PART VI. ECONOMIC ANALYSIS

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CHAPTER 1. METHOD AND ALTERNATIVES

1-1 Method

The values of costs and benefits in the economic analysis are evaluated in two ways. That is, by shadow pricing and by market pricing. It should be noted that sufficient statistics are not always available, such as unemployment while the shadow pricing inevitably requires statistics. These are the reasons why the analysis based on the market pricing, in addition to the shadow pricing, is employed.

There are several different viewpoints concerning evaluation of the economic returns. Here, however, the economic returns are evaluated in terms of the internal rate of return (IRR).

IRRs are calculated separately for Karachi Port, Qasim Port and the Inland Container Terminal at Lahore to evaluate each portion of the entire project. And IRRs are calculated for Karachi Port + Inland Container Terminal and Qasim Port + Inland Container Terminal as well to evaluate the entire project.

Further, all the benefits and costs to be evaluated are expressed at the price as of 1980/'81.

1-2 Alternatives

As an alternative in the case of Port Terminal to be considered for the sake of comparison, the case without investment, called as the WITHOUT case, is employed.

In the 'WITHOUT' case for Port Terminal, dry cargoes except for dangerous cargoes are assumed to be handled by the barges to relieve the excessive port congestion.

The upper limit of cargo volume by assumed barge operation is taken at 700,000 tons from the actual performance in the past. Accordingly in WITHOUT case, no additional investment is considered for facilities and barges.

As an alternative in the case of Inland Terminal, the WITHOUT case is also employed.

In this case, existing transport capacity is considered sufficient to accommodate the future cargo volume and no additional investment is considered.

CHAPTER 2. BENEFITS

2-1 Benefit Items

2-1-1 Formulation of Benefit Items

As the benefits brought by the introduction of containerization in Pakistan, the followings are considered.

(1) Contribution to the economic development by strengthening the basis for the nation's economic development through modernization of the Port.

(2) Reduction in cargo handling costs by raising cargo handling productivity through mechanization and containerization.

(3) Reduction of damage to cargo through containerization and mechanization.

(4) Reduction in packing costs through containerization.

(5) Increase of the rate of storage through modulization.

(6) Reduction in ship costs for awaiting berth and loading/unloading cargo through upgrading the port services.

(7) Reduction in transport period, and reduction in inland transport period and in accumulation of freights in the port area, through the increase of efficiency of inland transportation.

(8) Reduction in container rental fee through the shortening of transport time.

(9) Possible function of a center for an entrepot trade handling tranship cargo and providing container feeder services to the neigbouring countries.

(10) Prompt control of accurate information through introduction of computer system.

Among these, it is considered indispensable for the economic development being sought by this country to increase the cargo handling capacity of the port and inland container terminal and, at the same time, to meet the demand for container transportation. To promote, by the investment for the Plan, the function as a center for an entrepot trade handling tranship cargo and that of container feeder services leads to the improvement of not only nation's economic situation but also nation's international status.

All the benefits which are expected in various fields cannot easily be evaluated in monetary term and some are themselves immeasurable. The following four benefits are evaluated in terms of monetary and considered in the analysis.

(1) Reduction in ships' staying cost

(2) Reduction in cargo handling cost

(3) Reduction in transport/terminal cost

(4) Reduction in time cost

2-1-2 Attribution of Reduction Benefit in Ships' Staying Cost

Among the above four benefits, the whole benefit of reduction in ships' staying cost will not necessarily be attributed to Pakistan. This benefit will be primarily attributed to the operaters of ships. A percentage of the benefit attributable, irrespective of directly or indirectly, to Pakistan (hereinafter referred to as a "feedback ratio") is discussed below.

(1) The Share of Pakistan National Shipping Corporation in Cargo Traffic.

The marchant fleet in Pakistan is solely operated by the Pakistan National Shipping Corporation (PNSC) which is the body corporate supported by the government.

The share of PNSC in cargo traffic itself is assumed here as the ratio of the direct benefit to Pakistan. Table VI-2-1 shows PNSC's share in dry cargo by commodity in 1980, and Fig. VI-2-1 shows PNSC's share by month in 1980.

From these data, average share of PNSC in cargo traffic is estimated as about 22%. Since the internal rates of return are calculated over 30 years from 1982/'83, the most likely feedback ratio for next 30 years must be chosen. In this respect, the following two items are considered to affect directly to this ratio.

   a) Prospect of PNSC fleet

   b) Cargo traffic forecast

PNSC fleet in 1980 is shown in Table VI-2-2. Compared with the target value, as shown in Table VI-2-3, of the Fifth Five Year Plan started in 1977/'78, it comes out that ships building plan of PNSC is being carried out fairly well. At this rate, a certain measure of satisfactory results will be obtained in 1982/'83, the target year of the Fifth Five Year Plan.

The Fleet Composition Plan of PNSC is premised on PNSC's share in dry cargo of 38% as shown in Table VI-2-4. While, the increasing annual rate of cargo traffic is set up as 6% for general cargo, and 10% for dry bulk cargo in the Fifth Five Year Plan.

In this study, on the other hand, as the cargo traffic forecast already given in the PART I the increasing rate of cargo traffic from 1979/.80 to 1987/.88 is assumed as about 3.1% annually for general cargo and 2.3% for dry bulk cargo, which is far less than that of the Fifth Five Year Plan which is premised on PNSC's share of 38%.

Further, among the commodities handled in Karachi Port, there are some commodities as shown in Table VI-2-1, where PNSC's share has reached 30 to 40% already, and it's share in November 1980 exceeded 30%. (See the Fig. VI-2-1)

From the above discussion, a feedback ratio of 30%, which is the rounded off figure of expected share of PNSC in cargo traffic after 1987/'88, is employed as the case to be analyzed.

(2) Feedback Ratio in the Next 30 years

Besides the benefit due to the reduction in ships' staying cost through the PNSC's share in cargo traffic, the following factors appear not to be overlooked in consideration of the calculation period of 30 years, though they are much more ambiguous than the achieved share of PNSC:

   a) Long-term Prospect of the PNSC's Share

      According to the Code of Conduct for Liner Conference adopted at UNCTAD in 1974, 40% is mentioned as a trading country's share. Being supported by this, it is likely that the PNSC's share will increase in the next 30 years. Among the commodities through Karachi Port, there are some commodities as shown in Table VI-2-1, where PNSC's share has reached about 40% already.

   b) Raise in Port Tariff

      If all or a part of a raise of the port tariff corresponds to the reduction in the ships' staying cost, it can be said that all or a part of this benefit originally attributed to foreign ship

operators is internalized by means of a raise in the port tariff.

It is suggested in the next chapter that an average 25% raise of the port tariff inclusive of the container tariff be necessary to secure the sound finance of the Karachi Port Trust. This 25% raise corresponds in monetary terms to a little less than 27% of all the benefit due to the reduction in ships' staying costs.

In this connection, a raise of a port tariff generally leads to a rise in local prices through a rise of import prices and to a drop in the competitive position in the world market through a rise of export prices. The above mentioned raise, however, does not involve these negative effects, since the raise it self is confined to the extent of the benefit.

c) Feedback through Economic Activities

It would be considered that the benefit attributed directly to foreign ship operators returns to Pakistan to some extent with some time lag through the market mechanism in the world shipping, though the structure of the world shipping market is very complex.

With these situations in mind, a feedback ratio of 50% is employed in the present analysis besides that of 30%. This case would serve as a sensitivity analysis, as well.

2-1-3 Modal Split of Inland Transportation

The case of WITHOUT in economic evaluation at Inland Container Terminal might be appropriately assumed that cargoes loaded in bulk would be transported by the existing means of transportation, namely, railways and roads by the present modal split. The present modal split of Karachi to Up-country, as shown in Table VI-2-5, is 36.3% by railways and 63.7% by roads.

However, in the case of WITH, 100% of FCL cargo is assumed to be transported by railway, thus it is necessary to avoid overestimate of the benefits and it is more advantageous for the national economy to convert the road traffic to railway traffic in the future as discussed in PART II Chapter 4.

Considering the reasons mentioned above, the modal split of 50% by railway is adopted in the case of WITHOUT.

Modal split of 36.3% by railway is employed in the present analysis in addition to that of 50%. This case would serve as a sensitivity analysis, as well.

2-2 Benefits in the Port Terminal

Benefits in the port Terminal are (1) reduction in ships' staying cost (2) reduction in cargo handling cost and (3) reduction in time cost in the present analysis.

The above economic returns are evaluated from the viewpoint of the national economy of Pakistan and the amount of benefits brought by containerization is almost same as in both cases of Karachi Port or Qasim Port. The reasons are as follows:

a) Reduction in ships' staying cost is brought by reduction of berth awaiting period, and reduction in cargo handling period through raising the productivity at the container terminal. In case container terminal will be constructed at Qasim Port, cargo handling period will be reduced at the terminal, and berth awaiting period due to less volume of handling cargo will be reduced at Karachi Port.

While, in case container terminal will be constructed at Karachi Port, berth awaiting period

and cargo handling period will be reduced at Karachi Port. In the present plan which handles almost all containerizable cargo at Karachi Port, benefits as a state of Pakistan will be assumed almost same regardless of construction of container terminal at Karachi Port or Qasim Port.

b) Reduction in cargo handling cost is brought by labor saving through mechanization of the port.

The volume of containerizable cargo in Pakistan is not influenced and unchanged by the development in either ports, therefore its benefit is assumed to be just same.

c) Reduction in time cost is related to reduction of transportation time and average value of container cargo, so the amount of benefits is almost same whether goods are exported from either ports.

2-2-1 Reduction in Ships' Staying Cost

Average awaiting period is estimated by the queuing theory. It is assumed that both the distribution of ships' arrival and the distribution of cargo handling period are random distributions.

In the case of WITHOUT, the average awaiting period and the average cargo handling period for each year after 1987/88 are shown in Table VI-2-6.

By the commencement of its operation at four berths of Juna Bunder the port congestion will be improved after 1981/'82 but it will be aggravated again after 1987/'88 according as cargo handling volume increases. This aggravation is caused mainly by increases of handling cargo volume and the rate of general cargo, which has low handling efficiency, to the whole due to greater variety of commodity composition. Thus, berth awaiting period and cargo handling period will be increased.

The awaiting period in 1990/'91 is calculated at 6.03 days that is exactly same as the previous year, since the rate of berth occupancy for conventional berths slightly exceeds 100%. In the case of WITH, Table VI-2-7 shows the average awaiting period and the average cargo handling period for each year after 1987/'88.

The average berth awaiting period at conventional berths gradually decreases after 1987/'88 due to the decrease of conventional cargo through conversion to container cargo.

The average awaiting period for container ships is separately estimated by the queuing theory. The estimated results for container ships are shown in the right half column of Table VI-2-7. Table VI-2-8 (WITHOUT) and Table VI-2-9 (WITH) are obtained by making use of Table VI-2-6, Table VI-2-7 and the number of ships' call.

The difference between the WITH case and the WITHOUT case is shown in the 1st column of Table VI-2-11.

There are two methods for evaluating the ships' staying cost; one is to sum up the every expense required for ship's staying; and the other is to evaluate using time charterage. However, since the purpose of evaluation here is to evaluate the benefit not for an operators of a vessel but for Pakistan, it is more appropriate to adopt the time charterage which, as a matter of fact, is expressed in terms of "international market price".

Further, since fuel cost during ships' staying in the port is excluded in this charterage, the ships' staying cost inclusive of fuel cost is employed here.

The time charterage of dry cargo vessels (1 year) in July 1979 to June 1981 is shown in Table VI-2-10.

The average time charterage is shown graphically in Fig. VI-2-2.

Average tonnage of vessels calling Karachi Port is estimated at about 10,000 DWT for dry cargo vessels from the actual records in 1980.

The extrapolation by hyperbola gives about 16.4 US$/DWT·Month as shown in Fig. VI-2-2.

Taking into consideration the fluctuation of the charterage itself and the error possibly involved in the extrapolation, about 70% of this or 11.4 US$/DWT·Month is employed here. Fuel consumption during ships' staying is assumed to be 2.5 kt/day for 10,000 DWT. From the results shown above, ships' staying cost of 4,600 US$/Vessel·Day is finally adopted.

30% and 50% of the lump sum of the reduction in ships' staying cost are shown in 2nd and 3rd column of the Table VI-2-11 respectively. These are estimated by making use of total shipday shown in 1st column of the same table.

2-2-2 Reduction in Cargo Handling Cost

It is considered that there is no appreciable difference in the administrative cost between the case of the Urgent Plan (WITH case) and the WITHOUT case, hence only the direct cost required for cargo handling will be evaluated here. The direct cost or the cargo handling cost consists of the following costs:

a) Labor costs and

b) Operation/Maintenance costs (repair cost, fuel cost, and light and water costs, etc.)

however, the depreciation is not included in the analysis.

(1) Cargo handling cost in the case of WITHOUT

Workers engaged in stevedoring at Karachi Port belong to Karachi Port Trust (KPT) and Karachi Dock Labor Board (KDLB), which take over a portion of the work and are separate organizations. Therefore, cargo handling costs are estimated individually. The analysis is made on the basis of the budget of KPT for 1980/'81 in the case of KPT's workers and on the basis of the other data obtained in Pakistan in the case of KDLB's.

A. Cargo handling cost of KPT

Cargo handling cost is composed of variable portions affected by the following factors:

1 Volume of cargo handled (tonnage or No. of containers).

2 No. of ships' call, and

3 Net registered ton.

Accordingly, in the calculation of labour costs and operation/maintenance costs, their costs for the future are estimated by finding the unit costs for which the above factors are used as units. Further, in the variable unit costs affected by cargo volume, there is a considerable difference between these two cases of "general cargo" and "dry bulk cargo". Therefore, taking into consideration the variation of cargoes for the future, their costs for these two types are separately estimated.

As to the labour costs for skilled labours and unskilled labours, the ratio in the number of labours between skilled and unskilled labours is 1:2.88, and the ratio in wages varies widely from

1.15:1 to 4.55:1, and the average ratio of 1:0.5 in wages between skilled and unskilled labours is employed here.

The above results for unit labour costs are shown in Table VI-2-12, and Table VI-2-13 and those for unit operation/maintenance costs are shown in Table VI-2-14 and Table VI-2-15.

The numeral values used for the determination of each unit cost are as follows:

(1) As the labour costs and operation/maintenance costs for 1980/'81, those costs adopted in the budget of KPT for 1980/'81 are employed, which are shown in Table A-VI-1 and Table A-VI-2.

(2) As the total volume of cargo handled in 1980/'81 is also employed that adopted in the above budget. For the estimation of the volume of cargoes handled at alongside berths and by the barges, and of the volumes of general cargo and dry bulk cargo, their ratios based on the actual values in 1980 are employed. The results are shown in Table A-VI-5.

(3) No. of ship's call in 1980/'81 is estimated at 1646 for the fiscal year, which is based on the budget of KPT for 1980/'81.

(4) For net registered ton, the following values are employed from the average tonnage of ships' call in 1980.

General cargo vessel	3,400	NRT/Vessel
Bulk cargo vessel	6,000	NRT/Vessel

B. Cargo handling cost of KDLB

≪Labour Costs≫

It is assumed that 70% of total labours registered with KDLB are engaged in the operation through the year. Of the actually working labours, 80% or about 7,800 labours are assumed to be working at alongside berths, and 20% or about 2,000 labours for barge operation. The labour costs for alongside berths and barge operations are calculated based on an estimation that their average wage is 9,600 Rs./Year. The labour costs required for handling general cargo and bulk cargo are divided proportionally according to the ratio of gangs actually worked for handling both types of cargoes. The ratios of the gangs employed in the analysis are as follows:

	General cargo	Bulk cargo
Alongside berth	75.5%	24.5%
Barge	51.2%	48.8%

The ratio in wages between skilled and unskilled labours is exactly same as that used for the calculation in the case of KPT. From the above results, unit labour costs of KDLB are shown in Table VI-2-12.

≪Operation/Maintenance Costs≫

The operation/maintenance costs for port facilities of Karachi Port are estimated as the cost of KPT. Accordingly, as the operation/maintenance costs for KDLB, only the barge operation costs for the barges, tugs and some others possessed by private companies are estimated. For the methods of calculation, fuel cost is figured out by summing up the every expence required for barge operation; maintenance cost for barges and tugs is figured out by multiplying the purchased price by the fixed percentage; and the cost for the parts is also figured out by multiplying the

fuel cost by the fixed percentage.

As the result, they are 183.6 thousand US$ for general cargo, and 175.2 thousand US$ for bulk cargo. The unit costs are as shown in Table VI-2-14.

The details of labour costs and operation/maintenance cost are shown in Table A-VI-3 and Table A-VI-4.

(2) Cargo handling cost in the case of WITH

In the calculation of labour costs and operation/maintenance costs, their costs for the future are estimated in the same manner as in the case of WITHOUT, using the following factors: 1 No. of containers handled, 2 No. of ships' call, and 3 Net registered ton. The average wages for skilled and unskilled labours are employed as 18,000 Rs./year labour and 9,000 Rs./year labour, respectively.

The breakdown of the estimation is shown in Table VI-2-16 for unit labour cost, and Table VI-2-17 for unit operation/maintenance costs.

Among the operation/maintenance costs, material costs are calculated by summing up each cost of fuel, water and electricity, using the each consumption volume and the unit price. Concerning the maintenance costs, the fixed percentage of the capital cost is adopted as the equipment maintenance cost; shipmovement/service cost is calculated by using the unit cost exactly same as in the case of WITHOUT; and labour cost is calculated from the average wage. Their details are shown in from Table A-VI-6 through A-VI-9.

(3) Calculation of reduction in cargo handling cost

The cargo handling cost in the case of WITH must be divided into two types of costs in present analysis — cost on the side of Port Terminal, and that on the side of Inland Terminal such as loading/unloading cost for railway wagons. However, as a matter of convenience, the cost divided by the proportion of FCL cargo volume transported by railway to the total volume of containers handled at Port Terminal is employed as the cargo handling cost on the side of Inland Terminal, and the remaining cost is employed as that on the side of Port Terminal. The above proportion in each fiscal year from 1987/'88 is shown in Table VI-2-20. Further, the estimated values in future for the volume of cargo handled, number of ships' call and net registered ton by facility are shown in Table VI-2-18 (the case of WITHOUT) and in Table VI-2-19 (the case of WITH).

Based on the above conditions, the results of the calculation for cargo handling cost in each fiscal year from 1987/'88 are shown in Table VI-2-21 for the WITHOUT case, and in Tables VI-2-22 and VI-2-23 for the WITH case. As the result, the reduction in cargo handling cost for each fiscal year from 1987/'88 calculated from those above tables is as shown in Table VI-2-24.

2-2-3 Reduction in Time Cost

The commission of high-speed container ships in service and the reduction in cargo handling period due to the introduction of containerization bring about a remarkable reduction in time required for import and export of container cargoes, as compared with that in the conventional vessels. If the reduced time is converted to in the terms of monetary value, it can be estimated by the following equation:

$$RTC = Q \times P/360 \times V \times I$$

where,   Q :   Transport Cargo Volume (ton/year)
            P :   Reduction in Navigation Period (days)
            V :   Average Cargo Value (US$/ton)
            I :   Loan Interest (%/year)

However, the reduction in time when the cargoes are imported is the benefit on the side of consigners. Accordingly, the reduced time in export is only estimated as the benefit of Pakistan.

(1) Reduction in navigation period

First of all, one or two countries for each of world major ocean routes are selected from among the trade partners closely related with Pakistan as shown below:

1.	Asia	Hong Kong
		Japan
2.	Western Europe	United Kingdom
		Italy
3.	Middle East	Kuwait
4.	North America	USA I (New York)
		USA II (San Francisco)
5.	Eastern Europe	USSR
6.	Africa	Mosambique
7.	Oceania	Australia
8.	South America	Brazil

Next, when full container ships are placed in commission on the lines to/from Pakistan in future, the ports assumed to call are set up, and the distance between Karachi Port and each of the ports of call are estimated, as shown in Table A-VI-10. As the average speed of full container ships having a loading capacity of 600–1,000 TEU, the mean value of 15 full container ships which are now running on the lines to/from Japan is employed. The mean value of 15 full container ships which are now running on the lines to from Japan is employed. As the average speed of full container ships having a loading capacity of 600–1,000 TEU. The average value of 55 conventional freighters (6,000–10,000 DWT) is employed as the average speed of the freighters. As the result, they are 21 Knot and 14 Knot respectively.

Further, average staying period is calculated as 1 day per port for container ships and as 5 days per port for conventional freighters.

The reduction in navigation period weighted by individual volumes of foreign trades is 23.2 days as shown in Table VI-2-25. However, this reduction in navigation period excludes the reduced time at Karachi Port, thus, if it is included in the above estimate, the reduction in navigation period becomes about 30 days. Here, however, taking into consideration the errors in average staying period and average speed, 20 days equivalent to 70% of the above estimate is finally employed as the reduction in navigation period.

(2) Calculation of reduction in time cost

For 84 export items of containerizable cargoes, if their average value is calculated using the prices in 1980, 585 US$/ton is given as the mean. For loan interest, 14% for one-year is used. Based on the above conditions, the reduction in time cost, calculated for each fiscal year, is shown in Table VI-2-26.

2-3 Benefits in the Inland Terminal

The benefits in the inland terminal, treated as the subjects of present analysis, are as follows:
(1) Reduction in transport/terminal cost, and
(2) Reduction in time cost
The distance from Qasim Port to the Inland Terminal is about 20 km shorter than that from Karachi Port by railway, but by road they are almost the same. However, if Container Terminal is constructed at Aqsim Port, additional haulage necessary for transporting about 40% of the whole cargoes from Qasim to Karachi is required. Therefore, the additional haulage is assumed to offset the transport cost for 20 km each other; thus the distances from either port to Inland Terminal by rail and road are assumed almost the same.

2-3-1 Reduction in Transport/Terminal Cost

(1) Setting up the means of transportation

The means of transportation in the case of WITH are set up as follows:

All the FCL cargoes between Port Terminal and Inland Terminal are assumed to be transported by container unit trains. To the consignees/consigners in up-countries farther than the Inland Terminal, FCL cargoes (60%) are assumed to be transported by 40' trailer and LCL cargoes (40%) by 8 ton truck. To the consignees/consigners around Karachi city, all the FCL cargoes are assumed to be transported by 40' trailer.

In the case of WITHOUT, as described in 2-1-3 "Modal Split of Inland Transportation", 50% of the whole cargoes is presumed to be transported by the existing railway (loaded in bulk) to the consignees/consigners from the Port Terminal, and the other half by 8-ton truck. To the consignees/consigners around Karachi city, all the cargoes are presumed to be transported by 8-ton truck.

The average distances by rail/road, used for the calculation, are as follows:
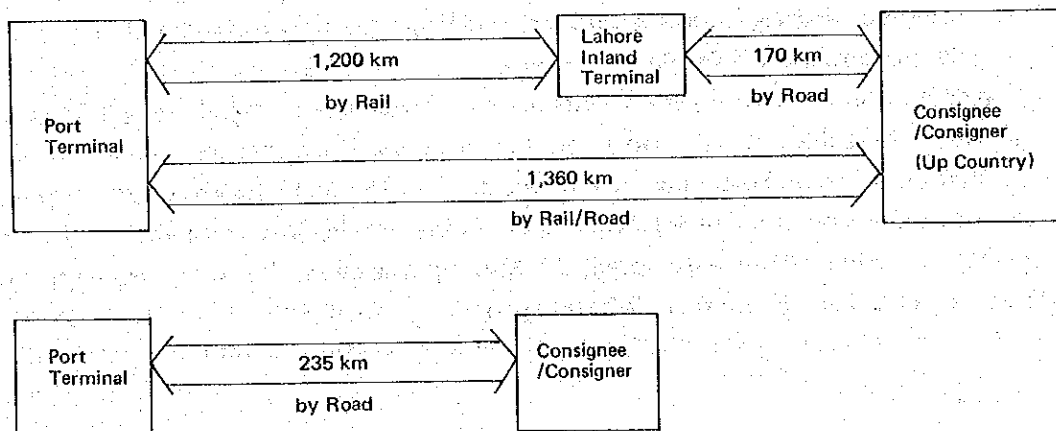
(2) Transport cost

In the estimation of transport unit cost by railway, the estimation method suggested in "Pakistan Railway on Traffic Costing Oct. 1978" proposed by World Bank is employed. The major conditions used for the estimation are as follows:

	Existing Train	Container Unit Train
Distance	1,360 km	1,200 km
Turn Round Time	10.4 days	4 days
Loading/Unloading Time	2 days	0.5 days

Transport unit cost by railway are shown in Table VI-2-27 for existing trains and in Table VI-2-28 for container unit trains.

On the other hand, operating unit cost for 8-ton truck and 40' trailer is calculated by summing up the every expense by using the consumption volume. In that calculation, the average loading volume per truck or trailer is assumed to be 7 tons for 8-ton truck and 25 tons for 40' trailers. The results of the calculation are shown in Tables VI-2-29 and VI-2-30 respectively. Further, the details of calculation for operating unit cost are shown in Tables A-VI-11 and A-VI-12.

Table VI-2-31 shows the estimated values of transport cargo volumes by transport sections for the fiscal year after 1987/88, and Table VI-2-32 to VI-2-38 show the transport costs by transport sections, calculated based on the above table, VI-2-31.

(3) Terminal cost

The formulas employed for estimation of transport cost by railway are those used for the computation of overall Pakistan Railway costs. For Pakistan Railways, which is a public corporation having the total employees of 140,000 and the operation expenditure of 2,500 million Rs. per annum, the labour cost in the Port Terminal and the Inland Terminal is a comparatively small expense. Therefore, the additional labour cost in the Port Terminal and the Inland Terminal can be regarded to be assimilated to the operation cost in Pakistan Railways. It can be possibly covered by the yearly operation cost. Accordingly, only the operation/maintenance costs required for railway transportation at the Port Terminal and the Inland Terminal is added as the terminal cost in the case of WITH.

≪Inland Terminal≫

The details of material costs and maintenance costs under the conditions of handling about 90,000 containers are shown in Table A-VI-15. Table VI-2-39 shows the terminal unit cost calculated based on the above table, A-VI-15.

≪Port Terminal≫

The operation/maintenance costs required for railway transportation at Port Terminal are given by multiplying the total operation/maintenance costs by the percentage shown in Table VI-2-20. These terminal costs are shown in Table VI-2-39. If the transport/terminal cost for each fiscal year in both cases of WITHOUT and WITH, as shown in Table VI-2-40, Table VI-2-41 respectively, is calculated based on the assumed transport volume shown in Table VI-2-31, the reduction in transport/terminal cost, as shown in Table VI-2-42, can be obtained from the difference between the above with and without.

2-3-2 Reduction in Time Cost

Here, the following two types of costs are estimated, which are reduction in time cost and reduction in rental fee of container box due to the shortening in turn round time. The turn round times between Port Terminal and Inland Terminal are as follows:

Container Unit Train	4 days
Existing Train	10.4 days
8-ton Truck	7 days

Consequently when the containers are transported by container unit train, the reduction in turn round time is 6.4 days for the conventional transportation by railway and 3 days for the transportation by road.

(1) Reduction in time cost

Since the reduction in transport time is caused by inland transport, both export and import commodities are considered to be the objects of calculation for the reduction in time cost. The average value of 55 commodities of containerizable cargoes for import is 763 US$/ton in 1980 prices, and the average value of export commodities is 585 US$/ton in same prices as mentioned in 2-2-3. Thus, the average value of export and import commodities weighted by individual ratios of export and import of container cargo volumes in the future is given as 672 US$/ton as shown in Table A-VI-16.

For loan interest, 14% for one-year is used.

The reduced value in time cost is obtained by the following equation. The value of reduction in time cost (RTC) for each fiscal year after 1987/'88 is estimated by using the following equation and the estimated cargo volume in the future as shown in Table VI-2-31. The results of the estimation are shown in Table VI-2-43.

$$RTC = (Q_1 \times P_1 / 360 \times V \times I) + (Q_2 \times P_2 / 360 \times V \times I)$$

where,
Q_1 : Traffic Cargo Volume by Railway (ton/year)
P_1 : Reduced Period in Turn Round Time by Railway (6.4 days)
Q_2 : Traffic Cargo Volume by Road (ton/year)
P_2 : Reduced Period in Turn Round Time by Road (3.0 days)
V : Average Cargo Value (672 US$/ton)
I : Loan Interest (14%/year)

(2) Reduction in rental fee of container box

Although the rental fee of container box somewhat varies with countries or dealers, the international price is about 2.5 US$/Box. In present analysis, 2.5 US$/Box is employed.

The reduced value in rental fee of container box (RRC) is obtained by the following equation:

$$RRC = (T_1 \times P_1 \times R) + (T_2 \times P_2 \times R)$$

where,
- T_1 : Traffic Cargo Volume by Railway (TEU/year)
- P_1 : Reduced Period in Turn Round Time by Railway (6.4 days)
- T_2 : Traffic Cargo Volume by Road (TEU/year)
- P_2 : Reduced Period in Turn Round Time by Road (3.0 days)
- R : Rental Charge of Container Box (2.5 US$/Box)

Table VI-2-44 shows the reduced value obtained from the cargo volume of each fiscal year in the future, as shown in Table VI-2-31, by using the above equation.

Table VI-2-1 PNSC's Share in Dry Cargo by Commodity (1980)

(Unit: %)

	Bulk Cargo					General Cargo				Total
	Wheat	Ferti-lizer	Phos./Sul-phur	Rice	Sub-Total	Cotton	Cement	Others	Sub-Total	
PNSC's Share	5.2	3.6	0	41.1	16.5	33.3	39.7	22.8	25.5	21.7

Source: KPT's Data

Table VI-2-2 Fleet Composition in 1980

Age as of 1980	No. of Vessels	TDW	Average DW per Vessel
0– 4	7	129,510	18,500
5– 9	4	59,647	15,000
10–14	14	168,165	12,000
15–	20	239,171	12,000
Total	45	596,493	13,300

Source: KPT's Data

Table VI-2-3 Fleet Disposition/Fleet Composition in 1983

	Fleet Disposition Plan			Fleet Composition		
	Age as of 1978	No.	TDW	Age as of 1983	No.	TDW
Liner	4–10	4	60,000	0– 5	21	315,000
				9–15	4	60,000
Tramp	11–14	15	198,000	16–19	15	198,000
To be scrapped	15–	25	300,000			
Total		44	558,000		40	573,000

Source: Fifth Five Year Plan

Table VI-2-4 Trade Share/Increasing Rate by Commodity
(Fifth Five Year Plan)

Type of Cargo	Estimated Trade Volume ('000 K/T)	Trade Share of Pakistani Fleet (%)	Transportation Requirement ('000 K/T)	Increasing Rate per Year (%)
General Cargo	4,700	42.6	2,000	6.0
Dry Bulk	3,200	31.3	1,000	10.0
Sub-Total (Dry Cargo)	7,900	38.0	3,000	
Liquid Bulk	7,600	0	0	11.0
Ore & Coal	3,500	0	0	
Total	19,000	15.8	3,000	

Table VI-2-5 Existing Modal Split 1980 (Karachi — Up-country)

Zone	Name	Import/ Export	Railway Traffic Ton	Railway Traffic %	Road Traffic Ton	Road Traffic %	Total Ton
12	Lahore	Import	10,893	24.6	33,391	75.4	44,284
		Export	776	7.2	10,017	92.8	10,793
13	Faisalabad	Import	7,510	47.1	8,449	52.9	15,959
		Export	1,012	15.2	5,649	84.8	6,661
14	Sargodha	Import	6,640	82.2	1,440	17.8	8,080
		Export	19	0.7	2,629	99.3	2,648
15	Gujranwala	Import	4,662	47.7	5,117	52.3	9,779
		Export	—		2,976	100.0	2,976
16	Rawalpindi	Import	17,890	65.7	6,724	34.3	19,614
		Export	824	11.2	6,520	88.8	7,344
17	Hazara	Import	176	32.2	369	67.8	545
		Export	—		865	100.0	865
18	Malakand	Import	—		285	100.0	285
		Export	—		246	100.0	246
19	Peshawar	Import	7,327	70.1	3,118	29.9	10,445
		Export	416	7.4	5,217	92.6	5,633
20	D.I. Khan	Import	517	38.6	821	61.4	1,338
		Export	—		400	100.0	400
	Total	Import	50,615	45.9	59,714	54.1	110,329
		Export	3,047	8.1	34,519	91.9	37,566
		Total	53,662	36.3	94,233	63.7	147,895

Table VI-2-6 Average Waiting Period/Average Working Period (WITHOUT)

Fiscal Year	Barge Average Working Period (days)	Alongside Berth		
		Average Waiting Period (days)	Average Working Period (days)	Total (days)
1986/87	11.92	0.90	5.96	6.86
1987/88	11.92	2.35	5.96	8.31
1988/89	11.94	2.47	5.97	8.44
1989/90	11.96	6.03	5.98	12.01
1990/91	11.98	6.03	5.99	12.02
1991/92	↓	↓	↓	↓
1992/93				

Table VI-2-7 Average Waiting Period/Average Working Period (WITH)

Fiscal Year	Conventional Berth				New CNTR Berth		
	Barge Average Working Period (days)	Alongside Berth			Average Waiting Period (days)	Average Working Period (days)	Total (days)
		Average Waiting Period (days)	Average Working Period (days)	Total (days)			
1986/87							
1987/88	11.88	0.38	5.94	6.32	0.03	0.83	0.86
1988/89	11.84	0.28	5.92	6.20	0.10	0.83	0.93
1989/90	11.80	0.18	5.90	6.08	0.29	0.83	1.12
1990/91	11.76	0.12	5.88	6.00	0.59	0.83	1.42
1991/92	↓	↓	↓	↓	↓	↓	↓
1992/93							

Table VI-2-8 Reduction in Ships' Staying Period (WITHOUT)

Fiscal Year	Barge			Alongside Berth			Total (ship-day)
	No. of Ships' Call (ships)	Average Staying Period (days)	Ship-Day	No. of Ships' Call (ships)	Average Staying Period (days)	Ship-Day	
1986/87	22	11.92	262.24	1,369	6.86	9,391.34	9,653.58
1987/88	19	11.92	226.48	1,444	8.31	11,999.64	12,226.12
1988/89	101	11.94	1,205.94	1,446	8.44	12,204.24	13,410.18
1989/90	165	11.96	1,973.40	1,489	12.01	17,882.89	19,856.29
1990/91	165	11.98	1,976.70	1,584	12.02	19,039.68	21,016.38
1991/92	→	→	→	→	→	→	→
1992/93	→	→	→	→	→	→	→

Table VI-2-9 Reduction in Ships' Staying Period (WITH)

Fiscal Year	Conventional Berth						New CNTR Berth			Total (ship-day)
	Barge			Alongside Berth			No. of Ships' Call (ships)	Average Staying Period (days)	Ship-Day	
	No. of Ships' Call (ships)	Average Staying Period (days)	Ship-Day	No. of Ships' Call (ships)	Average Staying Period (days)	Ship-Day				
1986/87										
1987/88	17	11.88	201.96	1,294	6.32	8,178.08	157	0.86	135.02	8,515.06
1988/89	15	11.84	177.60	1,267	6.20	7,855.40	267	0.93	248.31	8,281.31
1989/90	14	11.80	165.20	1,226	6.08	7,454.08	417	1.12	467.04	8,086.32
1990/91	13	11.76	152.88	1,191	6.00	7,146.00	527	1.42	748.34	8,047.22
1991/92	→	→	→	→	→	→	→	→	→	→
1992/93	→	→	→	→	→	→	→	→	→	→

Table VI-2-10 Time Charterage of Dry Cargo Vessels

(Unit: US$/DWT · Month)

Year	12,000—20,000 DWT	20,000—35,000 DWT	35,000—50,000 DWT	50,000—85,000 DWT
1979				
Jul.–Sep.	9.44	7.76	6.27	5.05
Oct.–Dec.	10.86	9.29	7.33	5.77
1980				
Jan.–Mar.	11.74	9.67	8.32	6.50
Apr.–Jun.	12.96	12.41	10.04	7.24
Jul.–Sep.	13.31	9.91	8.46	6.10
Oct.–Dec.	12.20	10.31	8.42	6.63
1981				
Jan.–Mar.	12.35	10.24	8.55	6.80
Apr.–Jun.	12.15	9.37	7.11	5.09
Average	11.88	9.87	8.06	6.15

Table VI-2-11 Reduction in Ships' Staying Cost

(Unit: '000 US$)

Fiscal Year	Without less With (Ship-Day)	Reduction Cost	
		Feedback Ratio 50%	Feedback Ratio 30%
1987/88	3,944.81	9,073.1	5,443.8
1988/89	5,128.87	11,796.4	7,077.8
1989/90	11,769.97	27,070.9	16,242.6
1990/91	12,969.16	29,829.1	17,897.4
1991/92	↓	↓	↓
1992/93			

* Time Charterage of Dry Cargo Vessel
  Average 4,600 US$/Vessel · Day
* Average DWT of Dry Cargo Vessel 10,000 ton

Table VI-2-12 Unit Labour Cost (WITHOUT)
— Cargo Handling/Cargo Storage Cost —

(Unit: US$/Ton)

		General Cargo			Bulk Cargo		
		Skilled	Unskilled	Total	Skilled	Unskilled	Total
Alongside Berth	KPT	0.66	0.95	1.61	0.13	0.18	0.31
	KDLB	0.61	0.88	1.49	0.27	0.40	0.67
	Total	1.27	1.83	3.10	0.40	0.58	0.98
Barge	KPT	1.23	1.78	3.01	0.58	0.83	1.41
	KDLB	2.32	3.35	5.67	1.58	2.27	3.85
	Total	3.55	5.13	8.68	2.16	3.10	5.26

Table VI-2-13 Unit Labour Cost (WITHOUT)
— Ship-movement/Service Cost —

	Unit	Dry Cargo		
		Skilled	Unskilled	Total
Pilot	US$ per Ship	111.9	161.2	273.1
Shipping Tugs/ Water Supply/ Sanitation	US$ per Total '000 NRT	36.8	53.1	89.9

Table VI-2-14 Unit Operation/Maintenance Cost (WITHOUT)
— Cargo Handling/Cargo Storage Cost —

(Unit: US$/Ton)

		General Cargo	Bulk Cargo
Alongside Berth	KPT	0.97	0.37
	KDLB	—	—
	Total	0.97	0.37
Barge	KPT	1.76	1.10
	KDLB	1.05	0.71
	Total	2.81	1.81

Table VI-2-15 Unit Operation/Maintenance Cost (WITHOUT)
— Ship-movement/Service Cost —

	Unit	Dry Cargo
Pilot Boat	US$ per Ship	173.2
Shipping Tugs/ Water Supply/ Sanitation	US$ per Total '000 NRT	178.8

Table VI-2-16 Unit Labour Cost (Container Terminal)

Item	Unit	Unit Cost		
		Skilled	Unskilled	Total
Cargo Handling/Cargo Storage Cost	US$ per TEU	7.89	2.01	9.90
Pilot	US$ per Ship	111.9	161.2	273.1
Shipping Tugs/Water Supply/Sanitation	US$ per Total '000 NRT	36.8	53.1	89.9

Table VI-2-17 Unit Operation/Maintenance Cost
(Container Terminal)

Item	Unit Cost (US$)
Fluctuating by No. of Ships' Call	549.8/Ship
Fluctuating by No. of TEU	11.23/TEU
Fluctuating by Total NRT	178.8/NRT
Fixed	140,100

Table VI-2-18 Cargo Tonnage, No. of Ships' Call, and Total Net Registered Ton (WITHOUT Case)

		Unit	General Cargo	Bulk Cargo	Total
1987/88	Alongside Berth	'000 ton	3,931	2,383	6,314
	Barge	'000 ton	33	47	80
	No. of Ships' Call	Ships	1,133	330	1,463
	Total NRT	'000 NRT	3,852	1,980	5,832
1988/89	Alongside Berth	'000 ton	4,036	2,244	6,280
	Barge	'000 ton	181	256	437
	No. of Ships' Call	Ships	1,205	341	1,546
	Total NRT	'000 NRT	4,097	2,046	6,143
1989/90	Alongside Berth	'000 ton	4,261	2,153	6,414
	Barge	'000 ton	296	417	713
	No. of Ships' Call	Ships	1,302	352	1,654
	Total NRT	'000 NRT	4,427	2,112	6,539
1990/91	Alongside Berth	'000 ton	4,564	2,213	6,777
	Barge	'000 ton	296	417	713
	No. of Ships' Call	Ships	1,389	360	1,749
	Total NRT	'000 NRT	4,723	2,160	6,883

Table VI-2-19 Cargo Tonnage, No. of Ships' Call, and Total Net Registered Ton Assumed by Facility (WITH Case)

Fiscal Year	Item		Unit	General Cargo	Bulk Cargo	Total
1987/88	Conventional Berth	Alongside Berth	'000 ton	3,433	2,322	5,755
		Barge	'000 ton	33	47	80
		No. of Ships' Call	Ships	990	321	1,311
		Total NRT	'000 NRT	3,366	1,926	5,292
	New CNTR Terminal	No. of TEUs	TEUs	—	—	67,652
		No. of Ships' Call	Ships	—	—	157
		Total NRT	'000 NRT	—	—	1,570
1988/89	Conventional Berth	Alongside Berth	'000 ton	3,323	2,354	5,677
		Barge	'000 ton	28	40	68
		No. of Ships' Call	Ships	957	325	1,282
		Total NRT	'000 NRT	3,254	1,950	5,204
	New CNTR Terminal	No. of TEUs	TEUs	—	—	118,764
		No. of Ships' Call	Ships	—	—	267
		Total NRT	'000 NRT	—	—	2,670
1989/90	Conventional Berth	Alongside Berth	'000 ton	3,171	2,373	5,544
		Barge	'000 ton	26	36	62
		No. of Ships' Call	Ships	913	327	1,240
		Total NRT	'000 NRT	3,104	1,962	5,066
	New CNTR Terminal	No. of TEUs	TEUs	—	—	191,604
		No. of Ships' Call	Ships	—	—	417
		Total NRT	'000 NRT	—	—	4,170
1990/91	Conventional Berth	Alongside Berth	'000 ton	3,036	2,395	5,431
		Barge	'000 ton	24	35	59
		No. of Ships' Call	Ships	874	330	1,204
		Total NRT	'000 NRT	2,972	1,980	4,952
	New CNTR Terminal	No. of TEUs	TEUs	—	—	253,086
		No. of Ships' Call	Ships	—	—	527
		Total NRT	'000 NRT	—	—	5,270

Table VI-2-20 Share of Handling Cargo Volume
in Port/Inland Terminal

Fiscal Year	Port Terminal %	Inland Terminal %
1987/88	60.9	39.1
1988/89	61.2	38.8
1989/90	62.3	37.7
1990/91	62.4	37.6

Table VI-2-21 Cargo Handling Cost (WITHOUT)

(Unit: '000 US$)

Fiscal Year		Labour Cost			Operation/ Maintenance Cost	Total
		Skilled	Unskilled	Sub-Total		
1987/88	Alongside	5,857.2	8,575.9	14,433.1	4,694.8	19,127.9
	Barge	218.7	315.0	533.7	177.8	711.5
	Ship movement	378.3	545.5	923.8	1,296.2	2,220.0
	Total	6,454.2	9,436.4	15,890.6	6,168.8	22,059.4
1988/89	Alongside	6,023.3	8,687.4	14,710.7	4,745.2	19,455.9
	Barge	1,195.5	1,722.1	2,917.6	972.0	3,889.6
	Ship movement	399.1	575.4	974.5	1,366.1	2,340.6
	Total	7,617.9	10,984.9	18,602.8	7,083.3	25,686.1
1989/90	Alongside	6,272.7	9,046.4	15,319.1	4,929.8	20,248.9
	Barge	1,951.5	2,811.2	4,762.7	1,586.5	6,349.2
	Ship movement	425.7	613.8	1,039.5	1,455.6	2,495.1
	Total	8,649.9	12,471.4	21,121.3	7,971.9	29,093.2
1990/91	Alongside	6,681.5	9,635.7	16,317.2	5,245.9	21,563.1
	Barge	1,951.5	2,811.2	4,762.7	1,586.5	6,349.2
	Ship movement	449.0	647.4	1,096.4	1,533.6	2,630.0
	Total	9,082.0	13,094.3	22,176.3	8,366.0	30,542.3

Table VI-2-22 Cargo Handling Cost (After Completion of Urgent Plan)
— Conventional Berth —

(Unit: '000 US$)

Fiscal Year		Labour Cost			Operation/ Maintenance Cost	Total
		Skilled	Unskilled	Sub-Total		
1987/88	Alongside	5,288.7	7,629.2	12,917.9	4,189.2	17,107.1
	Barge	218.7	315.0	533.7	177.8	711.5
	Ship movement	341.4	492.3	833.7	1,173.3	2,007.0
	Total	5,848.8	8,436.5	14,285.3	5,540.3	19,825.6
1988/89	Alongside	5,161.8	7,446.4	12,608.2	4,094.3	16,702.5
	Barge	185.8	267.6	453.4	151.1	604.5
	Ship movement	335.0	483.0	818.0	1,152.5	1,970.5
	Total	5,682.6	8,197.0	13,879.6	5,397.9	19,277.5
1989/90	Alongside	4,976.4	7,179.3	12,155.7	3,953.9	16,109.6
	Barge	170.1	245.0	415.1	138.2	553.3
	Ship movement	325.2	468.9	794.1	1,120.6	1,914.7
	Total	5,498.7	7,893.2	13,364.9	5,212.7	18,577.6
1990/91	Alongside	4,813.7	6,945.0	11,758.7	3,831.1	15,589.8
	Barge	160.8	231.6	392.4	130.8	523.2
	Ship movement	317.0	457.0	774.0	1,094.0	1,868.0
	Total	5,291.5	7,633.6	12,925.1	5,055.9	17,981.0

Table VI-2-23 Cargo Handling Cost (After Completion of Urgent Plan)
— Container Berth —

(Unit: '000 US$)

Fiscal Year		Labour Cost			Operation/ Maintenance Cost	Total
		Skilled	Unskilled	Sub-Total		
1987/88 (60.9%)	Cargo Handling/ Storage	325.1	82.8	407.9		407.9
	Ship movement	45.9	66.2	112.1		112.1
					771.5	771.5
	Total	371.0	149.0	520.0	771.5	1,291.5
1988/89 (61.2%)	Cargo Handling/ Storage	573.4	146.1	719.5		719.5
	Ship movement	78.4	113.1	191.5		191.5
					1,284.0	1,284.0
	Total	651.8	259.2	911.0	1,284.0	2,195.0
1989/90 (62.3%)	Cargo Handling/ Storage	941.9	240.0	1,181.9		1,181.9
	Ship movement	124.7	179.8	304.5		304.5
					2,035.2	2,035.2
	Total	1,066.6	419.8	1,486.4	2,035.2	3,521.6
1990/91 (62.4%)	Cargo Handling/ Storage	1,246.0	317.4	1,563.4		1,563.4
	Ship movement	157.8	227.6	385.4		385.4
					2,629.7	2,629.7
	Total	1,403.8	545.0	1,948.8	2,629.7	4,578.5

Table VI-2-24 Reduction in Cargo Handling Cost

(Unit: '000 US$)

Fiscal Year	Reduction Cost
1987/88	942.3
1988/89	4,213.6
1989/90	6,994.0
1990/91	7,982.8
1991/92	↓
1992/93	

Table VI-2-25 Reduction in Navigation Period (1)

Ocean Route	No. of Port of Call	Staying Period (days)	Distance (mile)	Navigation Period (days)	Total (days)	Reduction (days)	Share (%)	Reduction Total (days)
North America							10.5	3.9
USA I Conventional Freighter	6	30	10,500	31.3	61.3			
CNTR Ship	6	6	10,500	20.8	26.8	34.5		
USA II Conventional Freighter	7	35	11,800	35.1	70.1			
CNTR Ship	7	7	11,800	23.4	30.4	39.7		
Western Europe							26.2	6.5
U.K. Conventional Freighter	5	25	7,200	21.4	46.4			
CNTR Ship	5	5	7,200	14.3	19.3	27.1		
Italy Conventional Freighter	4	20	6,400	19.0	39.0			
CNTR Ship	4	4	6,400	12.7	16.7	22.3		
Middle East							25.5	2.4
Kuwait Conventional Freighter	2	10	1,300	3.9	13.9			
CNTR Ship	2	2	1,300	2.6	4.6	9.3		

Ocean Route		No. of Port of Call	Staying Period (days)	Distance (mile)	Navigation Period (days)	Total (days)	Reduction (days)	Share (%)	Reduction Total (days)
Asia								28.3	7.9
Hong Kong	Conventional Freighter	5	25	5,200	15.5	40.5			
	CNTR Ship	5	5	5,200	10.3	15.3	25.2		
Japan	Conventional Freighter	6	30	7,000	20.8	50.8			
	CNTR Ship	6	6	7,000	13.9	19.9	30.9		
Africa								2.2	0.3
Mosam-bique	Conventional Freighter	2	10	3,900	11.6	21.6			
	CNTR Ship	2	2	3,900	7.7	9.7	11.9		
Oceania								1.7	0.5
Austra-lia	Conventional Freighter	6	30	7,700	22.9	52.9			
	CNTR Ship	6	6	7,700	15.3	21.3	31.6		
South America								1.6	0.5
Brazil	Conventional Freighter	5	25	10,500	31.3	56.3			
	CNTR Ship	5	5	10,500	20.8	25.8	30.5		

Ocean Route		No. of Port of Call	Staying Period (days)	Distance (mile)	Navigation Period (days)	Total (days)	Reduction (days)	Share (%)	Reduction Total (days)
Eastern Europe								3.7	1.2
USSR	Conventional Freighter	6	30	9,100	27.1	57.1			
	CNTR Ship	6	6	9,100	18.1	24.1	33.0		
Total									23.2

Average Speed: Conventional Freighter   14 knot
Container Ship   21 knot

Table VI-2-26 Reduction in Time Cost

	Export CNTR Cargo Volume ('000 ton)	Reduction in Navigation Period (days)	Average Cargo Value (US$/ton)	Interest (%)	Reduction Time Cost ('000 US$)
1987/88	285	20	585	14	1,296.8
1988/89	491	20	585	14	2,234.1
1989/90	745	20	585	14	3,389.8
1990/91	975	20	585	14	4,436.3

Table VI-2-27 Working Expense for Existing Train (1,360 km)

Item		Economic Cost US$/ton
Labour Cost	Skilled	1.77
	Unskilled	1.42
	Sub-Total	3.19
Operation/ Maintenance Cost	Fuel, etc.	8.55
	Repair/Maintenance	6.48
	Others	2.70
	Sub-Total	17.73
Total		20.92

Table VI-2-28 Working Expense for CNTR Train (1,200 km)

Item		Economic Cost US$/ton
Labour Cost	Skilled Labour	1.21
	Unskilled Labour	0.97
	Sub-Total	2.18
Operation/ Maintenance Cost	Fuel, etc.	5.85
	Repair/Maintenance	4.37
	Others	2.51
	Sub-Total	12.73
Total		14.91

Table VI-2-29 Operating Cost per ton per 1,000 km (8-ton Truck)

Item		Economic Cost US$/Ton/1,000 km
Labour Cost	Skilled Labour	2.31
	Unskilled Labour	1.39
	Sub-Total	3.70
Operation/ Maintenance Cost	Fuel/Oil	15.86
	Repair/Maintenance	3.72
	Others	2.11
	Sub-Total	21.69
Total		25.39

Table VI-2-30 Operating Cost per ton per 1,000 km (40' Trailer)

Item		Economic Cost US$/Ton/1,000 km
Labour Cost	Skilled Labour	0.64
	Unskilled Labour	0.39
	Sub-Total	1.03
Operation/ Maintenance Cost	Fuel/Oil	7.41
	Repair/Maintenance	2.52
	Others	2.44
	Sub-Total	12.37
Total		13.40

Fiscal Year	Transport Section	Total	Port Terminal – Inland Terminal				Inland Terminal – Up-Country		Port Terminal
			Case I		Case II		FCL 60%	LCL 40%	Karachi Region
			Railway 50%	Road 50%	Railway 36.3%	Road 63.7%			
1987/88	'000 Ton	818.7	409.35	409.35	297.2	521.5	491.2	327.5	378.8
	TEU		40,935	40,935	29,720	52,150			
1988/89	'000 Ton	949.0	474.5	474.5	344.5	604.5	569.4	379.6	439.3
	TEU		47,450	47,450	34,450	60,450			
1989/90	'000 Ton	1,113.9	556.95	556.95	404.3	709.6	668.3	445.6	514.6
	TEU		55,695	55,695	40,430	70,960			
1990/91	'000 Ton	1,260.3	630.15	630.15	457.5	802.8	756.2	504.1	584.3
	TEU		63,015	63,015	45,750	80,280			
1991/92	'000 Ton	↓	↓	↓	↓	↓	↓	↓	↓
	TEU								

Note: Average weight of import/export container is 10 ton/TEU

Table VI-2-32 Railway Transport Cost (WITHOUT CASE)
　　　　　　　Port Terminal ◄──────────────► Consignee/Consigner
　　　　　　　(Existing Train 1,360 km)

Fiscal Year	Total	Labour Cost			Operation/Maintenance Cost			
		Skilled	Unskilled	Sub-Total	Fuel/Oil	Repair/Maintenance	Others	Sub-Total
1987/88	8,563.5	724.5	581.3	1,305.8	3,499.9	2,652.6	1,105.2	7,257.7
1988/89	9,926.7	839.9	673.8	1,513.7	4,057.0	3,074.8	1,281.2	8,413.0
1989/90	11,651.4	985.8	790.9	1,776.7	4,761.9	3,609.0	1,503.8	9,874.7
1990/91	13,182.8	1,115.4	894.8	2,010.2	5,387.8	4,083.4	1,701.4	11,172.6

Table VI-2-33 Road Transport Cost (WITHOUT CASE)
　　　　　　　Port Terminal ◄──────────────► Consignee/Consigner
　　　　　　　(8 ton Truck 1,360 km)

Fiscal Year	Total	Labour Cost			Operation/Maintenance Cost			
		Skilled	Unskilled	Sub-Total	Fuel/Oil	Repair/Maintenance	Others	Sub-Total
1987/88	14,134.9	1,286.0	773.8	2,059.8	8,829.5	2,071.0	1,174.6	12,075.1
1988/89	16,384.7	1,490.7	897.1	2,387.8	10,234.8	2,400.5	1,361.6	13,996.9
1989/90	19,232.0	1,749.8	1,052.9	2,802.7	12,013.2	2,817.8	1,598.3	16,429.3
1990/91	21,759.3	1,979.7	1,191.2	3,170.8	13,592.1	3,188.1	1,808.3	18,588.5

Table VI-2-34　Road Transport Cost (WITHOUT CASE)
Port Terminal ◄─────────────► Consignee/Consigner
(8 ton Truck 235 km)

Fiscal Year	Total	Labour Cost			Operation/Maintenance Cost			
		Skilled	Unskilled	Sub-Total	Fuel/Oil	Repair/Maintenance	Others	Sub-Total
1987/88	2,260.0	205.6	123.7	329.3	1,411.8	331.1	187.8	1,930.7
1988/89	2,621.1	238.5	143.5	382.0	1,637.3	384.0	217.8	2,239.1
1989/90	3,070.7	279.4	168.1	447.5	1,918.0	450.0	255.2	2,623.2
1990/91	3,486.3	317.2	190.9	508.1	2,177.7	510.8	289.7	2,978.2

Table VI-2-35　Railway Transport Cost (WITH CASE)
Port Terminal ◄─────────────► New Inland Terminal
(CNTR Unit Train 1,200 km)

Fiscal Year	Total	Labour Cost			Operation/Maintenance Cost			
		Skilled	Unskilled	Sub-Total	Fuel/Oil	Repair/Maintenance	Others	Sub-Total
1987/88	12,206.7	990.6	794.1	1,784.7	4,789.4	3,577.7	2,054.9	10,422.0
1988/89	14,149.6	1,148.3	920.5	2,068.3	5,551.7	4,147.1	2,382.0	12,080.8
1989/90	16,608.2	1,347.8	1,080.5	2,428.3	6,516.3	4,867.7	2,795.9	14,179.9
1990/91	18,791.2	1,525.0	1,222.5	2,747.5	7,372.8	5,507.5	3,163.4	16,043.7

Table VI-2-36　Road Transport Cost (WITH CASE)
New Inland Terminal ◄─────────────► Consignee/Consigner
(8 ton Truck 170 km)

Fiscal Year	Total	Labour Cost			Operation/Maintenance Cost			
		Skilled	Unskilled	Sub-Total	Fuel/Oil	Repair/Maintenance	Others	Sub-Total
1987/88	1,413.6	128.6	77.4	206.0	883.0	207.1	117.5	1,207.6
1988/89	1,638.5	149.1	89.7	238.8	1,023.5	240.0	136.2	1,399.7
1989/90	1,923.3	175.0	105.3	280.3	1,201.4	281.8	159.8	1,643.0
1990/91	2,175.8	198.0	119.1	317.1	1,359.2	318.8	180.8	1,858.8

Table VI-2-37 Road Transport Cost (WITH CASE)

New Inland Terminal ◄───────────► Consignee/Consigner

(40′ Trailer 170 km)

Fiscal Year	Total	Labour Cost			Operation/Maintenance Cost			
		Skilled	Unskilled	Sub-Total	Fuel/Oil	Repair/Maintenance	Others	Sub-Total
1987/88	1,118.9	53.4	32.6	86.0	618.8	210.4	203.7	1,032.9
1988/89	1,297.2	62.0	37.8	99.8	717.3	243.9	236.2	1,197.4
1989/90	1,522.4	72.7	44.3	117.0	841.9	286.3	277.2	1,405.4
1990/91	1,722.7	82.3	50.1	132.4	952.6	324.0	313.7	1,590.3

Table VI-2-38 Road Transport Cost (WITH CASE)

Port Terminal ◄───────────► Consignee/Consigner

(40′ Trailer 235 km)

Fiscal Year	Total	Labour Cost			Operation/Maintenance Cost			
		Skilled	Unskilled	Sub-Total	Fuel/Oil	Repair/Maintenance	Others	Sub-Total
1987/88	1,192.8	57.0	34.7	91.7	659.6	224.3	217.2	1,101.1
1988/89	1,383.5	66.1	40.3	106.4	765.0	260.2	251.9	1,277.1
1989/90	1,620.5	77.4	47.2	124.6	896.1	304.7	295.1	1,495.9
1990/91	1,839.9	87.9	53.6	141.4	1,017.5	346.0	335.0	1,698.5

Table VI-2-39 Unit Operation/Maintenance Cost

(Inland Terminal)

	Unit Cost (US$/TEU)
Fuel/Electricity/Water	2.52
Repair/Maintenance	6.49
Total	9.01

Table VI-2-40 Transport/Terminal Cost (WITHOUT)

(Unit: '000 US$)

Fiscal Year	Transport/ Terminal Cost
1987/88	24,958.4
1988/89	28,932.5
1989/90	33,954.1
1990/91	38,428.4
1991/92	
1992/93	

Railway : Road = 50 : 50

Table VI-2-41 Transport/Terminal Cost (WITH)

(Unit: '000 US$)

Fiscal Year	Terminal Cost			Transport Cost	Total
	Port Terminal	Inland Terminal	Sub-Total		
1987/88	495.4	489.8	985.2	15,932.0	16,917.2
1988/89	814.0	627.5	1,441.5	18,468.8	19,910.3
1989/90	1,231.5	827.0	2,058.5	21,674.4	23,732.9
1990/91	1,584.6	983.7	2,568.3	24,529.6	27,097.9
1991/92					
1992/93					

Table VI-2-42 Reduction in Transport/Terminal Cost

(Unit: '000 US$)

Fiscal Year	Modal Split (Railway : Road)	
	50 : 50	36.3 : 63.7
1987/88	8,041.2	9,567.8
1988/89	9,022.2	10,791.5
1989/90	10,221.2	12,298.6
1990/91	11,330.5	13,680.3
1991/92		
1992/93		

Table VI-2-43 Reduction in Time Cost

(Unit: '000 US$)

| Fiscal Year | Modal Split (Railway : Road) | |
	50 : 50	36.3 : 63.7
1987/88	1,005.6	905.9
1988/89	1,165.6	1,050.1
1989/90	1,368.2	1,232.5
1990/91	1,548.0	1,394.6
1991/92		
1992/93	↓	↓

Table VI-2-44 Reduction in Rental Cost of Container Box

(Unit: '000 US$)

| Fiscal Year | Modal Split (Railway : Road) | |
	50 : 50	36.3 : 63.7
1987/88	962.0	866.6
1988/89	1,115.1	1,004.6
1989/90	1,308.8	1,179.1
1990/91	1,480.9	1,334.1
1991/92		
1992/93	↓	↓

Fig. VI-2-1 PNSC's Share in Dry Cargo (1980)
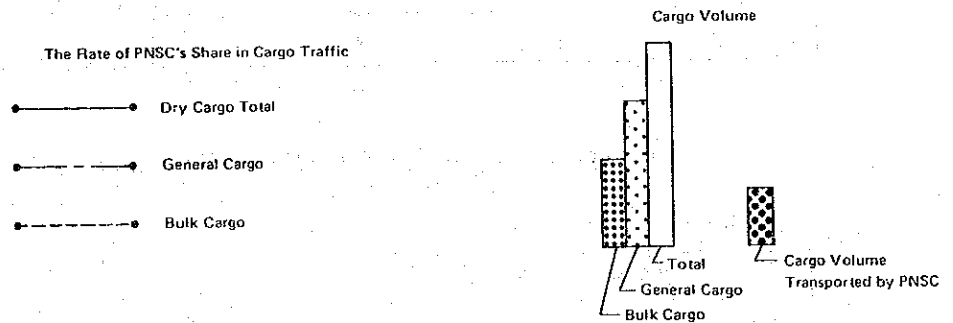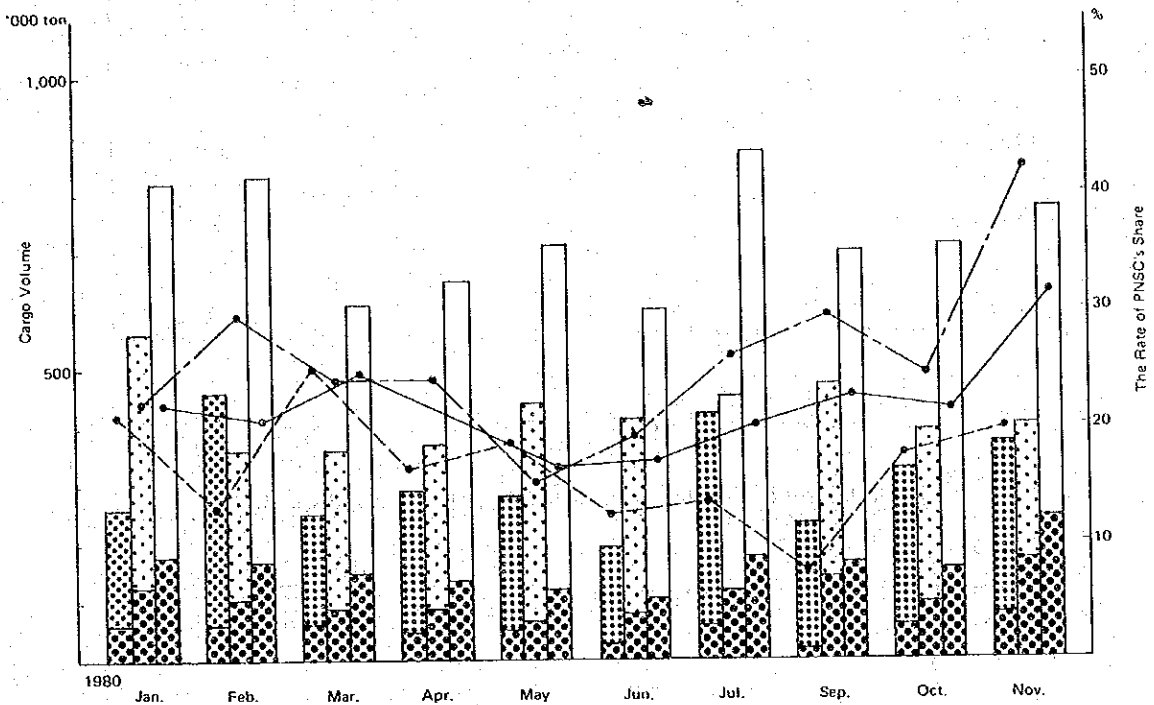
Fig. VI-2-2 Average Time Charterage of Dry Cargo Vessels

Highest   X
Lowest   O
Average   △

Charterage (US$/DWT, Month)

DWT ('000 Tons)
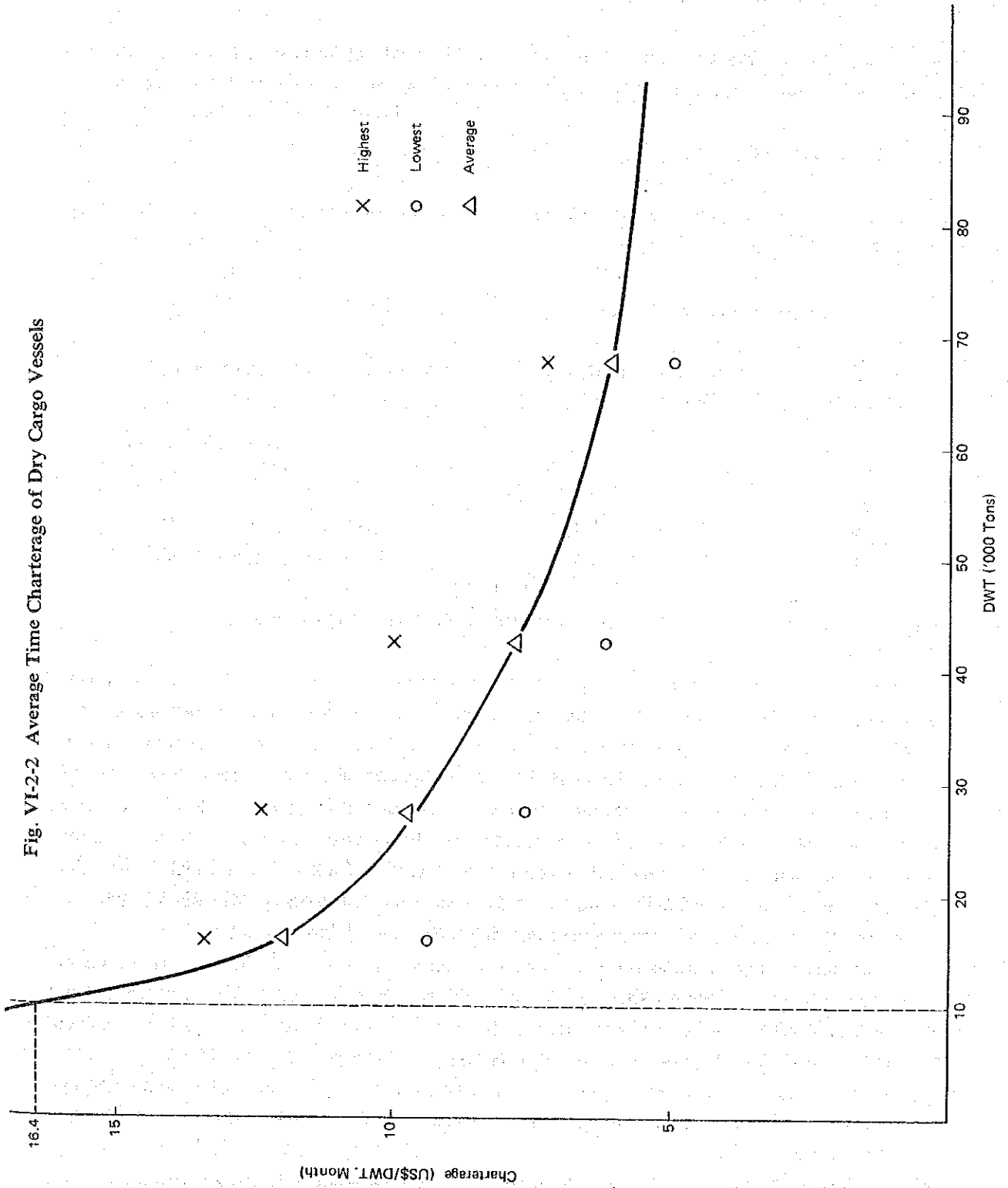
CHAPTER 3. COSTS

3-1 Construction Cost and Cost of Purchasing the Cargo Handling Equipments

Table VI-3-1, Table VI-3-2 and Table VI-3-3 show construction cost and cost of purchasing the cargo handling equipments for Karachi Port, Qasim Port and Inland Terminal respectively.

3-2 Administration Cost

It is considered that there is no difference in the administration cost between the WITH and the WITHOUT cases.

3-3 Access Improvement Cost

In present analysis, improvement costs of access roads and railways are adopted.
The followings show the costs shared Urgent Plan proposed in Part II, 5-4.

(Unit: '000 US$)

	Road	Railway	Total
Karachi	301.8	857.1	1,158.9
Qasim	201.6	0	201.6

3-4 Construction Cost of Facilities Necessary for Container Transportation

If a container terminal is to be constructed at Qasim Port, it is necessary to invest for various port supporting inflastructures to secure smooth container transportation -- for example, such facilities as the offices and storehouses of stevedoring companies, cargo transport companies and warehousing companies, and the offices of agencies, banks and insurance companies etc. It would be ideal if a new town inclusive of houses, schools, mosques and shops etc. could be constructed there. But here, in order to aboid overestimation of the benefits, we assume that the various functions necessary for container transportation are already sufficiently accumulated in Karachi City and that all labours related container transportation commute to Qasim from Karachi City. Therefore, the following costs are added separately in the analysis for Qasim Port:

1 Construction cost of inflastructures: The investment to provide minimum port supporting inflastructures such as the above mentioned facilities. However, taking into consideration that these facilities could be used for port activities other than container transportation as well, 50% of all the investments are finally adopted in present analysis.

   For reference, the construction costs of new town for PQA's staff and workers and new town necessary for container transportation are shown in Table A-VI-17(2) and A-VI-17(3) respectively.

2 Operation and maintenance cost: The operation and maintenance cost for commutor traffic from Karachi to Qasim and for related business trips, and their time costs.

3-4-1 Construction cost of facilities

Under the conditions of handling 1 million tons of container cargoes, the minimum facilities and their construction costs are as shown below, provided that the land acquisition cost is excluded.

However, taking into consideration that these facilities could be also used for port activities other than container transportation, 7,600 thousand US$ equivalent to 50% of the following estimation is finally adopted in present analysis.

	Required No. of Facilities
Shipping Agents	40
Consignee/Consigner Agents	20
Transport Companies	7
Stevedoring/Warehouse Companies	5
Bank	1
Insurance Company	1
Custom House	1
Quarantine Office	1
Total	76

Average Area per Facility	800 m²
Unit Construction Cost	250 US$/m²

Economic Cost = 76 × 800 m² × 250 US$/m² × 50%
$$= 7,600 \text{ ('000 US\$)}$$

3-5 Operation/Maintenance Costs

Operation/maintenance costs for container terminal of Karachi Port, Qasim Port and Inland (Lahore) are estimated respectively.

3-5-1 Operation/Maintenance Cost for Container Terminal at Karachi Port

The operation/maintenance cost for each fiscal year for container terminal, dredging, access road and access improved roads/railway is shown in Table VI-3-5.

3-5-2 Operation/Maintenance Cost for Container Terminal at Qasim Port

As mentioned in Chapter 3, 3-4, here we take up the case of commuting to Qasim from Karachi City and the costs caused by this are added in the operation/maintenance cost for the port terminal.

(1) Operating Cost of Commutor Traffic

Table A-VI-17 shows the number of stevedores and workers of agents and banks etc. required to handle 1 million tons of container cargoes.

The means of commuting of these workers (3,364 workers) from Karachi City to Qasim are

assumed to avail themselves of private car (20%), of minibus and bus (each 40%). The commuting distance from the center of Karachi City to Qasim, is assumed to be 50 km and that from the center of Karachi City to the container terminal of Karachi port to be 10 km. Table A-VI-18 to Table A-VI-21 show unit operating costs of private car, minibus and bus. Based on the above premises, operating cost of commutor traffic is estimated as shown in Table VI-3-6.

(2) Time Cost of Commuter

To obtain time cost of commuters, the following conditions are premised.

1. Ranking of annual income is classified into A. 45,000 Rs. per year (user of private car), B. 28,000 Rs. per year and C. 13,000 Rs. per year (average of skilled/unskilled labor).

2. Annual working hours 2,000 hrs.

3. Lost time for commuting to Qasim

$$(50 \text{ km} \div 56 \text{ km/hr}) - (10 \text{ km} \div 30 \text{ km/hr}) = 1.12 \text{ hrs.}$$

4. Since 100% of commuting time is not necessarily used for productive activities, discount rate of 50% is employed. Time cost is calculated by using the above conditions, and the results are shown in Table VI-3-7.

(3) Operating Cost of Related Business Trips

Table VI-3-8 shows operating cost for each fiscal year, assuming that one business trip is generated for 1 TEU.

(4) Time Cost of Related Business Trips

In order to obtain time cost of business trips, the following premises are employed.

(a) Ranking "B" as mentioned above is used for time cost of business trips.

(b) Average number of passengers are assumed to be 1.5.

(c) Lost time by travelling between Karachi to Qasim is assumed to be 2.86 hrs.

$$40 \text{ km} \div 56 \text{ km/hr} \times 4 = 2.86 \text{ hrs.}$$

Time cost obtained from the above premises is shown in Table VI-3-9.

(5) Road Maintenance Cost

Road maintenance cost between Karachi to Qasim is given as of 84.8 thousand US$ by using unit cost of 3 Rs. per m² per year.

$$40,000 \text{ m} \times 7 \text{ m} \times 3 \div 9.9 = 84.8 \text{ ('000 US\$)}$$

Table VI-3-9 shows the operation/maintenance cost at the container terminal and total costs summed up from 1) to 5).

Table VI-3-1 Composition of Construction Cost and CNTR Handling Equipment Cost
— Karachi Port —

(Unit: '000 US$)

Fiscal Year	Grand Total	Total	Construction Cost								Cost of Container Handling Equipment
			Foreign Currency	Sub-Total	Local Currency						
					Sub-Total	Labour Cost		Fuel	Material	*	
						Skilled	Unskilled				
1982/'83	1,227	1,227	384	305	100	50	50	102	103		
1983/'84	8,121	8,121	5,193	2,928	487	258	229	1,128	1,139	174	
1984/'85	23,768	23,768	14,016	9,752	1,562	826	736	3,731	4,459		
1985/'86	33,439	33,439	13,082	20,357	2,775	1,214	1,561	3,962	13,620		
1986/'87	48,917	15,128	5,171	9,957	1,380	558	822	1,321	7,256		33,739
Total	115,472	81,683	38,384	43,299	6,304	2,906	3,389	10,244	26,577	174	33,789

* Hire of Equipment and Others

Table VI-3-2 Composition of Construction Cost and CNTR Handling Equipment Cost
— Qasim Port —

(Unit: '000 US$)

Fiscal Year	Grand Total	Total	Construction Cost								Cost of Container Handling Equipment
			Foreign Currency	Sub-Total	Local Currency						
					Sub-Total	Labour Cost		Fuel	Material	*	
						Skilled	Unskilled				
1982/'83	1,099	1,099	824	275	92	46	46	90	93		
1983/'84	6,659	6,659	4,003	2,656	484	263	221	791	1,251	130	
1984/'85	18,382	18,382	10,448	7,934	1,484	831	653	2,539	3,911		
1985/'86	29,087	29,087	10,864	18,223	2,628	1,172	1,456	3,186	12,409		
1985/'87	47,791	14,002	4,496	9,506	1,311	530	781	1,262	6,933		33,789
Total	103,018	69,229	30,635	38,594	5,999	2,842	3,157	7,868	24,597	130	33,789

*Hire of Equipment and Others

Table VI-3-3 Composition of Construction Cost and CNTR Handling Equipment Cost
— Inland Terminal —

(Unit: '000 US$)

Fiscal Year	Grand Total	Total	Construction Cost								Cost of Container Handling Equipment
			Foreign Currency	Sub-Total	Local Currency						
					Sub-Total	Labour Cost		Fuel	Material	*	
						Skilled	Unskilled				
1982/'83											
1983/'84	719	719	540	179	60	30	30	60	59		
1984/'85	4,330	4,330	1,456	2,874	293	151	136	658	898	1,025	
1985/'86	15,967	15,967	4,609	11,358	1,561	677	884	2,008	7,789		
1986/'87	44,888	7,927	1,778	6,149	814	336	478	865	4,326	144	36,961
Total	65,904	28,943	8,383	20,560	2,728	1,200	1,528	3,591	13,072	1,169	36,961

*Hire of Equipment and Others

Table VI-3-4 Construction Cost of Facilities

Facilities	Required No. of Facilities
Shipping Agents	40
Consignee/Consigner Agents	20
Transport Companies	7
Stevedoring/Warehouse Companies	5
Bank	1
Insurance Company	1
Custom House	1
Quarantine Office	1
Total	76

Average Area per Facility $800 \ m^2$
Unit Construction Cost $250 \ US\$/m^2$
Economic Cost $= 76 \times 800 \ m^2 \times 250 US\$/m^2 \times 50\%$

$$= 7,600 \ (\text{'}000 \ US\$)$$

Table VI-3-5 Operation/Maintenance Cost (Karachi Port)

Fiscal Year	CNTR Terminal (Port)	Dredging	Access/Access Improved Road	Total
1987/88	1,291.5	204.1	9.3	1,504.8
1988/89	2,195.0	339.5	9.3	2,543.3
1989/90	3,521.6	498.7	9.3	4,029.9
1990/91	4,578.5	624.4	9.3	5,211.8
1991/92	↓	↓	↓	↓
1992/93				

Table VI-3-6 Operating Cost of Commutor Traffic

	Operating Cost
Private Car	$3,364 \times 20\% \div 1.5^* \times 622 \ RS \times \dfrac{40 \ km \times 2}{1,000 \ km} \times 30 \ days \div 9.9 = 676.5$
Mini-bus	$3,364 \times 40\% \div 13^* \times 970 \ RS \times \dfrac{40 \ km \times 2}{1,000 \ km} \times 300 \ days \div 9.9 = 243.3$
Bus	$3,364 \times 40\% \div 52^* \times 2,008 \ RS \times \dfrac{40 \ km \times 2}{1,000 \ km} \times 300 \ days \div 9.9 = 126.0$
Total	1,045.8 ('000 US\$)

* Passenger per Vehicle

Table VII-3-7 Time Cost of Commutor

Rank	Time Cost
A	2.28 US$/hr x 1.12 hr x 300 days x 673 x 50% = 257.8
B	1.40 US$/hr x 1.12 hr x 300 days x 1,345 x 50% = 316.6
C	0.66 US$/hr x 1.12 hr x 300 days x 1,346 x 50% = 149.1
Total	723.5 ('000 US$)

Table VI-3-8 Operating Cost of Related Business Trips

	Road (TEU)	No. of Cars	Balance Distance (km)	Unit Cost (Rs)	Operating Cost ('000 US$)
1987/88	28,370	28,370	40 x 4	622	285.2
1988/89	49,566	49,566	40 x 4	622	498.3
1989/90	78,773	78,773	40 x 4	622	791.9
1990/91	103,818	103,818	40 x 4	622	1,043.6

Table VI-3-9 Time Cost of Related Business Trips

	Unit Value (US$/hr)	No. of Cars	Average Passenger/Car	Hours	Time Cost ('000 US$)
1987/88	1.40	28,370	1.5	2.86	170.4
1988/89	1.40	49.566	1.5	2.86	297.7
1989/90	1.40	78,773	1.5	2.86	473.1
1990/91	1.40	103,818	1.5	2.86	623.5

Table VI-3-10 Operation/Maintenance Cost (Qasim Port)

(Unit: '000 US$)

Fiscal Year	CNTR Terminal (Port)	Dredging	Access/Access Improved Road	Commuting Cost	Total
1987/'88	1,291.5	776.0	8.2	2,309.7	4,385.4
1988/'89	2,195.0	1,165.6	8.2	2,650.1	6,018.9
1989/'90	3,521.6	1,586.4	8.2	3,119.1	8,235.3
1990/'91	4,578.5	1,923.0	8.2	3,521.2	10,030.9
1991/'92	4,578.5	1,923.0	8.2	3,521.2	10,030.9
1992/'93	4,578.5	1,923.0	8.2	3,521.2	10,030.9

Table VI-3-11 Operation/Maintenance Cost (Inland Terminal)

(Unit: '000 US$)

Fiscal Year	CNTR Terminal		Road	Total
	Port	Inland		
1987/'88	495.4	489.8	31.8	1,017.0
1988/'89	814.0	627.5	31.8	1,473.3
1989/'90	1,231.5	827.0	31.8	2,090.3
1990/'91	1,584.6	983.7	31.8	2,700.1
1991/'92	1,584.6	983.7	31.8	2,700.1
1992/'93	1,584.6	983.7	31.8	2,700.1

CHAPTER 4. SHADOW PRICING

4-1 Method of Estimating Shadow Prices

In estimating all benefits and costs, the shadow pricing is adopted. The method of estimating shadow prices is as follow:

a) All benefits and costs are to be divided into labor, traded goods and non-traded goods.

b) Further, the labor is to be divided into skilled labor and unskilled labor. The cost of skilled labour is obtained by multiplying its market price by a conversion factor for consumption (CFC) and the price of unskilled labour is calculated by multiplying its market price by a ratio of a shadow wage rate and a conversion factor for consumption (CFC).

c) Traded goods are to be expressed by CIF value for import and by FOB value for export.

d) Prices for non-traded goods are to be derived by multiplying appropriate conversion factors.

4-2 Standard Conversion Factor, Conversion Factor for Consumption, and Other Conversion Factor

4-2-1 Conversion Factor for Consumption

A conversion factor for consumption (CFC) is calculated by the following formula since there is no direct subsidies.

$$CFC = \frac{Ic + Ec}{Ic + Di + Ec - De}$$

Ic : Total amount of import for main consumer goods

Ec : Total amount of export for main consumer goods

Di : Total amount of import duties for main consumer goods

De : Total amount of export duties for main consumer goods

Custom statistics for five years from 1974/'75 on main consumer goods are shown in Table VI-4-1. By making calculations using the figures shown in the Table, the following average CFC is obtained:

$$CFC = 0.896$$

4-2-2 Conversion Factor for Machinery

A conversion factor for general machinery and vehicles is calculated here by using the similar formula used for CFC. Custom statistics used for calculations are shown in Table VI-4-2. Using the figures given in the table, the average conversion factor for machinery (CFM) is calculated as follow:

$$CFM = 0.781$$

For reference, the standard conversion factor is also calculated. Custom statistics on the

export and import are shown in Table VI-4-3. From this table, the standard conversion factor is calculated in the same manner as is used for CFC, and the following result is obtained.

$$SCF = 0.864$$

4-3 Shadow Wage Rate

There are, in general, two kinds of formulations for determining a shadow wage rate. Here, the following formulation is used for calculations:

$$SWR = C - (C-m)/S \dots\dots\dots(1)$$

where, SWR : Shadow wage rate
C : Wage in market price
m : Opportunity cost
S : Premium of saving (or investment)

The first term of the equation (1) shows the decrease in savings by the public sector due to payment for wages at market price and the second term indicates the amount consumed by labourers (C-m) as a result of implementation of a project, and is evaluated in terms of saving.

4-3-1 Estimate of Opportunity Cost

The opportunity cost is estimated in many cases from GDP per worker in agriculture sector. But, here, in addition this method, the minimum wage in the agricultural sector, the wage of hired labour, and the output per worker obtainable from the yield of paddy are calculated, and they are considered integrally.

As the deflators to convert into the 1980/'81 prices, GDP growth rate of agriculture sector is adopted. The figures are as follows.

1977/'78–'78/'79	1978/'79–'79/'80	1979/'88–'80/'81
4.2%	6.0%	5.0%

(Source: Statistical Division "Economic Survey 1979–80, Budget Speech 1980–81)

(1) Minimum Wage of Agriculture Sector

The minimum wages of the agriculture sector by provinces in 1980 are as follows.

Baluchistan	12 Rs./day = 1.21 US$/day
Punjab	12 Rs./day = 1.21 US$/day
Sind	10 Rs./day = 1.01 US$/day
N.W.F.P.	10 Rs./day = 1.01 US$/day

The average wage is 11 Rupees of 1.11US$ per day.

(2) Wages of Hired Labour

Wages are calculated from the results of farm management research* conducted in 1977–78 by Planning Unit Food and Agriculture Division. Major crops in Jhang district of Punjab Province are cotton, rice, wheat, sugarcane, and maize, and productivity of these crops is much lower than it's national average. Farms for objects of this survey is devided into the following three groups according to the sizes.

Group	No. of Farms	Size of Farm in Hectares
Low	35	0 – 5.06
Medium	10	5.061–10.12
High	5	10.121 and above

The working mandays and wages of hired labours are shown in Table VI-4-4. From this table, average wage of a hired labour per day is calculated, and the result shown in Table VI-4-5 is obtained. In the case of permanent labours, they are given daily foods, a suit of clothings, and a pair of shoes. Assuming that the price of daily foods is 7 Rupees per day and each price of a suit of clothings and a pair of shoes is 50 Rupees, the total amount converted these supplies into the wage per day is 7.67 Rupees.

Therefore, 10.32 to 11.27 Roupees per day is obtained in the case of casual labour, and in the case of permanent labour, 14.17 to 16.73 Rupees per day for 1977–78 prices is obtained. Here, as the wage of hired labour, casual labour's wage, 1.21 to 1.32 US$ per day after converted to the 1980/'81 prices, is employed.

(3) Output per Worker calculated from Yield of Paddy

The yield per hectare of paddy in 1979/'80 is about 1,580 kilogram according to Statistical Year Book 1980. If the average cultivating area is assumed to be 4.38 hectores per farm (from Statistical Yearbook 1980), the yield per farm of paddy is given as 6,920 kilogram. Since the procurement/support prices of paddy for 1979–80 crop is 1.61 to 0.5 Rupees per kilogram, as shown in Table VI-4-6, and annual mandays of workers per farm is about 940, the output per worker then becomes 3.68 to 11.85 Rupees per day for 1979/'80, or 0.39 to 1.26 US$ per day after converted to the 1980/'81 prices.

(4) Estimate by GDP of Agriculture Sector

GDP of agriculture sector (including forestry and fisheries) is 56,370 million Rupees in 1978/'79. Since the number of workers in agriculture sector is 11.93 million persons (from the statistics of Manpower Division), 13.5 Rupees per day is obtained for 350 working days per year, which is 15.0 Rupees per day or 1.52 US$ per day if converted to the 1980/'81 prices.

The above results are compiled and indicated in Table VI-4-7. From the results shown above, an opportunity cost of 1.0 US$ per day is finally adopted.

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* Farm Management Research in Pakistan Farm, Management Survey Report on Jhang Project 1977–78, Planning Unit Food and Agriculture Division

4-3-2 Estimate on the Premium "S" of Saving/Investment

The premium "S" is estimated by the following equation:

$$S = \frac{(1 - \theta)\gamma}{i - \theta\gamma}$$

where, θ : Rate of saving/investment

γ : Rate of return of marginal investment, and

i : Social discount rate

For θ, 11.57% of the average value for five years shown in Table VI-4-8 is used.

For γ, 16% is used, in consideration of present level (14% for one year) of loan interest in Pakistan. Then assuming that $i = 12\%$, which was used in other projects in Pakistan, the premium "S" is given as 1.394.

The premium "S" thus obtained might include substantial error. However, it is considered more appropriate to evaluate the second term in equation (1) than to evaluate the shadow wage rate only by an opportunity cost.

4-3-3 Estimate of Shadow Wage Rate (SWR)

Though the market wage "C" is 30 Rupees per day or 3.03 US$ per day, 40 Rupees per day = 4.04 US$ per day is used since a short-term employment condition is involved in the implementation of the Plan. Thus, the percentage of the shadow wage rate for the modification of labour cost of the civil engineering work is different from that of benefits items. The results of calculations for the shadow wage rate by using equation (1) are shown in Table VI-4-9 for each case. In the same table the ratios of the shadow wage rates to the wage in the market price are shown, as well.

4-4 Shadow Prices of Benefit Items

4-4-1 Reduction in Cargo Handling Cost

Conversion factors for labour cost are as follows:

o Conversion factor for skilled labor = 0.896
   [Conversion factor for consumption]
o Conversion factor for unskilled labour = 0.465
   [(Conversion factor for consumption)
      x (Ratio of shadow wage rate — long-term employment)] = 0.896 x 0.519

Since the operation/maintenance cost contains many elements whose details are unknown, in advance, such as repair cost, a simple average of three conversion factors for consumption, for fuel, and for machinery is employed here as a conversion factor for this cost. Concerning fuel, no cumstom duties are imposed on the import of crude oil. On the contrary, it is considered that a fairly large amount of subsidy is being paid to the Pakistan State Oil. For this reason, the price of fuel in this country is comparatively low and not too much different from the CIF price. Thus, a conversion factor of 1.0 is finally employed for fuel.

o Conversion factor for operation/maintenance = 0.892

    [(0.896 + 1.0 + 0.781) ÷ 3]

Using the above results, the cargo handling costs converted to the shadow prices (WITHOUT and WITH cases) are shown in Table VI-4-10 and Table VI-4-11 respectively.

From the results shown above, the amounts of reduction in cargo handling costs are obtained as shown in Table VI-4-12.

4-4-2 Reduction in Ships' Staying Cost

This itself is expressed in terms of the shadow price.

4-4-3 Reduction in Transport/Terminal Cost

For the conversion factors for skilled labour, unskilled labour, and fuel/oil, the followings are to be employed, as are discussed before.

o Conversion factor for skilled labour = 0.896

o Conversion factor for unskilled labour = 0.465

o Conversion factor for fuel/oil = 1.0

While, the conversion factor for material is employed a value of 0.896, which is the conversion factor for consumption. Transport/terminal cost converted to the shadow prices are obtained as shown in Table VI-4-13 (in the case of WITHOUT) and Table VI-4-14 (in the case of WITH) by making use of the above results.

From the results shown above, the amounts of reduction in transport/terminal cost are obtained as shown in Table VI-4-15.

4-4-4 Reduction in Time Cost

Since Time Cost is based on CIF and FOB prices and international rental charge of container box, this itself is expressed in terms of the shadow price.

4-5 Shadow Prices of the Cost Items

4-5-1 Construction Cost

The conversion factor for skilled labour is 0.896, exactly the same as the conversion factor for consumption.

While, the following is to be employed for unskilled labour.

o Conversion factor for unskilled labour = 0.412

    [(Conversion factor for consumption)

      x (Ratio of shadow wage rate − short-term employment)] = 0.896 x 0.460

For the conversion factor for fuel, a value of 1.0 is taken, as is discussed before.

The rent for construction machinery consists of rent for various machinerys and crafts such as dredgers, paving machinerys, dump trucks concrete mixing plants, etc., and are governed by various factors, such as types of machines, depreciation method, etc.

Hence, it appears difficult to evaluate the individual shadow price with acceptable accuracy.

Thus, the entire cost is converted as a whole by making use of the conversion factor for machinery already calculated as 0.781.

For the conversion factor for material, a value of 0.896 which is conversion factor for consumption, is employed.

The shadow prices of the construction costs for Karachi Port, Qasim Port, and Inland Terminal are shown in Table VI-4-16.

4-5-2 Cost of Purchasing Cargo Handling Equipments

Cargo handling equipment is based on the CIF price, however, the cost of engineering study for purchasing equipments and transportation cost of container equipments from Karachi to Lahore are to be included in the cost of purchasing cargo handling equipments.

The cost of engineering study consists of labour cost and material cost, and transportation cost consists of labour cost, fuel cost, rent for construction machinerys, and material cost.

Then, conversion factors of above mentioned costs are employed as follows:

o Conversion factor for skilled labour = 0.896
o Conversion factor for unskilled labour = 0.412
o Conversion factor for rent for construction machinery = 0.781
o Conversion factor for material = 0.896
  [Conversion factor for consumption]

The shadow prices of the cost of purchasing cargo handling equipments are shown in Table VI-4-17.

4-5-3 Access Improvement Cost

Since the construction and improvement cost of access roads and railways is calculated by using the convenient calculation method, which is multyplying the area by unit cost per m^2, the composition of the cost is not so definite.

Hence, here, the ratio of shadow price to market price for access road and railway at Karachi Port and Qasim Port is employed as a conversion factor for access improvement cost.

The results are as follows:

o Construction cost of access road and railway

(Unit: '000 US$)

	Karachi	Qasim	Total
Market Price	5,426	1,786	7,212
Shadow Price	5,029	1,663	6,692

o Conversion factor for access improvement cost
  (Ratio of shadow price to market price)
      = 6,692 ÷ 7,212 = 0.927

Using the above result, access improvement cost converted to the shadow price is shown in Table VI-4-18.

4-5-4 Construction Cost of Facilities Necessary for Container Transportation

For the same reason discussed before, the conversion factor for construction cost of facilities is employed the ratio of shadow price to market price for construction cost of container terminal at Qasim Port. The conversion factor for construction cost of facilities necessary for container transportation is calculated as follows:

o Construction cost of container terminal at Qasim Port

Market Price	25,587	('000 US$)
Sahdow Price	23,122	('000 US$)

o Conversion factor for construction cost of facilities
  (Ratio of shadow price to market price)
  $$= 23.122 \div 25,587 = 0.904$$

Using the above result, construction cost of facilities converted to the shadow price is given as 6,870.4 US$.

4-5-5 Operation/Maintenance Cost

For the conversion factor for skilled labour, unskilled labour (long-term employment), fuel/oil, operation/maintenance, a value of 0.896, 0.465, 1.0 and 0.892 will be taken respectively, as are discussed before.

From the results shown above, the operation/maintenance cost converted to the shadow prices are obtained as shown in Table VI-4-19, Table VI-4-20 and Table VI-4-21.

Table VI-4-1 Custom Statistics on Main Consumer Goods

(Unit: Million Rs)

	1974/'75	1975/'76	1976/'77	1977/'78	1978/'79	Average
Import	5,518.2	6,179.6	4,147.0	5,859.8	8,604.5	6,061.8
Duty Revenue	815.7	925.8	1,342.0	1,936.6	2,485.4	1,501.1
Export	4,008.4	4,860.8	5,522.0	5,960.3	8,523.8	5,775.1
Duty Revenue	249.2	193.9	45.7	73.4	63.5	125.1

Source; Central Board of Revenue "Statistical Bulletin"

Table VI-4-2 Custom Statistics on Machinery/Vehicle

(Unit: Million Rs)

	1974/'75	1975/'76	1976/'77	1977/'78	1978/'79	Average
Import	4,484.0	5,338.4	6,630.9	7,375.5	8,423.7	6,450.5
Duty Revenue	1,133.7	1,348.3	1,743.3	2,461.3	2,588.3	1,855.0
Export	61.3	122.0	51.0	209.0	301.7	149.0
Duty Revenue	0	0	0	0	0	0

Source; Central Board of Revenue "Statistical Bulletin"

Table VI-4-3 Custom Statistics

(Unit: Million Rs)

	1974/'75	1975/'76	1976/'77	1977/'78	1978/'79	Average
Import	20,925.0	20,465.3	23,012.2	27,814.7	36,388.1	25,721.1
Duty Revenue	3,836.8	4,498.7	6,004.2	8,251.3	10,065.7	6,545.3
Export	10,286.3	11,252.9	11,293.9	12,980.4	16,925.0	12,547.7
Duty Revenue	1,042.0	791.1	180.4	346.5	279.8	528.0

Source: Central Board of Revenue "Statistical Bulletin"

Table VI-4-4 Working Manday and Wages of Hired Labour

| | Hired Labour | Groupe of Farm | | | Total |
		Low	Medium	High	
Working Manday (Manday/Farm)	Casual Labour	17.00	47.00	274.20	338.20
	Permanent Labour	10.43	78.90	1,248.80	1,338.13
	Total	27.43	126.90	1,523.00	1,676.33
Total Wages (Rs./Farm)	Casual Labour	183.26	484.90	3,089.00	3,757.16
	Permanent Labour	65.14	505.00	9,631.80	10,201.94
	Total	248.40	989.90	12,720.80	13,959.10

Source; Farm Management Research in Pakistan, Farm Management Survey Report on Jhang Project 1977-78

Table VI-4-5 Average Wage of Hired Labour

(Unit; Rs per day per labour)

| Hired Labour | Group of Farm | | | Average |
	Low	Medium	High	
Casual Labour	10.78	10.32	11.27	11.11
Permanent Labour	6.25	6.40	7.71	7.62
Average	9.06	7.86	8.35	8.33

Table VI-4-6 Procurement/Support Prices of Paddy for 1979-80 Crop

| Variety | Price | |
	Rupee per Mound	Rupee per kg
Basmati	60.0	1.61
Sugdasi	33.5	0.90
Irri-6	30.0	0.80
Permal	25.0	0.67
Kangni	21.5	0.58
Begmi	21.5	0.58
Irri-8	20.5	0.55
Red	18.5	0.50

Source; Ministry of Food, Agriculture and Co-operatives "Economic Survey 1979-80"

Table VI-4-7 Estimate of Shadow Wage Rate

(Unit; US$/day)

Method	Estimated Shadow Wage Rate
Minimum Wage of Agricultural Sector	1.01 - 1.21
Wage of Hired Labour	1.21 - 1.32
Estimate from Paddy Production	0.39 - 1.26
Estimate from GDP	1.52

Table VI-4-8 Rate of National Savings/GNP

(Unit: Million Rs)

	1975/'76	1976/'77	1977/'78	1978/'79	1979/'80	Average
National Savings	13,385	17,014	24,017	23,814	29,287	21,503
GNP at Market Price	135,043	154,932	185,195	206,976	246,960	185,821
As Percentage of GNP	9.91	10.98	12,97	11.51	11.86	11.57

Source; Planning Division "Economic Survey, 1979-80"

Table VI-4-9 Shadow Wage Rate and Its Ratio to Market Price

	Shadow Wage Rate (US$/Day)	Ratio to Market Price
Full-Time, Long Term	1,574	0.519
Full-Time, Temporary	1,859	0.460

Table VI-4-10 Cargo Handling Cost (Shadow Price — WITHOUT Case)

(Unit; '000 US$)

Fiscal Year	Labour Cost			Operation/ Maintenance Cost	Total
	Skilled	Unskilled	Sub-Total		
1987/'88	5,783.0	4,387.9	10,170.9	5,502.6	15,673.5
1988/'89	6,825.6	4,968.5	11,794.1	6,318.3	18,112.4
1989/'90	7,750.3	5,799.2	13,549.5	7,110.9	20,660.4
1990/'91	8,137.5	6,088.8	14,226.3	7,462.5	21,688.8

Table VI-4-11 Cargo Handling Cost (Shadow Price – After completion of urgent plan)

(Unit: '000 US$)

Fiscal Year	Labour Cost			Operation/ Maintenance Cost	Total
	Skilled	Unskilled	Sub-Total		
1987/'88	5,572.9	3,992.3	9,565.2	5,630.1	15,195.3
1988/'89	5,675.6	3,932.1	9,607.7	5,960.3	15,568.0
1989/'90	5,882.5	3,865.5	9,748.0	6,465.1	16,213.1
1990/'91	5,999.0	3,803.0	9,802.0	6,855.6	16,657.6

Table VI-4-12 Reduction in Cargo Handling Cost (Shadow Price)

Fiscal Year	Reduction Cost
1987/'88	478.2
1988/'89	2,544.4
1989/'90	4,447.3
1990/'91	5,031.2
1991/'92	5,031.2
1992/'93	5,031.2

Table VI-4-13 Transport/Terminal Cost (Shadow Price – WITHOUT)

(Unit: '000 US$)

Fiscal Year	Modal Sprit (Railway: Road)	
	50 : 50	36.3 : 63.7
1987/'88	21,640.4	22.980.0
1988/'89	25,086.1	26,639.0
1989/'90	29,440.1	31,263.5
1990/'91	33,319.7	35,382.0
1991/'92	33,319.7	35,382.0
1992/'93	33,319.7	35,382.0

Table VI-4-14 Transport/Terminal Cost (Shadow Price — WITH)

(Unit: '000 US$)

Fiscal Year	Terminal Cost			Transport Cost	Total
	Port Terminal	Inland Terminal	Sub-Total		
1987/'88	441.9	436.9	878.8	13,815.4	14,694.2
1988/'89	726.1	559.7	1,285.8	16,015.0	17,300.8
1989/'90	1,098.5	737.7	1,836.2	18,794.8	20,631.0
1990/'91	1,413.5	877.5	2,291.0	21,271.0	23.562.0
1991/'92	1,413.5	877.5	2,291.0	21,270.0	23.562.0
1992/'93	1,413.5	877.5	2,291.0	21,270.0	23.562.0

Table VI-4-15 Reduction in Transport/Terminal Cost (Shadow Price)

(Unit: '000 US$)

Fiscal Year	Modal Sprit (Railway: Road)	
	50 : 50	36.3 : 63.7
1987/'88	7,642.0	9,146.7
1988/'89	8,591.9	10,336.1
1989/'90	9,755.5	11,803.7
1990/'91	10,828.8	13,145.3
1991/'92	10,828.8	13,145.3
1992/'93	10,828.8	13,145.3

Table VI-4-16 Construction Cost (Shadow Price)

(Unit: '000 US$)

Fiscal Year	Construction Cost		
	Karachi Port	Qasim Port	Inland Terminal
1982/'83	1,181	1,059	—
1983/'84	7,802	6,340	694
1984/'85	22,787	17,495	4,127
1985/'86	30,973	26,830	14,570
1986/'87	13,922	12,865	7,227
Total	76,665	64,589	26,618

Table VI-4-17 Cost of Purchasing Cargo Handling Equipment (Shadow Price)

(Unit: '000 US$)

Fiscal Year	Equipment Cost		
	Karachi Port	Qasim Port	Inland Terminal
1986/'87	33,702	33,702	36,871

Table VI-4-18 Access Improvement Cost (Shadow Price)

(Unit: '000 US$)

	Access Improvement Cost		
	Road	Railway	Total
Karachi	279.8	794.5	1,074.3
Qasim	186.9	0	186.9

Table VI-4-19 Operation/Maintenance Cost (Shadow Price)
— Karachi Port —

(Unit: '000 US$)

Fiscal Year	CNTR Terminal	Dredging	Access/Access Improved Road	Total
1987/'88	1,089.9	182.1	8.3	1,280.3
1988/'89	1,849.8	302.8	8.3	2,160.9
1989/'90	2,966.3	444.8	8.3	3,419.4
1990/'91	3,856.9	557.0	8.3	4,422.2
1991/'92	3,856.9	557.0	8.3	4,422.2
1992/'93	3,856.9	557.0	8.3	4,422.2

Table VI-4-20 Operation/Maintenance Cost (Shadow Price)
— Qasim Port —

(Unit: '000 US$)

Fiscal Year	CNTR Terminal	Dredging	Access/Access Improved Road	Commutor Traffic	Total
1987/'88	1,089.9	692.2	7.3	2,162.2	3,951.6
1988/'89	1,849.8	1,039.7	7.3	2,489.4	5,386.2
1989/'90	2,966.3	1,415.1	7.3	2,940.2	7,328.9
1990/'91	3,856.9	1,715.3	7.3	3,326.7	8,906.2
1991/'92	3,856.9	1,715.3	7.3	3,326.7	8,906.2
1992/'93	3,856.9	1,715.3	7.3	3,326.7	8,906.2

Table VI-4-21 Operation/Maintenance Cost (Shadow Price)
— Inland Terminal —

(Unit: '000 US$)

Fiscal Year	CNTR Terminal		Access Road	Total
	Port	Inland		
1987/'88	441.9	436.9	28.4	907.2
1988/'89	726.1	559.7	28.4	1,314.2
1989/'90	1,098.5	737.7	28.4	1,864.6
1990/'91	1,413.5	877.5	28.4	2,319.4
1991/'92	1,413.5	877.5	28.4	2,319.4
1991/'93	1,413.5	877.5	28.4	2,319.4

CHAPTER 5. ECONOMIC RETURNS

5-1 Internal Rate of Return

As mentioned in Chapter 1, the economic returns are evaluated in terms of the internal rate of return (IRR).

The internal rate of return IRR is obtained by the following equation:

$$\sum_{i=0}^{n-1} \frac{Bi - Ci}{(1 + IRR)^i} = 0$$

where,   n : Period of calculating IRR

Bi : Total amount of benefits at i-th year, and

Ci : Total amount of costs at i-th year

In the case of this project (Urgent plan), the service lifes of facilities and equipments are different individually as shown in Table A-VI-22 to Table A-VI-26. Further, the average service lifes weighted by individual costs are also different individually by development site proposed, provided that the costs used for calculation include engineering study fee and physical contingency, but price contingency, custom duty and sales tax are excluded.

The calculations are worked out for the periods of average service lifes added to construction periods for each development site proposed.

The above results are compiled and indicated as follows:·

Development Site Proposed	Average Service Life	Period of IRR Calculation
Karachi Port	22.7	29 years 1982/'83–2010/'11
Qasim Port	22.1	28 years 1982/'83–2009/'10
Inland CNTR Terminal	21.7	27 years 1983/'84–2009/'10
Karachi Port + Inland CNTR Terminal	22.3	28 years 1982/'83–2009/'10
Qasim Port + Inland CNTR Terminal	22.0	28 years 1982/'83–2009/'10

All the benefits and costs for each development site proposed are listed in Table VI-5-1 to Table VI-5-10. Table VI-5-1 to Table VI-5-5 show those in shadow prices, while Table VI-5-6 to Table VI-5-10 show the market prices. From these figures, IRRs having a feedback ratio of 30% and a modal split of 50% by railway, are calculated and the results are as follows.

Further, figures in parentheses show IRRs that are calculated respectively where the costs related to railway facilities are subtracted from the construction costs of the port terminal, and then, where the same costs are added to the construction costs of the Inland Terminal.

Table V-5-11 shows the economic costs that are assumed to belong to the Inland Terminal. Costs/Benefits and IRR in the above cases are shown in Table A-VI-37 ~ Table A-VI-40.

Development Site Proposed	Shadow Pricing	Market Pricing
Karachi Port	14.3% (16.2%)	14.8% (16.8%)
Qasim Port	12.2% (13.9%)	12.7% (14.4%)
Inland CNTR Terminal	14.0% (*1 10.5%) (*2 11.0%)	15.2% (*1 11.5%) (*2 12.0%)
Karachi Port + Inland CNTR Terminal	14.1%	14.9%
Qasim Port + Inland CNTR Terminal	12.8%	13.5%

*1 assuming construction of a Port Terminal in Karachi Port
*2 assuming construction of a Port Terminal in Qasim Port

In addition to the above evaluation, excluding rice (basmati) and cotton for export, IRRs are also calculated with the following results:

IRR

Development Site Proposed	Shadow Pricing	Market Pricing
Inland CNTR Terminal	4.0%	4.5%
Karachi Port + Inland CNTR Terminal	11.5%	12.0%
Qasim Port + Inland CNTR Terminal	9.8%	10.3%

Costs and Benefits are assumed to be as follows, where rice and cotton for export are excluded from the forecasting container volume:

(1) It is not necessary to reduce the scale of the plan for the Inland Container Terminal. Capital and operating expenditures will be the same as for the Urgent Plan discussed before.

(2) In proportion to the decreasing volume of rice and cotton for export, there will be an equivalent increase in the number of empty containers. Therefore, in the case of WITH, the economic cost is the same as in the Urgent Plan discussed before.

(3) In the case of WITHOUT, the economic cost is evaluated based on the container volume, excluding rice and cotton, which is shown in Table VI-5-12.

5-2 Feasibility of Urgent Plan

In port or inland transport investment projects, IRRs usually range from 10% to 20%. It is generally considered that a project with an IRR of more thn around 10% is economically feasible. Thus, it can be concluded that the present plan has sufficient economic feasibility. How-

ever, the difference in IRR between Karachi Port and Qasim Port, though not especially large, is a well established figure.

Therefore, from the point of view of the national economy, Karachi Port is more feasible and advantageous for port development than Qasim Port.

Excluding figures for rice/cotton, the IRR shows extremely low feasibility which can be explained by the fact that the benefits will decrease in proportion to container volumes (excluding rice and cotton), thus increased empty containers will entail wasteful transport costs. Empty containers will come to comprise approximately 50% of export containers.

Containerization will achieve its full benefits only when Port and Inland Terminals are operated in a integrated system. Accordingly, to assure viable full-fledged inland container transport, it will be necessary to convert the conventional cotton and rice transport/storage system to a system compatible with container transportation.

5-3 Risk Analysis

First, the pessimistic or optimistic possibilities to be included in the cost estimation, benefit estimation and estimation of calculation period are assumed as follows:

		Probability
(1) Cost estimation	as estimated	0.8
	10% higher	0.2
(2) Benefit estimation	as estimated	0.7
	10% higher	0.1
	10% lower	0.2
(3) Estimation of calculation period	as estimated	0.7
	5 years shorter	0.3

Next, 12 combinations are obtained by joining together the above possibilities respectively. Each IRRs and probabilities of these combinations are shown in Table VI-5-11 for Karachi Port, Table VI-5-13 for Qasim Port and Table VI-5-15 for Inland Terminal. And Table VI-5-12, Table VI-5-14 and Table VI-5-16 show the probability distribution and cumulative probability distribution for Karachi Port, Qasim Port and Inland Terminal respectively.

IRR calculated on a shadow price base is about 14% for Karachi Port, but weighted IRR is obtained at about 13% a little less than the above figure. Weighted IRR, as shown in the rightmost colum of Table VI-5-11, shows the expected value of this Urgent Plan.

Further, it comes out that the probability for 14% of IRR is 0.56, which is highest of all, and that the probability for IRR less than 10% is nothing from the probability distribution and cumulative probability distribution, as shown in Table VI-5-12.

While, in the case of Qasim Port, the probability for 12% of IRR is the highest (0.406) and the probability for IRR less than 10% is 0.13.

From the above results, it can be concluded that Karachi Port is more advantageous than Qasim Port, as well.

Table VI-5-1 Costs/Benefits and IRR – Shadow Price (Karachi Port – Feedback Ratio 30%)

IRR = 14.3%

(Unit: '000 US$)

No.	Fiscal Year	Costs				Total	Benefits			Present Value (Discount Rate=14.3%)
		Total	Construction	Equipment	Operation/ Maintenance		Reduction in Ships' Staying Cost	Reduction in Cargo Handling Cost	Reduction in Time Cost	
1	1982/'83	1,181	1,181							-1181.
2	'83/'84	7,802	7,802							-6825.9
3	'84/'85	22,787	22,787							-17441.94
4	'85/'86	30,973	30,973							-20741.71
5	'86/'87	48,698	14,996	33,702						-28531.61
6	'87/'88	1,280			1,280	7,219	5,444	478	1,297	3044.26
7	'88/'89	2,161			2,161	11,856	7,078	2,544	2,234	4347.81
8	'89/'90	3,419			3,419	24,080	16,243	4,447	3,390	8106.39
9	'90/'91	4,422			4,422	27,364	17,897	5,031	4,436	7875.2
10	'91/'92	4,422			4,422	27,364	17,897	5,031	4,436	6889.94
11	'92/'93	4,422			4,422	27,364	17,897	5,031	4,436	6027.94
12	'93/'94	4,422			4,422	27,364	17,897	5,031	4,436	5273.79
13	'94/'95	4,422			4,422	27,364	17,897	5,031	4,436	4613.99
14	'95/'96	4,422			4,422	27,364	17,897	5,031	4,436	4036.74
15	'96/'97	4,422			4,422	27,364	17,897	5,031	4,436	3531.7
16	'97/'98	4,422			4,422	27,364	17,897	5,031	4,436	3089.85
17	'98/'99	4,422			4,422	27,364	17,897	5,031	4,436	2703.28
18	'99/2000	4,422			4,422	27,364	17,897	5,031	4,436	2365.08
19	2000/'1	4,422			4,422	27,364	17,897	5,031	4,436	2069.18
20	'1/'2	4,422			4,422	27,364	17,897	5,031	4,436	1810.31
21	'2/'3	4,422			4,422	27,364	17,897	5,031	4,436	1583.82
22	'3/'4	4,422			4,422	27,364	17,897	5,031	4,436	1385.67
23	'4/'5	4,422			4,422	27,364	17,897	5,031	4,436	1212.31
24	'5/'6	4,422			4,422	27,364	17,897	5,031	4,436	1060.64
25	'6/'7	4,422			4,422	27,364	17,897	5,031	4,436	927.94
26	'7/'8	4,422			4,422	27,364	17,897	5,031	4,436	811.85
27	'8/'9	4,422			4,422	27,364	17,897	5,031	4,436	710.28
28	'9/'10	4,422			4,422	27,364	17,897	5,031	4,436	621.42
29	'10/'11	4,422			4,422	27,364	17,897	5,031	4,436	543.67
	Total	211,163	77,739	33,702	99,722	617,799	404,602	113,120	100,077	-79.1

Table VI-5-2 Costs/Benefits and IRR – Shadow Price (Qasim Port – Feedback Ratio 30%)

IRR = 12.2%

(Unit; '000 US$)

No.	Fiscal Year	Costs Total	Construction	Equipment	Operation/ Maintenance	Benefits Total	Reduction in Ships' Staying Cost	Reduction in Cargo Handling Cost	Reduction in Time Cost	Present Value (Discount Rate=12.2%)
1	1982/'83	1,059	1,059							-1059.
2	'83/'84	6,340	6,340							-5650.62
3	'84/'85	17,495	17,495							-13897.23
4	'85/'86	26,830	26,830							-18995.12
5	'86/'87	53,799	20,097	33,702						-33836.68
6	'87/'88	3,952			3,952	7,219	5,444	478	1,297	1837.32
7	'88/'89	5,386			5,386	11,856	7,078	2,544	2,234	3243.
8	'89/'90	7,329			7,329	24,080	16,243	4,447	3,390	7483.26
9	'90/'91	8,906			8,906	27,364	17,897	5,031	4,436	7349.23
10	'91/'92	8,906			8,906	27,364	17,897	5,031	4,436	6550.12
11	'92/'93	8,906			8,906	27,364	17,897	5,031	4,436	5837.89
12	'93/'94	8,906			8,906	27,364	17,897	5,031	4,436	5203.11
13	'94/'95	8,906			8,906	27,364	17,897	5,031	4,436	4637.36
14	'95/'96	8,906			8,906	27,364	17,897	5,031	4,436	4133.12
15	'96/'97	8,906			8,906	27,364	17,897	5,031	4,436	3683.7
16	'97/'98	8,906			8,906	27,364	17,897	5,031	4,436	3283.16
17	'98/'99	8,906			8,906	27,364	17,897	5,031	4,436	2926.17
18	'99/2000	8,906			8,906	27,364	17,897	5,031	4,436	2607.99
19	2000/'1	8,906			8,906	27,364	17,897	5,031	4,436	2324.41
20	'1 /'2	8,906			8,906	27,364	17,897	5,031	4,436	2071.67
21	'2 /'3	8,906			8,906	27,364	17,897	5,031	4,436	1846.41
22	'3 /'4	8,906			8,906	27,364	17,897	5,031	4,436	1645.64
23	'4 /'5	8,906			8,906	27,364	17,897	5,031	4,436	1466.7
24	'5 /'6	8,906			8,906	27,364	17,897	5,031	4,436	1307.22
25	'6 /'7	8,906			8,906	27,364	17,897	5,031	4,436	1165.08
26	'7 /'8	8,906			8,906	27,364	17,897	5,031	4,436	1038.4
27	'8 /'9	8,906			8,906	27,364	17,897	5,031	4,436	925.49
28	'9 /'10	8,906			8,906	27,364	17,897	5,031	4,436	824.85
	Total	300,135	71,646	33,702	194,787	590,435	386,705	108,089	95,641	-47.35

Table VI-5-3　Costs/Benefits and IRR – Shadow Price (Inland Terminal – Railway 50%, Road 50%)

IRR = 14.0%

(Unit: '000 US$)

No.	Fiscal year	Costs				Benefits			Present Value (Discount Rate=14.0%)
		Total	Construction	Equipment	Operation/ Maintenance	Total	Reduction in Transport Cost	Reduction in Time Cost	
1	1983/'84	694	694						-694.
2	'84/'85	4,127	4,127						-3620.18
3	'85/'86	14,570	14,570						-11211.14
4	'86/'87	44,078	7,227	36,871					-29764.89
5	'87/'88	907			907	8,914	6,946	1,968	4740.79
6	'88/'89	1,313			1,314	10,066	7,785	2,281	4545.51
7	'89/'90	1,865			1,865	11,486	8,809	2,677	4383.4
8	'90/'91	2,319			2,319	12,787	9,758	3,029	4183.4
9	'91/'92	2,319			2,319	12,787	9,758	3,029	3669.65
10	'92/'93	2,319			2,319	12,787	9,758	3,029	3218.99
11	'93/'94	2,319			2,319	12,787	9,758	3,029	2823.68
12	'94/'95	2,319			2,319	12,787	9,758	3,029	2476.91
13	'95/'96	2,319			2,319	12,787	9,758	3,029	2172.73
14	'96/'97	2,319			2,319	12,787	9,758	3,029	1905.9
15	'97/'98	2,319			2,319	12,787	9,758	3,029	1671.84
16	'98/'99	2,319			2,319	12,787	9,758	3,029	1466.53
17	'99/'2000	2,319			2,319	12,787	9,758	3,029	1286.43
18	2000/'1	2,319			2,319	12,787	9,758	3,029	1128.45
19	'1/'2	2,319			2,319	12,787	9,758	3,029	989.87
20	'2/'3	2,319			2,319	12,787	9,758	3,029	868.3
21	'3/'4	2,319			2,319	12,787	9,758	3,029	761.67
22	'4/'5	2,319			2,319	12,787	9,758	3,029	668.13
23	'5/'6	2,319			2,319	12,787	9,758	3,029	586.08
24	'6/'7	2,319			2,319	12,787	9,758	3,029	514.11
25	'7/'8	2,319			2,319	12,787	9,758	3,029	450.97
26	'8/'9	2,319			2,319	12,787	9,758	3,029	395.99
27	'9/'10	2,319			2,319	12,787	9,758	3,029	347.01
	Total	113,955	26,618	36,871	50,466	286,206	218,700	67,506	-34.47

Table VI-5-4 Costs/Benefits and IRR — Shadow Price
(Karachi Port + Inland Terminal — Feedback Ratio 30%, Railway 50%, Road 50%)
IRR = 14.1%

(Unit; '000 US$)

No.	Fiscal Year	Costs				Benefits					Present Value (Discount Rate=4.1%)
		Total	Construction	Equipment	Operation/ Maintenance	Total	Reduction in Ships' Staying Cost	Reduction in Cargo Handling Cost	Reduction in Time Cost	Reduction in Transport Cost	
1	1982/'83	1,181	1,181								-1181.
2	'83/'84	8,496	8,496								-7446.1
3	'84/'85	26,914	26,914								-20673.16
4	'85/'86	45,543	45,543								-30659.47
5	'86/'87	92,796	22,223	70,573							-54750.32
6	'87/'88	2,187			2,187	16,133	5,444	478	3,265	6,946	7211.43
7	'88/'89	3,475			3,475	21,922	7,078	2,544	4,515	7,785	8360.11
8	'89/'90	5,284			5,284	35,566	16,243	4,447	6,067	8,809	12027.77
9	'90/'91	6,741			6,741	40,151	17,897	5,031	7,465	9,758	11630.31
10	'91/'92	6,741			6,741	40,151	17,897	5,031	7,465	9,758	10193.09
11	'92/'93	6,741			6,741	40,151	17,897	5,031	7,465	9,758	8933.47
12	'93/'94	6,741			6,741	40,151	17,897	5,031	7,465	9,758	7829.51
13	'94/'95	6,741			6,741	40,151	17,897	5,031	7,465	9,758	6861.97
14	'95/'96	6,741			6,741	40,151	17,897	5,031	7,465	9,758	6014.
15	'96/'97	6,741			6,741	40,151	17,897	5,031	7,465	9,758	5270.81
16	'97/'98	6,741			6,741	40,151	17,897	5,031	7,465	9,758	4619.47
17	'98/'99	6,741			6,741	40,151	17,897	5,031	7,465	9,758	4048.61
18	'99/2000	6,741			6,741	40,151	17,897	5,031	7,465	9,758	3548.3
19	2000/'1	6,741			6,741	40,151	17,897	5,031	7,465	9,758	3109.82
20	'1 /'2	6,741			6,741	40,151	17,897	5,031	7,465	9,758	2725.52
21	'2 /'3	6,741			6,741	40,151	17,897	5,031	7,465	9,758	2388.71
22	'3 /'4	6,741			6,741	40,151	17,897	5,031	7,465	9,758	2093.52
23	'4 /'5	6,741			6,741	40,151	17,897	5,031	7,465	9,758	1834.82
24	'5 /'6	6,741			6,741	40,151	17,897	5,031	7,465	9,758	1608.08
25	'6 /'7	6,741			6,741	40,151	17,897	5,031	7,465	9,758	1409.36
26	'7 /'8	6,741			6,741	40,151	17,897	5,031	7,465	9,758	1235.19
27	'8 /'9	6,741			6,741	40,151	17,897	5,031	7,465	9,758	1082.55
28	'9 /'10	6,741			6,741	40,151	17,897	5,031	7,465	9,758	948.78
	Total	320,696	104,357	70,573	145,766	876,641	386,705	108,089	163,147	218,700	275.15

Table VI-5-5 Costs/Benefits and IRR – Shadow Price
(Qasim Port + Inland Terminal – Feedback Ratio 30%, Railway 50%, Road 50%)

IRR = 12.8%

(Unit; '000 US$)

No.	Fiscal Year	Costs Total	Construction	Equipment	Operation/ Maintenance	Benefits Total	Reduction in Ships' Staying Cost	Reduction in Cargo Handling Cost	Reduction in Time Cost	Reduction in Transport Cost	Present Value (Discount Rate=12.8%)
1	1982/'83	1,059	1,059								-1059.
2	'83/'84	7,034	7,034								-6235.82
3	'84/'85	21,622	21,622								-16993.3
4	'85/'86	41,400	41,400								-28845.17
5	'86/'87	97,897	27,324	70,573							-60360.93
6	'87/'88	4,859			4,859	16,133	5,444	478	3,265	6,946	6173.52
7	'88/'89	6,700			6,700	21,922	7,078	2,544	4,515	7,785	7389.54
8	'89/'90	9,194			9,194	35,566	16,243	4,447	6,067	8,809	11349.57
9	'90/'91	11,225			11,225	40,151	17,897	5,031	7,465	9,758	11036.1
10	'91/'92	11,225			11,225	40,151	17,897	5,031	7,465	9,758	9783.78
11	'92/'93	11,225			11,225	40,151	17,897	5,031	7,465	9,758	8673.56
12	'93/'94	11,225			11,225	40,151	17,897	5,031	7,465	9,758	7689.33
13	'94/'95	11,225			11,225	40,151	17,897	5,031	7,465	9,758	6816.78
14	'95/'96	11,225			11,225	40,151	17,897	5,031	7,465	9,758	6043.24
15	'96/'97	11,225			11,225	40,151	17,897	5,031	7,465	9,758	5357.49
16	'97/'98	11,225			11,225	40,151	17,897	5,031	7,465	9,758	4749.54
17	'98/'99	11,225			11,225	40,151	17,897	5,031	7,465	9,758	4210.59
18	'99/2000	11,225			11,225	40,151	17,897	5,031	7,465	9,758	3732.79
19	2000/'1	11,225			11,225	40,151	17,897	5,031	7,465	9,758	3309.21
20	'1/'2	11,225			11,225	40,151	17,897	5,031	7,465	9,758	2933.7
21	'2/'3	11,225			11,225	40,151	17,897	5,031	7,465	9,758	2600.8
22	'3/'4	11,225			11,225	40,151	17,897	5,031	7,465	9,758	2305.67
23	'4/'5	11,225			11,225	40,151	17,897	5,031	7,465	9,758	2044.03
24	'5/'6	11,225			11,225	40,151	17,897	5,031	7,465	9,758	1812.09
25	'6/'7	11,225			11,225	40,151	17,897	5,031	7,465	9,758	1606.46
26	'7/'8	11,225			11,225	40,151	17,897	5,031	7,465	9,758	1424.17
27	'8/'9	11,225			11,225	40,151	17,897	5,031	7,465	9,758	1262.56
28	'9/'10	11,225			11,225	40,151	17,897	5,031	7,465	9,758	1119.29
	Total	414,090	98,264	70,573	245,253	876,641	386,705	108,089	163,147	218,700	-70.41

Table VI-5-6 Costs/Benefits and IRR — Market Price (Karachi Port — Feedback Ratio 30%)

IRR = 14.8%

(Unit: '000 US$)

No.	Fiscal Year	Cost				Benefits				Present Value (Discount Rate=14.8%)
		Total	Construction	Equipment	Operation/ Maintenance	Total	Reduction in Ships' Staying Cost	Reduction in Cargo Handling Cost	Reduction in Time Cost	
1	1982/'83	1,227	1,227							-1227.
2	'83/'84	8,121	8,121							-7074.04
3	'84/'85	23,768	23,768							-18034.7
4	'85/'86	33,439	33,439							-22101.8
5	'86/'87	50,076	16,287	33,789						-28831.16
6	'87/'88	1,505			1,505	7,683	5,444	942	1,197	3098.41
7	'88/'89	2,543			2,543	13,526	7,073	4,214	2,234	4798.1
8	'89/'90	4,030			4,030	26,627	6,243	6,994	3,390	8599.19
9	'90/'91	5,212			5,212	30,316	17,897	7,983	4,436	8321.62
10	'91/'92	5,212			5,212	30,316	17,897	7,983	4,436	7248.8
11	'92/'93	5,212			5,212	30,316	17,897	7,983	4,436	6314.28
12	'93/'94	5,212			5,212	30,316	17,897	7,983	4,436	5500.25
13	'94/'95	5,212			5,212	30,316	17,897	7,983	4,436	4791.16
14	'95/'96	5,212			5,212	30,316	17,897	7,983	4,436	4173.48
15	'96/'97	5,212			5,212	30,316	17,897	7,983	4,436	3635.44
16	'97/'98	5,212			5,212	30,316	17,897	7,983	4,436	3166.76
17	'98/'99	5,212			5,212	30,316	17,897	7,983	4,436	2758.5
18	'99/2000	5,212			5,212	30,316	17,897	7,983	4,435	2402.87
19	2000/'1	5,212			5,212	30,316	17,897	7,983	4,436	2093.1
20	'1/'2	5,212			5,212	30,316	17,897	7,983	4,436	1823.25
21	'2/'3	5,212			5,212	30,316	17,897	7,983	4,436	1588.2
22	'3/'4	5,212			5,212	30,316	17,897	7,983	4,436	1383.45
23	'4/'5	5,212			5,212	30,316	17,897	7,983	4,436	1205.1
24	'5/'6	5,212			5,212	30,316	17,897	7,983	4,436	1049.73
25	'6/'7	5,212			5,212	30,316	17,897	7,983	4,436	914.4
26	'7/'8	5,212			5,212	30,316	17,897	7,983	4,436	796.52
27	'8/'9	5,212			5,212	30,316	17,897	7,983	4,436	693.83
28	'9/'10	5,212			5,212	30,316	17,897	7,983	4,436	604.38
29	'10/'11	5,212			5,212	30,316	17,897	7,983	4,436	526.47
	Total	234,161	82,842	33,789	117,530	684,472	404,602	179,793	100,077	218.59

Table VI-5-7 Costs/Benefits and IRR – Market Price (Qasim Port – Feedback Ratio 30%)

IRR = 12.7%

(Unit: '000 US$)

No.	Fiscal Year	Cost Total	Cost Construction	Cost Equipment	Cost Operation/ Maintenance	Benefits Total	Benefits Reduction in Ships' Staying Cost	Benefits Reduction in Cargo Handling Cost	Benefits Reduction in Time Cost	Present Value (Discount Rate=12.7%)
1	1982/'83	1,099	1,099							-1099.
2	'83/'84	6,659	6,659							-5908.61
3	'84/'85	18,382	18,382							-14472.55
4	'85/'86	29,087	29,087							-20320.16
5	'86/'87	55,593	21,804	33,789						-34460.73
6	'87/'88	4,385			4,385	7,683	5,444	942	1,297	1813.97
7	'88/'89	6,091			6,091	13,526	7,078	4,214	2,234	3663.73
8	'89/'90	8,236			8,236	26,627	16,243	6,994	3,390	7964.12
9	'90/'91	10,031			10,031	30,316	17,897	7,983	4,436	7794.42
10	'91/'92	10,031			10,031	30,316	17,897	7,983	4,436	6916.08
11	'92/'93	10,031			10,031	30,316	17,897	7,983	4,436	6136.71
12	'93/'94	10,031			10,031	30,316	17,897	7,983	4,436	5445.18
13	'94/'95	10,031			10,031	30,316	17,897	7,983	4,436	4831.57
14	'95/'96	10,031			10,031	30,316	17,897	7,983	4,436	4287.1
15	'96/'97	10,031			10,031	30,316	17,897	7,983	4,436	3804.
16	'97/'98	10,031			10,031	30,316	17,897	7,983	4,436	3375.33
17	'98/'99	10,031			10,031	30,316	17,897	7,983	4,436	2994.97
18	'99/2000	10,031			10,031	30,316	17,897	7,983	4,436	2657.47
19	2000/'1	10,031			10,031	30,316	17,897	7,983	4,436	2358.
20	'1/'2	10,031			10,031	30,316	17,897	7,983	4,436	2092.28
21	'2/'3	10,031			10,031	30,316	17,897	7,983	4,436	1856.51
22	'3/'4	10,031			10,031	30,316	17,897	7,983	4,436	1647.3
23	'4/'5	10,031			10,031	30,316	17,897	7,983	4,436	1461.67
24	'5/'6	10,031			10,031	30,316	17,897	7,983	4,436	1296.96
25	'6/'7	10,031			10,031	30,316	17,897	7,983	4,436	1150.8
26	'7/'8	10,031			10,031	30,316	17,897	7,983	4,436	1021.12
27	'8/'9	10,031			10,031	30,316	17,897	7,983	4,436	906.05
28	'9/'10	10,031			10,031	30,316	17,897	7,983	4,436	803.95
	Total	330,080	77,031	33,789	219,260	654,156	386,705	171,810	95,641	18.24

Table VI-5-8 Costs/Benefits and IRR – Market Price (Inland Terminal – Railway 50%, Road 50%)

IRR = 15.2%

(Unit; '000 US$)

No.	Fiscal Year	Cost				Benefits			Present Value (Discount Rate=15.2%)
		Total	Construction	Equipment	Operation/ Maintenance	Total	Reduction in Transport Cost	Reduction in Time Cost	
1	1983/'84	719	719						-719.
2	'84/'85	4,330	4,330						-3758.68
3	'85/'86	15,967	15,967						-12031.46
4	'86/'87	44,888	7,927	36,961					-29361.13
5	'87/'88	1,017			1,017	10,009	8,041	1,968	5105.6
6	'88/'89	1,473			1,473	11,303	9,022	2,281	4844.97
7	'89/'90	2,090			2,090	12,898	10,221	2,677	4624.13
8	'90/'91	2,600			2,600	14,360	11,331	3,029	4367.57
9	'91/'92	2,600			2,600	14,360	11,331	3,029	3791.19
10	'92/'93	2,600			2,600	14,360	11,331	3,029	3291.05
11	'93/'94	2,600			2,600	14,360	11,331	3,029	2856.82
12	'94/'95	2,600			2,600	14,360	11,331	3,029	2479.38
13	'95/'96	2,600			2,600	14,360	11,331	3,029	2152.67
14	'96/'97	2,600			2,600	14,360	11,331	3,029	1868.64
15	'97/'98	2,600			2,600	14,360	11,331	3,029	1622.08
16	'98/'99	2,600			2,600	14,360	11,331	3,029	1408.06
17	'99/2000	2,600			2,600	14,360	11,331	3,029	1222.27
18	2000/'1	2,600			2,600	14,360	11,331	3,029	1061.
19	'1/'2	2,600			2,600	14,360	11,331	3,029	921.01
20	'2/'3	2,600			2,600	14,360	11,331	3,029	799.48
21	'3/'4	2,600			2,600	14,360	11,331	3,029	694.
22	'4/'5	2,600			2,600	14,360	11,331	3,029	602.43
23	'5/'6	2,600			2,600	14,360	11,331	3,029	522.94
24	'6/'7	2,600			2,600	14,360	11,331	3,029	453.94
25	'7/'8	2,600			2,600	14,360	11,331	3,029	394.05
26	'8/'9	2,600			2,600	14,360	11,331	3,029	342.05
27	'9/'10	2,600			2,600	14,360	11,331	3,029	296.92
	Total	122,484	28,943	36,961	56,580	321,410	253,904	67,506	-147.42

Table VI-5-9 Costs/Benefits and IRR — Market Price
(Karachi Port + Inland Terminal — Feedback Ratio 30%, Railway 50%, Road 50%)
IRR = 14.9%

(Unit: '000 US$)

No.	Fiscal Year	Cost Total	Cost Construction	Cost Equipment	Cost Operation/ Maintenance	Benefits Total	Benefits Reduction in Ships' Staying Cost	Benefits Reduction in Cargo Handling Cost	Benefits Reduction in Time Cost	Benefits Reduction in Transport Cost	Present Value (Discount Rate=14.9%)
1	1982/'83	1,227	1,227								-1227.
2	'83/'84	8,830	8,840								-7693.65
3	'84/'85	28,098	28,098								-21983.12
4	'85/'86	94,406	49,406	70,750							-32570.14
5	'86/'87	94,964	24,214								-54485.24
6	'87/'88	2,522			2,522	17,692	5,444	942	3,265	8,041	7575.05
7	'88/'89	4,016			4,026	24,829	7,078	4,214	4,515	9,022	9045.12
8	'89/'90	6,120			6,120	39,525	16,243	6,994	6,067	10,221	12634.88
9	'90/'91	7,812			7,812	44,676	17,897	7,983	7,465	11,331	12135.07
10	'91/'92	7,812			7,812	44,676	17,897	7,983	7,465	11,331	10561.42
11	'92/'93	7,812			7,812	44,676	17,897	7,983	7,465	11,331	9191.86
12	'93/'94	7,812			7,812	44,676	17,897	7,983	7,465	11,331	7999.86
13	'94/'95	7,812			7,812	44,676	17,897	7,983	7,465	11,331	6962.45
14	'95/'96	7,812			7,812	44,676	17,897	7,983	7,465	11,331	6059.57
15	'96/'97	7,812			7,812	44,676	17,897	7,983	7,465	11,331	5273.78
16	'97/'98	7,812			7,812	44,676	17,897	7,983	7,465	11,331	4589.89
17	'98/'99	7,812			7,812	44,676	17,897	7,983	7,465	11,331	3994.68
18	'99/2000	7,812			7,812	44,676	17,897	7,983	7,465	11,331	3476.66
19	2000/'1	7,812			7,812	44,676	17,897	7,983	7,465	11,331	3025.81
20	'1 /'2	7,812			7,812	44,676	17,897	7,983	7,465	11,331	2633.43
21	'2 /'3	7,812			7,812	44,676	17,897	7,983	7,465	11,331	2291.93
22	'3 /'4	7,812			7,812	44,676	17,897	7,983	7,465	11,331	1994.72
23	'4 /'5	7,812			7,812	44,676	17,897	7,983	7,465	11,331	1736.05
24	'5 /'6	7,812			7,812	44,676	17,897	7,983	7,465	11,331	1510.92
25	'6 /'7	7,812			7,812	44,676	17,897	7,983	7,465	11,331	1314.99
26	'7 /'8	7,812			7,812	44,676	17,897	7,983	7,465	11,331	1144.46
27	'8 /'9	7,812			7,812	44,676	17,897	7,983	7,465	11,331	996.05
28	'9 /'10	7,812			7,812	44,676	17,897	7,983	7,465	11,331	866.89
	Total	351,433	111,785	70,750	168,898	975,566	386,705	171,810	163,147	253,904	-243.64

Table VI-5-10 Costs/Benefits and IRR — Market Price
(Qasim Port + Inland Terminal — Feedback Ratio 30%, Railway 50%, Road 50%)
IRR = 13.5%

(Unit: '000 US$)

No.	Fiscal Year	Costs Total	Construction	Equipment	Operation/ Maintenance	Benefits Total	Reduction in Ships' Staying Cost	Reduction in Cargo Handling Cost	Reduction in Time Cost	Reduction in Transport Cost	Present Value (Discount Rate= 13.5%)
1	1982/'83	1,099	1,099								-1099.
2	'83/'84	7,378	7,378								-6500.44
3	'84/'85	22,712	22,712								-17530.46
4	'85/'86	45,054	45,054								-30813.84
5	'86/'87	100,481	29,731	70,750							-60548.1
6	'87/'88	5,402			5,402	17,692	5,444	942	3,265	8,041	6524.88
7	'88/'89	7,492			7,492	24,829	7,078	4,214	4,515	9,022	8109.59
8	'89/'90	10,326			10,326	39,525	16,243	6,994	6,067	10,221	12033.64
9	'90/'91	12,631			12,631	44,676	17,897	7,983	7,465	11,331	11635.72
10	'91/'92	12,631			12,631	44,676	17,897	7,983	7,465	11,331	10251.74
11	'92/'93	12,631			12,631	44,676	17,897	7,983	7,465	11,331	9032.37
12	'93/'94	12,631			12,631	44,676	17,897	7,983	7,465	11,331	7958.03
13	'94/'95	12,631			12,631	44,676	17,897	7,983	7,465	11,331	7011.48
14	'95/'96	12,631			12,631	44,676	17,897	7,983	7,465	11,331	6177.52
15	'96/'97	12,631			12,631	44,676	17,897	7,983	7,465	11,331	5442.75
16	'97/'98	12,631			12,631	44,676	17,897	7,983	7,465	11,331	4795.37
17	'98/'99	12,631			12,631	44,676	17,897	7,983	7,465	11,331	4225
18	'99/2000	12,631			12,631	44,676	17,897	7,983	7,465	11,331	3722.47
19	2000/'1	12,631			12,631	44,676	17,897	7,983	7,465	11,331	3279.7
20	'1 /'2	12,631			12,631	44,676	17,897	7,983	7,465	11,331	2889.61
21	'2 /'3	12,631			12,631	44,676	17,897	7,983	7,465	11,331	2545.91
22	'3 /'4	12,631			12,631	44,676	17,879	7,983	7,465	11,331	2243.09
23	'4 /'5	12,631			12,631	44,676	17,897	7,983	7,465	11,331	1976.29
24	'5 /'6	12,631			12,631	44,676	17,897	7,983	7,465	11,331	1741.23
25	'6 /'7	12,631			12,631	44,676	17,897	7,983	7,465	11,331	1534.12
26	'7 /'8	12,631			12,631	44,676	17,897	7,983	7,465	11,331	1351.65
27	'8 /'9	12,631			12,631	44,676	17,897	7,983	7,465	11,331	1190.88
28	'9 /'10	12,631			12,631	44,676	17,897	7,983	7,465	11,331	1049.23
	Total	452,564	105,974	70,750	275,840	975,566	386,705	171,810	163,147	253,904	130.43

Table VI-5-11 Economic Costs Assumed to Belong to Inland CNTR Terminal

(Unit: '000US$)

Item	Karachi Port	Qasim Port
A Construction Cost		
(1) Pavement in CNTR terminal	1,003	1,003
(2) Railway	514	514
(3) Foundation of Rail Mounted Transfer Cranes	2,540	2,540
(4) Access Railway	2,100	786
Sub-total	(6,157)	(4,843)
B Purchasing Cost of Cargo Handling Equipments	5,162	5,162
· Rail mounted transfer crane		
· Road tractors		
· Road chassis 40'		
C Other Cost		
(1) Engineering Study & Supervision	459	400
(2) Physical Contingency	1,182	985
Sub-total	(1,641)	(1,385)
D Access Improvement Cost	857	—
E Operation/Maintenance Cost of Port Terminal		
1987–88	234	234
1988–89	397	397
1989–90	637	637
1990–91	829	829
1991–92	829	829

Table VI-5-12 Container Volume Excluding Rice/Cotton for Export
Handled in Inland CNTR Terminal

| Fiscal Year | Total ('000 ton) | Import | | Export | | |
		Sub-total ('000 ton)	FCL (TEU)	Sub-total ('000 ton)	FCL (TEU)	Empty (TEU)
1987–88	655	395	43,900	260	26,000	17,900
1988–89	759	460	51,100	299	29,900	21,200
1989–90	891	552	61,300	339	33,900	27,400
1990–91	1,008	625	69,400	383	38,300	31,100
1991–92	1,008	625	69,400	383	38,300	31,100

*Average Weight of TEU   Import: 9 ton/TEU, Export: 10 ton/TEU.

Table VI-5-13 IRRs and the Probabilities in 12 Combinations
(Karachi Port)

(1) Cost Estimation	(2) Benefit Estimation	(3) Estimation of Calculation Period	(4) IRR	(5) Probability (1)x(2)x(3)	(6) Weighted IRR (4)x(5)
			%		%
as estimated (0.8)	as estimated (0.7)	as estimated (0.7)	14	0.392	5.488
		shorter (0.3)	14	0.168	2.352
	10% higher (0.1)	as estimated (0.7)	16	0.056	0.896
		shorter (0.3)	15	0.024	0.360
	10% lower (0.2)	as estimated (0.7)	13	0.112	1.456
		shorter (0.3)	12	0.048	0.576
10% higher (0.2)	as estimated (0.7)	as estimated (0.7)	12	0.098	1.176
		shorter (0.3)	11	0.042	0.462
	10% higher (0.1)	as estimated (0.7)	13	0.014	0.182
		shorter (0.3)	13	0.006	0.078
	10% lower (0.2)	as estimated (0.7)	11	0.028	0.308
		shorter (0.3)	10	0.012	0.120
Total				1.000	13.454

Table VI-5-14 Cumulative Probability Distribution
(Karachi Port)

IRR	Probability Distribution	Cumulative Probability Distribution
%		
10	0.012	0.012
11	0.070	0.082
12	0.146	0.228
13	0.132	0.360
14	0.560	0.920
15	0.024	0.944
16	0.056	1.000

Table VI-5-15 IRRs and the Probabilities in 12 Combinations
(Qasim Port)

(1) Cost Estimation	(2) Benefit Estimation	(3) Estimation of Calculation Period	(4) IRR	(5) Probability (1)x(2)x(3)	(6) Weighted IRR (4)x(5)
			%		%
as estimated (0.8)	as estimated (0.7)	as estimated (0.7)	12	0.392	4.704
		shorter (0.3)	11	0.168	1.848
	10% higher (0.1)	as estimated (0.7)	14	0.056	0.784
		shorter (0.3)	13	0.024	0.312
	10% lower (0.2)	as estimated (0.7)	10	0.112	1.120
		shorter (0.3)	9	0.048	0.432
10% higher (0.2)	as estimated (0.7)	as estimated (0.7)	11	0.098	1.078
		shorter (0.3)	9	0.042	0.378
	10% higher (0.1)	as estimated (0.7)	12	0.014	0.168
		shorter (0.3)	11	0.006	0.066
	10% lower (0.2)	as estimated (0.7)	9	0.028	0.252
		shorter (0.3)	7	0.012	0.084
Total				1.000	11.226

Table VI-5-16 Cumulative Probability Distribution
(Qasim Port)

IRR	Probability Distribution	Cumulative Probability Distribution
%		
7	0.012	0.012
9	0.118	0.130
10	0.112	0.242
11	0.272	0.514
12	0.406	0.920
13	0.024	0.944
14	0.056	1.000

Table VI-5-17 IRRs and the Probabilities in 12 Combinations
(Inland Terminal)

(1) Cost Estimation	(2) Benefit Estimation	(3) Estimation of Calculation Period	(4) IRR	(5) Probability (1)x(2)x(3)	(6) Weighted IRR (4)x(5)
			%		%
as estimated (0.8)	as estimated (0.7)	as estimated (0.7)	14	0.392	5.488
		shorter (0.3)	13	0.168	2.184
	10% higher (0.1)	as estimated (0.7)	16	0.056	0.896
		shorter (0.3)	15	0.024	0.360
	10% lower (0.2)	as estimated (0.7)	12	0.112	1.344
		shorter (0.3)	11	0.048	0.528
10% higher (0.2)	as estimated (0.7)	as estimated (0.7)	12	0.098	1.176
		shorter (0.3)	13	0.042	0.546
	10% higher (0.1)	as estimated (0.7)	14	0.014	0.196
		shorter (0.3)	15	0.006	0.090
	10% lower (0.2)	as estimated (0.7)	11	0.028	0.308
		shorter (0.3)	11	0.012	0.132
Total				1.000	13.248

Table VI-5-18 Cumulative Probability Distribution
(Inland Terminal)

IRR	Probability Distribution	Cumulative Probability Distribution
%		
11	0.088	0.088
12	0.210	0.298
13	0.210	0.508
14	0.406	0.914
15	0.030	0.944
16	0.056	1.000

PART VII. FINANCIAL ANALYSIS
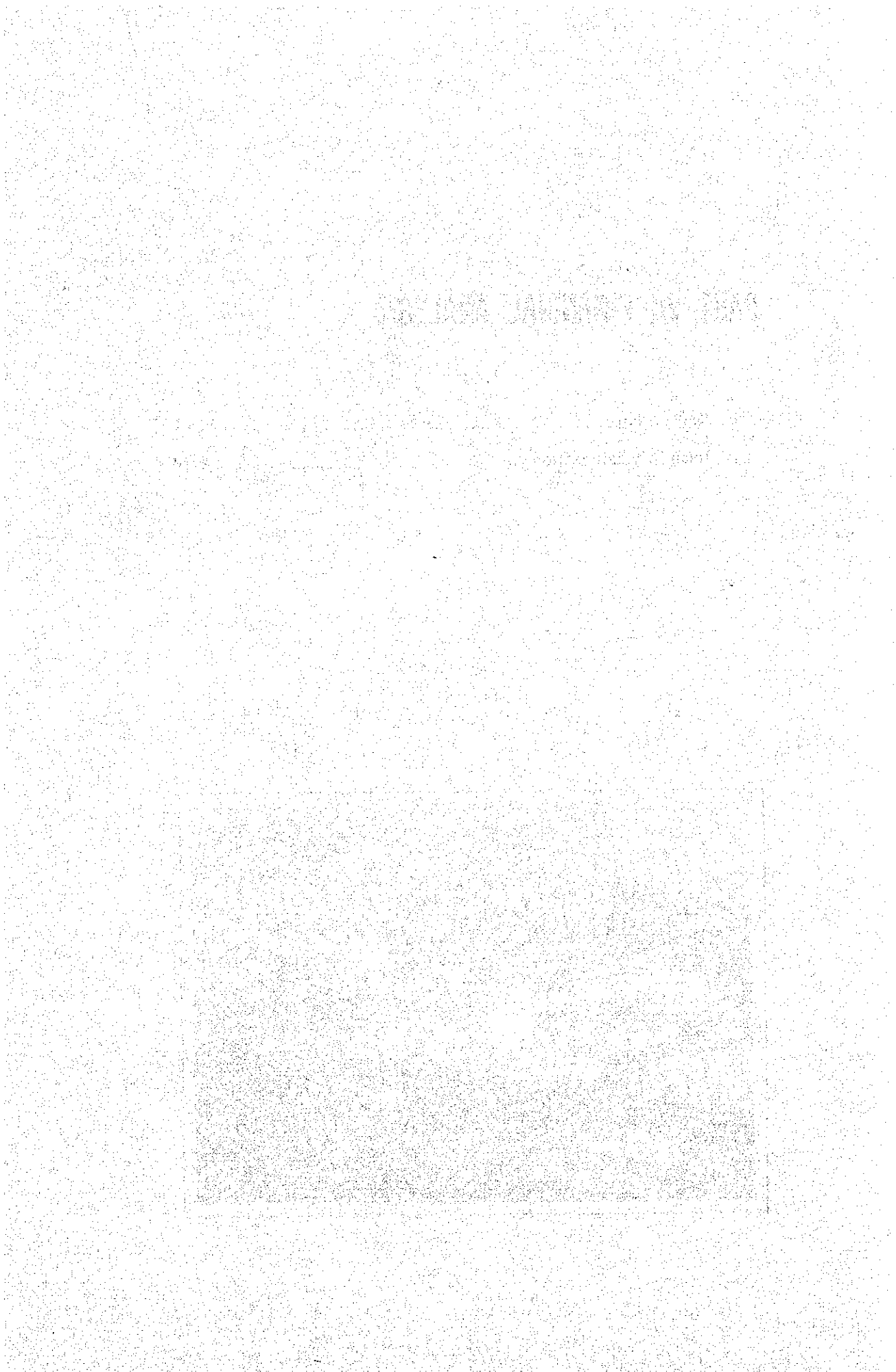
PART VII. FINANCIAL ANALYSIS

CHAPTER 1 KARACHI PORT

1-1 Premises

(1) Karachi Port shall assume the self-supporting accounting system.

(2) The financial analysis shall be made in respect of the whole Karachi Port including the Project, and the soundness of the finance such as the profitability, sources and applications of funds, and the financial status, etc. will be reviewed.

(3) The Project is considered independent, and the financial rate of return (FRR) will be used in judging the profitability.

(4) The tariff on container will be reviewed.

(5) The financial analysis shall be made in respect of the period from 1977-78 to 2005-06.

(6) Investment fund for the local currency portion shall be raised by themselves or by loans, and that for the foreign currency portion by foreign loans.

(7) No income tax shall be imposed on the profit.

(8) 1980 prices shall be used as the reference prices, and calculations made in the unit of million RS.

1-2 Analysis and Evaluation based on Financial Statements

1-2-1 Long Term Loans

Existing loans and loans made for the Project are shown in Tables A-VII-1 and A-VII-2. The existing loans are the foreign loans related up to the 4th Investment Project.

Following four cases were assumed as the terms of loan for the present project.

Case 1. (Foreign Currency)
Financing conditions of the World Bank were used as references; interest rate, 11.6%, term, 20 years after 5-year grace period.
(Local Currency)
Self-financed

Case 2. (Foreign Currency)
Financing conditions of Japan were used as reference; interest, 2.75%, term, 20 years after 10-year grace period.
(Local Currency)
Self-financed

Case 3. (Foreign Currency)
The same as Case 1.
(Local Currency)
Local loan on the same conditions as those of the World Bank.

Case 4. (Foreign Currency)

The same as for Case 2.

(Local Currency)

The same as for Case 3.

1-2-2 Fixed Assets

The capital expenditure for the existing facilities, the yearly expenditure for th containerization project, and the corresponding changes in the fixed assets are shown in Table A-VII-3 to 5 respectively. Of the investments made for the Project, the portion in both the foreign currency and the local currency include the custom duties and sales taxes. The depreciation was assumed at the residual cost of 0 and by the straight line method. The amount equivalent to 3.67% of the yearly acquistion cost was set as the depreciation cost for the existing facilities based on the actual records for 1977–78. The depreciation cost for the new facilities was calculated based on the current service lives shown in Table A-VII-6. The average services lives for the present project is 19.9 years and would end at 2005–06.

1-2-3 Revenue

The current tariff at KPT is already shown in Table III-3-3.

The tariff is converted from Gazette and indicated in the terms of the unit prices. The revenue was calculated by multiplying the said unit prices by the annual cargo volume (Tables A-VII-7 to 9) and the number of ship's call NRT and NRT ship day respectively (Table A-VII-10).

1-2-4 Operating Costs

(1) The items of costs at KPT comprise the direct costs — personnel cost, material cost, repair and maintenance costs, and the indirect costs — personnel cost, repair and maintenance cost, and administrative cost.

(2) Direct costs were divided into the variable cost and the fixed cost based on KPT Budget for 1980–81; the former was further classified to the unit costs of per ton of cargo, per vessels and per NRT. (Table A-VII-11).

(3) The indirect costs were assumed to remain unchanged and calculated as the costs common to the existing and the new facilities.

(4) The cost for existing facilities was calculated by multiplying the unit cost by the said cargo volume or the assumed values related to vessels.

(5) As for the new facilities, the labour cost, material cost and maintenance cost are shown in the Tables A-VII-12 to 14, respectively.

1-2-5 Financial Statements

(1) The financial statements were prepared for 1977–78 to 2005–06 for 6 cases shown in Table VII-1-1, setting the project life at 19 years starting from 1987–88 when the facilities will be offered for use, and ending in 2005–06. Summary of 6 cases in respect of the profit and loss statement, the sources and applications of funds and the balance sheet is shown in Tables VII-1-2 to 4, and the financial statements for Case E in Table VII-1-5 to 7. The operating

ratio and the return on net fixed assets for respective cases are shown in Table VII-1-8.

Of these 6 cases, Case A and Case B are to check the possibility without revising the current tariff. Case C and Case D are just to show how the financial situation would be, if entire local fund necessary for this Project is covered by KPT's own fund. The problem of Case C and Case D is that the tariff must be raised in advance of opening the new container terminal, or in other words, in advance of making available the benefits provided by the Project. Case E and Case F are recommendable as there are no problems with respect not only to the above mentioned problem but also to the other financial aspects such as fund sources and applications, financial profitability and so on.

(2) The operating ratio and the return on net fixed assets are adopted as the financial ratio for the judgement on the profitability of the Project.

When KPT contracted the loan with International Development Association (IDA) in respect of the 4th Project, they were obliged to keep the return on net fixed assets at 7% after 1982 lowest. It is desirable for the container project to gain the same rate.

In order to realize this return rate, the current tariff rate should be raised in consideration of the increase of 25% and 15% for the interest rates of 11.6% and 2.75% of the loans respectively. We shall now review the six cases.

a. Case A and Case B with the Current Tariff

There will be problems in the profitability and the fund sources and applications during and after the construction period of the Project. The profit is earned by the interest receivables for the invested negotiable securities. The return on net fixed assets are 0.6% and 2.1% in 1988–89 and 1989–90 respectively and the operating ratio are 84.0% and 77.1% in 1982–83 and 1987–88.

b. Case C and Case D based on the Raised Tariff (25% for C, 15% for D) from 1982–83

The status is satisfactory concerning the profitability, the fund sources and applications, the operating ratio and the return on net fixed assets. The return on net fixed assets changes from 4.8% to 8.9% for Case C between 1987–88 and 1989–90, and similarly from 2.7% to 6.2% for Case D. The operating ratio are 67.2% and 61.6% for Case C in 1982–83 and 1987–88 respectively, and similarly 73.1% and 67.0% for Case D. As stated before, both cases have a problem in the time of the revision of the tariff.

c. Case E and Case F based on the Foreign and Local Loans and the Raised Tariff (25% for E, 15% for F) from 1987–88.

There will be a need for raising the foreign and local currency loans as investment funds. The profitability is bad during the Construction period, but turns for the better on and after 1898–90. The return on net fixed assets of Case E is the same with that of Case C on and after 1987–88. In the same way, Case F is the same with Case D. The operating ratio are 84.0 and 61.6% of Case E in 1982–83 and 1987–88 respectively, and similarly 84.0% and 67.0% of Case F.

1-3 Analysis and Evaluation based on the Financial Rate of Return (FRR)

The aforementioned analysis was made in respect of the whole Karachi Port, but the analysis here is made considering the Project independently of others and its profitability is judged.

The yearly increases in the profit as the Project is carried out are compared with the capital cost made for the Project, and the financial rate of return (FRR) is sought. The increase in the profit is the profit before depreciation and interest payment obtained by deducting the increase/decrease in operating cost from the increase/decrease in the revenue achieved in the cases of "with and without" the investment. Table VII-1-9 shows the details.

The result obtained by seeking FRR is shown in Table VII-1-10. We considered it desirable that FRR remains at about the same level as the interest. The following FRR becomes a criteria for judgement of possibility of the Project, supposing two cases of the interest rate of 11.6% and 2.75% of the loan for the foreign currency portion in the investment funds, and also two cases of self-finance and interest rate of 11.6% of loan for the local currency portion.

(Investment funds)   foreign currency portion,   53.9%
                     local currency portion,   46.1%

Case 1. Loan interest: foreign currency portion, 11.6% local currency portion, self-financed,
         FRR   11.6 × 53.9% = 6.3 (%)
Case 2. Loan interest: foreign currency portion, 2.75% local currency portion, self-financed,
         FRR   2.75 × 53.9% = 1.5 (%)
Case 3. Loan interest: foreign currency portion,   11.6%
                          local currency portion,   11.6%
         FRR   11.6 (%)
Case 4. Loan interest: foreign currency portion,   2.75%
                          local currency portion,   11.6%
         FRR   2.75 × 53.9% + 11.6 × 46.1% = 6.8 (%)

Loan terms of Case E and Case F correspond to the above terms of Case 3 and Case 4 respectively. The result obtained by seeking FRR is 11.2% for Case E and 6.1% for Case F. Both cases are almost reasonable.

From the standpoint of the said financial analysis, we recommend that the current tariff be raised by 25%, and we are of the opinion that this raise is necessary also from the point of FRR.

1-4 Tariff on Container

There is presently no tariff on container established by KPT except for wharfage for empty containers. When the container terminal is constructed, it will become necessary to establish the tariff on container. We recommend that the container profitability is reviewed and a reasonable container tariff be set by comparing the general cargo tariff and the container tariff in other ports overseas.

Table VII-1-11 shows the result of the container tariff review on the premises that the operating cost, the interest and the depreciation cost be recovered. Details is shown in Appendix VII-2.

Table VII-1-1 Case Study

Case	Foreign Currency	Local Currency	Tariff Rate
A	Foreign Loan Interest Rate: 11.6% Term: 20 years after 5 years' grace period	Own Budget	Current Tariff
B	Interest Rate: 2.75% Term: 20 years after 10 years' grace period	Same as above	Same as above
C	Interest Rate: 11.6% Term: 20 years after 5 years' grace period	Same as above	Raising current tariff by 25% in and after 1982–83
D	Interest Rate: 2.75% Term: 20 years after 10 years' grace period	Same as above	Raising current tariff by 15% in and after 1982–83
E	Interest Rate: 11.6% Term: 20 years after 5 years' grace period	Interest Rate: 11.6% Term: 20 years after 5 years' grace period	Raising current tariff by 25% in and after 1987–88
F	Interest Rate: 2.75% Term: 20 years after 10 years' grace period	Same as above	Raising current tariff by 15% in and after 1987–88

Table VII-1-2 Profit & Loss Statement (Summary)

(Unit: Million RS)

	Case	1977-78	1978-79 - 1981-82	1982-83	1983-84	1984-85	1985-86	1986-87	1987-88	1988-89	1989-90	1990-91	1991-92 - 1995-96	1996-97 - 2000-01	2001-02 - 2005-06
Revenue	A	325	2,037	488	515	509	513	538	571	606	653	690	3,489	3,498	3,495
	B	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	C	"	"	610	644	636	641	673	714	758	817	863	4,361	4,372	4,369
	D	"	"	561	592	585	590	619	657	697	751	794	4,012	4,023	4,019
	E	"	"	488	515	509	513	538	714	758	817	863	4,361	4,372	4,369
	F	"	"	"	"	"	"	"	657	697	751	794	4,012	4,023	4,019
Expenditure		198	1,533	410	420	403	400	408	440	446	456	462	2,321	2,325	2,325
Operating Profit	A	127	504	78	95	106	113	130	131	160	197	228	1,168	1,173	1,170
	B	"	"	"	"	"	"	"	"	"	"	"	"	"	"
	C	"	"	200	224	233	241	265	274	312	361	401	2,040	2,047	2,044
	D	"	"	151	172	182	190	211	217	251	295	332	1,691	1,698	1,694
	E	"	"	78	95	106	113	130	274	312	361	401	2,040	2,047	2,044
	F	"	"	"	"	"	"	"	217	251	295	332	1,691	1,698	1,694
Less Bad Debt		5													
Less Interest on Loans	A	33	179	34	36	45	58	86	106	100	94	87	361	231	116
	B	"	"	33	33	33	35	40	43	41	39	37	164	116	78
	C	"	"	34	36	45	58	86	106	100	94	87	361	231	116
	D	"	"	33	33	33	35	40	43	41	39	37	164	116	78
	E	"	"	34	38	56	88	143	177	167	158	147	610	391	254
	F	"	"	33	35	44	65	97	114	108	103	97	413	276	149
Profit before Depreciation	A	89	325	44	59	61	55	44	25	60	103	141	807	942	1,054
	B	"	"	45	62	73	78	90	88	119	158	191	1,004	1,057	1,092
	C	"	"	166	188	188	183	179	168	212	267	314	1,679	1,816	1,928
	D	"	"	118	139	149	155	171	174	210	256	295	1,527	1,582	1,616
	E	"	"	44	57	50	25	-13	97	145	203	254	1,430	1,656	1,790
	F	"	"	45	60	62	48	33	103	143	192	235	1,278	1,422	1,545
Less Depreciation		37	164	79	84	84	84	84	145	145	145	145	725	725	642

- to be continued -

	Case	1977-78	1978-79 - 1981-82	1982-83	1983-84	1984-85	1985-86	1986-87	1987-88	1988-89	1989-90	1990-91	1991-92 - 1995-96	1996-97 - 2000-01	2001-02 - 2005-06
Profit after Depreciation	A	52	161	-35	-25	-23	-29	-40	-120	-85	-42	-4	82	217	412
	B	"	"	-34	-22	-11	-6	6	-57	-26	13	46	279	332	450
	C	"	"	87	104	104	99	95	23	67	122	169	954	1,091	1,286
	D	"	"	39	55	65	71	87	29	65	111	150	802	857	974
	E	"	"	-35	-27	-34	-59	-97	-48	0	58	109	705	931	1,148
	F	"	"	-34	-24	-22	-36	-51	-42	-2	47	90	553	697	903
Add. Miscellaneous Income		46	152	39	39	39	39	39	39	39	39	39	195	195	195
Less Prior Year's Adjustment		11													
Net Profit	A	87	313	4	14	16	10	-1	-81	-46	-3	35	277	412	607
	B	"	"	5	17	28	33	45	-18	13	52	85	474	527	645
	C	"	"	126	143	143	138	134	62	106	161	208	1,149	1,286	1,481
	D	"	"	78	94	104	110	126	68	104	150	189	997	1,052	1,169
	E	"	"	4	12	5	-20	-58	-9	39	97	148	900	1,126	1,343
	F	"	"	5	15	17	3	-12	-3	37	86	129	748	892	1,098
Accumulated Net Profit from 1977-78	A	1,243	1,556	1,560	1,574	1,590	1,600	1,599	1,518	1,472	1,469	1,504	1,781	2,193	2,800
	B	"	"	1,561	1,578	1,606	1,639	1,684	1,666	1,679	1,731	1,816	2,290	2,817	3,462
	C	"	"	1,682	1,825	1,968	2,106	2,240	2,302	2,408	2,569	2,777	3,926	5,212	6,693
	D	"	"	1,634	1,728	1,832	1,942	2,068	2,136	2,240	2,390	2,579	3,576	4,628	5,797
	E	"	"	1,560	1,572	1,577	1,557	1,499	1,490	1,529	1,626	1,774	2,674	3,800	5,143
	F	"	"	1,561	1,576	1,593	1,593	1,584	1,581	1,618	1,704	1,833	2,581	3,473	4,571

Table VII-1-3　Sources and Applications of Funds (Summary)

(Unit: Million RS)

	Case 1977-78	1978-79 – 1981-82	1982-83	1983-84	1984-85	1985-86	1986-87	1987-88	1988-89	1989-90	1990-91	1991-92 – 1995-96	1996-97 – 2000-01	2001-02 – 2005-06
Sources of Funds														
Profit before Depreciation　A		325	44	59	61	55	44	25	60	103	141	807	942	1,054
B		"	45	62	73	78	90	88	119	158	191	1,004	1,057	1,092
C		"	166	188	188	183	179	168	212	267	314	1,679	1,816	1,928
D		"	118	139	149	155	171	174	210	256	295	1,527	1,582	1,616
E		"	44	57	50	25	-13	97	145	203	254	1,430	1,656	1,790
F		"	45	60	62	48	33	103	143	192	235	1,278	1,422	1,545
Long-term Loans　A		272	9	51	139	130	386							
B		"	"	"	"	"	"							
C		"	"	"	"	"	"							
D		"	"	"	"	"	"							
E		"	12	84	250	349	632							
F		"	"	"	"	"	"							
Miscellaneous Income		152	39	39	39	39	39	39	39	39	39	195	195	195
Government's Investment		114												
Total　A		863	92	149	239	224	469	64	99	142	180	1,002	1,137	1,249
B		"	93	152	251	247	515	127	158	197	230	1,199	1,252	1,287
C		"	214	278	366	352	604	207	251	306	353	1,874	2,011	2,123
D		"	166	229	327	324	596	213	249	295	334	1,722	1,777	1,811
E		"	95	180	339	413	658	136	184	242	293	1,625	1,851	1,985
F		"	96	183	351	436	704	142	182	231	274	1,473	1,617	1,740
Application of Funds														
Capital Expenditure		901	61	84	250	349	632	70	71	59	53	265	245	213
Repayment of Long-term Loans　A		110	24	28	29	33	34	70	71	59	53	265	245	213
B		"	"	"	"	"	"	34	35	23	17	229	"	"

– to be continued –

	Case	1977-78	1978-79 - 1981-82	1982-83	1983-84	1984-85	1985-86	1986-87	1987-88	1988-89	1989-90	1990-91	1991-92 - 1995-96	1996-97 - 2000-01	2001-02 - 2005-06
	C		110	24	28	29	33	34	70	71	59	53	265	245	213
	D		"	"	"	"	"	"	34	35	23	17	229	"	"
	E		"	"	"	"	"	"	101	102	90	84	420	400	368
	F		"	"	"	"	"	"	65	66	54	48	384	"	"
Total	A		1,011	85	112	279	382	666	70	71	59	53	265	245	213
	B		"	"	"	"	"	"	34	35	23	17	229	"	"
	C		"	"	"	"	"	"	70	71	59	53	265	"	"
	D		"	"	"	"	"	"	34	35	23	17	229	"	"
	E		"	"	"	"	"	"	101	102	90	84	420	400	368
	F		"	"	"	"	"	"	65	66	54	48	384	"	"
Increase/Decrease of Net Current Assets	A		-148	7	37	-40	-158	-197	-6	28	83	127	737	892	1,036
	B		"	8	40	-28	-135	-151	93	123	174	213	970	1,007	1,074
	C		"	129	166	87	-30	-62	137	180	247	300	1,609	1,766	1,910
	D		"	81	117	48	-58	-70	179	214	272	317	1,493	1,532	1,598
	E		"	10	68	60	31	-8	35	82	152	209	1,205	1,451	1,617
	F		"	11	71	72	54	38	77	116	177	226	1,089	1,217	1,372
Net Current Assets at Beginning of Year	A	123	-25	-18	19	-21	-179	-376	-382	-354	-271	-144	593	1,485
	B		"	-17	23	-5	-140	-291	-198	-75	99	312	1,282	2,289
	C		"	104	270	357	327	265	402	582	829	1,129	2,738	4,504
	D		"	56	173	221	163	93	272	486	758	1,075	2,568	4,100
	E		"	-15	53	113	144	136	171	253	405	614	1,819	3,270
	F		"	-14	57	129	183	221	298	414	591	817	1,906	3,123
Net Current Assets of End of Year	A	123	-25	-18	19	-21	-179	-376	-382	-354	-271	-144	593	1,485	2,521
	B		"	-17	23	-5	-140	-291	-198	-75	99	312	1,282	2,289	3,363
	C		"	104	270	357	327	265	402	582	829	1,129	2,738	4,504	6,414
	D		"	56	173	221	163	93	272	486	758	1,075	2,568	4,100	5,698
	E		"	-15	53	113	144	136	171	253	405	614	1,819	3,270	4,887
	F		"	-14	57	129	183	221	298	414	591	817	1,906	3,123	4,495

Table VII-1-4 Balance Sheet (Summary)

(Unit: Million RS)

	Case	1977-78	1981-82	1982-83	1983-84	1984-85	1985-86	1986-87	1987-88	1988-89	1989-90	1990-91	1995-96	2000-01	2005-06
Assets															
Fixed Assets		1,157	1,894	1,876	1,876	2,042	2,307	2,855	2,710	2,565	2,420	2,275	1,550	825	183
Land		15	15	15	15	15	15	15	124	124	124	124	124	124	124
Net Fixed Assets to be depreciated		796	869	1,702	1,765	1,681	1,597	1,513	2,586	2,441	2,296	2,151	1,426	701	59
Work in Progress		346	1,010	159	96	346	695	1,327							
Investment		332	332	332	332	332	332	332	332	332	332	332	332	332	332
Net Current Assets	A	123	-25	-18	19	-21	-179	-376	-382	-354	-271	-144	593	1,485	2,521
	B	"	"	-17	23	-5	-140	-291	-198	-75	99	312	1,282	2,289	3,363
	C	"	"	104	270	357	327	265	402	582	829	1,129	2,738	4,504	6,414
	D	"	"	56	173	221	163	93	272	486	758	1,075	2,568	4,100	5,698
	E	"	"	-15	53	113	144	136	171	253	405	614	1,819	3,270	4,887
	F	"	"	-14	57	129	183	221	298	414	591	817	1,906	3,123	4,495
Total	A	1,612	2,201	2,190	2,227	2,353	2,460	2,811	2,660	2,543	2,481	2,463	2,475	2,642	3,036
	B	"	"	2,191	2,231	2,369	2,499	2,896	2,844	2,822	2,851	2,919	3,164	3,446	3,878
	C	"	"	2,312	2,478	2,731	2,966	3,452	3,444	3,479	3,581	3,736	4,620	5,661	6,929
	D	"	"	2,264	2,381	2,595	2,802	3,280	3,314	3,383	3,510	3,682	4,450	5,257	6,213
	E	"	"	2,193	2,261	2,487	2,783	3,323	3,213	3,150	3,157	3,221	3,701	4,427	5,402
	F	"	"	2,194	2,265	2,503	2,822	3,408	3,340	3,311	3,343	3,424	3,788	4,280	5,010
Capital Employed															
Capital Fund		16	130	130	130	130	130	130	130	130	130	130	130	130	130
Long-term Loans	A	353	515	500	523	633	730	1,082	1,012	941	882	829	564	319	106
	B	"	"	"	"	"	"	"	1,048	1,013	990	973	744	499	286
	C	"	"	"	"	"	"	"	1,012	941	882	829	564	319	106
	D	"	"	"	"	"	"	"	1,048	1,013	990	973	744	499	286
	E	"	"	503	559	780	1,096	1,694	1,593	1,491	1,401	1,317	897	497	129
	F	"	"	"	"	"	"	"	1,629	1,563	1,509	1,461	1,077	677	309

- to be continued -

	Case	1977-78	1981-82	1982-83	1983-84	1984-85	1985-86	1986-87	1987-88	1988-89	1989-90	1990-91	1995-96	2000-01	2005-06
Reserve	A	1,243	1,556	1,560	1,574	1,590	1,600	1,599	1,518	1,472	1,469	1,504	1,781	2,193	2,800
	B	"	"	1,561	1,578	1,606	1,639	1,684	1,666	1,679	1,731	1,816	2,290	2,817	3,462
	C	"	"	1,682	1,825	1,968	2,106	2,240	2,302	2,408	2,569	2,777	3,926	5,212	6,693
	D	"	"	1,634	1,728	1,832	1,942	2,068	2,136	2,240	2,390	2,579	3,576	4,628	5,797
	E	"	"	1,560	1,572	1,577	1,557	1,499	1,490	1,529	1,626	1,774	2,674	3,800	5,143
	F	"	"	1,561	1,576	1,593	1,596	1,584	1,581	1,618	1,704	1,833	2,581	3,473	4,571
Total	A	1,612	2,201	2,190	2,227	2,353	2,460	2,811	2,660	2,543	2,481	2,463	2,475	2,642	3,035
	B	"	"	2,191	2,231	2,369	2,499	2,896	2,844	2,822	2,651	2,919	3,164	3,446	3,878
	C	"	"	2,312	2,478	2,731	2,966	3,452	3,444	3,479	3,581	3,736	4,620	5,661	6,929
	D	"	"	2,264	2,381	2,595	2,802	3,280	3,314	3,383	3,510	3,682	4,450	5,257	6,213
	E	"	"	2,193	2,261	2,487	2,783	3,323	3,213	3,150	3,157	3,221	3,701	4,427	5,402
	F	"	"	2,194	2,265	2,503	2,822	3,408	3,340	3,311	3,343	3,424	3,788	4,280	5,010

Table VII-1-5 Profit & Loss Statement (Case E)

(Unit: Million R$)

	1977-78	1978-79 - 1981-82	1982-83	1983-84	1984-85	1985-86	1986-87	1987-88	1988-89	1989-90	1990-91	1991-92 - 1995-96	1996-97 - 2000-01	2001-02 - 2005-06
Revenue	325	2,037	488	515	509	513	538	714	758	817	863	4,361	4,372	4,369
Cargo Handling Container								39	68	109	143	715	715	715
Other Cargo			232	247	241	241	252	242	239	234	230	1,169	1,168	1,165
Cargo Storage Container								1	1	2	3	13	13	13
Other Cargo			119	125	130	132	141	133	133	131	129	643	643	643
Shipmovement and Services			84	90	85	87	92	103	112	124	133	681	691	691
Property Management			53	53	53	53	53	53	53	53	53	268	268	268
Sub-total			488	515	509	513	538	571	606	653	690	3,489	3,498	3,495
x Tariff Raise by 25%														
Expenditure	198	1,533	410	420	403	400	408	440	446	456	462	2,321	2,325	2,325
Cargo Handling & Cargo Storage			278	286	270	267	273	300	302	305	307	1,540	1,540	1,540
Shipmovement & Services			110	112	111	111	113	118	122	129	133	671	675	675
Property Management			22	22	22	22	22	22	22	22	22	110	110	110
Operating Profit	127	504	78	95	106	113	130	274	312	361	401	2,040	2,047	2,044
Less Interest on Loans	33	179	34	38	56	88	143	177	167	158	147	610	391	254
Profit before Depreciation	89	325	44	57	50	25	13	97	145	203	254	1,430	1,656	1,790
Less Depreciation	37	164	79	84	84	34	84	145	145	145	145	725	725	642
Profit after Depreciation	52	161	-35	-27	-34	-59	-97	-48	0	58	109	705	931	1,148
Add. Miscellaneous Income	46	152	39	39	39	39	39	39	39	39	39	195	195	195
Less Prior Year's Adjustment	11													
Net Profit	87	313	4	12	5	-20	-58	-9	39	97	148	900	1,126	1,343
Accumulated Net Profit from 1977-78	1,243	1,556	1,560	1,572	1,577	1,557	1,499	1,490	1,529	1,626	1,774	2,674	3,800	5,143

Table VII-1-6　Sources and Applications of Funds (Case E)

(Unti: Million RS)

	1977-78	1978-79 - 1981-82	1982-83	1983-84	1984-85	1985-86	1986-87	1987-88	1988-89	1989-90	1990-91	1991-92 - 1995-96	1996-97 - 2000-01	2001-02 - 2005-06
Sources of Funds														
Profit before Depreciation		325	44	57	50	25	-13	97	145	203	254	1,430	1,656	1,790
Long-term Loans		272	12	84	250	349	632							
Miscellaneous Income		152	39	39	39	39	39	39	39	39	39	195	195	195
Government's Investment		114												
Total		863	95	180	339	413	658	136	184	242	293	1,625	1,851	1,985
Applications of Funds														
Capital Expenditure		901	61	84	250	349	632	101	102	90	84	420	405	368
Repayment of Long-term Loans		110	24	28	29	33	34							
Total		1,011	85	112	279	382	666	101	102	90	84	420	405	368
Increase/Decrease of Net Current Assets		-148	10	68	60	31	-8	35	82	152	209	1,205	1,451	1,617
Net Current Assets at Beginning of Year		123	-25	-15	53	113	144	136	171	253	405	614	1,819	3,270
Net Current Assets at End of Year	123	-25	-15	53	113	144	136	171	253	405	614	1,819	3,270	4,887

Table VII-1-7　Balance Sheet (Case E)

(Unit:　Million RS)

	1977-78	1981-82	1982-83	1983-84	1984-85	1985-86	1986-87	1987-88	1988-89	1989-90	1990-91	1995-96	2000-01	2005-06
Assets														
Fixed Assets	1,157	1,894	1,876	1,876	2,042	2,307	2,855	2,710	2,565	2,420	2,275	1,550	825	183
Land	15	15	15	15	15	15	15	124	124	124	124	124	124	124
Net Fixed Assets to be depreciated	796	869	1,702	1,765	1,681	1,597	1,513	2,586	2,441	2,296	2,151	1,426	701	59
Work in Progress	346	1,010	159	96	346	695	1,327							
Investment	332	332	332	332	332	332	332	332	332	332	332	332	332	332
Net Current Assets	123	-25	-15	53	113	144	136	171	253	405	614	1,819	3,270	4,887
Total	1,612	2,201	2,193	2,261	2,487	2,783	3,323	3,213	3,150	3,157	3,221	3,701	4,427	5,402
Capital Employed														
Capital Fund	16	130	130	130	130	130	130	130	130	130	130	130	130	130
Long-term Loan	353	515	503	559	780	1,096	1,694	1,593	1,491	1,401	1,317	897	497	129
Reserves	1,243	1,556	1,560	1,572	1,577	1,557	1,499	1,490	1,529	1,626	1,774	2,674	3,800	5,143
Total	1,612	2,201	2,193	2,261	2,487	2,783	3,323	3,213	3,150	3,157	3,221	3,701	4,427	5,402

Table VII-1-8. Operating Ratio and Return on Net Fixed Assets

	Case	1977-78	1982-83	1983-84	1984-85	1985-86	1986-87	1987-88	1988-89	1989-90	1990-91
Operating Ratio (%)	A	60.9	84.0	81.6	79.2	78.0	75.8	77.1	73.6	69.8	67.0
	B	"	"	"	"	"	"	"	"	"	"
	C	"	67.2	65.2	63.4	62.4	60.6	61.6	58.8	55.8	53.5
	D	"	73.1	70.9	68.9	67.8	65.9	67.0	64.0	60.7	58.2
	E	"	84.0	81.6	79.2	78.0	75.8	61.6	58.8	55.8	53.5
	F	"	"	"	"	"	"	67.0	64.0	60.7	58.2
Return on Net Fixed Assets (%)	A	7.3	—	0.6	1.1	1.3	1.6	—	0.6	2.1	3.6
	B	"	—	"	"	"	"	"	"	"	"
	C	"	6.4	7.5	7.3	6.8	6.3	4.8	6.5	8.9	11.3
	D	"	3.8	4.7	4.8	4.6	4.4	2.7	4.1	6.2	8.2
	E	"	—	0.6	1.1	1.3	1.6	4.8	6.5	8.9	11.3
	F	"	—	"	"	"	"	2.7	4.1	6.2	8.2

Note: 1. Operating ratio: $\dfrac{\text{Operating Expenditure}}{\text{Operating Revenue}} \times 100$

2. Return on Net Fixed Assets: $\dfrac{\text{Profit after depreciation and before interest}}{\text{Net Fixed Assets at End of Year}} \times 100$

Table VII-1-9 Revenue and Expenses "With" and "Without" of CNTR Project

(Unit: Million RS)

	With						Without						Difference					
	1987-88	1988-89	1989-90	1990-91	1991-92 - 2005-06	Total	1987-88	1988-89	1989-90	1990-91	1991-92 - 2005-06	Total	1987-88	1988-89	1989-90	1990-91	1991-92 - 2005-06	Total
Revenue																		
Tariff Raise																		
(1) 0%	571	606	653	690	10,482	13,002							8	30	52	56	845	991
(2) 10%	628	667	719	760	11,530	14,304							65	91	118	126	1,893	2,293
(3) 15%	657	697	751	794	12,054	14,953							94	121	150	160	2,417	2,942
(4) 17%	668	709	764	807	12,264	15,212	563	576	601	634	9,637	12,011	105	133	163	173	2,627	3,201
(5) 20%	685	728	784	829	12,578	15,604							122	152	183	195	2,941	3,593
(6) 25%	714	758	817	863	13,103	16,255							151	182	216	229	3,466	4,244
(7) 26%	719	764	823	869	13,207	16,382							156	188	222	235	3,570	4,371
(8) 30%	742	788	849	898	13,627	16,904							179	212	248	264	3,990	4,893
Expenditure	440	446	456	462	6,971	8,775	416	418	425	436	6,577	8,272	24	28	31	26	394	503
Operating Profit																		
Tariff Raise																		
(1) 0%	131	160	197	228	3,511	4,227							-16	2	21	30	451	488
(2) 10%	188	221	263	298	4,559	5,529							41	63	87	100	1,499	1,790
(3) 15%	217	251	295	332	5,083	6,178							70	93	119	134	2,023	2,439
(4) 17%	228	263	308	345	5,293	6,437	147	158	176	198	3,060	3,739	81	105	132	147	2,233	2,698
(5) 20%	245	282	328	367	5,607	6,829							98	124	152	169	2,547	3,090
(6) 25%	274	312	361	401	6,132	7,480							127	154	185	203	3,072	3,741
(7) 26%	279	318	367	407	6,236	7,607							132	160	191	209	3,176	3,868
(8) 30%	302	342	393	436	6,656	8,129							155	184	217	238	3,596	4,390

Table VII-1-10 FRR

Percentage of Tariff Raise	FRR
0%	Less than 0.1%
10%	3.0%
15%	6.1%
17%	7.2%
20%	8.8%
25%	11.2%
26%	11.7%
30%	13.5%

Table VII-1-11 Container Tariff (per unit)

(Unit: RS)

	Interest rate 11.6%		Interest rate 2.75%	
	20 ft	40 ft	20 ft	40 ft
FCL	1,060	1,590	910	1,370
LCL	1,590	2,390	1,370	2,050
Transhipment	800	1,200	690	1,030
Empty	1,060	1,590	910	1,370
Storage	65	130	55	110

CHAPTER 2. INLAND CONTAINER TERMINAL

2-1 Premises

(1) The terminal shall assume the self-supporting accounting system under the organization of Pakistan Railways (PR).

(2) The financial analysis shall be made in respect of the Project alone, and the soundness of the finance such as the profitability, source and application of funds, and the financial status, etc. will be reviewed.

(3) The financial rate of return (FRR) of the Project will be used in judging the profitability.

(4) The tariff on container will be reviewed.

(5) The financial analysis shall be made in respect of the period from 1983--84 to 2006--07.

(6) Investment funds for the local currency portion shall be raised by PR or Government investment or loans, and that for the foreign currency portion by foreign loans.

(7) No income tax shall be imposed on the profit.

(8) 1980 prices shall be used as the reference prices, and calculations made in the unit of million RS.

2-2 Analysis and Evaluation based on Financial Statements

2-2-1 Long Term Loans

Following four cases were assumed in the source of investment funds for the Project.

Case 1. (Foreign Currency)
Financing conditions of the World Bank were used as references; interest rate, 11.6%, term, 20 years after 5 years grace period.
(Local Currency)
Investment by PR or Government, dividend; 6.25% per annum.

Case 2. (Foreign Currency)
Financing conditions of Japan were used as references; interest, 2.75%, term, 20 years after 10 years grace period.
(Local Currency)
The same as for Case 1.

Case 3. (Foreign Currency)
The same as Case 1.
(Local Currency)
Local loans at the same financing conditions of the World Bank. Interest, 11.6%, term, 20 years after 5 years grace period.

Case 4. (Foreign Currency)
The same as for Case 2.
(Local Currency)
The same as for Case 3.

Transitions in these loans are shown in Table A-VII-15.

2-2-2 Fixed Asset

The yearly expenditure for the containerization project and the changes in the fixed assets based on them are shown respectively in Table A-VII-16 and Table A-VII-17. Of the investment made in the Project, the portions in both the foreign currency and the local currency include the custom duties and sales taxes. The depreciation cost for the fixed assets was calculated based on the service lives at PR (Table A-VII-18) setting the residual price at 0 and following the straight line method. Since the average service lives are 20.1 years, the project life was assumed to be 20 years, the project ending in 2006—07.

2-2-3 Revenue

The current tariff at PR is already shown in Table VII-2-11.

Freight and surcharges (cargo handling charges) are set, and the general cargo tariff is applied for wharfage (storage charge). The revenue was calculated by multiplying the above tariff with the annual cargo Volume. (Table A-VII-19).

2-2-4 Operating Cost

The operating cost comprises the costs of operating trains and operating the terminal. Appendix VII-4 shows the method of cost calculation for the former. The total cost of operating a container train was classified into a variable cost and a fixed cost, and the unit cost per ton of cargo for a variable cost was assumed. (Table A-VII-20). The annual costs of operating a container train was obtained by multiplying the unit cost by the above mentioned annual cargo volume to obtain the variable cost, to which was added the fixed cost. As for the cost of operating the terminal, the labour cost, material cost and maintenance cost are shown in Table A-VII-21 to 23, respectively.

Since the cost of operating the train includes the cargo handling and transportation at the departure and destination stations, the personnel cost for loading/unloading operation at the terminal was assumed to be included in the said cost.

2-2-5 Financial Statements

Considering the investment scope of the Project, the financial analysis was limited to the Project alone, and did not include the whole organization of PR. We also assumed that the Inland Container Terminal which will handle the containers exclusively had no relation with the present Lahore Dry Port.

Six cases shown in Table VII-2-1 were reviewed, setting the project life at 20 years from 1987—88 after the terminal is open to use. Financial statements for the period from 1983—84 to 2006—07 were prepared. The summary of six cases in respect of the profit & loss statement, the fund sources and application and the balance sheet is shown in Table VII-2-2 to 4, and the financial statements for Case E is shown in Table VII-2-5 to 7.

The operating ratio and the return on net fixed assets for respective cases are shown in Table VII-2-8.

We shall now review the six cases.

(1) Cases A, B, C and D where the current tariff remains unchanged

The differences between Cases A & B and Cases C & D are that regarding sources of funds in local currency, the former uses PR or Government investments (at 6.25% dividend per year), while the latter uses the local loan (at 11.6% interest). In every cases the level of the current tariff is extremely high, and therefore, there are no difficulties in their profitability or fund sources and application. The operating ratio fluctuates below 45% while the return on net fixed assets at above 19%. Accompanying the completion of the container terminal at the sea port and the inland container terminal, the large scale container transportation becomes possible after 1987−88. We recommend that the review of the current tariff be made and they be lowered to a reasonable level after 1987−88.

(2) Cases E and F where the current tariff is lowered by 20%

As for Case E, the profitability will remain problematic until 3 years after the completion of the Project, but the net profit of more than 70 mil. RS is expected after 4 years. A certain amount of net profit is expected for Case F from the year of completion, and its profitability is expected to exceed that of Case E. There are no difficulties foreseen for both cases in respect of fund sources and applications. The operating ratio and return on net fixed asset will fluctuate respectively below 56% and above 9%.

2-3 Analysis and Evaluation Based on the Financial Rate of Return (FRR)

Similarly to the above financial analysis, the analysis here was based on the profitability of the Project alone disregarding the Lahore Dry Port. Accordingly, the yearly increases in the profit as the Project is carried out were reviewed in respect of the case "with", setting the case "without" at zero. The said increase in the profit was compared corresponding to the capital cost for the Project and the financial rate of return was sought. The result is shown in Table VII-2-9. FRR is 34.7% in the case of the current tariff and becomes 25.0% if the tariff is cut down by 20%.

If the current tariff is reduced by 33.4% with the loan interest of 11.6%, or by 36.9% with that of 2.75%, the balance will become zero. Accordingly, it is assumed that at least 17% of FRR is needed.

2-4 Tariff on Container

We recommend that the tariff on container be established by reviewing the container profitability and comparing the general cargo tariffs and the container tariffs at terminals of other countries. Table VII-2-10 shows the result of the container tariff review based on the premises that the operating cost, the interest and the depriciation cost are to be recovered in respect of the Project. The details is shown in the Appendix VII-5.

Table VII-2-1 Case Study

Case	Foreign Currency	Local Currency	Tariff Rate
A	Foreign Loan Interest Rate: 11.6% Term: 20 years after 5 years grace period	PR or Government Investment Dividend: 6.25% per year	Current Tariff
B	Interest Rate: 2.75% Term: 20 years after 10 years grace period	Same as above	Same as above
C	Interest Rate: 11.6% Term: 20 years after 5 years grace period	Local Loan: Interest rate 11.6% Term: 20 years after 5 years grace period	Same as above
D	Interest Rate: 2.75% Term: 20 years after 10 years grace period	Same as above	Same as above
E	Interest Rate: 11.6% Term: 20 years after 5 years grace period	PR or Government Investment Dividend: 6.25% per year	Reducing current tariff by 20% on and after 1987-88
F	Interest Rate: 2.75% Term: 20 years after 10 years grace period	Same as above	Same as above

Table VII-2-2 Profit & Loss Statement (Summary)

(Unit: Million RS)

Item	Case	1983-84	1984-85	1985-86	1986-87	1987-88	1988-89	1989-90	1990-91	1991-92	1992-93 1996-97 (5 years)	1997-98 2001-02 (5 years)	2002-03 2006-07 (5 years)
Revenue	A					396	462	553	627	627	3,135	3,135	3,135
	B					"	"	"	"	"	"	"	"
	C					"	"	"	"	"	"	"	"
	D					"	"	"	"	"	"	"	"
	E					317	370	442	502	502	2,510	2,510	2,510
	F					"	"	"	"	"	"	"	"
Expenditure						176	192	216	235	235	1,175	1,175	1,175
Operating Profit	A					220	270	337	392	392	1,960	1,960	1,960
	B					"	"	"	"	"	"	"	"
	C					"	"	"	"	"	"	"	"
	D					"	"	"	"	"	"	"	"
	E					141	178	226	267	267	1,335	1,335	1,335
	F					"	"	"	"	"	"	"	"
Less Interest on Loans	A		2	5	30	71	72	71	71	68	302	237	172
	B		1	1	7	31	32	34	36	36	178	163	148
	C		4	15	59	93	93	88	84	79	327	210	92
	D		3	11	36	53	53	51	49	47	202	136	68
	E		2	5	30	71	72	71	71	68	302	237	172
	F		1	1	7	31	32	34	36	36	178	163	148
Less Dividend	A.B.E.F.					36	37	38	40	40	200	200	200
Profit before Depreciation & Improvement Fund	A		-2	-5	-30	113	161	228	281	284	1,458	1,523	1,588
	B		-1	-1	-7	153	201	265	316	316	1,582	1,597	1,612
	C		-4	-15	-59	127	177	249	308	313	1,633	1,750	1,868
	D		-3	-11	-36	167	217	286	343	345	1,758	1,824	1,892
	E		-2	-5	-30	34	69	117	156	159	833	898	963
	F		-1	-1	-7	74	109	154	191	191	957	972	987
Less Depreciation						67	69	72	74	74	370	370	370
Less Improvement Fund						4	4	5	5	5	25	25	25
Net Profit	A		-2	-5	-30	42	88	151	202	205	1,063	1,128	1,193
	B		-1	-1	-7	82	128	188	237	237	1,187	1,202	1,217
	C		-4	-15	-59	56	104	172	229	234	1,238	1,355	1,473
	D		-3	-11	-36	96	144	209	264	266	1,363	1,429	1,497
	E		-2	-5	-30	-37	-4	40	77	80	438	503	568
	F		-1	-1	-7	3	36	77	112	112	562	577	592
Accumulated Net Profit from 1983-84	A		-2	-7	-37	5	93	244	446	651	1,714	2,842	4,035
	B		-1	-2	-9	73	201	389	626	863	2,050	3,252	4,469
	C		-4	-19	-78	-22	82	254	483	717	1,955	3,310	4,783
	D		-3	-14	-50	46	190	399	663	929	2,292	3,721	5,218
	E		-2	-7	-37	-74	-78	-38	39	119	557	1,060	1,628
	F		-1	-2	-9	-6	30	107	219	331	893	1,470	2,062

Table VII-2-3 Sources and Applications of Funds (Summary)

(Unit: Million RS)

Case	1983-84	1984-85	1985-86	1986-87	1987-88	1988-89	1989-90	1990-91	1991-92	1992-93 (1996-97)	1997-98 (2001-02)	2002-03 (2006-07)
Source of Funds												
Profit before Depreciation & Improvement Fund												
A		-2	-5	-30	113	161	228	281	284	1,458	1,523	1,588
B		-1	-1	-7	153	201	265	316	316	1,582	1,597	1,612
C		-4	-15	-59	127	177	249	308	313	1,633	1,750	1,868
D		-3	-11	-36	167	217	286	343	345	1,758	1,824	1,892
E		-2	-5	-30	34	69	117	156	159	833	898	963
F		-1	-1	-7	74	109	154	191	191	957	972	987
Long-term Loan												
A	5	14	46	384								
B	"	"	"	"								
C	7	44	163	590								
D	"	"	"	"								
E	5	14	46	384								
F	"	"	"	"								
Short-term Loan												
A		2	5	30								
B		1	1	7								
C		4	15	59								
D		3	11	36								
E		2	5	30								
F		1	1	7								
PR or Government Investment												
A	2	30	117	206								
B	"	"	"	"								
C	0	0	0	0								
D	0	0	0	0								
E	2	30	117	206								
F	"	"	"	"								
Total												
A	7	44	163	590	113	161	228	281	284	1,458	1,523	1,588
B	"	"	"	"	153	201	265	316	316	1,582	1,597	1,612
C	"	"	"	"	127	177	249	308	313	1,633	1,750	1,868
D	"	"	"	"	167	217	286	343	345	1,758	1,824	1,892
E	"	"	"	"	34	69	117	156	159	833	898	963
F	"	"	"	"	74	109	154	191	191	957	972	987

Table VII-2-3　Sources and Applications of Funds (Summary)

	Case	1983-84	1984-85	1985-86	1986-87	1987-88	1988-89	1989-90	1990-91	1991-92	1992-93 (1996-97)	1997-98 (2001-02)	2002-03 (2006-07)
Applications of Funds													
Capital Expenditure		7	44	163	590								
Repayment of Long-term Loan	A						22	22	22	22	110	110	110
	B										88	110	110
	C						40	40	40	40	200	200	200
	D						18	18	18	18	178	200	200
	E						22	22	22	22	110	110	110
	F										88	110	110
Repayment of Short-term Loan	A					37							
	B					9							
	C					78							
	D					50							
	E						37						
	F					9							
Total	A	7	44	163	590	37	22	22	22	22	110	110	110
	B	"	"	"	"	9	0	0	0	0	88	110	110
	C	"	"	"	"	78	40	40	40	40	200	200	200
	D	"	"	"	"	50	18	18	18	18	178	200	200
	E	"	"	"	"		59	22	22	22	110	110	110
	F	"	"	"	"	9	0	0	0	0	88	110	110
Increase/Decrease of Net Current Assets	A					76	139	206	259	262	1,348	1,413	1,478
	B					144	201	265	316	316	1,494	1,487	1,502
	C					49	137	209	268	273	1,433	1,550	1,668
	D					117	199	268	325	327	1,580	1,624	1,692
	E					34	10	95	134	137	723	788	853
	F					65	109	154	191	191	869	862	877
Net Current Assets at Beginning of Year	A						76	215	421	680	942	2,290	3,703
	B						144	345	610	926	1,242	2,736	4,223
	C						49	186	395	663	936	2,369	3,919
	D						117	316	584	909	1,236	2,816	4,440
	E						34	44	139	273	410	1,133	1,921
	F						65	174	328	519	710	1,579	2,441
Net Current Assets at End of Year	A					76	215	421	680	942	2,290	3,703	5,181
	B					144	345	610	926	1,242	2,736	4,223	5,725
	C					49	186	395	663	936	2,369	3,919	5,587
	D					117	316	584	909	1,236	2,816	4,440	6,132
	E					34	44	139	273	410	1,133	1,921	2,774
	F					65	174	328	519	710	1,579	2,441	3,318

Table VII-2-4 Balance Sheet (Summary)

(Unit: Million RS)

Item	Case	1983-84	1984-85	1985-86	1986-87	1987-88	1988-89	1989-90	1990-91	1991-91	1996-97	2001-02	2006-07
Assets													
Fixed Assets													
Land		7	51	214	804	766	728	690	652	614	424	234	44
Net Fixed Assets to be depreciated						41	41	41	41	41	41	41	41
Work in Progress		7	51	214	804	725	687	649	611	573	383	193	3
Net Current Assets	A					76	215	421	680	942	2,290	3,703	5,181
	B					144	345	610	926	1,242	2,736	4,223	5,725
	C					49	186	395	663	936	2,369	3,919	5,587
	D					117	316	584	909	1,236	2,816	4,440	6,132
	E					34	44	139	273	410	1,133	1,921	2,774
	F					65	174	328	519	710	1,579	2,441	3,318
Total	A	7	51	214	804	842	943	1,111	1,332	1,556	2,714	3,937	5,225
	B	7	51	214	804	910	1,073	1,300	1,578	1,856	3,160	4,457	5,769
	C	7	51	214	804	815	914	1,085	1,315	1,550	2,793	4,153	5,631
	D	7	51	214	804	883	1,044	1,274	1,561	1,850	3,240	4,674	6,176
	E	7	51	214	804	800	772	829	925	1,024	1,557	2,155	2,818
	F	7	51	214	804	831	902	1,018	1,171	1,324	2,003	2,675	3,362
Capital Employed													
Capital Fund	A	2	32	149	355	355	355	355	355	355	355	355	355
	B	2	32	149	355	355	355	355	355	355	355	355	355
Long-term Loan	A	5	19	65	449	449	427	405	383	361	251	141	31
	B	5	19	65	449	449	449	449	449	449	361	251	141
	C	7	51	214	804	804	764	724	684	644	444	244	44
	D	7	51	214	804	804	786	768	750	732	554	354	154
	E	5	19	65	449	449	427	405	383	361	251	141	31
	F	5	19	65	449	449	449	449	449	449	361	251	141
Short-term Loan	A		2	7	37	37							
	B		1	2	9								
	C		4	19	78								
	D		3	14	50								
	E		2	7	37								
	F		1	2	9								
Improvement Fund etc						33	68	107	148	189	394	599	804
Reserves	A		-2	-7	-37	5	93	244	446	651	1,714	2,842	4,035
	B		-1	-2	-9	73	201	389	626	863	2,050	3,252	4,469
	C		-4	-19	-78	-22	82	254	483	717	1,955	3,310	4,783
	D		-3	-14	-50	46	180	399	663	929	2,292	3,721	5,218
	E		-2	-7	-37	-74	-78	-38	39	119	557	1,060	1,628
	F		-1	-2	-9	-6	30	107	219	331	893	1,470	2,062
Total	A	7	51	214	804	842	943	1,111	1,332	1,556	2,714	3,937	5,225
	B	7	51	214	804	910	1,073	1,300	1,578	1,856	3,160	4,457	5,769
	C	7	51	214	804	815	914	1,085	1,315	1,550	2,793	4,153	5,631
	D	7	51	214	804	883	1,044	1,274	1,561	1,850	3,240	4,674	6,176
	E	7	51	214	804	800	772	829	925	1,024	1,557	2,155	2,818
	F	7	51	214	804	831	902	1,018	1,171	1,324	2,003	2,675	3,362

Table VII-2-5 Profit & Loss Statement (Case E)

(Unit: Million RS)

	1983-84	1984-85	1985-86	1986-87	1987-88	1988-89	1989-90	1990-91	1991-92	1992-93 / 1996-97	1997-98 / 2001-02	2002-03 / 2006-07
x 80%					317	370	442	502	502	2,510	2,510	2,510
Revenue												
Freight												
Import Loaded 20 ft					113	132	160	182				
40 ft					113	132	160	182				
Export Loaded 20 ft					60	69	79	88				
40 ft					60	69	79	88				
Empty 20 ft					6	7	11	13				
40 ft					6	7	11	13				
Sub-total					358	416	500	566	566	2,830	2,830	2,830
Cargo handling												
Import Loaded 20 ft					14	16	19	22				
40 ft					14	16	19	22				
Export Loaded 20 ft					5	6	7	8				
40 ft					5	6	7	8				
Sub-total					38	45	52	60	60	300	300	300
Cargo storage												
Import					-	1	1	1	1	5	5	5
Total					396	462	553	627	627	3,135	3,135	3,135
Expenditure												
for working CNTR Train Variable					106	122	144	163				
Fixed					47	47	47	47				
for CFS Material					2	2	3	3				
Maintenance					19	19	19	19				
Labour Variable					1	1	2	2				
Fixed					1	1	1	1				
					176	192	216	235	235	1,175	1,175	1,175
Operating Profit					141	178	226	267	267	1,335	1,335	1,335

Table VII-2-5 Profit & Loss Statement (Case E)

	1983-84	1984-85	1985-86	1986-87	1987-88	1988-89	1989-90	1990-91	1991-92	1992-93 / 1996-97	1997-98 / 2001-02	2002-03 / 2006-07
Less Interest		2	5	30	71	72	71	71	68	302	237	172
for working CNTR Train Variable					10	11	13	15	15	75	75	75
Fixed					9	9	9	9	9	45	45	45
for CFS		2	5	30	52	52	49	47	44	182	117	52
Less Dividend					36	37	38	40	40	200	200	200
for working CNTR Train Variable					7	8	9	11	11	55	55	55
Fixed					7	7	7	7	7	35	35	35
for CFS (L/C x 6.25%)					22	22	22	22	22	110	110	110
Profit before Depreciation & Improvement Fund		-2	-5	-30	34	69	117	156	159	833	898	963
Less Depreciation					67	69	72	74	74	370	370	370
for working CNTR Train Variable					15	17	20	22	22	110	110	110
Fixed					14	14	14	14	14	70	70	70
for CFS					38	38	38	38	38	190	190	190
Less Improvement Fund					4	4	5	5	5	25	25	25
for working CNTR Train Variable					2	2	3	3	3	15	15	15
Fixed					2	2	2	2	2	10	10	10
Net Profit		-2	-5	-30	-37	-4	40	77	80	438	503	568
Accumulated Net Profit from 1983-84		-2	-7	-37	-74	-78	-38	39	119	557	1,060	1,628

Table VII-2-6 Sources and Applications of Funds (Case E)

(Unit: Million RS)

	1983-84	1984-85	1985-86	1986-87	1987-88	1988-89	1989-90	1990-91	1991-92	1992-93 / 1996-97	1997-98 / 2001-02	2002-03 / 2006-07
Sources of Funds												
Profit before Depreciation & Improvement Fund		-2	-5	-30	34	69	117	156	159	833	898	963
Long-term Loans	5	14	46	384								
Short-term Loans		2	5	30								
PR or Government Investment	2	30	117	206								
Total	7	44	163	590	34	69	117	156	159	833	898	963
Application of Funds												
Capital Expenditure	7	44	163	590								
Repayment of Long-term Loans						22	22	22	22	110	110	110
Repayment of Short-term Loans						37						
Total	7	44	163	590		59	22	22	22	110	110	110
Increase/Decrease of Net Current Assets					34	10	95	134	137	723	788	853
Net Current Assets at Beginning of Year						34	44	139	273	410	1,133	1,921
Net Current Assets at End of Year					34	44	139	273	410	1,133	1,921	2,774

Table VII-2-7 Balance Sheet (Case E)

(Unit: Million RS)

	1983-84	1984-85	1985-86	1986-87	1987-88	1988-89	1989-90	1990-91	1991-91	1996-97	2001-02	2006-07
Assets												
Fixed Assets	7	51	214	804	766	728	690	652	614	424	234	44
Land					41	41	41	41	41	41	41	41
Net Fixed Assets to be depreciated					725	687	649	611	573	383	193	3
Work in Progress	7	51	214	804								
Net Current Assets					34	44	139	273	410	1,133	1,921	2,774
Total	7	51	214	804	800	772	829	925	1,024	1,557	2,155	2,818
Capital Employed												
Capital Fund	2	32	149	355	355	355	355	355	355	355	355	355
Long-term Loans	5	19	65	449	449	427	405	383	361	251	141	31
Short-term Loans		2	7	37	33	68	107	148	189			
Improvement Fund etc.		-2	-7	-37	-74	-78	-38	39	119	394	599	804
Reserves										557	1,060	1,628
Total	7	51	214	804	800	772	829	925	1,024	1,557	2,155	2,818

Table VII-2-8 Operating Ratio and Return on Net Fixed Assets

	Case	1987–88	1988–89	1989–89	1990–91	1991–92
Operating Ratio (%)	A	44.4	41.6	39.1	37.5	37.5
	B	"	"	"	"	"
	C	"	"	"	"	"
	D	"	"	"	"	"
	E	55.5	51.9	48.9	46.8	46.8
	F	"	"	"	"	"
Return on Net Fixed Assets (%)	A	19.5	27.1	37.7	48.0	51.0
	B	"	"	"	"	"
	C	"	"	"	"	"
	D	"	"	"	"	"
	E	9.1	14.4	12.6	28.8	30.6
	F	"	"	"	"	"

Note: 1. Operating Ratio: $\dfrac{\text{Operating Expenditure}}{\text{Operating Revenue}} \times 100$

2. Return on Net Fixed Assets:

$\dfrac{\text{Profit after Depreciation and before Interest}}{\text{Net Fixed Assets and End of Year}} \times 100$

Table VII-2-9 FRR

Tariff Reduction	Internal Rate of Return (FRR)
0%	34.7%
5%	32.5%
10%	30.0%
15%	27.6%
20%	25.0%
25%	22.3%
30%	19.5%
35%	16.6%
40%	13.3%

Table VII-2-10 Tariff on Container

(in the case of no profit no loss — (F/C)
Interest Rate 11.6% (L/C) PR or
Government Investment. Dividend 6.25%)

Tariff on Freight   (Unit: Rs)

	20 ft	40 ft
Import Loaded	3,000	6,000
Export Loaded	1,900	3,800
Empty	900	1,800

Tariff on Cargo-handling and Storage

	20 ft	40 ft
FCL	570	860
LCL	860	1,290
Empty	570	860
Storage	35	70

Table VII-2-11 Current Tariff

(Unit: RS)

Item	Tariff
On Container	
Freight (Lahore–Karachi)	
Import 20ft Loaded	5,000 per unit
" " Empty	1,500 "
" 40ft Loaded	10,000 "
" " Empty	3,000 "
Export 20ft Loaded	3,200 "
" Empty	1,500 "
" 40ft Loaded	6,400 "
" " Empty	3,000 "
Surcharge (Shed-wagon)	
Import 20ft	600 "
" 40ft	1,200 "
Export 20ft	300 "
" 40ft	600 "
On General Cargo	
Freight (Lahore–Karachi)	
Import Iron & Steel	312 per tonne
Export Rice	149 "
Sugar	208 "
Cotton	208 "
Surcharge (Shed to Wagon)	
Import	70 per tonne
Export	35 "
Whartage (Storage)	
7 days free	
First 10 days	2 per GWT
Next 10 days	8 "
Over 20 days	10 "