loading/unloading	225.04	316.44	335.71	339.62	400.15	441.78	487.82	520.51	555.55	592.63
Storage	48.68	65.85	76.67	64.44	91.34	100.84	111.35	118.81	126.81	135.27
Other	90.78	130.18	150.34	190.70	179.42	198.08	218.73	233.38	249.09	265.72
Marketing	50.47	54.51	60.41	55.15	71.77	79.23	87.49	93.35	99.64	106.29
Subtotal	414.97	566.98	623.13	649.91	742.68	819.93	905.39	966.05	1,031.09	1,099.91
Operating taxes										
Loading/unloading	6.75	10.17	10.84	10.91	12.96	14.31	15.81	16.86	18.00	19.20
Storage	1.46	3.53	4.12	3.45	4.93	5.45	6.01	6.42	6.85	7.30
Other	3.09	5.11	5.49	6.11	7.75	8.56	9.45	10.08	10.76	11.48
Marketing	0.85	1.08	1.33	1.42	1.55	1.71	1.89	2.02	2.15	2.30
Total operating tax	12.15	19.89	21.78	21.99	27.19	30.03	33.16	35.38	37.76	40.28
Net sales										
Loading/unloading	218.29	306.27	324.87	328.71	387.19	427.47	472.01	503.65	537.55	573.43
Storage	47.22	62.32	72.55	60.99	86.41	95.39	105.34	112.39	119.96	127.97
Other	87.69	125.07	144.85	184.49	171.67	189.52	209.28	223.30	238.33	254.24
Marketing	49.62	53.43	59.08	53.73	70.22	77.52	85.60	91.33	97.49	103.99
Total net sales	402.82	547.09	601.35	627.92	715.49	789.90	872.23	930.67	993.33	1,059.63
Operating Costs										
Loading/unloading	83.71	99.87	121.29	135.37	153.94	172.86	193.13	209.41	226.41	244.02
Storage	11.11	12.02	16.14	18.51	19.57	21.61	23.86	25.46	27.17	28.99
Other	31.31	44.87	62.15	81.92	90.94	99.63	109.14	116.18	123.66	131.51
Marketing	42.67	45.60	51.90	48.06	61.98	68.43	75.56	80.62	86.05	91.79
Total operating costs	168.80	202.36	251.48	283.86	326.43	362.53	401.69	431.67	463.29	496.31
Operating Profit										
Loading/unloading	134.58	206.40	203.58	193.25	233.25	254.61	278.88	294.24	311.14	329.41
Storage	36.11	50.30	56.41	42.46	66.84	73.78	81.48	86.93	92.79	98.98
Other	56.38	80.20	82.70	102.51	80.73	89.89	100.14	107.12	114.67	122.73
Marketing	6.95	7.83	7.18	5.63	8.24	9.09	10.04	10.71	11.44	12.20
Total operating profit	234.02	344.73	349.87	343.85	389.06	427.37	470.54	499.00	530.04	563.32
Non-operating income	0.56	0.77	0.51	0.60	0.65	0.72	0.80	0.85	0.91	0.97
Non-operating expenses	14.99	17.94	23.55	37.27	28.05	30.97	34.20	36.49	38.95	41.55
Other income	0.00	0.41	1.26	-	1.52	1.84	2.37	3.19	4.49	6.60
Profit before taxes	219.59	327.97	328.09	307.18	363.18	398.95	439.51	466.55	496.49	529.34
Income tax	120.77	180.38	51.55	51.55	51.55	51.55	51.55	51.55	51.55	51.55
Adjustment taxes	54.90	81.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other payment to state	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00	21.00
Net profit after taxes	22.92	44.60	255.54	234.63	290.63	326.41	366.96	394.00	423.94	456.79
Operating ratio	41.9	37.0	41.8	45.2	45.6	45.9	46.1	46.4	46.6	46.8
Return on assets employed	-	44.7	42.3	38.1	34.7	29.8	27.0	24.4	22.6	21.3

CHINA

SHANGHAI HARBOR BUREAU

Balance Sheet (at December 31)

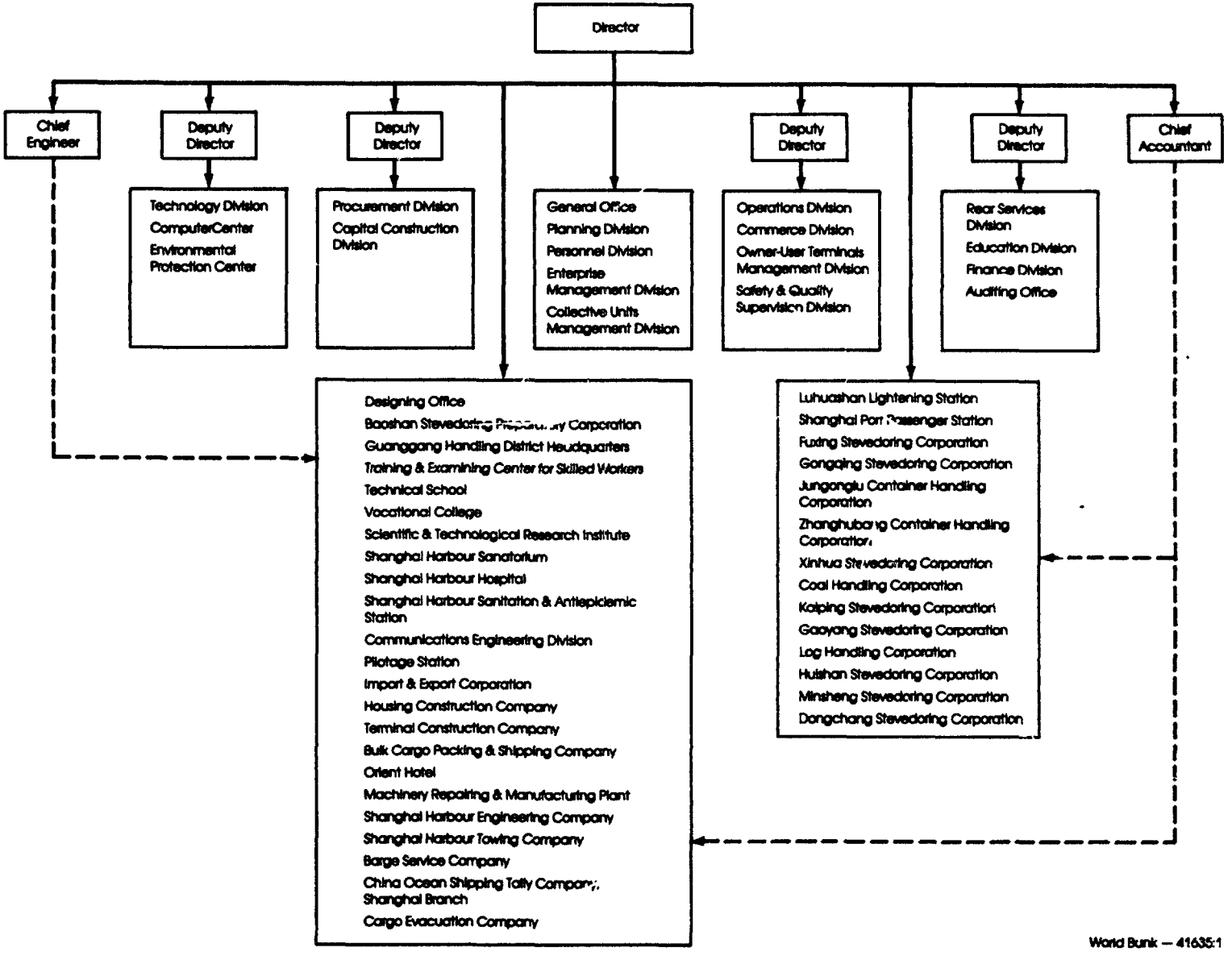
(Y million)

	Actual			Forecast						
	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Assets										
Fixed assets - at cost	986.67	1,084.95	1,132.06	1,279.80	1,631.96	1,984.12	2,336.26	2,691.26	3,046.26	3,401.26
less depreciation	258.27	272.12	292.58	314.61	352.68	392.29	438.28	490.69	549.53	614.79
Subtotal	728.40	812.83	839.48	965.19	1,279.28	1,591.83	1,897.98	2,200.57	2,496.73	2,786.47
Current assets										
Inventory	29.47	43.82	86.85	57.49	77.36	86.13	95.67	102.92	110.57	118.58
Receivables	334.27	30.70	43.18	100.41	51.99	57.40	63.38	67.62	72.18	76.99
Cash	127.82	139.11	191.42	143.48	114.51	160.46	246.00	311.67	355.18	431.62
Subtotal	191.56	213.72	321.45	301.38	243.86	303.99	405.05	482.21	537.93	627.19
Special fund assets	57.20	77.72	198.10	365.81	301.51	363.73	434.26	510.40	589.76	675.89
Total assets	977.16	1,104.27	1,359.03	1,632.38	1,824.65	2,259.55	2,737.29	3,193.18	3,624.42	4,089.55
Liabilities and Equity										
State funds-contributed	721.23	778.16	777.72	849.68	849.68	849.68	849.68	849.68	849.68	849.68
Internal funds for port development	0.00	0.00	0.00	30.74	167.83	431.96	728.45	1,046.31	1,375.89	1,746.55
L/T loans - IBRD	7.17	34.67	61.76	84.77	83.93	166.09	248.25	288.41	272.74	257.07
Current liabilities	101.22	114.63	187.50	219.48	232.07	258.40	287.02	308.75	331.72	355.73
Special funds	147.54	176.81	332.05	447.71	491.14	553.42	623.89	700.03	794.39	880.52
Total liabilities and Equity	977.16	1,104.27	1,359.03	1,632.38	1,824.65	2,259.55	2,737.29	3,193.18	3,624.42	4,089.55
Debt: capital (%)										
current ratio										

Sources and Application of Funds

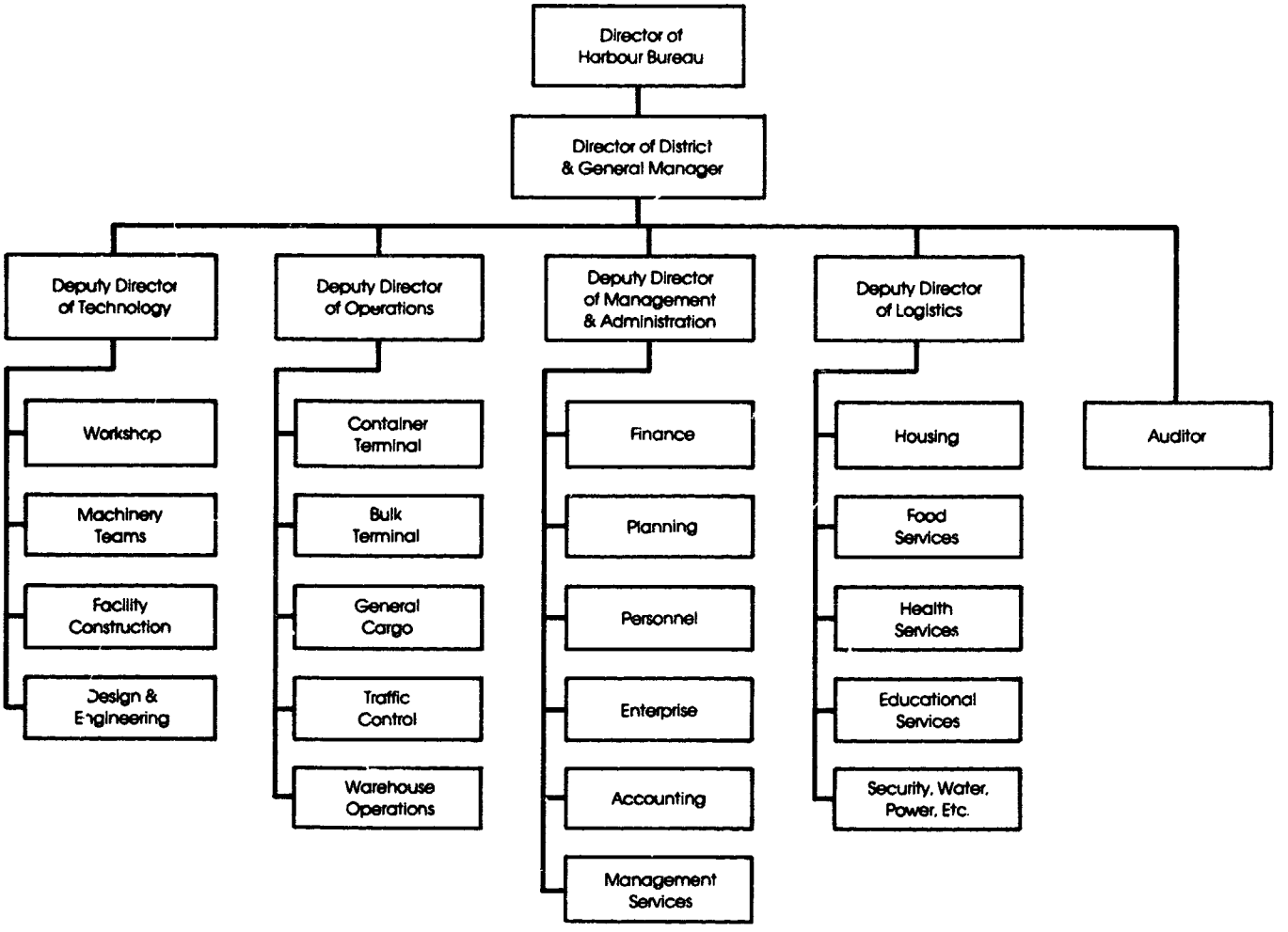
Sources										
Net profit	22.92	44.60	255.54	234.63	290.63	326.41	366.96	394.00	423.94	456.79
Depreciation	12.60	13.85	20.46	22.03	38.07	39.61	45.99	52.41	58.84	65.26
State contribution	72.35	56.93	(0.44)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Borrowing - IBRD	18.84	27.50	27.09	23.01	0.00	83.00	83.00	41.00	0.00	0.00
Total sources	126.71	142.88	302.65	279.67	328.70	449.02	495.95	487.41	482.78	522.05
Applications										
Capital expenditure	86.33	98.28	47.11	147.74	352.16	352.16	352.14	355.00	355.00	355.00
Special fund expenditure	130.00	35.85	220.68	183.98	45.81	62.22	70.53	76.14	79.36	86.13
Loan repayment - IBRD	72.35	56.93	(0.44)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Change w/capital	(37.48)	(2.54)	(17.45)	(4.11)	(41.14)	(12.15)	(13.10)	(10.24)	(10.76)	(11.19)
Total applications	178.85	131.59	250.34	327.61	357.67	403.07	410.41	421.74	439.27	445.61
Net funds flow	(52.14)	11.29	52.31	(47.94)	(28.97)	45.95	85.54	65.67	43.51	76.44
Opening balance	179.96	127.82	139.11	191.42	143.48	114.51	160.46	246.00	311.67	355.18
Closing balance	127.82	139.11	191.42	143.48	114.51	160.46	246.00	311.67	355.18	431.62

CHINA
ORGANIZATION OF THE SHANGHAI HARBOUR BUREAU



World Bank — 41635:1

CHINA
TYPICAL ORGANIZATION OF DISTRICT



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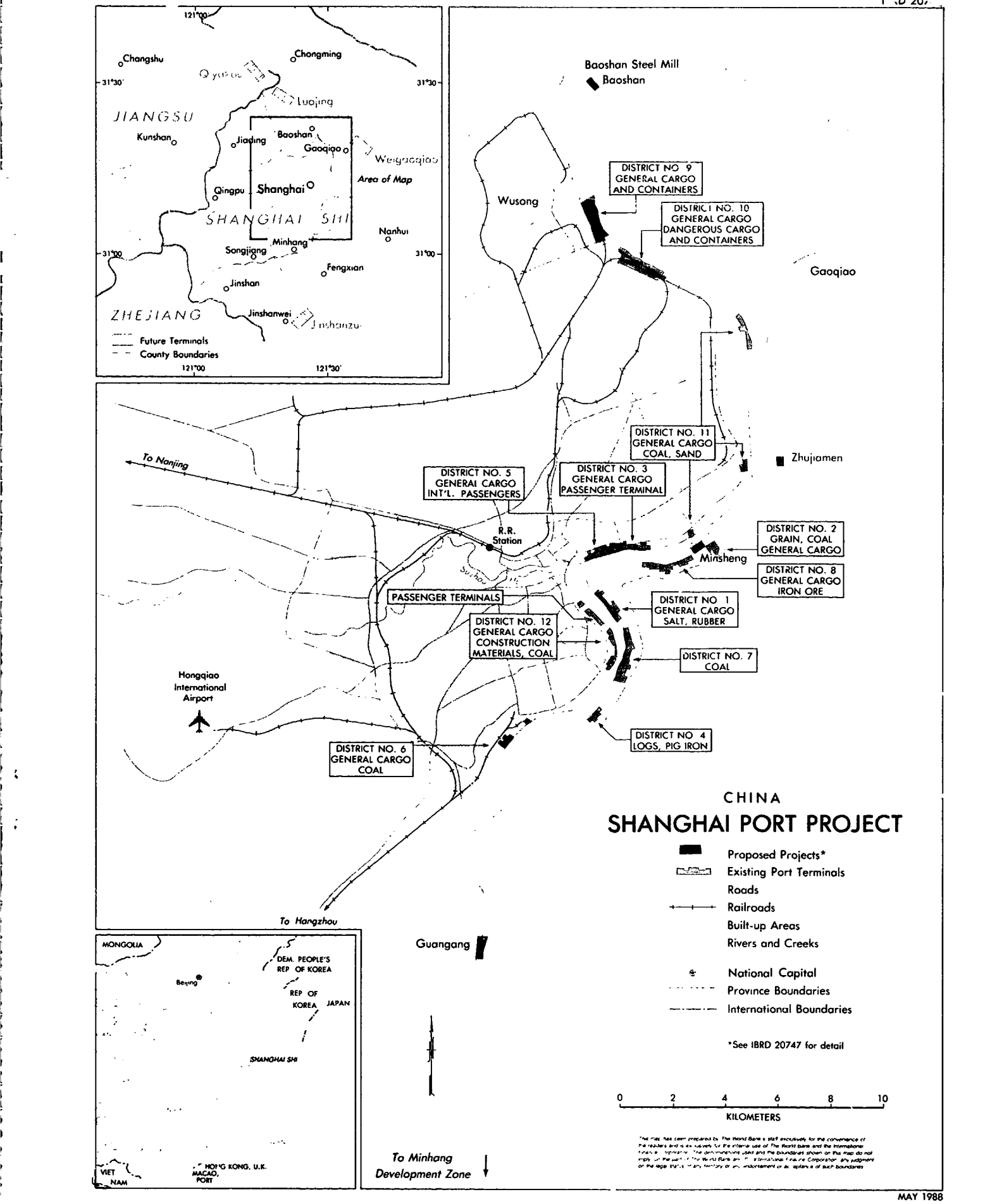
MAP SECTION

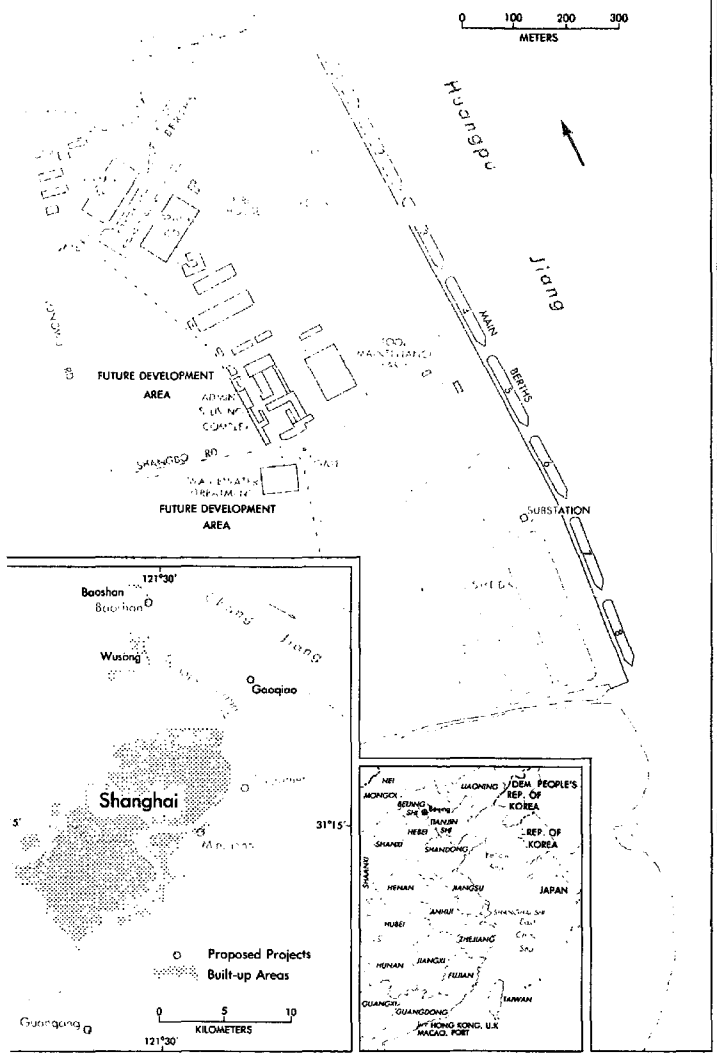

Changshu
Chongming
Qyuhou
Luojing
JIANGSU
Kunshan
Jiading
Baoshan
Gaoqiao
Waigaoqiao
Area of Map
Qingpu
Shanghai
SHANGHAI SHI
Nanhui
Minhang
Songjiang
Fengxian
Jinshan
ZHEJIANG
Jinshanwei
Jinshanzui
Future Terminals
County Boundaries
121°00'
121°30'
31°30'
31°00'
Baoshan Steel Mill
Baoshan
Wusong
DISTRICT NO 9
GENERAL CARGO
AND CONTAINERS
DISTRICT NO. 10
GENERAL CARGO
DANGEROUS CARGO
AND CONTAINERS
Gaoqiao
DISTRICT NO. 11
GENERAL CARGO
COAL, SAND
Zhujiamen
To Nanjing
DISTRICT NO. 5
GENERAL CARGO
INT'L. PASSENGERS
DISTRICT NO. 3
GENERAL CARGO
PASSENGER TERMINAL
R.R.
Station
DISTRICT NO. 2
GRAIN, COAL
GENERAL CARGO
Minsheng
DISTRICT NO. 8
GENERAL CARGO
IRON ORE
PASSENGER TERMINALS
DISTRICT NO 1
GENERAL CARGO
SALT, RUBBER
DISTRICT NO. 12
GENERAL CARGO
CONSTRUCTION
MATERIALS, COAL
DISTRICT NO. 7
COAL
Hongqiao
International
Airport
DISTRICT NO 4
LOGS, PIG IRON
DISTRICT NO. 6
GENERAL CARGO
COAL
To Hangzhou
Guangang
CHINA
SHANGHAI PORT PROJECT
Proposed Projects*
Existing Port Terminals
Roads
Railroads
Built-up Areas
Rivers and Creeks
National Capital
Province Boundaries
International Boundaries
*See IBRD 20747 for detail
0 2 4 6 8 10
KILOMETERS
To Minhang
Development Zone
MONGOLIA
DEM. PEOPLE'S
REP OF KOREA
Beijing
REP OF
KOREA
JAPAN
SHANGHAI SHI
VIET
NAM
HONG KONG, U.K.
MACAO,
PORT

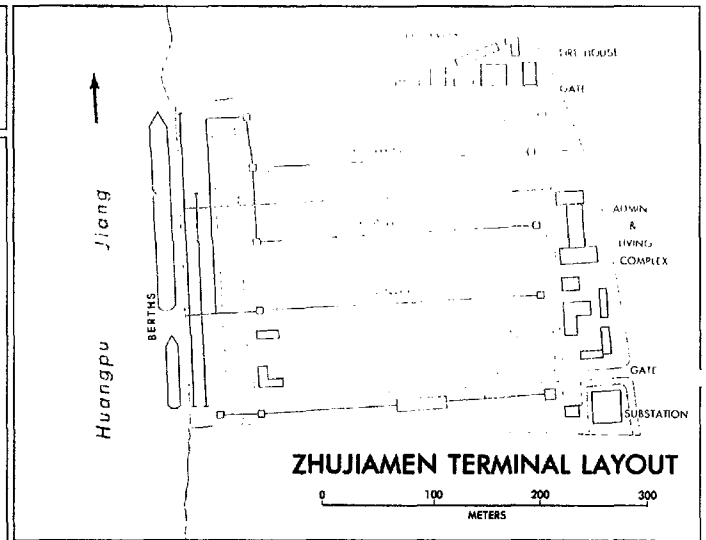
MAY 1988

CHINA

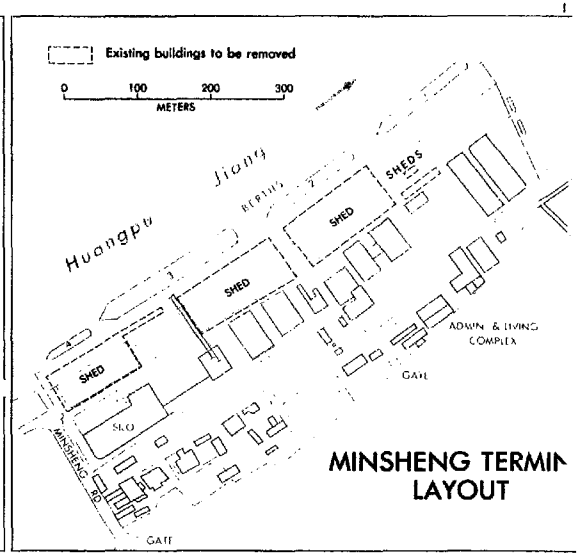
SHANGHAI PORT

GUANGANG TERMINAL LAYOUT

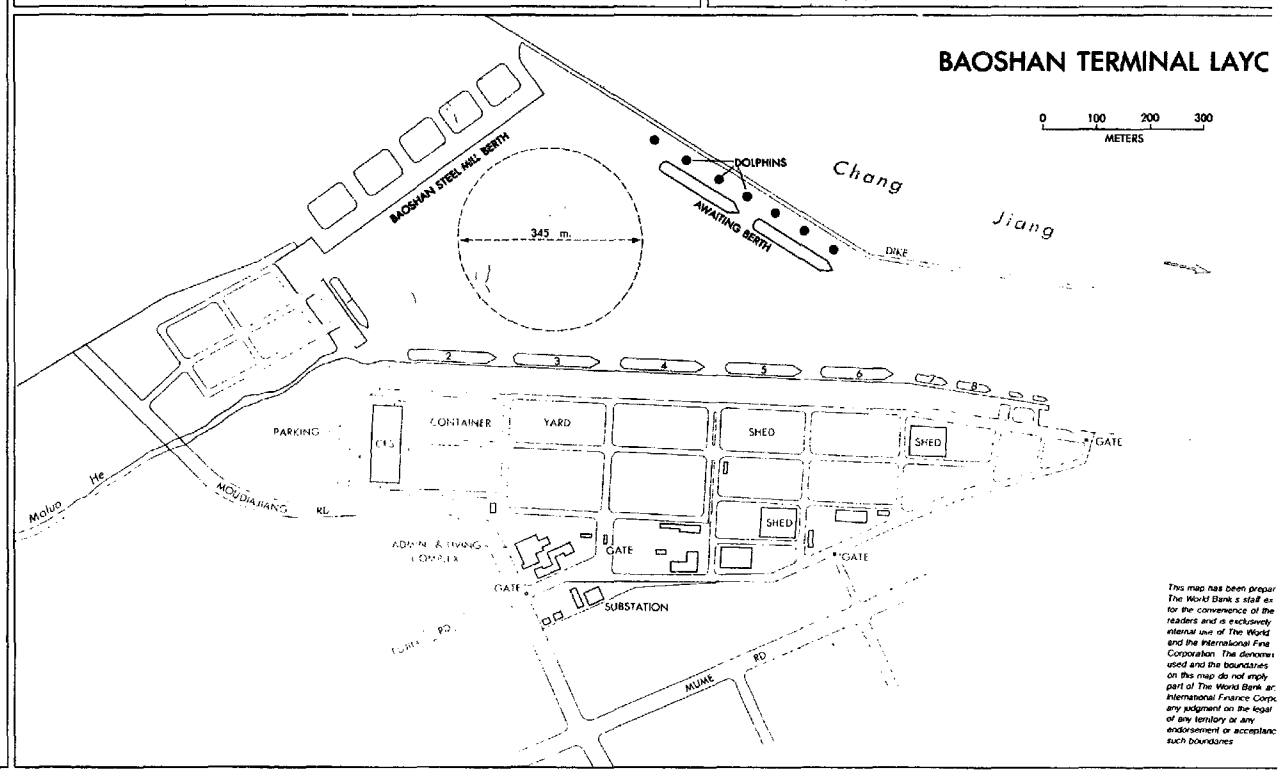




ZHUJIAMEN TERMINAL LAYOUT



MINSHENG TERMIN LAYOUT



BAOSHAN TERMINAL LAYC

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such boundaries