

8-1-4 Items of analysis

(1) Investment (economic price)

(Unit: Rs 1,000)

	Construction cost	First year	Second year	Third year
Land for factory	5,900	5,900		
Colony for officers and staff	93,384	25,766	36,336	31,246
Civil Eng. and structure	210,533	48,195	103,225	59,113
Mechanical facilities (Plant & machinery)	269,486	12,420	243,209	13,857
Electricity	69,521	50	22,538	46,933
Utilities	46,371			46,371
Fitting and Appliance	930			930
Contingencies	34,805	4,617	20,265	9,923
Engineering consulting	68,829	36,565	18,071	14,193
Technical training	24,816	2,197		22,619
<b>Total</b>	<b>824,538</b>	<b>135,709</b>	<b>443,644</b>	<b>245,185</b>

Note: Construction cost includes material and equipment prices, labour charges, and incidental expenses.

(2) Cost (economic cost)

Price of imported parts (Imported raw materials cost)

C&F Price (in yen) ÷ Shadow exchange rate (S.E.R.)

Incidental import expenses (excluding import duty)

Inland transportation cost of imported parts

Premiums for marine and land insurance on imported parts

Unloading cost of imported parts

Othr expenses

Cost of domestically procured raw materials

Only a few items are subject to sales tax, so the market price was used as the economic price.

Personnel expenses

Only a limited number of staff are subject to the income tax, so the actual personnel expenses are used.

Fuel and electricity expenses and maintenance cost

Actual estimate is used as it is.

Reserves

5% of total expenses is estimated for reserves.

(3) Cost calculation for the case "without the project"

According to the rolling stock manufacturers, the international market price of diesel electric locomotives of the same type as those to be manufactured in this factory is said to range from ¥264,000,000 (about US\$1.1 million) to ¥312,000,000 (about US\$ 1.3 million).

The price of imported locomotives in the case of "without the project" can be calculated as follows, including incidental import expenses (excluding import duty):

312 million yen (Upper limit) →  
 264 million yen (Lower limit) → 288 million yen (Average)

288 mil. yen ..... Unit price per imported locomotive  
 28 mil. yen ..... Spare parts price (10% of unit price)  
 5 mil. yen ..... After-service fee during guarantee period

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321 mil. yen ..... Price of imported locomotive (C&F)  
 @ ¥15.474 ..... Shadow exchange rate

20,745 thousand Rs ..... C&F price in Rs  
 207 thousand Rs ..... Unloading expenses (1% of C&F price)  
 197 thousand Rs ..... Premium of marine and land insurance  
 (0.95% of C&F)  
 103 thousand Rs ..... Other expenses (0.5% of C&F)

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21,252 thousand Rs ..... Price including incidental expenses

1,063 thousand Rs ..... Reserves (5% of price including incidental  
 expenses)

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22,315 thousand Rs ..... Price per unit of imported locomotive

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Price per unit of imported locomotive x Number of imported loco-  
 tives = Total cost of the case "without the project"

8-1-5 Evaluation and analysis results

For the detailed evaluated and analysis results, refer to Appendix 2 and Appendix 3.

(Unit: Rs 1,000.-)

Year	Investment	Benefit	Net Flow
1	135,709		-135,709
2	443,644		-443,644
3	245,185		-245,185
4		24,835	24,835
5		47,244	47,244
6		60,864	60,864
7		101,116	101,116
8		162,212	162,212
9		163,344	163,344
10		163,842	163,842
11		164,059	164,059
12		164,059	164,059
13		164,221	164,221
to		to	to
23		-164,221	164,221
24	408,847	164,221	-244,626
25		164,221	164,221
to		to	to
32		164,221	164,221
33	-328,232	164,221	492,453

Base case (1): Economic internal rate of return (EIRR) = 12.5%

### Sensitivity analysis

If a cost overrun (10% in foreign currency and 20% in domestic currency) occurs in the total investment:

Case (2) EIRR = 11.1%

If a factory with an annual 25-unit production is constructed and operated (base case), the economic internal rate of return (EIRR) is 12.5%. The EIRR in case (2) is 11.1%, and this EIRR shows that the cost overruns as assumed would not be a serious hindrance to the project.

As mentioned in the item dealing with economic benefits, this project has various inherent non-quantifiable benefits such as technological transfer, promotion of employment opportunities, encouragement of related domestic industries, promotion of regional development and foreign currency savings.

The results of the economic analysis plus these additional socio-economic benefits prove that this project is worthy of implementation in Pakistan.

### 8-1-6 Non-quantifiable benefits

#### (1) Technological transfer and promotion of employment opportunities

When the diesel electric locomotive manufacturing factory is established in order to newly manufacture locomotives domestically, manufacturing technologies must be transferred first. In this project, skilled labours required for the factory's operation will be trained and educated under the technical training programme during the construction period. These technical training expenses make up a part of the construction cost (investment amount).

After the technologies have been transferred under the above training programme, unskilled labours who have completed their training will be skilled and will be engaged in the factory's operation as employees. In other words, promotion of employment opportunities will follow the technological transfer.

On the other hand, even if a skilled labour has been seconded from Pakistan Railways, his vacated position in P.R. will have to be filled by promotion of another skilled labour. In order to fill this other labour's position, P.R. will have employ one unskilled labour from among the unemployed in Pakistan. It is very obvious that this promotion benefit of employment opportunities, not quantified in the economic analysis, will have a positive effect on the Gross Domestic Product.

(2) Encouragement of the related domestic industries

Most of the locomotive materials and parts are made of steel. This factory is to use an increasingly higher domestic ratio of home-produced steel, and to request new production of such locomotive materials and parts by the domestic steel industry. The raw materials used for these locomotive materials and parts are iron ore and scrap iron, some of which will be imported. Accordingly, in the price of the materials and parts, the personnel expenses (processing expenses) and the value added will be factors in the increase of the Gross Domestic Product.

(3) Regional development

The factory will not be located in an industrial area and will be somewhat distant from the nearest town. Therefore, it will require a new colony for some five hundred officers, general employees and their families with public facilities such as a school, mosque, market, etc. In this colony, a few thousand people will have a community life with the usual consumers' demands, which should be met with good supplies. Therefore, this factory may have a positive impact on the economic activity in this area, and it is evident that this project will contribute to the promotion of regional economic and community development.

(4) Foreign exchange savings

This project can be seen as one element in the policy for the development of industry through import substitution. With the start of operations of the manufacturing facility, foreign exchange that had previously been targeted for the purchase of completed locomotives will be saved; subsequent demand

for foreign exchange will exist for the import of parts and materials only. As the role of domestic manufacture increases, the need for foreign exchange for parts and materials should decline, too.

In considering foreign exchange savings, it should be remembered that foreign exchange must be utilized in the construction of the manufacturing facility. Nevertheless, with the development of the domestic industry, this project will in the end make valuable contributions to foreign exchange savings.

## 8-2 Financial Analysis

### 8-2-1 Objective

The diesel electric locomotive manufacturing factory of this project will basically be operated as a factory belonging to the Pakistan Railways. Even in this case, the analysis herein will be made to see if the factory itself can be operated independently, by referring to the financial internal rate of return, prospective profit and loss statement, and cash flow projection.

### 8-2-2 Assumptions

Basically those assumptions for economic analysis apply here, except that the prices used here are market prices as of April, 1982. The price of imported goods is the international market price and the price in Rs is calculated according to the official rate of exchange of Rs 1.00 = ¥21.585.

## 8-2-3 Investment plan

(Unit: Rs 1,000)

	Construction cost	First year	Second year	Third year
Land for factory	5,900	5,900		
Colony for officers and staff	93,348	25,766	36,336	31,246
Civil engineering and structure	210,403	48,149	103,179	59,075
Mechanical facilities (Plant & machinery)	266,967	12,380	242,340	12,247
Electricity	68,416	50	22,523	45,843
Utilities	46,264			46,264
Fitting and Appliance	930			930
Contingencies	34,611	4,612	20,219	9,780
Engineering consulting	51,703	27,526	13,478	10,699
Technical training	17,790	1,575		16,215
<b>Total</b>	<b>796,335</b>	<b>125,959</b>	<b>438,076</b>	<b>232,300</b>
Foreign currency portion	331,668	44,017	203,435	84,216



(Unit: Rs 1,000.-)

	Construction cost	Domestic currency	Foreign currency	Foreign currency Ratio (%)
Land for factory	5,900	5,900		0
Colony for officers and staff	93,348	93,348		0
Civil engineering and structure	210,403	182,143	28,260	13.4
Plant & machinery	266,967	84,850	182,117	68.2
Electricity	68,416	44,418	23,998	35.1
Utilities	46,264	23,007	23,257	50.3
Fitting and Appliance	930	930		0
Contingencies	34,611	21,730	12,882	35.6
Engineering consulting	51,703	8,340	43,363	83.9
Technical training	17,790		17,790	100.0
Total	796,335	464,666	331,668	41.6

Breakdown for cost of factory land (Unit: Rs 1,000.-)

Land purchasing cost	900
Registration fee	500
Compensation	2,500
Incidental expenses	2,000
Total	5,900

(Data supplied by the Pakistan Railways)

Breakdown for cost of colony

Land purchasing cost	5,100
Development cost	17,000
Electric work	4,000
Gas work	3,500
Officers' residences	11,802
Residences for general employees	38,346
Public facilities cost (Market, mosque, school, etc.)	4,600
Road within colony	7,000
Planting work (gardening, lawns)	2,000
Total	93,348

(Data supplied by the Pakistan Railways)

Investment breakdown by year for colony

(Unit: Rs 1,000)

	Construction cost	First year	Second year	Third year
Land purchasing cost	5,100	5,100		
Development cost	17,000	17,000		
Electric work	4,000	1,000	1,120	1,880
Gas work	3,500	980	1,500	1,020
Officer's residences	11,802	1,686	10,116	
Residences for general employees	38,346		16,600	21,746
Public utilities	4,600			4,600
Road within colony	7,000		7,000	
Planting work	2,000			2,000
<b>Total</b>	<b>93,348</b>	<b>27,380</b>	<b>36,336</b>	<b>31,246</b>

The import price (foreign currency) and incidental import expenses (domestic currency) of material and equipment imports required in the civil engineering, mechanical facilities, and electric work facilities are calculated on the basis of the following assumptions.

Material and equipment import price:

C&F Karachi

Incidental import expenses:

(Included in the cost of civil engineering, mechanical, and electrical work in domestic currency)

(a) Inland transport cost: (Karachi—Nowshera)

Rs 452.58/ton (As calculated by the Pakistan Railways)

### Weight of material and equipment imports

Material and equipment imports related to civil engineering and structure	1,650 tons
Material and equipment imports related to mechanical facilities (Plant & machinery)	1,701 tons
Material and equipment imports related to electrical facilities (Electricity)	50 tons
Material and equipment imports related to utilities	210 tons
(b) Premiums for marine and land insurance (Yokohama—Nowshera)	0.95% of C&F price
(c) Import tariff	40% of C&F price
(d) Unloading cost	1% of C&F price
(e) Miscellaneous expenses	0.5% of C&F price

### 8-2-4 Operation plan

#### (1) Annual production plan

On the basis of the locomotive manufacturing plan, the annual production is planned as follows:

First year	5 units
Second year	8 units
Third year	10 units
Fourth year	16 units
Eighth year and beyond	25 units

#### (2) Imported raw materials cost (Imported parts cost)

The price of imported goods is made up of the C&F price plus the incidental import expenses, which include inland transport cost, premiums for marine and land insurance, import duty, unloading cost, and miscellaneous expenses. The rate and calculation method are the same as for the import price and incidental import expenses of construction materials and equipment.

## (3) Price of domestically procured raw materials (Parts)

The domestic market price is applied.

(Unit: Rs 1,000.-)

	First year			Second year			Third year		
	Per unit	Units	Expense	Per unit	Units	Expense	Per unit	Units	Expense
Raw material import price (imported parts)	9,265	5	46,328	8,107	8	64,856	8,107	10	81,070
Incidental import expenses	3,969	5	19,847	3,468	8	27,750	3,468	10	34,688
Total of imported goods	13,234	5	66,172	11,575	8	92,606	11,575	10	115,758
Price of domestically procured raw materials	1,811	5	9,057	2,798	8	22,386	2,798	10	27,982

	Fourth year			Fifth to ninth year			Tenth year and beyond		
	Per unit	Units	Expense	Per unit	Units	Expense	Per unit	Units	Expense
Raw material import price (imported parts)	8,107	16	129,712	7,528	25	188,200	5,791	25	144,775
Incidental import expenses	3,468	16	55,500	3,222	25	80,574	2,485	25	62,136
Total of imported goods	11,575	16	185,212	10,750	25	279,524	8,276	25	206,911
Price of domestically procured raw materials	2,798	16	44,772	3,618	25	90,456	6,087	25	152,189

(4) Personnel expenses

Personnel expenses include direct personnel expenses (processing cost), indirect personnel expenses, and welfare cost.

Category	Rank	Annual Salary per Person (Rs)	Average Salary per Category (Rs)	No. of Staff	Personnel Expenses per Category (Rs)
S	21	40,500	37,725	2	75,450
	20	34,950			
A	19	30,000	25,500	13	331,500
	18	21,000			
B	17	15,900	13,800	27	372,600
	16	11,700			
	15	-			
C	14	9,180	8,385	78	654,030
	13	8,640			
	12	8,160			
	11	7,560			
D	10	7,020	5,400	481	2,597,400
	9	-			
	8	5,460			
	7	4,560			
	6	-			
5	4,560				
E	4	-	3,750	288	1,080,000
	3	3,960			
	2	3,750			
	1	3,540			
				889	5,110,980

$$\frac{\text{Rs } 5,110,980}{889} = \text{Rs } 5,749.- \dots \text{Annual average salary per person}$$

(Unit: Rs 1,000.-)

	First year		Second year		Third year		Forth year	
	Emplo- yees	Expen- se	Emplo- yees	Expen- se	Emplo- yees	Expen- se	Emplo- yees	Expen- se
Processing cost (Direct person- nel expenses)	300	1,725	500	2,875	500	2,875	597	3,432
Indirect person- nel expenses	315	1,811	320	1,840	340	1,955	370	2,127
Welfare cost		1,768		2,358		2,415		2,780
Total of employees	615		820		840		967	
Personnel expenses		5,304		7,073		7,245		8,339

	Fifth year		Sixth year		Seventh year		Eighth year	
	Emplo- yees	Expen- se	Emplo- yees	Expen- se	Emplo- yees	Expen- se	Emplo- yees	Expen- se
Processing cost (Direct person- nel expenses)	673	3,869	548	3,150	493	2,834	469	2,696
Indirect person- nel expenses	420	2,415	420	2,415	420	2,415	420	2,415
Welfare cost		3,142		2,783		2,625		2,556
Total of employees	1,093		968		913		889	
Personnel expenses		9,426		8,348		7,874		7,667

The welfare cost is estimated at 50% of the total of direct and indirect personnel costs.

(5) Depreciation

Depreciation is based on 20 years for mechanical facilities (plant, machinery and electrical equipment) and 50 years for buildings according to the regulations of the Pakistan Railways. (Depreciation includes contingencies of investment).

(6) Fuel and electricity expenses

These expenses are estimated at 1% of raw materials cost. (Raw materials import price + Price of domestically procured raw material) x 1% = Annual fuel and electricity expenses

(7) Maintenance cost

Maintenance cost of buildings (including colony) is estimated at 0.15% of the investment amount, and maintenance cost of mechanical facilities is estimated by multiplying 1% of the investment amount by the annual production/25. (Investment amount of the above cases includes contingencies)

Investment amount for buildings x 105% x 0.15% = Annual maintenance cost of buildings  
(including reserve 5%)

Investment amount for mechanical facilities (plant & machinery, electricity, utilities) x 105% x 1% x (Annual production/25 units) = Maintenance cost of mechanical facilities.

(8) Contingencies

Estimated at 5% of net operations cost, excluding depreciation.

(9) Sales calculation basis

Since a domestic market price does not exist in Pakistan for the type of locomotives to be manufactured in this planned factory, the international market price will be applied. This international market price includes incidental import expenses and other expenses. It is assumed that the Pakistan Railways will buy locomotives manufactured in this factory at a price equivalent to the international market price.



Calculation basis for purchase price of the  
Pakistan Railways Locomotive import  
price (C&F)

¥321 million

(See "Cost calculation for case without project" in the economic analysis)

@ ¥ 21.585

Official rate of exchange per Rupee

C&F Karachi price in Rs	14,872 thousand Rs
Unloading cost (1% of C&F)	149 thousand Rs
Premiums for marine and land insurance (0.95% of C&F)	141 thousand Rs
Other expenses (0.5% of C&F)	75 thousand Rs
Import duty (40% of C&F)	5,948 thousand Rs
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Price including incidental expenses	21,185 thousand Rs
Reserve (5% of price including incidental expenses)	1,059 thousand Rs
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Import price per unit	22,244 thousand Rs
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Import price per unit x Production = Sales

## 8-2-5 Investment and funding

(Unit: Rs 1,000.-)

		Total	First year	Second year	Third year
Investment items	Investment (including construction cost, engineering, and training cost)	796,335	125,959	438,076	232,300
	Foreign currency	331,668	44,017	203,435	84,216
	Domestic currency	464,666	81,942	234,640	148,084
	Working funds (Parts for five units in the initial year)	75,233	-	-	75,233
	Foreign currency	46,328	-	-	46,328
	Domestic currency	28,905	-	-	28,905
	Sub-total	871,568	125,959	438,076	307,533
	Foreign currency	377,996	44,017	203,435	130,544
	Domestic currency	493,571	81,942	234,640	176,989
	Interest during construction	14,414	660	4,372	9,382
Total	885,982	126,617	442,448	316,915	
Foreign currency	377,996	44,017	203,435	130,544	
Domestic currency	507,985	82,602	239,012	186,371	
Funding items	Fund raising	885,982	126,617	442,448	316,915
	Long-term loan	377,996	44,017	203,435	130,544
	Governmental budgetary fund	507,985	82,602	239,012	186,371

Payment in foreign currency included in the investment items will be funded by a long-term loan while that in domestic currency will be funded by Pakistan Government budgetary fund (capital fund). For this "capital fund," a dividend of 6.25% must be paid (as stipulated in the investment recovery regulation for governmental projects in Pakistan).

The interest on the long-term loan is assumed to be an annual 3%, and the loan will be repayed in equal installments for 20 years after a grace period of 10 years.

The interest during construction will be accomodated by the "Capital funds."

For the working funds, a one-year material cost for the following year's production is earmarked for inventory investment.

#### 8-2-6 Evaluation

For the detailed evaluation, refer to Appendix-4. and 5.

(1) Financial internal rate of return	
Base case (1)	10%
(2) Sensitivity analysis	
Case (2) (with cost overrun of 10% in foreign currency and 20% in domestic currency)	9%

#### 8-2-7 Result of financial analysis.

The profit and loss statement shows a black figure from the second year after operations begin, but the cash flow statement indicates a sustained shortage of funds up to the fourth year due to expenditures of working funds to maintain a one-year inventory. The cumulative shortage of funds will be eliminated by the sixth year, but the working funds must be raised during this period. Large working capital inevitably leads to an FIRR just short of 10%. However, the profitable independent operation of the factory will be possible by reducing the inventory investment and if working capital can be raised to cover the short fall.

A P P E N D I X

## Basis for calculation of shadow exchange rate

## PAKISTAN'S MAJOR EXPORTS

(July - March)

Items	Traiff ratio (%)	1976 - 1977		1977 - 1978		1978 - 1979		1979 - 1980		1980 - 1981	
		Portion of total exports	Weighted arithmetic average(%)	Portion of total exports	Weighted arithmetic average(%)	Portion of total exports	Weighted arithmetic average(%)	Portion of total exports	Weighted arithmetic average(%)	Portion of total exports	Weighted arithmetic average(%)
1. Fish & fish preparations	0.4	0.03	0.0	0.03	0.0	0.03	0.0	0.02	0.0	0.02	0.0
2. Rice	14.9	0.22	3.3	0.19	2.8	0.20	3.0	0.18	2.7	0.18	2.7
3. Hides and skins	-	0.00	-	-	-	-	-	-	-	-	-
4. Raw wool	-	0.01	-	0.01	-	0.01	-	0.00	-	0.00	-
5. Raw cotton	40.0	0.03	1.2	0.08	3.2	0.04	1.6	0.14	5.6	0.21	8.4
6. Cotton waste	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
7. Leather	20.0	0.06	1.2	0.05	1.0	0.07	1.4	0.05	1.0	0.03	0.6
8. Cotton yarn	44.2	0.10	4.4	0.08	3.5	0.12	5.3	0.09	4.0	0.07	3.1
9. Cotton thread	-	0.00	-	0.01	-	0.00	-	0.00	-	0.00	-
10. Cotton cloth	40.0	0.14	5.6	0.13	5.2	0.13	5.2	0.10	4.0	0.08	3.2
11. Petroleum & products	45.0	0.02	0.9	0.05	2.3	0.04	1.8	0.08	3.6	0.06	2.7
12. Synthetic textiles	1.4	0.00	0.0	0.01	0.0	0.00	0.0	0.00	0.0	0.04	0.1
13. Footwear	-	0.01	-	0.01	-	0.01	-	0.00	-	0.00	-
14. Animal casings	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
15. Cement & products	-	0.00	-	0.00	-	-	-	-	-	-	-
16. Guar & products	30.0	0.02	0.6	0.02	0.6	0.02	0.6	0.01	0.3	0.01	0.3
17. Oil cakes	45.0	0.00	-	0.01	0.5	0.00	-	0.00	-	0.00	-
18. Paints & varnishes	-	0.00	-	0.00	-	0.00	-	0.00	-	0.00	-
19. Tobacco, raw & manufactured	-	0.01	-	0.01	-	0.01	-	0.00	-	0.00	-
20. Readymade garments & hosiery	40.0	0.04	1.6	0.01	0.4	0.02	0.8	0.03	1.2	0.03	1.2
21. Drugs & chemicals	-	0.01	-	0.01	-	0.01	-	0.01	-	0.00	-
22. Surgical instruments	35.0	0.01	0.4	0.01	0.4	0.01	0.4	0.01	0.4	0.01	0.4
23. Carpets & rugs	20.0	0.08	1.6	0.09	1.8	0.10	2.0	0.09	1.8	0.08	1.6
24. Sports goods	55.0	0.02	1.1	0.02	1.1	0.01	0.6	0.01	0.6	0.01	0.6
25. Others	30.0	0.19	5.7	0.17	5.1	0.17	5.1	0.18	5.4	0.17	5.1
Total		1.00	27.6	1.00	27.9	1.00	27.8	1.00	30.6	1.00	30.0

(DATA 1. Pakistan Customs Tariff, Government of Pakistan Central Board of Revenue and Ministry of Commerce)

(DATA 2. Pakistan Economic Survey 1980 - 81, Government of Pakistan Finance Division)

## Value of Exports and Imports and their relative weight in Foreign Trade

(million Rupees)

	1976 - 1977		1977 - 1978		1978 - 1979		1979 - 1980		1980 - 1981 (JULY - MARCH)	
	Value	Portion (%)	Value	Portion (%)	Value	Portion (%)	Value	Portion (%)	Value	Portion (%)
Major Export	11,293.9	32.9	12,980.4	31.8	16,925.0	31.7	23,410.1	33.3	21,395.9	35.0
Major Import	23,012.2	67.1	27,814.7	68.2	36,388.1	68.3	46,929.1	66.7	39,776.9	65.0
Total	34,306.1	100.0	40,795.1	100.0	53,313.0	100.0	70,339.2	100.0	61,172.8	100.0

## PAKISTAN'S MAJOR IMPORTS

(July - March)

Items	Tariff ratio (%)	1976 - 1977		1977 - 1978		1978 - 1979		1979 - 1980		1980 - 1981	
		Portion of total imports	Weighted arithmetic average(%)	Portion of total imports	Weighted arithmetic average(%)	Portion of total imports	Weighted arithmetic average(%)	Portion of total imports	Weighted arithmetic average(%)	Portion of total imports	Weighted arithmetic average(%)
1. Chemicals	50	0.02	1.0	0.02	1.0	0.02	1.0	0.02	1.0	0.02	1.0
2. Drugs & medicines	50	0.02	1.0	0.02	1.0	0.02	1.0	0.02	1.0	0.02	1.0
3. Dyes & colours	95	0.01	1.0	0.01	1.0	0.01	1.0	0.01	1.0	0.01	1.0
4. Chemical fertilizers	50	0.03	1.5	0.04	2.0	0.08	4.0	0.06	3.0	0.09	4.5
5. Electrical goods	105	0.06	6.3	0.06	6.3	0.05	5.3	0.04	4.2	0.03	3.2
6. Machinery, non-electrical	50	0.14	7.0	0.15	7.5	0.12	6.0	0.12	6.0	0.11	5.5
7. Transport equipment	130	0.09	11.7	0.06	7.8	0.07	9.1	0.13	16.9	0.07	9.1
8. Paper, board & stationery	60	0.01	0.6	0.01	0.6	0.01	0.6	0.01	0.6	0.01	0.6
9. Tea	100	0.03	3.0	0.05	5.0	0.03	3.0	0.02	2.0	0.02	2.0
10. Sugar, refined	60	0.00	0.0	0.00	0.0	0.00	0.0	0.01	0.6	0.01	0.6
11. Art-silk yarn	95	0.01	1.0	0.03	2.9	0.03	2.9	0.03	2.9	0.02	1.9
12. Iron & steel & manufactures thereof	40	0.08	3.2	0.10	4.0	0.07	2.8	0.06	2.4	0.05	2.0
13. Non-ferrous metals	40	0.01	0.4	0.01	0.4	0.01	0.4	0.01	0.4	0.01	0.4
14. Petroleum & products	70	0.18	12.6	0.18	12.6	0.14	9.8	0.23	16.1	0.29	20.3
15. Oil, vegetable	40	0.06	2.4	0.06	2.4	0.08	3.2	0.05	2.0	0.05	2.0
16. Grains, pulses and flour	90	0.03	2.7	0.05	4.5	0.10	9.0	0.02	1.8	0.01	0.9
17. Other imports	85	0.22	18.7	0.15	12.8	0.16	13.6	0.16	13.6	0.18	15.3
Total		1.0	74.1	1.0	71.8	1.0	72.7	1.0	75.5	1.0	71.3

## Calculation method

Year		Difference	Shadow exchange rate
1976 - 77	Import 67.1% x 74.1% = 49.7%	40.6	21.585 ÷ 1.406 = Yen 15.352
	Export 32.9% x 27.6% = 9.1%		
1977 - 78	Import 68.2% x 71.8% = 49.0%	40.1	21.585 ÷ 1.401 = Yen 15.407
	Export 31.8% x 27.9% = 8.9%		
1978 - 79	Import 68.3% x 72.7% = 49.7%	40.9	21.585 ÷ 1.409 = Yen 15.319
	Export 31.7% x 27.8% = 8.8%		
1979 - 80	Import 66.7% x 75.5% = 50.4%	40.2	21.585 ÷ 1.402 = Yen 15.396
	Export 33.3% x 30.6% = 10.2%		
1980 - 81	Import 65.0% x 71.3% = 46.3%	35.8	21.585 ÷ 1.358 = Yen 15.895
	Export 35.0% x 30.0% = 10.5%		
		Average	Yen 15.474

Appendix 2

\*\*\* PAKISTAN RAILWAYS LOCOMOTIVES MANUFACTURING FACTORY PROJECT \*\*\*  
 \*\*\*\*\*  
 (UNIT : RS./000)

ECONOMIC ANALYSIS  
 CASE 1

RS.1.00 = 15.474 YEN : MAX PRODUCTION 25 CARS : INVESTMENT 825 MIL.RS. ( FOREIGN 463 MIL.RS. , LOCAL 362 MIL.RS. ) :  
 \*---FOREIGN PORTION :

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33			
<b>BENEFIT</b>																																				
QUANTITY OF LOCOMOTIVES																																				
WITHOUT				5	8	10	16	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25		
WITH				86742	131279	162290	255930	395672	394539	394042	393824	393824	393663	393663	393663	393663	393663	393663	393663	393663	393663	393663	393663	393663	393663	393663	393663	393663	393663	393663	393663	393663	393663	393663		
IMPORTED PARTS*	64625	90474	113093	180949	262537	262537	262537	262537	262537	201952	201952	201952	201952	201952	201952	201952	201952	201952	201952	201952	201952	201952	201952	201952	201952	201952	201952	201952	201952	201952	201952	201952	201952	201952		
INCIDENTAL EX FOR IHP	1764	2434	3042	4860	7111	7111	7111	7111	7111	5627	5627	5627	5627	5627	5627	5627	5627	5627	5627	5627	5627	5627	5627	5627	5627	5627	5627	5627	5627	5627	5627	5627	5627	5627		
HOME PRODUCED PARTS	9057	22386	27982	44772	90456	90456	90456	90456	90456	152189	152189	152189	152189	152189	152189	152189	152189	152189	152189	152189	152189	152189	152189	152189	152189	152189	152189	152189	152189	152189	152189	152189	152189	152189		
PERSONNEL EXPENSES	5304	7073	7245	8339	9426	8348	7874	7667	7667	7667	7667	7667	7667	7667	7667	7667	7667	7667	7667	7667	7667	7667	7667	7667	7667	7667	7667	7667	7667	7667	7667	7667	7667	7667		
FUEL & LIGHT	554	872	1091	1745	2787	2787	2787	2787	2787	2970	2970	2970	2970	2970	2970	2970	2970	2970	2970	2970	2970	2970	2970	2970	2970	2970	2970	2970	2970	2970	2970	2970	2970	2970		
MAINTENANCE	1308	1788	2109	3071	4513	4513	4513	4513	4513	4513	4513	4513	4513	4513	4513	4513	4513	4513	4513	4513	4513	4513	4513	4513	4513	4513	4513	4513	4513	4513	4513	4513	4513	4513		
SUB TOTAL	82611	125028	154562	243743	376830	375752	375278	375071	375071	374917	374917	374917	374917	374917	374917	374917	374917	374917	374917	374917	374917	374917	374917	374917	374917	374917	374917	374917	374917	374917	374917	374917	374917	374917		
CONTINGENCIES	4131	6251	7728	12187	18842	18788	18764	18754	18754	18746	18746	18746	18746	18746	18746	18746	18746	18746	18746	18746	18746	18746	18746	18746	18746	18746	18746	18746	18746	18746	18746	18746	18746	18746		
PRODUCTION COST SAV. BENE.	24935	47244	60864	101116	162212	163344	163842	164059	164059	164221	164221	164221	164221	164221	164221	164221	164221	164221	164221	164221	164221	164221	164221	164221	164221	164221	164221	164221	164221	164221	164221	164221	164221	164221		
<b>INVESTMENT DIFF</b>																																				
WITH	135709	443644	245165																																	
LAND <LOCO FACTORY>	5900																																			
COLONY <LAND & CONST.>	25766	36336	31246																																	
CIVIL & STRUCTURES	40195	103225	59113																																	
PLANT & MACHINERY	12420	243209	13857																																	
ELECTRICITY	50	22538	46933																																	
UTILITY			46371																																	
FITTING/APPLIANCE			930																																	
CONTINGENCIES	4617	20265	9923																																	
CONSULT & ENGINEER.*	31925	16221	12343																																	
CONSULT & ENGINEER.	4640	1850	1850																																	
TECHNICAL TRAINING*	2197		22619																																	
SALVAGE VALUE																																				
EIRR																																				
NET FLOW	-135709	-443644	-245185	24835	47244	60864	101116	162212	163344	163842	164059	164059	164221	164221	164221	164221	164221	164221	164221	164221	164221	164221	164221	164221	164221	164221	164221	164221	164221	164221	164221	164221	164221	164221	492453	
EIRR	12.549	12.549	12.549	12.549	12.549	12.549	12.549	12.549	12.549	12.549	12.549	12.549	12.549	12.549	12.549	12.549	12.549	12.549	12.549	12.549	12.549	12.549	12.549	12.549	12.549	12.549	12.549	12.549	12.549	12.549	12.549	12.549	12.549	12.549	12.549	

Appendix 3

\*\*\* PAKISTAN RAILWAYS LOCOMOTIVES MANUFACTURING FACTORY PROJECT \*\*\*  
 =====  
 ECONOMIC ANALYSIS  
 CASE 2  
 (UNIT : RS./000)

RS.1.00 = 15.474 YEN : COST OVERRUN ( FOREIGN 10 % , LOCAL 20 % ) : MAX PRODUCTION 25 CARS :  
 INVESTMENT 942 MIL.RS. ( FOREIGN 509 MIL.RS. , LOCAL 433 MIL.RS. ) : \*\*\*-FOREIGN PORTION :

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33				
BENEFIT																																					
QUANTITY OF LOCOMOTIVES				5	6	10	16	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25			
WITHOUT				111577	178523	223153	357046	557884	557884	557884	557884	557884	557884	557884	557884	557884	557884	557884	557884	557884	557884	557884	557884	557884	557884	557884	557884	557884	557884	557884	557884	557884	557884	557884			
WITH				86938	131533	162582	256338	396254	395121	394624	394406	394406	394245	394245	394245	394245	394245	394245	394245	394245	394245	394245	394245	394245	394245	394245	394245	394245	394245	394245	394245	394245	394245	394245			
IMPORTED PARTS*				64625	90474	113093	180949	262537	262537	262537	262537	262537	201952	201952	201952	201952	201952	201952	201952	201952	201952	201952	201952	201952	201952	201952	201952	201952	201952	201952	201952	201952	201952	201952			
INCIDENTAL EX FOR IMP				1764	2434	3042	4868	7111	7111	7111	7111	7111	5627	5627	5627	5627	5627	5627	5627	5627	5627	5627	5627	5627	5627	5627	5627	5627	5627	5627	5627	5627	5627	5627			
HOME PRODUCED PARTS				9057	22356	27982	44772	90456	90456	90456	90456	90456	152189	152189	152189	152189	152189	152189	152189	152189	152189	152189	152189	152189	152189	152189	152189	152189	152189	152189	152189	152189	152189	152189			
PERSONNEL EXPENSES				5304	7073	7245	8339	9426	8348	7874	7667	7667	7667	7667	7667	7667	7667	7667	7667	7667	7667	7667	7667	7667	7667	7667	7667	7667	7667	7667	7667	7667	7667	7667			
FUEL & LIGHT				554	672	1091	1745	2767	2767	2767	2767	2767	2970	2970	2970	2970	2970	2970	2970	2970	2970	2970	2970	2970	2970	2970	2970	2970	2970	2970	2970	2970	2970	2970			
MAINTENANCE				1494	2030	2387	3460	5068	5068	5068	5068	5068	5068	5068	5068	5068	5068	5068	5068	5068	5068	5068	5068	5068	5068	5068	5068	5068	5068	5068	5068	5068	5068	5068	5068		
SUB TOTAL				82798	125269	154840	244131	377384	376306	375832	375625	375625	375471	375471	375471	375471	375471	375471	375471	375471	375471	375471	375471	375471	375471	375471	375471	375471	375471	375471	375471	375471	375471	375471	375471		
CONYINGENCIES				4140	6263	7742	12207	18869	18815	18792	18781	18781	18774	18774	18774	18774	18774	18774	18774	18774	18774	18774	18774	18774	18774	18774	18774	18774	18774	18774	18774	18774	18774	18774	18774		
PRODUCTION COST SAV DENE				24639	46990	60571	100708	161630	162763	163260	163478	163478	163639	163639	163639	163639	163639	163639	163639	163639	163639	163639	163639	163639	163639	163639	163639	163639	163639	163639	163639	163639	163639	163639	163639		
INVESTMENT DIFF																																					
WITH	156560	503139	282239																																		
LAND <LOC FACTORY>	7080																																				
COLONY <LAND & CONST.>	30919	43503	37495																																		
CIVIL & STRUCTURES	56345	122381	69726																																		
PLANT & MACHINERY	13651	267506	16060																																		
ELECTRICITY	60	26582	53358																																		
UTILITY			52303																																		
FITTING/APPLIANCE			1116																																		
CONYINGENCIES	5403	23004	11503																																		
CONSULT & ENGINEER.*	35117	17843	13578																																		
CONSULT & ENGINEER.	5568	2220	2220																																		
TECHNICAL TRAINING*	2417		24880																																		
SALYAGE VALUE																																					
EIRR																																					
NET FLOW	-156560	-503139	-282239	24639	46990	60571	100708	161630	162763	163260	163478	163478	163639	163639	163639	163639	163639	163639	163639	163639	163639	163639	163639	163639	163639	163639	163639	163639	163639	163639	163639	163639	163639	163639	163639		
EIRR	11.146	11.146	11.146	11.146	11.146	11.146	11.146	11.146	11.146	11.146	11.146	11.146	11.146	11.146	11.146	11.146	11.146	11.146	11.146	11.146	11.146	11.146	11.146	11.146	11.146	11.146	11.146	11.146	11.146	11.146	11.146	11.146	11.146	11.146	11.146		











JICA