STUDY REPORT ON REHABILITATION PLAN ON SPECIAL STEELS OF PAKISTAN LIMITED THE ISLAMIC REPUBLIC OF PAKISTAN

November, 1980

Japan International Cooperation Agency

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PREFACE

It is with great pleasure that I present this report entitled Study Report on Rehabilitation Plan on Special Steels of Pakistan Limited to the Government of the Islamic Republic of Pakistan.

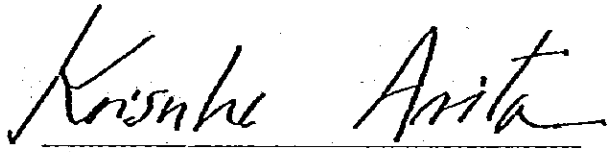
This report embodies the result of the survey which was carried out in Pakistan in March, 1980 by the Japanese survey team commissioned by the Japan International Cooperation Agency following the request of the Government of the Islamic Republic of Pakistan.

The survey team, headed by Mr. Yoshihiro Mitarashi, had a series of close discussion with the persons concerned of State Engineering Corporation (SEC) and Special Steels of Pakistan Limited (SSP) as well as the officials concerned of the Government of the Islamic Republic of Pakistan, and conducted a wide scope of field survey and data analyses.

I sincerely hope that this report will be useful as a basic reference for development of the iron and steel industry in Pakistan.

I am particularly pleased to express my appreciation to the officials concerned of the Government of the Islamic Republic of Pakistan, SEC and SSP for their close cooperation extended to the Japanese team.

November, 1980



KEISUKE ARITA
President
Japan International Cooperation Agency

CONTENTS

LIST OF ABBREVIATIONS AND EQUIVALENTS

Currency Equivalents:

Rs. = Pakistan Rupee
US$ = Rs.10
Rs. ≒ ¥25

Fiscal Year:

July 1 to June 30 (beginning from the 1st of July of each calendar year to and ending on 30th of June in the next calendar year)

Numerical Abbreviations:

mm	–	millimetre
m	–	meter
km	–	kilometre = 1,000 metres
m^2	–	square metre
ft^2	–	square feet
m^3	–	cubic metre
cft	–	cubic feet = 0.0283 cubic metre
min	–	minute
hr	–	hour
d	–	day
y	–	year
kg	–	kilogram
t	–	metric ton = 1,000 kilograms
kg/m^3	–	kilogram per cubic metre
kg/t	–	kilogram per tonne
°C	–	degree centigrade
k cal	–	kilogram calorie
W	–	watt
kW	–	kilowatt
kWh	–	kilowatt hour
%	–	per cent
t/hr	–	tonne per hour

t/d	–	tonne per day
t/y	–	tonne per year
billion	–	a thousand millions

Other Abbreviation:

JICA	–	Japan International Cooperation Agency
JCI	–	Japan Consulting Institute
PIDC	–	Pakistan Industrial Development Corporation
PASMIC	–	Pakistan Steel Mills Corporation
ECC	–	Economic Council of Cabinet
SEC	–	State Engineering Corporation
SSP	–	Special Steels of Pakistan Ltd.
PSM	–	Peoples Steel Mills Ltd.
PECO	–	Pakistan Engineering Corporation
MSC	–	Metropolitan Steel Corporation
PMTF	–	Pakistan Machine Tool Factory
HMC	–	Heavy Mechanical Complex Ltd.
HFF	–	Heavy Foundry and Forge Ltd.
PACO	–	Pakistan Automobile Corporation
PTC	–	Pakistan Tractor Corporation
UNIDO	–	United Nation Industrial Development Organization
ILO	–	International Labour Organization
USA	–	United State of America
UK	–	United Kingdom
W. Germany	–	West Germany
USSR	–	Union of Soviet Socialist Republic
T	–	Thickness
D	–	Diameter
W	–	Width
L	–	Length
CR	–	Cold Roll
HR	–	Hot Roll
ϕ	–	Round
	–	Square
SC	–	Carbon Steel
AL	–	Alloy Steel
SUP	–	Spring Steel

Rs./kW	–	Rupees per kilowatt
Rs./kWh	–	Rupees per kilowatt hour
Rs./t	–	Rupees per tonne
fce	–	Furnace
A.P. line	–	Annealing Pickling line
GDP	–	Gross Domestic Product
GNP	–	Gross National Product
SAE	–	Society of Automotive Engineer
IRR	–	Internal Rate of Return

LIST OF TABLES

LIST OF FIGURE

LIST OF APPENDIXES

SUMMARY AND CONCLUSION

SUMMARY AND CONCLUSION

Special Steels of Pakistan Ltd. (SSP) is a state-managed corporation affiliated with State Engineering Corporation (SEC) and is the sole special steel manufacturer in Pakistan.

SSP's plant is presently closed, based on a decision by the Economic Council of Cabinet (ECC) in December, 1979.

A field survey was conducted in March, 1980, followed with careful studies and deliberations, in order to set up a rehabilitation plan for the plant. However, the unfortunate conclusion is that no workable rehabilitation plan is available for recommending the enforcement.

The surveys and investigations compiled in this survey report, as well as the conclusion, are summarized as follows:

1. History of SSP

1.1 The project to construct this special steel plant was initiated in the early 1960s, construction was started in 1972 and completed in 1975, and production was commenced in 1975.

1.2 Fifteen years elapsed from the time of project planning to commencement of production, during which period various unexpected incidents occurred such as political and economic upheavals in the country, worldwide fluctuations in the foreign exchange market and outbreak of the oil crisis, with the result that SSP's total sum of investment, initially Rs.167,000,000, had inflated by three times to Rs.530,000,000 by the time the plant was completed in 1975.

2. Cause of Closure of SSP Plant

2.1 The heavy-chemical, machinery and other industries which had been regarded as the potential clients for SSP products at the time of project planning, failed to develop as initially anticipated.

2.2 As judged from its profit and loss statement, the major factors causing SSP's deficits are as follows:

(1) Very low sales from commencement of operations

i) Low selling prices. (Refer to Table 1-9.)

ii) Small sales volume. (Low operation rate of roughly 20%: excluding consignment rolling.)

(2) High variable costs

i) Extremely low production yield and high unit consumption of raw materials and utilities. (Refer to Table 1-6.)

ii) Very high raw material purchasing prices compared with those of industrially advanced countries, with many raw materials priced 2 – 3 times higher inclusive of import duties.

(3) The relationship between SSP's sales and variable costs is as follows:

Sales < Variable cost (See Fig. 1-1.)

(4) High fixed costs. (Refer to Table 1-15.)

i) High labour cost owing to surplus workers.

ii) High depreciation cost exceeding the annual sales volume.

iii) Huge payment of interest since the larger portion of capitals for machinery and equipment procurement and plant operation had been met with loans.

2.3 The absolute annual volume of demand for special steels (including stainless steel) in Pakistan was inadequate, or slightly over 40,000 t in 1975/76 – 1979/80. (Refer to Fig. 3-1.)

2.4 SSP's mean annual output of special steels in 1975/76 – 1979/80 was roughly 3,710 t/y (at operation rate of about 18%), which is equivalent to only 9% of the total demand in Pakistan. (Refer to Table 1-4.)

2.5 A reason for this small volume of production and sales lies with SSP's existing production facilities, by which products cannot be produced in the sizes and surface finishing

demanded by users. (Refer to Table 1-1.)

2.6 SSP's debt equity ratio, roughly 92 : 8 at time of commencement of operations, had deteriorated to roughly 96 : 4 as of June 30, 1979, and this abnormally large liability has been the direct factor for its huge payment of interests.

2.7 SSP's lack of working capital has been reported as having prevented it from even proper procuring necessary raw materials, and lack of capital also prevented it from receiving adequate technical guidance.

2.8 Owing to the situation described just above, SSP's management and technical levels were very low, leading to deficits in various fields of operation.

(1) Poor product quality and process controls

i) Since product quality was inferior to imported products, SSP had to sell at lower prices.

ii) Generation of large quantities of defective products led to lower production yield and higher variable costs.

(2) Lack of manufacturing cost control

No actual manufacturing cost control was performed at SSP. Producing special steels without any proper manufacturing cost control setup is extremely reckless.

(3) Inept procurement and stock control

Whereas raw materials immediately necessary for production were deficient owing to lack of capital huge quantities of raw materials unnecessary for some time were held in stock, with the result that capital was fixed.

3. Estimation of Demands for Special Steels, Steel Castings and Steel Forgings in Pakistan

3.1 In estimating the demand for special steels, the principal end user industries recommended by SSP management were visited. The consumption of special steels by type of end user industry was classified and tabulated on the basis of the contents of their demands as well as their response to the survey mission's questionnaire relating to demands, from which the total

demand for special steels in Pakistan was estimated for 1979/80. This total demand is calculated on the basis of the shares of the product output of each end user industry in total output of Pakistan.

3.2 Estimating future demands from the demand for 1979/80 is very difficult owing to lack of statistical data and since new industries may be sprung up. Therefore, the 1984/85 demand by type of end user industry was estimated by using as reference material the production plans and estimates of various industrial organizations in Pakistan, estimates of end user industries and by referring to the Fifth Five-Year Plan.

The demands for beyond 1984/85 were estimated at the same growth rates of demand for the period from 1979/80 to 1984/85.

3.3 By built-up and calculating of the special steel demands of the respective end user industries in this manner, the total demand of 40,400 t/y for special steels and stainless steel plates and sheets in 1979/80, will be equivalent to 4 - 6% of the total iron and steel demand in Pakistan. The total demand for special steel in 1984/85 is estimated at 75,300 t/y.

3.4 The forecast of demands for special steels by end user industry is as shown in Table 3-2. (See next page.)

These demand estimates by type of end user industries are based on the premise that the production plans of industrial organizations and end user industries, as well as the plan for domestic production of parts, would proceed as anticipated. Accordingly, depending on the outcome of these plans, the attainment of the aforementioned demand volumes may be extended to a later period.

3.5 The industries having high production growth rates are 1) the transportation machinery industries such as the farm tractor, four-wheeler, motorcycle and bicycle manufacturing industries, the principal reasons for which are the increasing number of registered vehicles and the plan to rapidly increase the ratio of domestic production of parts for these vehicles, and 2) the medical appliance manufacturing industry which uses stainless steel bars of small sizes to produce medical appliances for export to meet demands which are growing rapidly from year to year.

3.6 A big user of special steels is the munitions industry. However, over 90% of the special steels demanded by the industry are of large sizes not producible by SSP at present.

Table 3-2. Forecast of Demand for Special Steel

End User Industry	Demand		Mean Annual Growth Rate (%)
	1979/80 (t/y)	1984/85 (t/y)	
Construction	1,400	2,100	8.4
Agricultural machinery	1,300	7,600	42.4
Steel ball for Cement crusher	750	950	4.8
Other industrial machines	2,100	2,850	6.3
Sub-Total	4,150	11,400	22.4
Automobile and Repair parts	4,100	15,800	31.0
Motor cycle	0	1,650	-
Sub-Total	4,100	17,450	31.0
Railway carriage	100	100	0
Other transportation (Bicycle, etc.)	2,000	4,400	17.1
Utensil for Home use	7,400	8,400	2.6
Surgical instrument	2,000	4,000	14.9
Sub-Total	9,400	12,400	5.7
Electric machine	600	900	8.4
National defence	11,900	18,000	8.6
Hand tool	3,000	4,800	9.9
Miscellaneous (Adjustment)	3,750	3,750	0
Grand Total	40,400	75,300	13.2

Remark: This table is a part of Table 3-2.

3.7 Roughly 7,400 t/y of stainless steel sheets were consumed in 1979/80 for the manufacture of tableware and cooking utensils. These sheets are the thickness under 0.7 mm and have a surface brightness of 2B and BA, and are therefore not producible with SSP production facilities.

3.8 From their very nature, steel castings and forgings are extremely diversified in type, shape, size and weight, and no reliable statistical data on their demand are available. Most end users of these products adopt the method of producing what they need by themselves or rely on products manufactured by affiliated corporations. They possess ample production facilities and surplus production capacities, with the result that their facilities are utilized at an extremely low rate of operation.

The demands for steel castings and forgings in 1979/80, which are not met by self-production, are estimated at roughly 372 t/y and 1,155 t/y, respectively, and in 1984/85, at 830 t/y and 1,010 t/y, respectively.

4. Tentative Rehabilitation Plan

A tentative rehabilitation plan which is conceived optimum for improving SSP's management was formed.

4.1 The summary of the basic policies which were adopted in determining the production plan for the tentative plan is as follows:

(1) The range of product sizes is to be expanded and new products, not included in the former production plan, are to be manufactured by minimum necessary investment in machinery and equipment.

(2) Products which were included in the original production plan but which are not in big demand and for which increase of demand in future cannot be expected, are not to be included in the new production plan of the tentative plan.

(3) The labour force is to be limited to the minimum necessary number of workers.

(4) For three years at least, technical guidance are to be received from industrially advanced countries in order to upgrade technical level.

(5) Mild steel is not to be manufactured.

4.2 The products to be manufactured by SSP on the basis of the basic policies outlined in the preceding paragraph are special steel rolled products limited to the following size ranges:

Billet: Sizes ranging from 75 mm to 90 mm
Bar and Flat bar: Sizes ranging from 22 mm to 40 mm

New products to be manufactured are billets and spring steel (flat bars).

4.3 Minimum necessary equipment are to be added, such as billet straightener and devices for inspecting the surfaces and inner defects of steel products.

4.4 The production plan based on the tentative plan, as shown in Table 4-1, envisages a production volume of 7,800 t/y in the 1st year, 11,450 t/y in the 5th year and 18,400 t/y in the 10th year. The mean annual production growth rate of 10% is adopted, which is the same as the growth rate of the manufacturing industry under the Fifth Five Year Plan.

4.5 Carbon steel and stainless steel plates and sheets are not to be produced owing to the following reasons:

(1) There are only small demands for carbon steel and stainless steel hot rolled plates and sheets.

(2) Regarding stainless steel cold rolled plates and sheets, the products demanded by end users are thin products having surface brightness and thicknesses of under 0.7 mm, which are normally manufactured in strip mills by special mass-production processes requiring huge capital investments. These products cannot be manufactured with SSP's existing facilities.

4.6 Steel castings and forgings are not manufactured owing to the following reasons:

(1) Most end users of these products produce what they need by themselves. They possess ample production facilities and surplus production capacities, with the result that their facilities are being utilized at an extremely low rate of operation.

(2) These products are diversified and produced in small lots, and there is a plan to manufacture specific products (as for producing vehicle parts) by specialized plants.

5. Economic Assessment of Tentative Rehabilitation Plan

5.1 A financial assessment of SSP was performed with respect to the tentative plan, based on the following preconditions:

(1) The additional funds necessary for enforcing the tentative plan were estimated at a total of Rs.85,600,000, a breakdown of which is as follows:

Machinery and equipment cost	Rs.16,600,000
Fee of technical guidance	Rs.25,000,000
Working capital for plant operation	Rs.44,000,000

(2) The unit selling prices of SSP products, in terms of CIF Karachi prices inclusive of import duties, are as shown in Table 6-1, excluding sales tax.

Table 6-1. Unit Selling Price of Product per Tonne

Unit: Rs.

Product	Billet		Bar		
	Carbon Steel (SC)	Alloy Steel (AL)	Carbon Steel (SC)	Alloy Steel (AL)	Spring (SUP)
Unit Price	6,870	10,190	9,120	12,070	9,840

(3) The prices for procurement of raw materials are based on SSP's actual procurement prices.

(4) The variable costs of products were determined on the basis of the production yield (Table 4-3) and unit consumption of raw materials and utilities which are improved by higher technical level owing to technical guidance.

Table 4-3. Production Yield

Final Product	Item		SSP Performance	Plan by Survey Team
Billet	Good Ingot/Raw Material	(A)	88.2%	86%
	Billet Product/Ingot	(B)	-	77%
	(A) x (B)		-	66%
Bar	Good Ingot/Raw Material	(A)	88.2%	86%
	Billet/Ingot	(B)	75.0%	82%
	Bar Product/Billet	(C)	58.8%	88%
	(A) x (B) x (C)		38.9%	62%

(5) The mean annual wages per employee was set at Rs.15,000 by referring to SSP's wage standards.

(6) The tangible fixed assets outstanding on the books as of June 30, 1979, was set at Rs.305,567,000, to which was added the new investment of Rs.85,600,000, based on which the depreciation cost for each year was calculated. (Refer to Table 6-4.)

(7) SSP's annual payment of interest was set at Rs.94,831,000 on the assumption that the interest rate on its liabilities as of June 30, 1979, is 10%.

5.2 The Pro Forma Income Statement and Cash Flow Schedule were prepared on the basis of the financial assessment preconditions outlined in paragraph 4.1, and the Internal Rate of Return (IRR) was calculated by the DCF method.

(1) As indicated by the Pro Forma Statement (Table 6-8-1), a huge deficit would be generated every year when this tentative plan is adopted, and there would be no outlook for dissolving these deficits. Even if the debt equity ratio of 30 : 70 proposed by SSP is realized, deficits would be generated likewise and they would be unavailable for dissolution of deficits.

(2) Regarding the cash flow (refer to Table 6-8-1), a chronic state of acute cash shortage would result every year when the tentative plan is adopted. Accordingly, if SSP is to carry out tentative plan, it would have no alternative but to rely

on the government or SEC for annual subsidies for covering the cash shortage generated each year in order to secure its existence.

(3) The internal rate of return of the tentative plan is -7.174%, which means that if the tentative plan is adopted, the total invested capital would diminish steadily without the entire sum ever being recovered.

(4) Sensitivity analysis was performed with respect to fluctuations in product selling prices, raw material costs and utilities costs. It was confirmed that a very low IRR would be obtained even if these factors are improved to some extent.

(5) Judging from the results of the financial assessment described above, the conclusion is that SSP's viability as a corporation cannot be maintained even on the basis of this tentative plan.

6. Study of Rehabilitation Plan from Standpoint of Government and SEC

6.1 The government or SEC will have to supplement SSP's cash shortage in the form of annual subsidies when the tentative plan is enforced by SSP.

The total amount of subsidies to be disbursed from the 1st to 10th year, and the net present value of subsidies as of the zeroth year, will be as follows: (Refer to Table 7-1.)

Debt equity ratio	96 : 4	30 : 70
Total subsidy	Rs.766,199,000	Rs.115,139,000
Net present value of subsidy as of zeroth year	Rs.481,426,000	Rs.81,420,000

As is evident from these results, the government or SEC would have to bear an enormous financial burden when SSP enforces the tentative plan, so this subject requires the most serious scrutiny.

6.2 If it is assumed that there is no interest paid the cash inflow according to the tentative plan would be as shown in Table 7-2. Namely, with a total investment of Rs.85,600,000, the total cash inflow from the 1st to 10th year would be Rs.226,118,000.

The total net cash inflow for the period from the 0th (zeroth) to 10th year generated by this cash inflow would be Rs.140,555,000, so with a discount factor of 10%, the net present

value of cash inflow as of the zeroth year would be Rs.37,758,000.

Namely, the net cash inflow generated when the tentative plan is enforced would be Rs.37,758,000 in terms of the net present value of cash inflow as of the zeroth year, which may be regarded as the value generated by the existing plant.

Accordingly, if there is some other plan by which the existing plant could be managed at a value exceeding Rs.37,758,000, then such a plan would be better than this tentative plan.

7. Conclusion

Financial analysis has shown that even if preconditions causing favorable results are set up for the production plan for rehabilitation of SSP, deficits would not be dissolved for a long period of time owing to the plant's extremely poor financial efficiency and profitability, leading us to the conclusion that there is unfortunately no workable rehabilitation plan for SSP.

INTRODUCTION

INTRODUCTION

Special Steel of Pakistan Ltd. (SSP) is the sole specialized special steel manufacturer in Pakistan.

SSP continued to operate under a state of chronic deficit management ever since it commenced operations, and the closure of its plant was ordered by the Economic Council of Cabinet (ECC) on the grounds that there was no outlook for dissolving the plant's huge deficits.

The government of Pakistan requested the Japanese government, through the medium of the Japanese Embassy in Pakistan, to investigate into the feasibility of rehabilitating the plant. In response to this request, the Japanese government studied the request and decided to dispatch a survey mission to Pakistan, consigning the task of enforcing the feasibility survey to the Japan International Cooperation Agency (JICA).

JICA organized a survey mission consisting of eight specialized special steel experts, and conducted field surveys for a period of 24 days from March 3rd to the 27th of the same month, 1980.

The survey and feasibility study were performed by the following procedures:

1. Economic Analysis of Causes of SSP's Deficit Management and Grasp of SSP's Present Situation

During the survey period, a wide variety of past records and data relating to SSP's production, sales, procurement and finance were collected, and with respect to items on which data were unavailable, interviews were held with related personages in order to obtain information for supplementing insufficient data.

The data and information collected in this manner were analysed and studied from various aspects, and the causes of SSP's deficit management were clarified.

2. Survey of Demands for Special Steels (Including Stainless Steel), Castings and Forgings in Pakistan

The Principal users of special steels, steel castings and steel forgings in Pakistan were

surveyed by the method of questionnaire by interview, in order to clarify the demands existing for these products.

In addition, in order to clarify the factors involved in the consumption of these proudcts, the members of the survey mission paid visits to plants producing automobiles, farm tractors and other commercial products, which are not direct users of special steels but are deeply related to these products. The national corporations making the production plans of these plants were also visited in order to find out their plans and to obtain related data.

Regarding the production, import and export of special steel products, related data were collected by means of the statistical data published by the government of Pakistan, and in Japan by means of export/import data released by various international organizations.

Meanwhile, the demands for special steel products were estimated by kind of end user industries on the basis of user responses to questionnaires, then summed up. At the same time, export-import statistical data were referred to and the volumes of demand existing for special steel products in Pakistan were summed up.

Based on these results, and by giving due thought to the growth rates of special steel demands by kind of end user industry and their future plans, an estimate was made of the future trends in the demands for special steel products.

3. Preparation of Tentative Plan

Based on the results of demand survey, a production plan was drafted for most efficiently utilizing SSP's existing production facilities, and a tentative plan for SSP's rehabilitation was prepared.

4. Financial Evaluation

A Pro Forma Income Statement and Cash Flow Schedule were prepared by the according method in order to sound out the soundness of the tentative plan that was drafted. At the same time, the internal rate of return was calculated by the DCF method and the financial aspects of the tentative plan studied on the basis these results.

5. Study of Merits/Demerits of the Tentative Plan for SSP's Rehabilitation from Government's Standpoint

Various referential values were calculated by the DCF method with respect to the tentative plan for use by the government of Pakistan in making its decision.

6. Conclusion

The results obtained by the methods described above in items 4 and 5 are made the conclusion of this survey study.

The survey mission's composition as well as a description of its itenerary of survey are given in the Appendix.

During a period of October 28 to November 4, 1980, JICA mission made an explanation on the Draft Report to the officials of the Government of Pakistan, SEC and SSP concerned, and also held discussions with them. As a result, the Draft Report was partially revised and what were desired at that time were included in the Appendixes.

In this report, the name 'SSP' was used despite several changes in the corporation's name during its history.

We avail ourselves of this opportunity to express our sincerest gratitude to all personages concerned of SSP, special steel consumers we visited and various other related governmental and other organizations, who offered us their unreserved cooperation, useful references and helpful opinions.

CHAPTER 1.
HISTORY OF SPECIAL STEELS OF PAKISTAN LTD. (SSP) AND CAUSES OF CLOSURE

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1.1 History of SSP

The history of SSP starts with the stage of its construction plan in early 1960 and extends to the stage of its closure in late 1979. This span of roughly 20 years may be divided broadly into the following three stages:

Stage 1: From 1960 to December, 1968
From planning to effectuation of contract

Stage 2: From January, 1969 to August, 1975
From execution of contract to delivery of plant

Stage 3: From September, 1975 to December, 1979
From commencement of commercial production to closure of plant

1.1.1 Stage 1: From Planning to Effectuation of Contract

1960-1963 Planning by Pakistan Industrial Development Corporation (PIDC) of this project

1964 Valika Group was given permission to materialize the project

Jun. 1965 -
Feb. 1968 Valika Group Conducted a series of negotiations with Nissho Co., Ltd. while so doing, Valika Group decided on the plant production capacity and the product mix.

Feb. 1968 Contract was signed by Valika Group and Nissho Co., Ltd.

Dec. 1968 Plant construction contract was effectuated.

The Pakistan Industrial Development Corporation (PIDC) envisaged in the early 1960s a plan to construct a special steel plant, and later in 1964 entrusted the implementation rights for the plan with the Valika Group, a private corporation.

Pakistan was then implementing "The Third Five Year Plan 1965-69". Ambitious industrialization plans were drafted and PIDC, for its part, drew up plans to construct a variety of industrial complexes including heavy machinery complex, heavy chemical complex and heavy locomotive complex. The special steel plant was planned to produce and supply various kinds of special steel necessary for the heavy industrial complexes just mentioned.

Pakistan's heavy industry was being promoted primarily by governmental organizations centering around PIDC, as described above. In the 1960s, private enterprises, having gained strength through the success in the investments in light industries, especially in the cement and textile industries, became enthusiastic in establishing themselves in the sector of heavy industries.

The Ayub Kahn regime, aware of this situation, adopted a policy to permit projects planned by governmental organizations to be turned over to accredited private corporations for materialization if they so desire.

This special steel plant project was the first heavy industrial project that was transferred to the private sector for execution.

The Valika Group, having taken over the rights for implementation of the project from PIDC, negotiated with Nissho-Iwai Co., Ltd., and concluded the contract in February, 1968.

No reliable feasibility study or selection of production capacity and product mix based on actual demand appears to have been made by PIDC during drafting of original project plan nor by the Valika Group.

It may, however, be said that more decisive blow to the commercial feasibility of this project is believed to have been dealt by the non-realization of the ambitious extension plan of heavy chemical complex which was envisaged in the 1960s. Whereas a fairly big demand had been anticipated for SSP products at the time of planning, the gap between the estimated demade in the industrial sector and actual demand after completion of the plant had been considerably great.

1.1.2 Stage 2: From Execution of Contract to Delivery of Plant

Dec. 1968 Execution of contract commenced.

Feb. 1970 Shipment of machinery started as per the schedule in the contract.

Jun. 1970 Valika Group became incapable of establishing letters of credit, and this condition continued until November, 1971

Feb. 1971 Disturbance occured in East Pakistan.

May 1971 Pakistan government declared moratorium.

Dec. 1971 War broke out between India and Pakistan.
Bhutto regime was established.

Jan. 1972 Bhutto regime declared nationalization of principal industries, placing SSP under the state control. Shipment completed.

Oct. 1972 Installation of plant equipment commenced.

Apr. 1973 SSP renamed Peoples Steel Mills, Ltd.

Jun. 1973 PSM engineers (72 persons) started receiving technical training in Japan for their respective assignment in SSP.

Aug. 1974 Partial trial operation commenced.

Aug. 1975 Guarantee operation of all equipment completed, and the plant was formally taken over by PSM.

Upon effectuation of the contract in December, 1968, plant designing and manufacture of equipment commenced immediately, and shipment of machinery and equipment started in February, 1970, as stipulated in the contract. In August the same year, the Valika Group became incapable of establishing letters of credit and the shipping was suspended until November, 1971.

Shipping of machinery and equipment of the plant became possible in December, 1971, with the opening of letters of credit. However, refusal by shipowners due to the outbreak of war between Pakistan and India led to stoppage of shipping until mid-January, 1972. Shipment of all plant machinery and equipment was completed toward the end of January, 1972.

The Bhutto regime which assumed power on December 20, 1971, promulgated its Economic Reforms Order on January 16, 1972, which placed the special steel plant under the state control. This Order had the effect of adversely influencing the smooth progress of the project, as indicated by the serious delays compared with initial schedules, as shown below:

	Contracted Schedule	Actual Schedule
Effectuation of contract	Dec. 1968	Dec. 1968
Final shipment	Dec. 1970	Jan. 1972
Starting of installation	Jul. 1970	Oct. 1972
Completion of installation	Jun. 1971	Aug. 1974
Starting of trial operation	Jul. 1971	Aug. 1974
Delivery of plant	Feb. 1972	Aug. 1975
Period of time required	3 years 2 months	6 years 8 months

A delay of three years and 6 months was unfortunately made in the schedule, as shown above.

In the meantime, the world economy faced an age of most turbulent upheavals. The oil crisis, wide fluctuations in foreign exchange rates and a galloping inflation were witnessed. The plant construction cost, initially estimated at roughly Rs.167 million, underwent a violent increase during this turbulent period and reached a staggering sum of Rs.532 million by the time the plant started commercial operation. In addition, since 92% of the moneys was the proceeds from loans, and the construction schedule delayed for such a long period of time, SSP's financial stability was badly affected.

1.1.3 Stage 3: From Commencement of Commercial Production to Termination of Plant Operations

Aug. 1975 Commercial production commenced immediately after plant take over.

Mar. 1978 Application placed with the government for converting a portion of loan to the capital to improve the poor capital/loans ratio of 8 : 92.

Aug. 1978 Application placed with the government for the following points:

1) Improvement of capital/loans ratioto 7 : 3
2) Additional loan of Rs.149.8 million
3) Shelving of interest payments for a period of ten years

Dec. 1978 Loan of Rs.35.1 million was received from the Government as operating fund for a period up to the end of June, 1979.

1979 Corporate name changed to Special Steels of Pakistan, Ltd.

Mar. 1979 Budget of Rs.5 million requested for conducting a market survey.

Dec. 1979 Termination of plant operation decided following the deliberations by Economic Council of Cabinet (ECC).

Although commercial production started in August, 1975, timely procurement of necessary raw materials became difficult owing to inept procurement procedure and acute shortage of funds. In addition, whereas this special steel plant had been designed to supply special steel materials to the various heavy industrial complexes planned for construction in the 1960s, as described earlier, hardly any of these complexes was actually constructed owing to the changes in Pakistan's political and economic environments. This made it impossible for the special steel plant to secure stable clients for its products.

One of the characteristics of special steel production is that special steel is produced as orders are received, and it requires certain technique to keep the plant in good operating condition. SSP's plant was operated without receiving suitable technical for management, production control and production know-how from foreign countries, with the result that the plant's annual rate of operation slumped to about 20%, aggravating SSP's financial situation.

According to the terms of the contract, SSP had the right to demand from the Japanese contractor to receive technical know-how up to a limit of 350 man-days during the five-year period from the time of plant take-over to August, 1980, but the shortage of funds and other factors prevented it even from exercising this privilege.

SSP's capital remained the same during the entire period from the time of commencement of commercial production in August, 1975, to the time of closure in December, 1979. An acute shortage of operating funds was chronic, and emergencies were tided over, by the advance payments from Pakistan Steel Mills Corporation, Pakistan Railways and other clients. There was virtually no financial aid from the government, and it was practically impossible to ask for additional loans from commercial banks. The interest on loans in the meantime continued to bulge increasingly.

In order to get over the difficulties, SSP appealed for assistance to the government authorities through its upper organization verbally and in writing. As a result, the SSP's predicament was finally taken up as one of the agenda for deliberations by the ECC in December, 1979. After the serious deliberations, ECC resolved that SSP operations should be shut down for the reason that there was no distinct outlook to alleviate SSP's operational deficits.

1.2 Production Capacity and Principal Equipment

1.2.1 Production Capacity

Table 1-1 indicates the design production capacity of SSP's special steel plant as determined by the Valika Group. (See on page 1-7.)

1.2.2 Principal Equipment

Table 1-2 indicates the principal equipment installed in the plant in order to maintain the production capacity described in Item 1.2.1. These equipment were designed with enough capacities for producing the product mix indicated in Table 1-1, and were more sophisticated than those of other existing steel plants in Pakistan. (See on page 1-8.)

Table 1-1. Production Capacity

Name of Products	Annual Production t/y	Specification of Products			
		Steel Grade	Form	T/D* x W x L	Final Treatments
Stainless Steel Cold Rolled Sheet	2,000	AISI-304	Sheet	(0.7–1.2)mm x 914mm x (1.5–2.0)m	"2D" Finish (Cold Rolled, Annealed and Pickled Sheet)
Stainless Steel Hot Rolled Sheet	3,000	AISI-304	Sheet	(1.2–2.3)mm x 914mm x (1.5–2.0)m	No. 1 Finish (Hot Rolled, Annealed and Pickled Sheet)
Carbon Steel Plate/Sheet	1,000	JIS-SM50C	Plate, Sheet	(2.3–6)mm x 914mm x (1.0–1.5)m	Hot Rolled
Special Steel Bar	11,200	Carbon Steel: AISI-1045 1060 1080 Cr-Mo Steel: AISI-4118 4130 Ni-Cr Steel: AISI-3140 Cr Steel: AISI-5135 Stainless Steel: AISI-304	Round Square Hexagonal	(ϕ22–40) mm x (4.0–6.0) m (□22–40) mm x (4.0–6.0) m (⏢23–41) mm x (4.0–6.0) m	Hot Rolled, Annealed.
Forged Product	800	Carbon Steel: AISI-1030 1035 1045	Free, Die	Free Forged (500 t/y) Die Forged (300 t/y)	As Forged, Annealed.
Cast Steel Product	2,000	Carbon Steel: AISI-0030	–	Unit Weight: 5–5,000 kg	As Cast, Annealed
Total	20,000	–	–	–	–

* Thickness or diameter

Table 1-2 Principal Equipment

Name of Shop	Principal Equipment		Materials	Products	Application of Products
Steel Melting and Steel Casting	Electric Arc Furnace (10/12 t) Ingot Conditioning Equipment, etc. Electric Arc Furnace ¾ t Steel Casting Equipments	x 2 x 1 x 1 x 1	Steel Scrap, Ferro Alloy Lime Stone, Fluorite, etc.	900 kg, Round Ingot 600 kg, Slab Ingot As-cast Steel	Billet Sheet/Plate Cast Steel Product
Blooming and Slabbing Mill	Ingot Reheating Furnace (9 t/h)	x 1	900 kg, Round Ingot	90x90, 75x75 mm Billet	Bar Rolling Forging
	φ800 x 1,800mm 2-High Rev. Mill (Blooming & Slabbing Combined Mill)	x 1	600 kg, Slab Ingot	12–18 mm T Sheet-bar	Stainless, Sheet Rolling
	Roll Grinder and Roll Lathe	x 1		Min. 6 mm, Steel Plate	Sheet/Plate
Bar Rolling Mill	Billet Reheating Furnace (6 t/h) Bar Rolling Mill Train (3-High Rougher: φ450 x 1,600 x 1) (3-High Finisher: φ300 x 600 x 3) (2-High Finisher: φ300 x 600 x 1) Annealing-Furnace, etc.	x 1 x 1	90x90 – 75x75 x 2,300mm Billets (146 kg)	22 – 40 mm Bar (Round, Square, Hexagonal)	Semi-finished Bar Product
Sheet Rolling Mill	Sheet-bar Reheating F'ce (4 t/h) Hot Sheet Mill (Pullover) (2-High Rougher: φ700 x 1,120 x 1) (2-High Finisher: φ700 x 1,120 x 1) Cold Sheet Mill (φ320/850 x 1,120: 4-High Non-Rev.) Roll Grinder, Shear, Leveller, etc.	x 2 x 1	12–18 mm T Sheet Bar	Stainless Sheet 0.7–2.3 mm T Carbon Steel Sheet 2.3–5 mm T	Stainless Sheet (Hot Sheet, Cold Sheet) Carbon Steel Sheet
Forging	Air Hammer (1 t x 1, ½ t x 1) Air Drop Hammer (1 t x 1, ½ t x 1) Furnace, etc.		Bar and Billet	As Forged	As Forged
Sub-Station, etc.	Electric Sub-Station Air-Compressor, Crane, Fork-lift, Track, Mobil crane, Testing equipment, etc.		–	–	Utility Supply, Transportation, Testing, etc.

1.3 Procurement

The Procurement Department should procure good raw materials as cheaply as possible and secure proper quantities of these materials in stock. However, it appears that SSP made arrangements for procuring raw materials on the premise of producing the entire line of designed product mix, despite the fact that there were no orders for certain products in the first year of operation.

Some kinds of the raw materials in stock at end the 1975 term exceeded the volume normally consumed in a period of four years up to 1978. On the other hand some kinds of the raw materials necessary for daily production were insufficiently stocked. For example, hot top brick could not be procured and production was hampered, it was reported.

In addition, the excessive large stock increased maintenance costs such as interest on stockpile materials and administration expenses, and the effects of a bearish market also influenced adversely to impair the turnover rate, increase operating expenses and consequently lower the business management efficiency.

The purchasing prices of some of the raw materials are indicated in Table 1-3, which are exceedingly higher as compared with prices in Japan.

Table 1-3. Purchasing Price

	Classification	Unit	SSP (Oct. 1979)	Japan (Oct. 1979)
Imported*	Scrap (Heavy)	Rs./t	2,800	1,320 - 1,400
	Pig Iron	Rs./t	4,480	1,320 - 1,400
	Fe-Si	Rs./t	19,460	7,200 - 8,000
	Fe-Mn (H)	Rs./t	9,324	4,080
	Fe-Cr (H)	Rs./t	23,100	6,720
	Fe-Cr (L)	Rs./t	32,200	11,400
	Hot Top Brick	Rs./piece	210	120
	Graphite Electrode	Rs./t	26,600	19,200 - 20,000
Local	Electricity	Rs./kWh	0.55	0.4 - 0.6
	Fuel	Rs./1,000 cft	11.02	** 56 - 64
	Fluorite	Rs./t	1,200	840 - 880

Remarks: * C&F price x 1.4 (Import duty)

** Price of oil equivalent to 1,000 cft of natural gas in calorific value

Practically most of the raw materials and ferro alloys are imported, and it is considered that the purchasing prices of these raw materials were rather high, possibly because they were purchased in small quantities. An additional imposition of 40% import duty made the prices of these materials two to three times higher than those available in industrially advanced steel producing countries. This is one of the factors that brought difficulties to SSP.

1.4 Operating Performance

Funds had been deficient from the time of commencement of plant operation, resulting in insufficient procurement of necessary raw materials and auxiliary materials. Lack of funds also prevented introduction of necessary technical assistance for long-term plant management by aid of specialized special steel engineers from industrially advanced countries. As a result, plant output and operation rate fell to as low as 20% of the designed production capacity, the productivity was low due to excessive employees, and the product yield was also very poor.

1.4.1 Output and Production Efficiency

Excluding the rolling of billets under consignment, the plant's mean annual output during the period from August, 1975, to June, 1979, was as shown in Table 1-4.

Table 1-4. Capacity and Result of Production

Classification	A) Capacity (t/y)	B) Result (t/y)	B) / A) %
Stainless Sheet (C.R.)	2,000	170	8.5
Stainless Plate (H.R.)	3,000	30	1.0
Carbon Steel Plate (H.R.)	1,000	350	35.0
Carbon, Alloy and Stainless Bar	11,200	110	1.0
Casting	2,000	90	4.5
Forging	800	60	7.5
Sub-Total	20,000	810	4.0
Billet	0	2,900	
Grand Total	20,000	3,710	18.5

Namely, the plant's production efficiency was as low as only 4% of the designed production capacity, and even when taking into consideration the production of billets, which had not been included in the original plan, the production efficiency was only 18.5%.

Table 1-5 indicates some part of the plant's mean annual output of each process for the same period as indicated above. As shown in the table, the actual production efficiency is very low in each stage a processes.

Table 1-5. Plan and Result of Production by Process

	A) Plan (t/y)	B) Result (t/y)	B) / A) (%)	Shift
Melting	28,320	6,151	21.7	3
Cogging and Blooming	28,320	4,888	17.3	1

Regarding the number of employees, the initial plan was projected to produce a total of 20,000 tons of special steel annually by a three-shift operation per day in the steel making and sheet rolling processes, while by a two-shift operation per day for the other processes. According to this operation, a labor force of 1,099 employees was the reasonably proper number.

However, the number of employees as of January, 1978, and January, 1979, was 1,280 and 1,206, respectively, in spite of the low production efficiency of 18.5%, which indicates the hiring of an excessive number of employees. This may be attributable to the powerfulness of the SSP labor union, as shall be described in further details later under the subject of Labor Situation (Item 1.6), which prevented SSP from deploying a suitable number of workers proportionate to the rate of operation.

1.4.2 Production Yield, Efficiency and Unit Consumption of Raw Materials and Utilities

Table 1-6 indicates the production yield by stage of process, which serves as an indicator for evaluating the operation technique level of production lines. It is evident that the yield at SSP is far lower than those of industrially developed countries.

Table 1-6. Yield of Products

Process	Product	Yield	
		SSP	Developed Countires
Melting Shop	Ingot (Ingot/Raw Material)	79 - 89%	85 - 90%
Cogging Mill	Billet (Billet/Ingot)	74 - 78%	85 - 90%
Bar Mill	Bar (Bar/Billet)	31 - 63%*	90 - 95%
Total Yield		19 - 42%	70 - 75%

Remark: * This includes the products from the trial period.

A study of this table shows that, as compared with corresponding figures for developed countries, the ingot yield is 1 - 6% lower, the billet yield 11 - 12% lower and the bar yield 32 - 59% lower, namely the difference with developed countries becomes increasingly larger in the succeeding stage of processes.

By superficial observation the extremely poor overall yield at SSP may appear to be due to the poor operation technique in the bar rolling process. However, a study of the inspection slips and ledgers at SSP indicated that the poor yield in bar rolling was primarily due to the low technical level in the proceding steel making and cogging processes. Namely defects generated in these processes were not eliminated owing to the inadequate control measures of intermediate inspection and defect removal, with the result that defective billets were sent to the bar mill for rolling.

For example, defective billets which should have been discovered and eliminated by inspection after cogging were sent to the bar mill, with the result that a large number of pipe defects were discovered in bar products after completion of the final manufacturing process.

Table 1-7 shows the principal indicators relating to production efficiency and unit consumption of raw materials and utilities.

Table I-7. Efficiency and Unit Consumption

Item	SSP		Developed Countries
	Design Efficiency	Result	
Steel Making Time (Tap to tap: min/heat)	318	270 - 300	160 - 180
Power Consumption of E.A. Fce. (kWh/t of Ingot)	750	780	530 - 560
Refractory Consumption (kg/t of Ingot)	--	38	18 - 20
Life of Mould (heat)	39	40 - 50	200 - 250

Remarks: 1) The figures for developed countries represent the performance of furnaces of the same type and capacity as that of SSP.

2) Design efficiency considers the local conditions.

While the poor yield and production efficiency stems directly from SSP's low plant operation rate, it is also due to the lack of suitable measures for pinpointing and eliminating the causes of defects. Survey Mission realizes that there have been various factors beyond the control of SSP.

1.4.3 Technical Level

The poor performance in productivity, operation rate, yield and efficiency and the high unit consumption of raw materials/utilities, has increased manufacturing costs. Meanwhile, SSP had had to sell its products at market prices which were lower than manufacturing costs, leading to substantial SSP losses.

The following points may be cited to indicate the low technical level at SSP:

1) Inadequate Technical Guidance

Prior to commencement of plant operation, a total of 72 SSP technicians received technical training at Japanese steel plants for a period of 6 months to one year in their respective fields of assignments, based on the training program outlined in the contract.

While this type of technical training is naturally necessary, it was also necessary to perform at SSP a wide range of technical guidance on process control and quality control by relying on the services of specialized engineers from advanced steel manufacturing countries for at least 3 – 4 years, in order to ensure unhindered production of special steels even after commencement commercial operation.

Special steels cannot be produced simply by constructing a plant and operating it according to the instruction manual. In order to produce various kinds of special steel products of diversified properties, a wide range of highly sophisticated technologies and technical know-how is required. In addition, each process is greatly influenced by the performance of the preceding process, and the quality of the product is determined by the cumulative influences of all the processes involved. Accordingly, special steels of excellent quality can be produced only by adopting an integrated system of control of the widest range of technologies in the entire production line from selection of raw materials to shipment of finished products.

The SSP management fully recognized the necessity of technical guidance after commencement of plant operation, but as described earlier, the acute shortage of funds prevented it from exercising its rights to procure the services of specialized engineers for technical guidance for 350 man-days over a period of five years as stipulated in the contract.

2) Shortages of Raw Materials, Auxiliary Materials and Parts

Procurement personnel who had little idea as to the proper procurement of raw materials, auxiliary materials and parts induced shortage of needed materials. The shortage was also aggravated owing to lack of funds. This situation pressed engineers to devise measures for obtaining these materials, which prevented them from exerting themselves in improvement of technology, improvement of plant performance and training of workers.

It was only natural that engineers became incapable of improving technical standards or reducing manufacturing costs.

1.5 Sales Performance

As indicated in Table 1-8, the total volume of finished and semi-finished products sold by SSP after commencement of plant operation is 31,674 tons, of which 252 tons were exported, and the remainder sold to domestic users.

The sales volumes by kinds of product, shows that billets were sold in the volume of 28,936 tons (92%), round and flat bars 269 tons (0.9%), plates and sheets 1,429 tons (4.5%), castings 292 tons (0.9%), forgings 178 tons (0.6%) and miscellaneous products 317 tons (1.1%). (See Table 1-8 on page 16.)

As indicated by these figures, the volume of sales of non flat product was so small since the equipment were not designed for producing bars in the sizes demanded by the domestic market, with the result that the output of bars was only 269 tons in five years against the large production capacity of 11,200 tons/yr of the bar rolling mill. By contrast, the sales volume of billets, whose production had not been included in the original product mix, ran up to 28,936 tons, occupying substantially the entire volume of non flat sales.

Regarding the destinations of these products, round and flat bars as well as castings and forgings were sold to a wide range of industries including the automotive, cement, farming machinery, textile machinery, general industrial machinery and defense industries. Meanwhile, billets which were roughly 92% of the domestic sales amount were bought in the largest volume by Pakistan Steel Mills Corporation (PASMIC) for its construction materials, Pakistan Engineering Corporation (PECO) for producing industrial machinery, and steel manufacturers such as Metropolitan Steel Corporation (MSC), Amrass Corporation and Razzaque Steels Ltd.

As for sales prices of SSP products, they are in principle based on those of imported products, but it seems that SSP was forced to discount their sales prices due to the inferior quality.

Stainless sheets could not compete with imported products because users did not require the thicknesses of those sheets available of SSP. Additionally, those imported stainless sheets were of the secondary quality available at a substantially lower prices than those of the SSP products.

Table 1-9 offers a comparison between the sales prices of representative SSP products and those of corresponding imported products. As indicated by the Table, a definite

Table 1-8. Sales Results of SSP Products

Unit: Quantity t
Value Rs.

		1975/76		1976/77		1977/78		1978/79		79, July–Dec.		Total	
		Quantity	Unit Value	Quantity	Unit Value	Quantity	Unit Value	Quantity	Unit Value	Quantity	Unit Value	Quantity	Unit Value
Billet	Carbon Steel												
	Prime quality	5,318.8	3,410.7	3,781.9	4,647.0	2,801.8	5,000.7	1,678.7	5,215.1	1,607.6	5,004.6	15,188.8	4,380.0
	Second quality			97.5	3,400.0	774.3	3,366.7	1,742.8	3,260.0	298.4	3,805.0	2,913.0	3,349.0
	Cogging							(4,546.2)	(663.3)	(6,006.2)	(591.5)	(10,552.4)	(622.0)
	Sub-Total	5,318.8	3,410.7	3,879.4	4,615.7	3,576.1	4,646.9	3,421.5	4,219.2	1,906.0	4,817.0	18,101.8	4,214.0
	Alloy Steel			10.1	10,150.0			97.7	7,818.9	174.3	5,650.0	282.9	6,564.0
	Total	5,318.8	3,410.7	3,889.5	4,630.0	3,576.1	4,646.9	3,519.2	4,319.0	2,080.3	4,847.6	18,383.9	4,250.0
Round Bar /Flat Bar	Carbon Steel			5.0	7,500.0	120.0	6,166.0	18.7	9,145.0	9.5	9,645.0	153.2	6,788.0
	Stainless Steel			1.1	10,394.0	0.1	25,000.0	0.3	40,000.0	1.0	22,500.0	2.5	19,824.0
	Alloy Steel			7.6	9,816.0	24.8	8,000.0	41.6	9,597.0	39.7	9,033.0	113.7	9,060.0
	Total			13.7	9,017.1	144.9	6,493.9	60.6	9,608.0	50.2	9,417.1	269.4	7,867.9
Stainless Sheet	CR-Prime quality	35.1	15,327.0	36.7	21,942.0	88.7	24,122.0	36.8	26,925.0	22.2	27,399.0	219.5	23,124.0
	CR-Second quality	7.5	13,224.0	74.7	15,246.0	109.7	32,461.0	50.3	20,773.0	16.9	23,115.0	259.1	24,058.0
	HR-Prime quality	0.4	20,000.0	18.3	25,868.0	8.7	25,121.0	24.8	37,454.0	1.0	46,019.0	53.2	31,428.0
	Total	43.0	15,004.0	129.7	18,639.0	207.1	28,581.0	111.9	26,493.0	40.1	26,068.0	531.8	24,409.0
Plate	Carbon Steel												
	Prime quality	297.4	5,627.7	260.2	6,460.0	12.3	6,908.0	293.3	6,581.0	26.4	7,038.0	889.6	6,244.0
	Second quality							5.8	5,200.0	1.1	9,000.0	6.9	5,852.0
	Total	297.4	5,627.7	260.2	6,460.0	12.3	6,908.0	299.1	6,554.2	27.5	7,116.5	896.5	6,241.0
Casting	Carbon Steel	13.3	19,288.0	3.2	24,630.0	0.9	35,402.0	1.1	18,171.0	0.7	12,003.0	19.2	20,573.0
	Stainless/Alloy	8.4	27,565.0	9.5	39,679.0	120.7	35,016.0	6.7	35,000.0	26.7	21,059.0	172.0	32,745.0
	Gray cast iron							101.1	12,829.0			101.1	12,892.0
	Total	21.7	22,492.0	12.7	35,887.0	121.6	35,019.0	108.9	14,347.0	27.4	20,828.0	292.3	25,079.0
Forging	Carbon Steel	18.1	13,345.0			1.5	9,800.0	4.8	15,073.0	1.3	23,326.0	25.7	14,011.0
	Stainless/Alloy	16.4	7,855.0	65.7	15,587.0	19.5	54,672.0	24.4	36,766.0	5.5	63,478.0	131.5	26,357.0
	Grinding Media							21.0	8,500.0			21.0	8,500.0
	Total	34.5	10,735.0	65.7	15,587.0	21.0	51,467.0	50.2	22,867.0	6.8	55,802.0	178.2	22,472.0
Export	Contracted price	25.0	10,000.0	150.7	12,277.0			59.4	23,429.0	16.6	23,307.0	251.7	15,406.0
Miscellaneous		1.0	22,440.0	1.0	52,155.0	135.4	5,435.0	95.7	26,443.0	83.9	13,365.0	317.0	6,173.0
Ground Total		5,741.4		4,523.2		4,218.4		8,851.2		8,339.0		31,673.2	

Remarks: 1) Quantity in ( ) shows the billets rolled on consignment from PASMIC and other companies.
2) Unit value in ( ) shows the rolling fee of the billets.

relation exists between the prices of SSP products and imported products, with the exception of a portion of products having different sizes and compositions.

Table 1-9. Comparison between Sales Price of SSP Products and Sales Price of Imports

		Sales Price of SSP Products (Rs.)	Import Price (Estimate)			
			C&F Price (Rs.)	Duty (%)	Sales Tax (%)	Sales Price of Import Product (Rs.)
Billet	Carbon Steel	5,000 - 5,200	-	-	-	-
	Alloy Steel	5,700 - 5,800	2,610	60	10	4,600
Round Bar/Flat Bar	Carbon Steel	9,100 - 9,600	6,020	70	20	12,280
	Alloy Steel	9,000 - 9,600	6,070	70	10	11,350
Plate	Carbon Steel	6,600 - 7,000	3,686	70	10	6,893
Sheet	Stainless Steel	27,000 - 27,400	13,024	70	10	24,355

Remarks: (1) Data Source

* Sales Price of SSP Product ..... Answer of SSP for survey mission's questionnaire.
* C&F Price ..... Statistic Division, Government of Pakistan.
Average Price form July/1979 to January/1980.

(2) Sales Price of Import Product

C&F Price x (1 + Duty/100 %) x (1 + Sales Tax/100 %)

1.6 Labour Situation

Regarding labour conditions in general, the minimum wage is provided by the following three labour laws:

1) Factories Act (1934)
2) West Pakistan Industrial & Commercial Employment (Standing Order) Ordinance (1968)
3) West Pakistan Shops & Establishment Ordinance (1969)

These three labour laws define the standards relating to the rights of labourer's

organization, employment, hours of labour, holidays and leaves, bonus, retirement allowance, social security system and welfare.

According to these ordinances, the period of probation is three months at the longest as a principal form applicable to the greater portion of employees in large enterprises. Upon expiration of the three months of probation, a probationer automatically becomes a permanent employee. A temporary worker becomes a permanent employee after working for nine months and if his period of further employment is expected to extend over a substantial period of time.

Regarding dismissal, as defined under the item of termination of employment, the employer is required to give the employee to be dismissed a written advance notice one month prior to the date of dismissal, clearly stating the reason for dismissal. This may be substituted by additional payment of one month's wages.

If the dismissed is dissatisfied with the treatment, he may plead his case to the collective bargaining between the management and labour union. In actually, other than misconduct defined by the law dismissal of an employee is considered extremely difficult.

Regarding holidays, Friday is the weekly holiday. In addition, there are paid holidays based on legal holidays, holidays stipulated by contract, holidays which are customary and holidays which are announced by the central government or local government from time to time to meet special occasions.

There are essentially three kinds of leaves -- annual leave, casual leave and sick leave. When these leaves are combined with the holidays described above, the maximum number of working days per annum for a factory is 263 days. Incidentally, it is prescribed by the ordinance that holidays not taken can be carried over to the following year up to a fixed number of days, or for the employee to demand an equivalent remuneration.

The aforementioned three labour ordinances essentially spell out the minimum standards, and revision of provisions is possible by collective bargaining, in which case these revisions have a similar validity as of a law. Similar binding power is exercised by provisions which are established by customary or traditional practices.

Provisions are also made for group insurance and group incentive schemes on the basis of labour laws with respect to social security and welfare. For example, there are the Worker's Children Education Ordinance (1971) by which taxes for education should be im-

posed, the West Pakistan Employees Social Security Ordinance (1979), and the Worker's Welfare Fund Ordinance (1971) for offering loans to workers, for example, for housing purposes. These systems are supported financially primarily by employers.

As described above, the Factories Act of 1963 was followed with the successive enactment of labor ordinances in 1968, 1969 and 1971, and backed by these ordinances, workers started making demands for recognition of their rights.

The year 1970 marked a peak in labor strife. There were 356 cases of labor strife with the participation of 272,387 laborers, resulting in a loss of 3,114,850 man-days. With the emergence of the Bhutto regime in late 1971, principal industries and commercial banks were placed under the state control, and the number of labor strikes themselves decreased owing to the adoption of measures offering preferential treatment to laborers. However, organized labor and labor unions meanwhile grew into powerful organizations.

For reference, the information on the labour strifes in those days is offered hereunder, based on ILO statistics.

Year	Number of Labour Strifes	Number of Participants	Man-Day Loss	Reamrks
1968	138	116,576	417,428	Enactment of West Pakistan Industrial & Commercial Employment (Standing Order) Ordinance
1969	339	298,137	1,782,592	West Pakistan Shops & Establishment Ordinance
1970	356	272,387	3,114,850	Shipping of plant equipment commenced
1971	141	107,962	815,211	Outbreak of Indo-Pakistan War, Emergence of Bhutto regime
1972	341	12,588	611,908	Nationalization of SSP Installation of equipment commenced
1973	229	126,930	399,318	—
1974	370	301,753	1,433,553	Trial operation commenced
1975	266	129,385	798,183	Completion of warranty operation
1976	171	77,502		—
1977	81	49,093	200,865	—

The construction of SSP's special steel plant coincided with this period of incessant labour strife. A follow-up of the number of employees at SSP during the stage of the plant's construction shows that whereas there were only 88 employees at time of nationalization of the plant in January, 1972, the number expanded to 713 in 1973, and in the final stage of plant construction in 1974, the number had swollen to 1,191. Due to the Government's instructions, SSP was not able to dispose of those construction workers upon termination of construction, but was obliged to retain them even though many of them were not needed for the operation of the plant.

Although at the stage of trial operation of the plant, SSP tried to decrease the number of workers employed for construction work and newly hire plant operation workers, but this could not be done. In 1975, the number further increased to 1,465, which SSP managed to reduce to 1,119.

This number is far larger than that required for the full operation of the plant. Since these workers have to be kept on the payroll even though the plant was in operation at the rate of 20 - 25% of its full capacity. The labor problem was one of the major factors aggravating SSP's management.

1.7 Management Analysis

SSP's management condition was analyzed on the basis of the following thoughts:

1.7.1 Foundation of Analysis

1) The balance sheet received from SSP was rearranged in the general form.

2) The SSP's balance sheet lists such costs as the expenses for training in Japan, costs for plant start-up and expenses for trial production, under the heading of intangible assets, but in order to clarify the actual amount of profits and losses, the balance sheet was rearranged by listing training expenses under intangible assets, and start-up and trial production expenses under the profit and loss statement in the term concerned under review.

3) While contingent liabilities and committments should be included in fixed liabilities for analysis, these items were eliminated from the analysis since the SSP's balance sheet simply handles these items in its marginal notes.

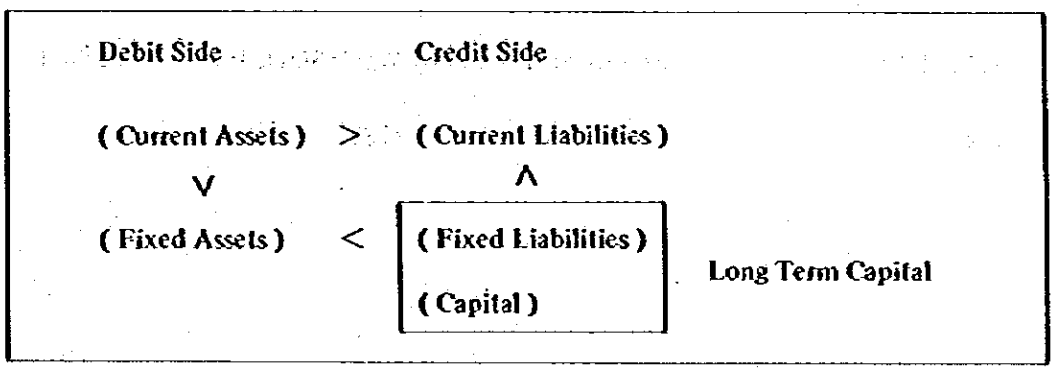
4) With the unit of Rs.1,000 the amount of money was figured out and Rs.500 and over were rounded at Rs.1,000 but neglected for the less.

5) Although analysis of profitability, safety, activity and manufacturing cost of product is normally performed in management analysis, profitability analysis was eliminated as marginal profits have not been gained since commencement of the plant operation.

1.7.2 How the Balance Sheet should be

The method to represent the balance sheet differs widely depending on the country's economic structure, commercial laws, taxation laws, kind of business and scale of enterprise.

In general, if the capital is comparatively small and procurement of plant equipment can not be furnished, and in addition, if funds are financed by financial organizations through long-term loans or corporate bonds as equipment funds, the following representation of the balance sheet will be preferable.



1.7.3 Financial Statements and Indicators

SPP's financial statements and indicators are as follows:

Table 1-10	1975-1979	Statement of Assets of Balance Sheet
Table 1-11	1975-1979	Statement of Capital and Liabilities of Balance Sheet
Table 1-12	1975-1979	Balance Sheet (Refer to Fig. 1-1)
Table 1-13	1975-1979	Financial Indicators
Table 1-14	1975-1978	Analysis of Cost of Goods Sold
Table 1-15	1975-1978	Analysis of Total Cost
Table 1-16		Comparison of SSP Balance Sheet with Those of Other Countries
Table 1-17		Results of Analysis by Wall's Single Indicator Method
Fig. 1-1		Profit and Loss (1977/78)

Table 1-10. Balance Sheet, Statement of Assets

Unit: Rs.1,000

Item	'75	'76	'77	'78	'79
Current Assets	145,885	164,178 (112.5)	165,503 (113.4)	141,390 (96.9)	122,018 (83.6)
Cash and Bank Balance	1,398	12,519 (895.5)	13,231 (946.4)	14,396 (1,029.8)	1,695 (121.2)
Credit Sales Account	281	1,431 (509.3)	4,203 (1,495.7)	3,229 (1,149.1)	6,989 (2,487.2)
Goods	4,523	14,917 (329.8)	13,399 (296.2)	13,325 (294.6)	
Materials	90,451	77,560 (85.7)	74,647 (82.5)	62,167 (68.7)	81,087 (78.3)
Goods In-Transit	8,642	14,864 (172)	15,049 (174.1)	11,828 (136.9)	
Stocks	37,022	39,652 (107.1)	38,586 (104.2)	33,550 (90.6)	29,216 (78.9)
Advances, etc.	3,568	3,235 (90.7)	6,388 (179)	1,647 (46.2)	3,031 (84.9)
Long Term Deposits	910	920 (101)	921 (101.2)	921 (101.2)	921 (101.2)
Claim Receivable	2,731	2,604 (95.3)	3,211 (117.6)	3,164 (115.9)	3,711 (135.9)
Fixed Asset	353,818	353,868 (100)	320,286 (90.5)	338,010 (95.5)	305,567 (86.4)
Intangible Assets	2,533	2,533	2,533	2,533	2,533
Deferred Charges	5	5	5	5	5
Profit & Loss Account (Adverse Balance)	-	Δ29,067	Δ88,812	Δ221,549	Δ395,588
Loss for this Financial Period	Δ29,067	Δ59,745 (205.5)	Δ132,737 (456.7)	Δ174,039 (598.8)	Δ145,782 (501.5)
Total	534,949	612,917 (114.6)	714,007 (133.5)	881,700 (164.8)	990,885 (185.2)
Carring Over of Depreciation	264	381	34,300	70,249	

Remarks: 1) As of 30 June of each year.
2) Figures in ( ) represent values obtained with 1975 figures set at 100.

Table 1-11. Balance Sheet, Capital and Liabilities

Unit: Rs.1,000

Item	'75	'76	'77	'78	'79
Current liabilities	183,725	207,160 (112.8)	249,689 (135.9)	288,317 (156.8)	353,404 (192.4)
Credit Provisions and Accrued Expenses	51,874	44,206 (85.2)	79,657 (153.6)	76,405 (147.3)	92,120 (177.6)
Bank Loans, etc.	131,266	149,556 (113.9)	158,203 (120.5)	198,637 (151.3)	253,619 (193.2)
Customers Advances	585	13,398 (2,290.3)	11,829 (2,022.1)	13,274 (2,269.1)	7,665 (1,310.3)
Long Term Loan and Deffered Liability	308,654	363,187 (117.7)	421,749 (136.6)	550,722 (178.4)	594,910 (192.7)
Deventures	37,210	56,617 (152.2)	56,617 (152.2)	56,617 (152.2)	56,617 (152.2)
Long Term Loan	246,091	280,448 (114)	309,025 (125.6)	430,426 (174.9)	467,704 (190)
Provision for Gratuity	969	1,738 (179.4)	3,012 (310.8)	3,685 (380.3)	4,385 (452.5)
Deferred Custom Duty	7,590	7,590	7,590	7,590	7,590
Other Liability	16,794	16,794	16,794	16,794	16,794
Consortium Loan	-	-	28,710	35,610	41,820
Capital					
Share Capital	42,570	42,570	42,570	42,570	42,570
Total	534,949	612,917 (114.6)	714,007 (133.5)	881,700 (164.8)	990,885 (185.2)
Liabilities other than above					
Contingent Liability	7,104	15,267	17,294	20,216	
Commitment	266	15,870	1,256	206	
Pending Lawsuits Against the Company	-	-	-	2,500	
Total	7,370	31,137	18,550	22,922	

Remark: As of 30 June of each year.

Table 1-12. Statement of Profit and Loss

Unit: Rs.1,000

Item	'75	'76	'77	'78	'79
Turnover	10,466	10,795	24,884	31,780	28,296
Cost of Goods Sold	14,118	17,335	93,235	92,445	83,621
Gross Profit	-3,652	-6,540	-68,351	-60,665	-55,325
General and Administration Expense	523	1,270	1,598	1,390	1,805
Selling and Distribution Expense	25	364	642	469	
Operating Profit	-4,199	-8,174	-70,591	-62,524	-57,130
Other Income	-	77	29	118	3,740
Financial Expenses	24,868	51,648	62,175	111,623	92,393
Net Profit for the year	-29,067*	-59,745	-132,737	-174,029	-145,783

Remark: * Denotes listing of trial manufacture losses as intangible assets in Balance Sheet.

Fig. 1-1. Profit and Loss (1977/78)

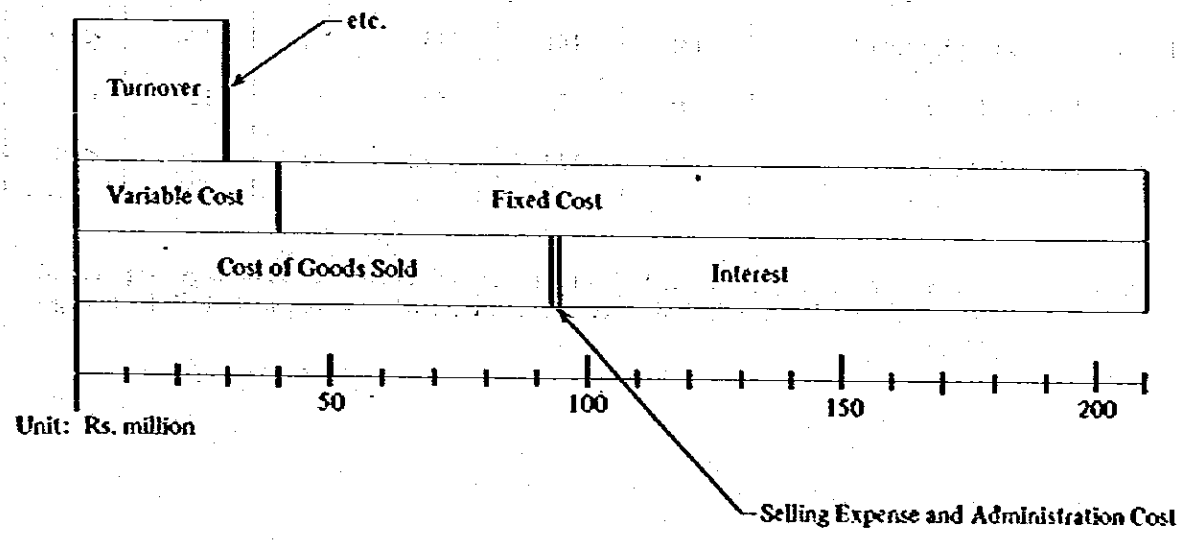


Table 1-13. Financial Indicators

Item	'75	'76	'77	'78	'79	Reference
Liquidity (%)	79.4	79.3	66.3	49.0	34.5	>100
Quick Ratio (%)	0.9	6.7	7.0	6.1	2.5	>100
Ratio of Fixed Liability to Net Worth (%)	831	831	752	794	718	<100
Ratio of Fixed Assets to Long Term Capital (%)	101.5	87.8	69.5	57.4	48.3	<100
Liability Ratio (%)	1,157	1,340	1,577	1,971	2,228	<100
Turnover Ratio of Total Capital (times)	0.02	0.02	0.04	0.04	0.03	>1
Turnover Ratio of Owned Capital (times)	0.25	0.25	0.59	0.75	0.67	>5
Turnover Ratio of Inventory Assets (times)	0.07	0.07	0.07	0.24	0.25	>20
Turnover Ratio of Raw Materials (times)	0.12	0.13	0.33	0.46		>20
Turnover Ratio of Fixed Assets (times)	0.03	0.03	0.07	0.10	0.09	>6
Turnover-Cost of Goods Sold (%)	135	161	375	291	296	<80
Turnover-Payment Interest (%)	238	478	250	351	327	<3
Turnover-Labor Cost (%)	32.3	123	73.6	58.4		<21

Remark: Turnover ratios are calculated on the basic of the mean values obtained at the beginning and end of terms. The figures shown in the Reference column are the values serving as the basis for management analysis.

Table 1-14. Analysis of Cost of Goods Sold

Unit: Rs.1,000

Item	'75	'76	'77	'78
Opening Stock	15,329	90,451	77,560	74,647
Raw Materials	15,329	86,172	63,909	62,369
Returnable Scrap	-	4,279	13,651	12,278
Purchases	95,548	1,826	18,725	4,779
Transferred to General Store	-	Δ594	Δ702	Δ326
Closing Stock	90,451	77,560	74,647	62,167
Raw Materials	86,172	63,909	62,369	57,001
Returnable Scrap	4,279	13,651	12,278	5,166
Materials Consumed	20,425	14,124	20,937	16,932
Manufacturing Expense	6,858	19,828	70,965	72,218
Total Manufacturing Cost	27,283	33,952	91,902	89,150
Work-in-Process-Opening Inventory	-	8,641	14,864	15,049
Work-in-Process-Closing Inventory	8,641	14,864	15,049	11,828
Cost of Goods Manufactured	18,641	27,729	91,717	92,372
Finished Goods Opening Inventory	-	4,523	14,917	13,399
Finished Goods Closing Inventory	4,523	14,717	13,399	13,325
Cost of Goods Sold	14,118	17,335	93,235	92,445

Table 1-15. Analysis of Total Cost

Unit: Rs.1,000

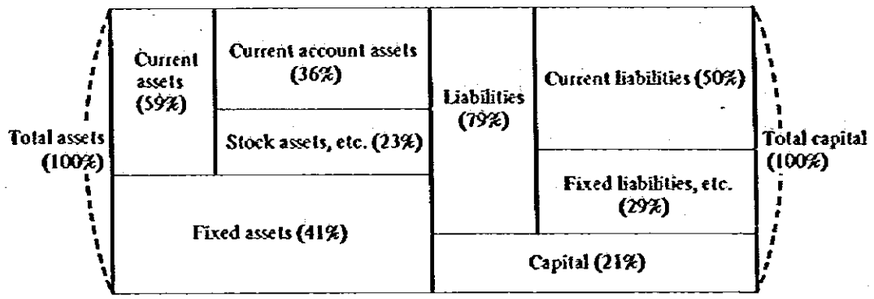
Item	'75	'76	'77	'78	Total		
Raw Materials Consumed	20,425	14,124	20,937	16,932	72,418		
Work-in-Process	+13,164	+16,617	-1,333	-3,295	+25,153		
Balance	7,261	-2,493	22,270	20,227	47,265		
Cost of Goods Manufactured	6,858	19,828	70,965	72,218	169,869		
Variable Cost	3,459	6,833	19,346	17,827	47,465		
Fixed Cost	3,399	12,995	51,619	54,391	122,404		
General and Selling Expenses	548	1,634	2,240	1,859	6,281		
Variable Cost	1	46	217	25	289		
Fixed Cost	547	1,588	2,023	1,834	5,992		
Total Cost	14,667	18,999	95,475	94,304	223,445	100	
Variable Cost	10,721	4,386	41,833	38,079	95,019	42.5	
Fixed Cost	3,946	14,613	53,642	56,225	128,426	57.5	100
Major Item in Fixed Expenses							
Labor Cost	3,380	13,271	18,319	18,557	53,527		41.7
Depreciation Cost	264	117	33,919	35,949	70,249		54.7

A comparison of SSP's balance sheet with those of leading industrialized countries is given in Table 1-16 for reference.

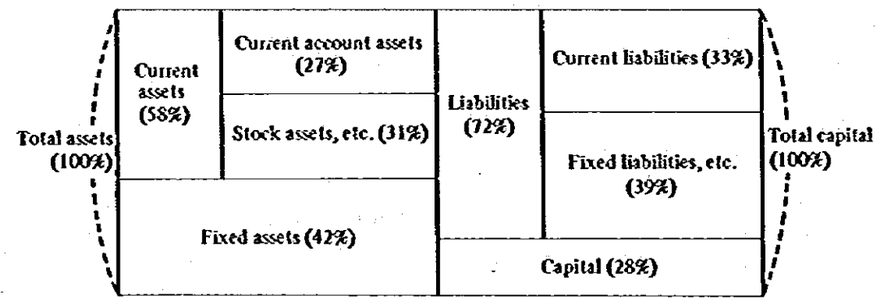
Table 1-16. Comparison between SSP's Balance Sheet and Those of Other Countries

Balance Sheets of Leading Corporations (All Industries)
of Principal Industrialized Countries (Fiscal 1974)

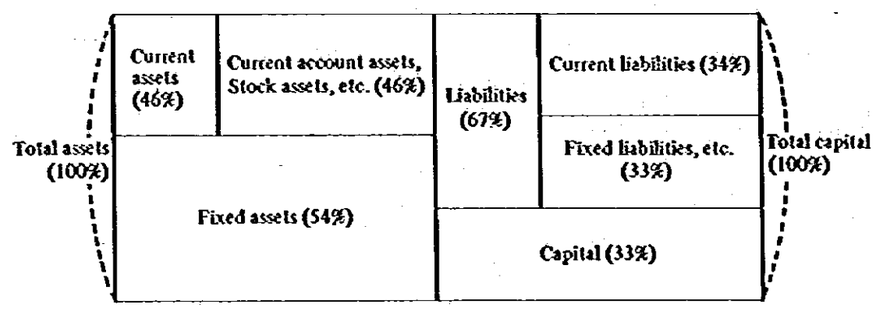
Japan (104 Corporations)



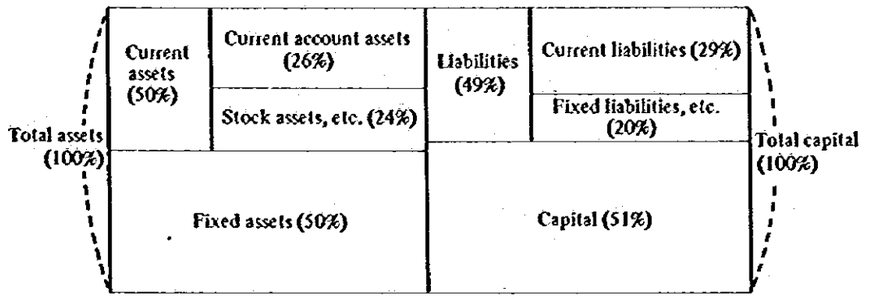
West Germany (27 Corporations)



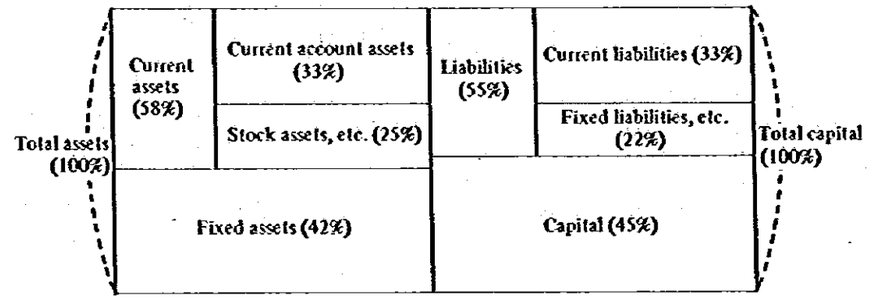
France (10 Corporations)



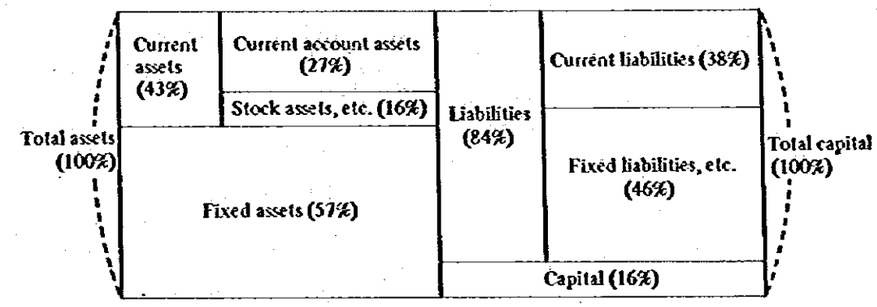
U.S.A. (187 Corporations)



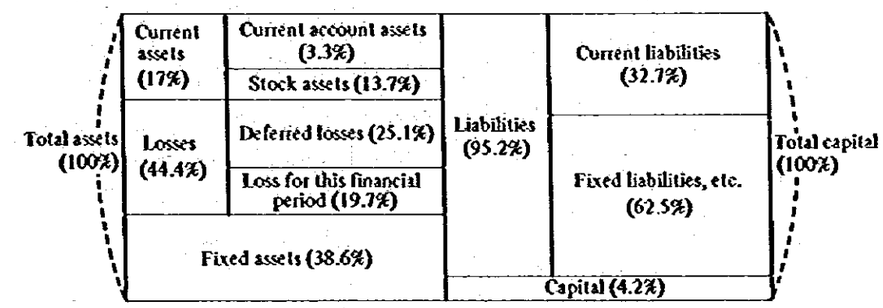
United Kingdom (33 Corporations)



Italy (5 Corporation)



Balance Sheet of SSP (1978)



The results of analysis of SSP's management condition by Alexander Wall's single indicator method is shown in the table below:

Table 1-17. Results of Analysis by Wall's Single Indicator Method

Ratio	Description of ratio	a Weight	b Standard ratio	c Actual ratio	d c / b	e Indicator d x a
Liquidity fluid ratio	Current assets ÷ Current liabilities	25	200%	49.0%	25%	6.25
Ratio of fixed assets	Owned capital ÷ Fixed capital	15	250	12.6	5	0.75
Liability ratio	Owned capital ÷ Non-owned capital	25	150	5.1	3.4	0.85
Receivable credits turnover	Annual turn-over ÷ Receivable credits	10	600	855	143	14.3
Inventory assets turnover	Annual turn-over ÷ Stock assets	10	800	24.2	3	0.3
Fixed assets turnover	Annual turn-over ÷ Fixed capital	10	400	9.6	2	1.2
Owned capital turnover	Annual turn-over ÷ Owned capital	5	300	74.7	25	1.25
	Total indicators	100				23.8
	Indicator excess or deficiency					∆76.3

Remark: 1. The fixed ratio and liability ratio are divided inversely and matched to the liquidity.

2. Turnover ratios are indicated in %, with 1 turnover = 100%, and 3 turnovers = 300%.

The condition of SSP's business management is analyzed by using the various tables described above. However, since SSP had a short history and had not mastered the technique of performing various kinds of necessary systematic controls as a special steel manufacturer, and since the special steel plant was closed before plant operation skills had been amply acquired, the various kinds of data obtained from SSP are inadequate and unreliable.

Analysis of business management is performed by using the financial indicators shown in Table 1-13. The definitions of the various items contained in the table are as follows:

Liquidity = Current assets / Current liabilities x 100

Quick ratio = Liquid assets / Current liabilities x 100

Ratio of fixed assets = Fixed assets / Owned capital x 100

Ratio of fixed assets to long term capital = Fixed assets / Long-term capital x 100

Liability ratio = Total liabilities / Owned capital x 100

Long-term capital = Owned capital + Fixed liabilities + Special reserves

Total liabilities = Current liabilities + Fixed laibilities + Special reserves

Turnover ratio of total capital (Times/year)
= Turnover / Total capital (Average at beginning and closing of term)

Turnover ratio of owned capital (Times/year)
= Sales revenues / Owned capital (Average at beginning and closing of term)

Turnover ratio of inventory assets (Times/year)
= Sales revenue / Stock assets (Average at beginning and closing of term)

Turnover ratio of raw materials (Times/year)
= Turnover / Stock of raw materials (Average at beginning and closing of term)

Turnover ratio of fixed assets
= Turnover / Fixed assets (Average at beginning and closing of term)

Ratio of turnover to cost of goods sold = Cost of goods sold / Turnover x 100

Ratio of payment interests turnover
= Payment interest + Payment discount ratio - Receivable interest / Turnover x 100

Ratio of labour cost to turnover = Total labour cost / Turnover x 100

1.7.4 Safety Analysis

The current asset is required to have an ample allowance for taking account of all current liabilities and, in addition, to cover working capitals and worthless assets. Accordingly, it will be desirable for the liquidity to exceed at least 100%. However, with SSP, the liquidity fell steadily from 79.4% in 1975 to 34.5% in 1979.

SSP's extreme lack of funds can be known even from the poor current-account ratio.

The ratio of fixed assets, which indicates the extent by which fixed assets are covered by owned capital, was 12 - 14%, with theremainder almost entirely met by corporate bonds and long-term loans. Meanwhile, the liability increased rapidly from 1,159% in 1975 to 2,228% in 1979, indicating how large the total amount of liabilities was, and how rapidly it was increasing.

As pointed out even by SSP, it is international common sense to establish a company with owned capital which is at least 30% of the total amount of investment, but SSP started out with only 8% of owned capital, and by the end of June, 1979, its owned-capital ratio had dwindled to 4%.

1.7.5 Activity Analysis

Activity analysis is performed to investigate the condition of utilization of assets and the condition of increase of sales revenues and profits, as a means to sound out the activity of the corporation as well as its future growth potential.

In this analysis, the annual turnover ratios of the company's various kinds of assets are studied on the basis of the turnover, but since SSP's turnover was extremely small, all of these turnover ratios were very poor.

SSP's owned capital was constant from the time of commencement of plant operation, while its turnovers increased gradually, so its owned-capital turnover ratio increased steadily from year to year, although at a low level, from 0.25 times/yr. to 0.75 times/yr.

The total capital turnover ratio was even poorer than the owned capital turnover ratio. This was because the amount of loans inflated rapidly compared with the increase in turnovers, thereby increasing the volume of total and resulting in an aggrevation of the total capital

turnover ratio. This situation corroborates SSP's incapability of adopting effective measures for improving its financial situation ever since it started operating the plant.

The target items of study with respect to inventory assets are the stock of raw materials, products and goods-in-transit at the end of each term.

Regarding raw materials, the stock at the end of the 1975 term was larger than that consumable over a four-year period up till 1978. In addition, the stock was imbalanced. For example, hot top bricks necessary for daily production were insufficient. Procuring in large volumes has the advantage of decreasing procurement expenses and enabling purchasing at lower prices, but holding an excessively large stock increases the interest, maintenance costs such as control expenses, aggravates the turnover ratio, ties up working capitals and impairs business efficiency. In case of SSP, holding an excessive stock led to serious repercussions.

Regarding products and goods-in-transit, the stock was excessive for both these products in comparison with turnovers. This was basically due to a large carry over of inventory of SSP in the form of ingots, billets and bars produced during the test and trial run periods. Moreover, the excessive value of return scrap was generated. Accordingly, while suffering from insufficiency of funds, a large portion of corporate funds was idling in the form of excessive stocks of raw materials, products, and goods-in-transit.

Due to the situations described above, the inventory assets turnover ratio was aggravated extremely to as low as 0.07 - 0.25.

The stagnation of the anticipated heavy industrial complex construction projects under Pakistan's industrialization program had stifled the emergence of industries using special steels, with the result that the demand for special steels remained stagnant. As a consequence, the operation rate of the special steel plant constructed with an enormous investment of Rs.532.5 million was undoubtedly aggravated, making the fixed assets turnover ratio very poor.

1.7.6 Analysis of Gross Manufacturing Cost

The cost of good sold has chronically exceeded turnovers ever since the plant was put in operation, resulting in large deficits. According to the business performance for the four fiscal years from 1975 to 1978, the raitos of fixed costs and variable costs in the cost of goods.

sold were 57.5% and 42.5%, respectively, indicating a very high ratio of fixed costs, which primarily consisted of labor costs and depreciation costs.

Even with a low plant operation rate of 20%, the labour force far exceeded the number of employees normally necessary for full plant operation, making the turnover labour cost ratio as poor as 32 ~ 123%. There were many years in which the labor cost exceeded turnovers. According to data available for the four fiscal years from 1975 to 1978, labour costs accounted for roughly 42% of fixed costs.

The depreciation rate is 5% for plant buildings and 10% for principal equipment by the fixed rate method. Up to the time of survey, the depreciation cost for each year surpassed turnovers.

It is generally accepted that a company's financial situation is precarious if the turnover interest ratio exceeds 3%. With SSP, the ratio exceeded 300%.

The principal causes for selling below the cost are conceived to be the following:

1) Poor plant operation rate.

2) Poor performance in production yield, high unit consumption of raw materials, low production efficiency and interim product quality owing to insufficient acquisition of plant operation techniques.

3) Failure to grasp actual manufacturing costs and lack of efforts to reduce costs.

1.7.7 On Sales Price

The market price of special steel in Pakistan will be determined by the price of the imported special steel, on which 70% import duty is being imposed, and by the price of SSP's product. Needless to say, the market price is also influenced by the level of quality of the product.

SSP adopted the method of preparing budgetary manufacturing costs which corresponded with plant operation rates of 75% and 50%. Table 1-18 offers a comparison between total cost and sales price when the plant was operated at a rate of 50%, for the period from July to December, 1979.

Table 1-18. Comparison between Total Cost and Sales Price

Products of SSP	Total Cost (A)	Sales Price (B)	(B)/(A)
Cold Rolled Stainless Steel Sheet	Rs. 47,984	Rs. 27,399	57.1%
Hot Rolled Stainless Steel Bar	25,525	22,500	88.1%
Hot Rolled Alloy Steel Bar (EN 351)	14,762	9,033	61.2%

Since SSP's mean plant operation rate was about 20%, the total manufacturing costs were actually higher than those shown in the table, so perhaps SSP products undoubtedly would have been unable to compete with imported products even at sales prices which were less than one-half the total costs.

1.7.8 Summary of Business Management Analysis

SSP's business management was analyzed in the manner described above by using various kinds of data. In addition, since the added value was negative at SSP, the added value labour productivity was also negative, resulting in management failure.

The principal factors causing this unfortunate situation may be summarized as follows:

1) Small scale of the domestic market for special steels, castings and forgings, insufficient SSP efforts in marketing and lack of orders.

2) Inadequate manufacturing skills and lack of efforts for cost reduction.

3) Lack of capital.

4) Excessive stock and imbalance of inventory assets.

5) Excessive fixed assets.

6) Excessive increase of loans.

7) Excessive increase of total capital.

8) Excessive number of employees, indigent measures to cope with labor unions, etc.

1.8 Aid by Government or Upper Organizations

Regarding financial aids to SSP by the government or upper organizations, there had been none worthy of special mention other than the interest-free loan of Rs.35.1 million by the Ministry of Finance in December, 1978, for use as operating funds. Incidentally, a sum of Rs.20 million was disbursed by the government for use as employees' severance pay fund at time of plant shut down in December, 1979.

SSP submitted several applications requesting conversion of loans into capital to government authorities through the medium of governmental organizations since its commencement of commercial plant operation in August, 1975, but without avail.

In August, 1979, an appeal requesting the following dispositions was placed with the government by coordinating the contents of appeals submitted hitherto:

1) Improvement of capital ratio.

2) Loan of Rs.60 million for use as working capitals.

3) Exemption of imposition of duties on imported raw materials, and levying of protective duties on competitive imported products.

4) Disbursement of an additional Rs.90 million for expanding the range of products manufactured.

However, the plant treaded the path to shut down without this final appeal providing any favourable result.

The SSP management had been fully conscious of the difficulty of procuring necessary raw materials, stagnancy of production owing to insufficient working capital, as well as the inadequate technical know-how, but had been unable to adopt proper measures for coping with these situations owing to the decisive shortage of funds.

1.9 Factors Causing Shutdown of Plant Operation

The Economic Council of Cabinet arrived at the conclusion to order plant shutdown in December, 1979, on the grounds that there was no tangible outlook for settling SSP's enormous deficits.

The factors causing SSP's deficits have already been pointed out in this chapter, but here these factors are grasped systematically in order to clarify underlying problems.

The profits or losses of a company are essentially determined by the relationship between turnover and costs. Since costs can be divided into variable costs and fixed costs, it will be possible to clarify a corporation's profit or loss situation by clarifying the relationship existing among turnover, variable costs and fixed costs, and the specific elements closely related to these respective items.

Therefore, in order to elucidate the factors which have been responsible for SSP's deficits systematically, a description is given hereunder of the relationships existing among turnover, variable costs and fixed costs, and the background elements closely related to these three items.

1.9.1 Turnover

The turnover is defined by the following relationship:

Turnover = Unit sales price x Sales volume

SSP's turnovers have been exceedingly small since the time of commencement of plant operation, comprising a major factor for its deficit operation.

(1) Sales prices were low

In Pakistan, over 90% of the consumption of special steels and stainless steels is met by imports, so the domestic prices of special steels and stainless steels are determined primarily by import prices. Accordingly, in order to receive orders, SSP had no alternative but to compete with imported products by selling at prices which were lower than variable costs. In addition, since its products were inferior in quality compared with imported products, it had to discount its prices to below those of imported products as requested by users.

Billets comprised 92% of SSP's total sales volume. Since the import duty for billets was 60%, compared with that of 70% for other kinds of products, the market price of billets was low, making the product disadvantageous for making profits.

(2) Sales volume was not enough

The demand for special steels and stainless steels being about 40,000 t/y in Pakistan, the absolute volume can not be regarded as being so large. According to SSP's sales performance, it annual sales volume, excluding consignment rolling, remained at about 4,000 t/y.

The following reasons are conceivable for SSP's small sales volume:

1) With SSP equipment, there is a limit to the sizes of products manufactured, as shown in Tabl 1-1, making it impossible to produce much of the products demanded by the domestic market. Namely, regarding product sizes, a gap existed between plant production capacity and product demand.

2) Regarding castings and forgings, principal users possessed their own production facilities or procured their necessary castings and forgings from affiliated manufacturers, making it difficult for SSP to receive orders for these products.

1.9.2 Variable Costs

The variable cost is defined by the following formula:

Variable cost
= Unit price of raw material, utilities etc. to be purchased
x Unit consumption of raw material, utilities, etc.
x Production volume

Accordingly, in order to grasp the actual conditions surrounding variable costs, it will be necessary to elucidate two background elements -- unit consumption and the purchasing price of raw materials and utilities.

In order to acquire technical skills necessary for the manufacture of special steels, 72 engineers received technical training relating to their respective fields of operation at Japanese plants. However, operational guidance at the SSP plant was not implemented owing to lack of funds, and it is doubtful whether education and training were extended sufficiently to field

workers. Namely, it can be said that the technical level of SSP as a whole had not attained to the standard necessary for producing special steel products. As a result, proper process control and quality control were not carried out, defective products were created, production yield was very poor and the unit consumption at SSP was very high compared with those of advanced countries.

Owing to small production volume and deficiency of funds, raw materials and utilities were not procured in large quantities at one time, making the purchasing prices higher than those of advanced countries. Some items including import duties were two to three times higher.

A study of actual conditions at SSP showed that the following condition existed with respect to the relationship between turnover and variable costs, owing to the high unit consumption and high purchasing prices:

$$\text{Turnover} - \text{Variable costs} = \text{Marginal profits} < 0.$$

Namely, the variable costs such as raw materials, auxiliary materials and other items were being expended in excess of the proceeds from products sold, with the result that SSP was continuing deficit operation by which the more it produced and sold, the more dificit was made under a inconceivable condition for a corporation.

Regarding the factors of SSP's deficit operation, mention may be made here that, although SSP was not performing the actual cost calculations up to the standard of industrialized countries, they had an overall idea of the cost at which its products were being manufactured, and that they were conscious of the fact that the variable costs exceeded the turnover, but they could not help it because the plant had to be operated.

1.9.3 Fixed Costs

The three major elements composing fixed costs are labour cost, depreciation cost and interest.

Despite SSP's low plant operation ratio of about 20%, it kept on its payroll a very large labour force of 1,100 - 1,460 employees which exceeded the number of employees necessary for full plant operation. As a result, the ratio of labour cost to turnover was very high, or from 32 to 123%.

One of the major factors forcing SSP to maintain such a superfluous number of employees was the existence of a powerful labour union. However, granting that the labour union was so powerful, the lack of resourcefulness of management in aspects of labour contorol must be pointed out, of not having adopted proper measures as by negotiating with the labour union on the problem of reduction of employees.

The depreciation cost was calculated by the fixed rate method. During 1977/1978, it ran up to roughly Rs.36 million, which exceeded the amount of cost of good sold of Rs.31.8 million for the same period, thereby increasing the manufacturing cost substantially. Here, too, the low plant operation ratio made the depreciation cost a heavy burden.

SSP had procured the greater portion of both equipment and working capital through loans, with the result that about 96% of its total capital employed consisted of laibilities at the end of 1978 term. As a consequence, in the 1977/1978 period, SSP had to pay roughly Rs.111 million of interest which ran up to 3.5 times its turnover.

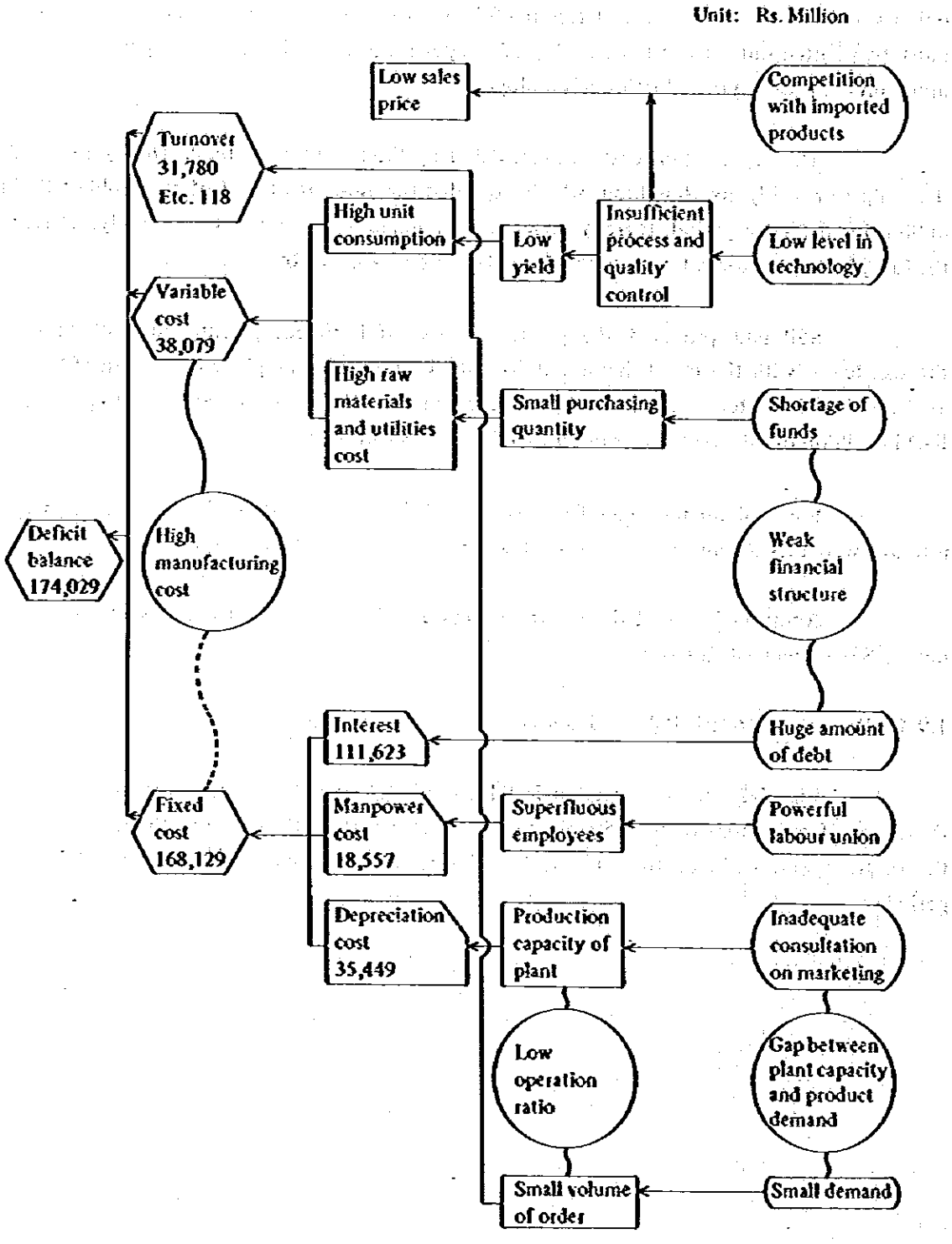
SSP had no resources for making such large payments of interest, so outstanding interests were met through new loans, gradually increasing the total amount of loans.

Additional loans led to a vicious cycle of heavier interest burdens, steadily undermining SSP's financial situation.

1.9.4 Diagram of Deficit Balance Factors

Fig. 1-2 shows a diagram in which the deficit balance factors eventually causing shutdown of operations of the SSP plant are indicated systematically. The figures indicated in the diagram were deduced from the various financial statements available for the 1977/1978 period.

Fig. 1-2. Reasons for Deficit Balance SSP



CHAPTER 2.
OUTLINE OF ECONOMY AND IRON & STEEL INDUSTRY OF PAKISTAN

CHAPTER 2. OUTLINE OF ECONOMY AND IRON & STEEL INDUSTRY OF PAKISTAN

2.1 Economy of Pakistan

2.1.1 Background of Pakistan's Economy

Pakistan has traditionally been an agricultural country where wheat, rice, cotton and sugar cane are cultivated. The textile industry using raw cotton produced domestically has flourished for ages, and is Pakistan's leading industry in the sector of industrial manufacturing.

When Pakistan segregated and gained independence from India in 1947, its territory was separated by India where there were entirely different weather and natural features. In addition, in those days, a distinct economic differential existed between East Pakistan and West Pakistan.

Correcting this economic differential had then been one of the important economic policies adopted by the Government of Pakistan, and to realize this policy the government constructed heavy and chemical industrial plants in East Pakistan. There were very few large-scale heavy and chemical industrial plants in Pakistan before 1970.

The Bhutto regime that attained power in 1971 proclaimed an Economic Reforms Order under the slogan of 'fair distribution of wealth', and placed strategic industries under the state control. Furthermore, these industries where placed under the jurisdiction of the respective national corporations established for the heavy machinery, chemical, ceramic, cement, electric power, fertilizer and other industries.

These economic policies of the Bhutto regime implanted a fear of nationalization of commercial operations among the private industrial entrepreneurs, stifling their desire for investments and resulting in ageing of plant facilities and equipment.

Meanwhile, the projects of heavy industries of the national corporations began to materialize in the 1970s, with the construction of Pakistan's representative large-scale plants such as Pakistan Machine Tool Factory (PMTF), Heavy Mecahnical Complex (HMC) and Heavy Foundry and Forge (HFF) in West Pakistan.

Today, Pakistan is promoting industrialization actively by constructing various kinds of industrial plants in addition to the aforementioned plants, in order to achieve industrial development.

2.1.2 Recent Trends in Economic Structure

As indicated in Table 2-1, agriculture accounts for roughly 30% of Pakistan's gross national product (G.N.P.) followed by industrial manufacturing of 15% and the sector of wholesale and retail of 13%.

Agriculture assumes a large ratio of G.N.P., exerts far-reaching influences on related sectors such as the sectors of farm produce processing and distribution, and consititutes the main axis to support the economy of Pakistan.

Regarding the sector of industrial manufacture which assumes roughly 15% of G.N.P., the light industry represented by the textile industry is the center of this sector even today, and the weight of heavy industries, which emerged in the 1970s, is still very light.

According to Table 2-1, the mean growth rate of the sector of industrial manufacturing for the periods from 1973/1974 to 1978/1979 was 3.25%, which is far lower than that of 5.72% of G.N.P.

The Pakistan government allotted governmental investment funds equivalent to 25.6% and 24.3%, respectively, to the sector of industrial manufacture from the annual development funds for the fiscal years 1978/1979 and 1979/1980, indicating a serious effort for national industrialization. In particular, the government has continued to invest a sum exceeding Rs.3 billion annually in the recent years for the construction of PASMIC's Karachi Integrated Steel Mill, and an early completion of the steel mill and the establishment of related industries are expected.

In addition, plans for increasing the outputs of domestically manufactured parts are being carried out for the manufacture of automobile parts by Pakistan Automobile Corporation (PACO), and manufacture of farm tractor parts by Pakistan Tractor Corporation (PTC), and a part of these plans has already been materialized.

2.1.3 Trade

Pakistan's principal export items and their ratios to the total export volume are cotton and cotton products (30%), rice (20%) and carpet (10%), while principal import items

Table 2-1. Gross National Product at Constant Factor Cost of 1959/60

Unit: Rs. Million

Year	1973/74		77/75		75/76		76/77		77/78		78/79*	
Sector		%		%		%		%		%		%
Agriculture	13,357	35.1	13,074	33.0	13,659	33.0	13,998	32.5	14,348	30.3	14,948	29.7
Mining & Quarrying	180	0.5	181	0.5	175	0.4	206	0.5	210	0.4	217	0.4
Manufacturing	6,101	16.0	6,136	15.5	6,231	15.0	6,258	14.5	6,833	14.4	7,160	14.2
Construction	1,490	3.9	1,754	4.4	2,094	5.1	2,076	4.8	2,248	4.8	2,452	4.9
Electricity/Gas Distribution	1,086	2.8	949	2.7	985	2.4	1,143	2.7	1,245	2.6	1,346	2.7
Transport, Storage & Communication	2,466	6.5	2,575	6.5	2,605	6.3	2,649	6.2	3,003	6.3	3,265	6.5
Wholesale & Retail Trade	5,449	14.3	5,622	14.2	5,724	13.8	5,650	13.2	6,121	12.9	6,518	13.0
Banking & Insurance	879	2.3	1,006	2.5	1,039	2.5	1,124	2.6	1,241	2.6	1,390	2.8
Housing	1,275	3.3	1,321	3.3	1,369	3.3	1,418	3.3	1,469	3.1	1,522	3.0
Public Administration & Defence	2,983	7.8	3,972	10.0	3,854	9.3	4,135	9.6	4,593	9.7	4,934	9.8
Services	2,653	7.0	2,803	7.1	2,964	7.2	3,060	7.1	3,319	7.0	3,510	7.0
Gross Domestic Product	37,901		39,393		40,679		41,727		44,630		47,262	
Net Factor Income from Other Countries	184	0.5	258	0.7	711	1.7	1,295	3.0	2,675	5.7	3,042	6.0
Gross National Product	38,085	100.0	39,651	100.1	41,410	100.0	43,022	100.0	47,305	99.8	50,304	100.0
Population (in Million)	67.2		69.2		71.3		73.4		75.6		77.9	
Per Capita Gross Income (Rs.)	567		573		581		586		625		646	

Pakistan Economic Survey 1978/79: Government of Pakistan.

* Provisional

are petroleum and petroleum products, machinery, steel, chemical fertilizers and foodstuff.

As indicated in Table 2-2, Pakistan's trade is characterized by a chronic state of over-import.

Table 2-2. Import and Export

Unit: Rs. Million

Year	1974/75	75/77	76/77	77/78	78/79*
Import	20,925.0	20,465.3	23,012.2	27,814.7	26,102.9
Export	10,286.3	11,252.9	11,293.9	12,980.4	11,635.8
Balance	△10,638.7	△9,212.4	△11,718.3	△14,834.3	△14,467.1

* July 1978 – March 1979

The invisible trade balance also continues to register a deficit.

The deficit payment position of trade balance and invisible trade balance can not be counterbalanced even by the balance of transfer accounts which are mainly the remittance of foreign exchange to home by overseas workers and the proceeds of economic aid funds received by the Government from foreign countries through long and short-term loans obtained by the Government, financial organizations and private sectors from foreign countries.

The situation of Pakistan's international balance of payments for the last five years is shown in Table 2-3.

The amount of foreign currencies sent home by overseas workers has been increasing at a fast pace during the last several years, and is expected to exceed $1,500 million in 1979/1980. However, the construction rush in the Middle East countries is expected to abate henceforth owing to the reconsideration of various projects, so that a further increase cannot be anticipated in the amount of foreign currencies sent home by these overseas workers.

In addition, the amount of official foreign liabilities payments has also increased after the expiration of the liabilities payment extension agreement concluded with creditor countries in 1978.

Table 2-3. Balance of Payment

Unit: Million US$

Item	1974/75	75/76	76/77	77/78	78/79*
A. Goods and Services	Δ1,397.1	Δ1,299.6	Δ1,641.6	Δ1,826.3	Δ1,268.3
Merchandise	Δ1,136.6	Δ977.3	Δ1,286.0	Δ1,468.9	Δ1,059.3
Others	Δ260.5	Δ322.3	Δ355.6	Δ357.4	Δ209.0
B. Unrequited Transfers	333.4	472.8	739.1	1,337.6	769.3
Private	229.4	353.0	590.4	1,225.8	715.7
Government	104.0	119.8	148.7	111.8	53.7
C. A + B	Δ1,063.7	Δ826.8	Δ902.5	Δ488.7	Δ499.0
D. Capital and Monetary Gold	1,049.0	835.5	845.5	512.5	552.2
E. C + D	Δ14.7	8.7	Δ57.0	23.8	53.2
F. Errors and Omissions Net	14.7	Δ8.8	57.0	Δ23.8	Δ53.3

Pakistan Economic Survey 1978 – 79: Government of Pakistan

* July 1978 – Dec. 1978.

Owing to these situations, it is conceived rather difficult henceforth to make up for the trade and invisible trade deficits by foreign currencies sent home by overseas workers or through loans from foreign countries.

Accordingly, in order to ensure smooth growth of Pakistan's economy, it is necessary to increase the production of agriculture which is the nucleus of the country's economy, stimulate economic activities by expanding both consumption and exports of commodities, and improve the international balance of trade situation.

2.2 Pakistan's Iron & Steel Industry

2.2.1 Demand and Production of Iron & Steel

The volume of steel production in Pakistan in recent years is 250,000 – 400,000 t/y and the volume of steel imports 400,000 – 500,000 t/y, and a very wide fluctuation occurs in these figures, depending on the year. Pakistan exports only a small volume of steel, so the volume of consumption of steel is estimated at 650,000 – 900,000 t/y. (See Table 2-4.)

The survey mission estimated Pakistan's demand for steel on the basis of data obtained from the Statistics Division, the Government of Pakistan, and the United Nations statistical data 'Export of Iron and Steel to Pakistan by World's 26 Principal Countries', but a considerable differences existed between these data.

The volume of production of round bars and shape steel assumes 70 – 80% of the total volume of steel produced in Pakistan, while other products are pipes, wires, iron castings, steel castings and steel forgings. Steel plates are not being produced.

The larger portion of mild steels such as round bars and shape steel is being produced by means of electric furnaces (3 – 5 t x 91 furnaces, 10 – 15 t x 19 furnaces) and small rolling mills (290 units) located primarily in the regions of Lahore and Karachi, but these facilities are outdated and inefficient, with most of these plants handling raw materials and products manually.

With steel makers in Pakistan, the following points were observed here and there in aspects of quality control:

1) With respect to chemical analysis, some were analyzing the contents of carbon and manganese, but no analysis was being made with respect to other elements.

2) Rolled steel products were being shipped out without cutting off the defective parts at both ends of these products.

3) A product size and shape inspection was not rigidly performed, and some mills were shipping out products without correcting surface scars or defects at both ends of the products. The general situation was that the rolled products were being shipped out as long as they possessed the shape of steel bar or shape steel.

Table 2-4. Steel Demand in Pakistan (Excluding of Cast and Forging Steel)

(Unit: 1,000 t/y)

	Import (include semi-product)			Domestic Production			Export (C)	Special Steel Demand (2) + (4)	Total Demand (A) + (B) − (C)
	(1) Mild Steel	(2) Special steel	(A): (1) + (2) Total	(3) Mild Steel	(4) Special Steel	(B): (3) + (4) Total			
1974/1975	255.2 (335)	81.0	336.2 (416)	224.0	0	224.0	0	81.0	560.2 (640)
1975/1976	286.4 (405)	25.9	312.3 (431)	230.7	5.7	236.4	–	31.6	548.7 (667)
1976/1977	362.2 (368)	24.9	387.1 (395)	269.6	4.5	274.1	0.2	39.4	661.0 (668)
1977/1978	337.1 (518)	26.9	364.0 (545)	315.3	8.8	324.1	–	35.7	688.1 (869)
1978/1979	296.2 (–)	25.1	321.3 (–)	362.4	10.3	372.7	0.1	35.4	694.0 (–)

Reference: Import; Statistic Division Government of Pakistan.
Domestic Production; Mild Steel: Statistic Division Government of Pakistan.
Special steel: SSP Data (including cogging products).
( ); Statistics of World Trade in Steel (UNIDO).

The steel scrap used as the principal raw material for the electric furnaces of many of these steel plants, as well as the semi-finished products (billets) used as the raw material for the rolling mills, are mostly relied on imports. These imported steel scrap and billets are imposed an import duty of 40% of their CIF prices and are imported in small lots, making their prices higher than those of the advanced countries. In addition stable import of steel scrap and billets is difficult owing to such adverse conditions as insufficiency of foreign currency, insufficient funds of small and medium scale plants and importation in small lots.

The volume of supply of steel scrap in the world is expected to become increasingly insufficient, and in the U.S.A., the leading exporter of steel scrap, there are rumors of enforcement of export restrictions. Another reason for the world's dwindling supply of steel scrap is the increasing production ratio of electric furnace steel (using steel scrap as the main raw material) in principal steel producing countries the last decade, with respect the total volume of steel produced.

Table 2-5. Production Ratio of Electric Furnace Steel in the Principal Iron & Steel Production Countries

Unit: %

	Japan	U.S.A.	U.K.	W. Germany	France	Italy
1968	18.2	12.8	16.0	9.0	10.1	37.9
1973	17.9	18.5	19.9	10.4	10.7	41.4
1978	21.9	23.5	35.4	14.4	15.1	50.7

Needless to say, the price of steel scrap is largely inflenced by the world's iron and steel market, but in view of the situations described above, it can be said that the price of steel scrap will generally follow the path of steady increase.

As the world's production of steel increases steadily, countries blessed with natural gas and other energy resources as well as countries possessing iron ore will follow the path of tendency to increase their production of reduced iron by the direct reduction process for use as substitute raw material in place of steel scrap for electric furnaces and other means of steel production.

In this respect, Pakistan has a vast reserve of untapped, quality iron ore in the northern regions, and also possesses natural gas reserves. In the future if a reduced iron plant based on the direct reduction process using domestic or imported iron ore is constructed, the reduced iron produced by such plant can play an important role as the raw material for the many existing electric furnances.

The levels of controls enforced with respect to the storage and handling of raw materials by users of steel materials in Pakistan are very low, except for a very few steel plants. For example, these materials are trampled with the feet, or handled roughly and processed without due caution.

2.2.2 Pakistan Steel Mills Corporation (PASMIC)

Presently under construction in the outskirts of Karachi is Pakistan's first integrated steel plant based on economic aid by the Soviet Union, which is designed for producing 1,100,000 t/y of crude steel. The schedule is to start the operation of No. 1 blast furnace (1,750 t/day) at the end of 1980, and to commence steel production by means of L.D. converters (130 t x 2 units) in 1981, and successive operation of continuous casting machine for bloom and slab, 800-mm billet mill, 1,700-mm hot strip mill, cold strip mill, and full production of 1,100,000 t/y of crude steel by means of a two blast furnace system in 1985.

The billet mill of this integrated steel mill is designed to produce 260,000 t/y of billets ranging in sizes from 50 x 50 mm to 100 x 100 mm for supplying billets to the small rolling mills located in various parts of the country, and is therefore certain to play a vital role in the supply of raw materials to Pakistan users.

In the sector of steel plates, hot coils having thicknesses of 1.6 – 10.0 mm the maximum width of 1,500 mm are to be produced by the hot strip mill, and sheared plates from the hot coils. These hot rolled products are to be used as raw materials for the manufacture and repair of automobiles, buses, trucks, railway transportation machinery, ships and buildings, also for producing boilers, container vessels, machines, steel furnitures, welded pipes and other steel products.

Meanwhile, the cold strip mill is to produce sheets which are 0.3 mm thick, 700 – 1,500 mm wide and 1 – 4 m long and cold rolled coils. These cold rolled products are to be used as raw materials for the galvanized steel sheet mill installed in the integrated plant, while a portion of these cold rolled products is to be shipped out to domestic manufactures for producing automobiles, bus bodies, bicycles, steel structures, drum cans, steel furnitures, machine parts

and other products.

These hot and cold rolled steel plates and sheets are expected to fully meet the demands for steel plates and sheets in Pakistan.

The manufacture of low alloy steel is also being planned among the products produced by this integrated plant. The sizes of these products extend over a wider range than those of SSP's products, and the quality of the products produced by the high-performance strip mills may be better than that of products produced by SSP's production system.

Owing to the reasons described above, SSP's steel plate production facilities will lose their significance of existence when the PASMIC's steel plant commences operation. This situation is corroborated by the history of rationalization of steel production facilities of advanced steel producing countries, in which case the outdated pull-over type rolling mill was superseded by the strip mill.

Smooth advancement of manufacturing operations by PASMIC's steel plant is a matter of the most vital importance to Pakistan's iron and steel industry. Accordingly, the government will have to adopt proper measures for suitable procurement of imported raw materials (iron ore, coking coal, etc.) as well as for technical know-how transfer in order to attain high levels of production efficiency and yields.

2.2.3 Demand for Special Steels in Pakistan and Position of SSP

The estimated volume of demand for steel in Pakistan, as described earlier, is 650,000 – 900,000 t/y, of which the demand for special steels runs up to 35,000 – 40,000 t/y, including the import volume and domestic production volume (see Table 2-4). The ratio of special steel demand to the total steel demand lies in the range of 4 – 6%.

The ratio of special steel production volume to the total steel production volume in the principal countries of the world is as shown in Table 2-6, but figures are rather disparate owing to differing classifications and definitions among these countries. However, the steady increase in the ratio of production of special steel during the last decade is evident.

The production of special steel hot rolled products in Japan during the last couple of decades has increased steadily in parallel with the volume of production of four-wheeled vehicles. (See Fig. 2-1.) Meanwhile, a study of the ratio of production of crude special steel by kind of furnace shows that the ratio of production by L.D. converters is gaining steadily

Table 2-6. Production Ratio of Special Steel in Total Crude Steel (Principal Countires)

Unit: %

	Japan	U.S.A.	Canada	W. Germany	France	Italy	U.K.	Benelux	Sweden	Austira
1968	12.0	11.6	7.2	11.1	10.9	12.0	7.7	1.4	25.9	13.6
1973	11.2	12.0	10.8	15.6	13.0	13.2	9.0	2.0	28.2	13.8
1978	15.0	14.7	12.7	21.5	15.6	20.9	10.1	3.1	31.2	(12.5)

( ): 1977

owing to the development of sophisticated L.D. converter technologies and increase in the demand for special steel. (See Fig. 2-2.)

As PASMIC gradually acquires advanced steel manufacturing technologies, it will become capable of producting special steel billets by employing continuous casting equipment in combination with the L.D. converter.

At this stage, the billets produced from steel ingots by SSP may become inferior in both production yield rate and quality to the billets produced by PASMIC, making SSP's position precarious in the sector of manufacture of special steel billets.

Fig. 2-1. Production of Special Steel Hot Rolled Products and of Four Wheeled Vehicles in Japan

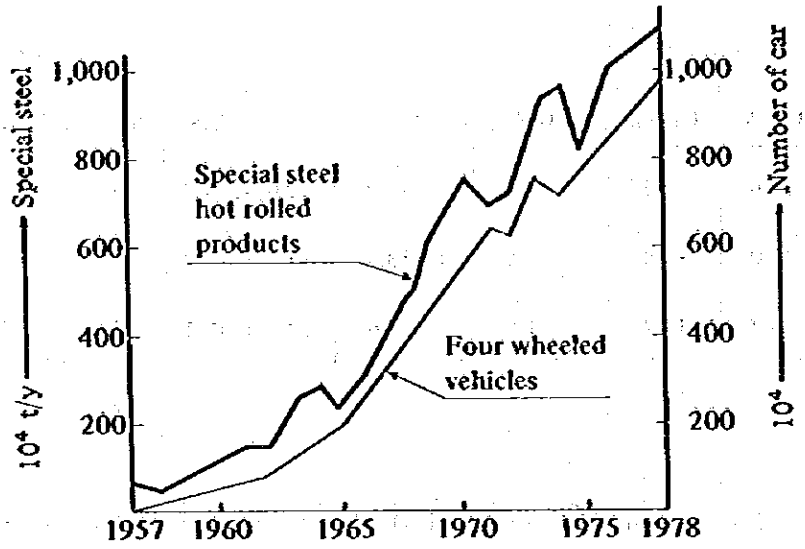
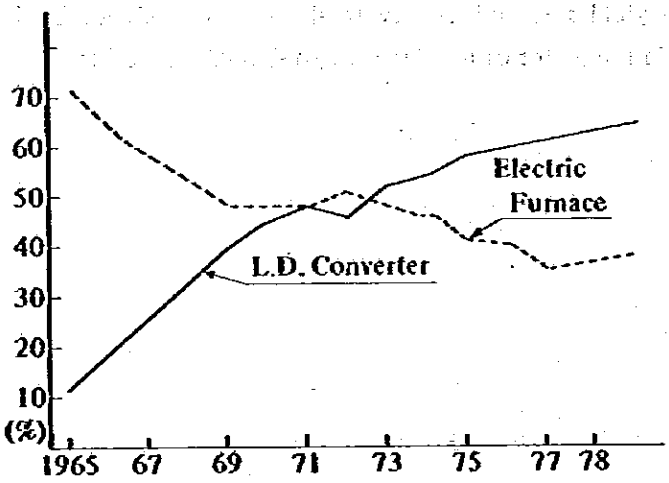


Fig. 2-2. Production Ratio of Special Steel by L.D. Converter and Electric Furnace



CHAPTER 3.
ESTIMATION OF DEMANDS FOR SPECIAL STEELS, STEEL CASTINGS AND FORGINGS IN PAKISTAN

CHAPTER 3. ESTIMATION OF DEMANDS FOR SPECIAL STEELS, STEEL CASTINGS AND FORGINGS IN PAKISTAN

The steel manufacturing industry producing special steels, steel castings and forgings is a raw material supplying industry. An observation of the process of increase in the steel demands in the industrially advanced countries shows that the steel industry, which serves the role of supplying steel materials to various kinds of machinery industries for producing civil engineering and construction machines, machine tools, automobiles, tractors, ships and heavy machinery, as well as diverse systems and equipment for steel making plants, chemical plants and cement plants, has achieved progress in concert with the development of these various kinds of industries.

If the demands for steel products such as special steel castings and forgings are to increase in Pakistan henceforth, this is believed to be realized by following the same process of progress as in the advanced countries, pacing at a same speed with the progress of various other industries demanding steel.

The question of whether the demands for special steels, steel castings and forgings would continuously increase to the point that these manufacturing industries could attain an economical capacity, depends largely on the progress of the machinery industry which is the main sources of demands for steel.

In this chapter, a description is given of the methodology and the results of demand estimation of special steels, steel castings and forgings.

3.1 Rolled Special Steel

3.1.1 Definition of Rolled Special Steel and Methodology of Demand Estimation

In Pakistan, it was learned that the special steel industry as well as those industries demanding special steels are still undeveloped, and that the Survey Mission could not obtain any clear definition of special steel nor statistics relating to demand and supply, including production, delivery, and stock of special steels.

Prior to estimating the demand for special steels, for the purpose of this report,

the Survey Mission took the advantage of defining the range of special steels, as follows:

1) Imported products: Alloy steel (including stainless steels) and high carbon steels as classified in Brussels Dutiable Items.

2) Domestic products: SSP products belonging to the category of alloy steels and high carbon steel described in 1) above, and high-grade carbon steels containing $P \leqq 0.030\%$ and $S \leqq 0.035\%$.

Demand was surveyed on the rolled products included in 1) and 2) above. However, as some steel users producing their own steels for self-consumption cannot be regarded as sources of demand for SSP products, their demand was not considered in this survey.

The most suitable method must be selected to perform the demand estimation as accurately as possible. The adoption of regression analysis utilizing the past statistical data for estimating special steel demands was considered inappropriate for the following reasons:

1) Limited availability of statistical data extending over a long period of time, owing to the political change in Pakistan.

2) A change in the special steel demand structure is expected in future owing to a sharp increase in the production of automobiles and farm tractors and an increasing ratio of domestic parts production.

Since forecast using statistical data cannot be adequately made, the Survey Mission is of opinion that the following method should be appropriate for the present survey;

1) Interview prominent users and obtain their past consumption records of special steel.

2) Analyze the records into respective industrial fields.

3) Obtain, also from the interview and the answers to questionnaire, their market share in Pakistan.

4) From 1) and 3), obtain the total demand in Pakistan in 1979/80.

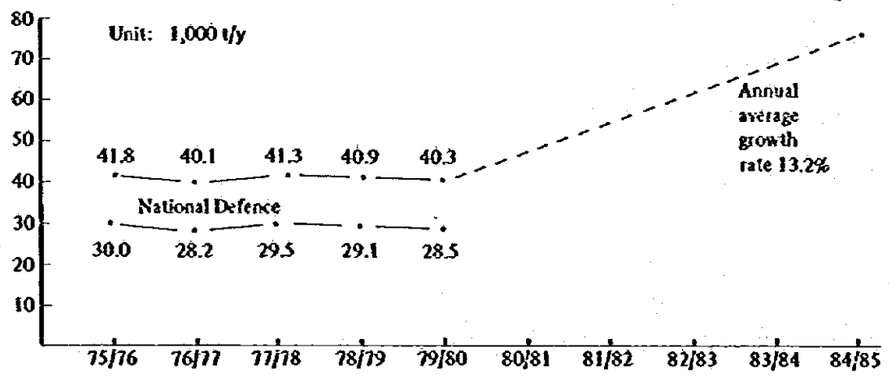
5) Estimate the increase of demand in 1984/85 for respective industrial fields on the

Table 3-1. Domestic Demand of Special Steel

Unit: t/y

	1975/76				1976/77				1977/78				1978/79				1979/80			
	Import	Produc-tion	Export	Domestic Demand	Import	Produc-tion	Export	Domestic Demand	Import	Produc-tion	Export	Domestic Demand	Import	Produc-tion	Export	Domestic Demand	Import	Produc-tion	Export	Domestic Demand
Ingot	3	0		3	–	0			2	0		2	26	0		26	34	0		34
Billet	5,966	5,319		11,285	13,333	3,988		17,321	7,055	3,723		10,778	8,881	3,518		12,399	5,844	4,036		9,880
Bliom	53	0		53	7	0		7					3	0		3	–	0		–
Sub-Total	6,022	5,319		11,341	13,340	3,988		17,328	7,057	3,723		10,780	8,910	3,518		12,428	5,878	4,036		9,914
Bar/Rod	2,229	0		2,229	1,632	14		1,646	939	145		1,084	884	61		945	312	100		412
Section/ Angle, etc.	2,151	0		2,151	400	0		400	7,034	0		7034	7,950	0		7,950	7,311	0		7,311
Wire Rod/wire	4,356	0		4,356	1,343	0		1,343	2,456	0		2,456	793	0		793	729	0		729
Sub-Total	8,736	0		8,736	3,375	14		3,389	10,429	145		10,574	9,627	61		9,688	8,352	100		8,452
Plate/Sheet	9,625	340	25	9,940	7,198	390	151	7,437	7,898	219	–	8,177	6,616	411	59	6,968	10,119	80	34	10,165
Total	24,383	5,659	25	30,017	23,913	4,392	151	28,154	25,384	4,087	–	29,531	25,153	3,990	59	29,084	24,349	4,216	34	28,531

Fig. 3-1. Total Demand of Special Steel in Pakistan



Remark: Data Source

1) Import: Statistic Division Government of Pakistan.
Demand (1979/80) is estimated

2) Produciton and Export:
Answer of SSP for Survey Mission's questionnaire.
(exclude cogging from production)

3) National Defence:
Interview with manufacture and estimate.

Table 3-2. Forecast of Demand on Special Steel

End use Industry	Demand 1979/80 (t/y)	Demand 1984/85 (t/y)	Annual growth rate (%)	Background and calculation basis	Composition (%) 1979/80	Composition (%) 1984/85	Composition in Japan (%)	Characteristics in Composition
Construction	1,400	2,100	8.4	Annual growth rate 8.4% of construction is the Fifth Five Year Plan. (1978 to 1983)	3.5	2.8	14.8	Changes in Pakistan from 1979/80 to 1984/85
Agricultural machinery	1,300	7,600	42.4	PACO's forecast units/y 1979/80 9,000 – 1984/85, 20,000	3.2	10.1		1) Sharp increase of agricultural machinery and automobile.
Steel ball for Cement Crusher	750	950	4.8	Interview with manufacture and annual growth rate cement production of the Fifth Five Year Plan	1.9	1.3		2) Sharp down of home use and others.
Other industrial machines	2,100	2,850	6.3	Interview with manufactures and annual growth rate of GDP of manufacturing industries in the Fifth Five Year Plan	5.2	3.8		
Sub-Total	4,150	11,400	22.4		10.3	15.2	25.9	Comparison with Japan
Automobile and repair parts	4,100	15,800	31.0	PACO's forcast 1979/80 1984/85 Production (Bus & truck 6,594 13,600; Passenger car, etc. 33,400 53,000)	10.1	21.0		1) Low level of composition of construction, machinery and automobile which are under developed.
Motor Cycle	0	1,650	–	PACO's forecast 1979/80 1984/85 Production (two vehicle 68,000 110,000)	0	2.2		2) High level of bicycle utensil and defence.
Sub-Total	4,100	17,450	31.0		10.1	23.2	42.4	
Railway carriage	100	100	0	Interview with manufacture	0.2	0.1	0.9	
Other transportation (Bicycle, etc.)	2,000	4,400	17.1	Annual growth rate 17.5% of bicycle production in the Fifth Five Year Plan	5.0	5.9	3.3	
Utensil for home use	7,400	8,400	2.6	Interview with manufacture and estimate	18.3	11.2		
Surgical Instrument	2,000	4,000	14.9	Interview with Exporters Association	5.0	5.3		
Sub-Total	9,400	12,400	5.7		23.3	16.5	5.5	
Electric machine	600	900	8.4	Interview with manufacture and estimate	1.5	1.2	3.3	
National Defence	11,900	18,000	8.6	Interview with manufacture	29.5	24.0	2.5	
Hand tool	3,000	4,800	9.9	Annual growth rate 10% of GDP of manufacturing industries in the Fifth Five Year Plan	7.4	6.4		
Miscellaneous (adjustment)	3,750	3,750	0		9.2	4.7		
Grand Total	40,400	75,300	13.2		100.0	100.0	100.0	

Remarks: 1. Miscellaneous is Gap of calcultions between the aggregate demand of each industry and the estimate from import and export.
2. Above figure do not include self consumption of special steel.

basis of the data obtained during the interviews and "the Fifth Five Year Plan 1978–83" of Pakistan.

6) Obtain the rate of increase until 1984/85, and use the same rate for demand after 1984/85.

The total of estimated demand in 1979/80 for respective fields of industries consuming special steel should be equal to the volume of the apparent domestic demand in Pakistan.

The apparent domestic demand volume is the result of (import volume) + (munitions volume)* + (domestic output) – (export volume), and is as shown in Table 3-1 and Fig. 3-1.

A difference of 3,750 t/y exists between the apparent domestic demand volume of 40,400 t/y and the estimated demand volume by kind of special steel consuming industries of 36,650 t/y. This difference is regarded as estimation error and indicated in Table 3-2 as miscellaneous (adjustment), making the total volume of estimated demand by kind of special steel consuming industries as 40,400 t/y in 1979/80.

* Special steel materials imported for the purpose of munitions are not included in the import statistics, and SSP's product has not been sold for such purposes in 1979/80. Therefore, in order to estimate the total domestic demand in Pakistan of special steel it is necessary to add the demand raised by munitions.

In the estimation of demand, the domestic demand of rolled special steel between 1979/80 and 1984/85 on the basis of 1979/80 was looked out. And demands of rolled special steel products for the domestic production of forgings in order to make parts of automobiles and tractors in these industries are included as a precondition.

3.1.2 Demand for Rolled Special Steels

It is estimated that the total volume of demand for special steels in Pakistan, is 40,400 t/y in 1979/1980 and 75,300 t/y in 1984/1985, with a mean annual rate of increase of 13.2%.

A rapid increase is expected in two kinds of vehicles in the sector of manufacture of farm tractors owing to the mechanization of agriculture as a means to increase produce outputs, as well as in the secotr of manufacture of automobiles owing to the spread of motorization. Increased demands for special steels are also expected in other industries such as the bicycle industry owing to the popularization of bicycles as living necessaries, and the medical equipment

industry which is certain to attain rapid growth by virtue of the government's preferential policies on the financial and taxation measures.

3.1.3 Demand Estimation for Rolled Special Steels by Sources of Demand

(1) Special Steels for Automobiles and Their Repair

The special steel demand by automobiles depends upon the number and type of cars, the ratio of their domestic manufacture, and the volume of special steel demand for their repair. The automotive industry in Pakistan is still in its infancy compared with that of the advanced countries. With the exception of a portion of parts for buses and trucks, virtually the entire volume of automobile parts is now imported, and only assembling is being performed.

The special steel demand related with automobiles is certain to increase substantially in the future for producing trucks, passenger cars, commercial vehicles and other types of cars for the following reasons:

1) The development of other forms of competitive means of transportation is inconceivable, and transportation of goods by domestic animals is certain to shift to the use of trucks and commercial vehicles.

2) Progress of industrialization.

3) Spread of motorization.

4) Increase in the number of foreign made vehicles brought home by overseas workers.

Owing to the factors listed above, the number of automobiles in the country will increase steadily from year to year. The volume of production of automobiles and the number of registered automobiles, as deduced from the Pakistan's automobile import statistics and the outlook of production by the Pakistan Automobile Corporation (PACO), are shown in Tables 3-3 and 3-4, respectively.

The volume of special steel demand in future was calculated by taking into account the future domestic manufacture of automobile parts to meet the combined needs of new automobiles and already registered automobiles shown in Tables 3-3 and 3-4. According to this calculation, the special steel demand of 4,100 t/y in 1979/1980 will be increased to 15,800 t/y in 1984/1985, registering a mean annual growth rate of 31.0%.

Table 3-3. Automobile (Four Wheeler) Production

	Commercial Vehicle		Passemger Car	Jeep	Bus	Truck	Total
	Light	Mini.					
1975/76	2,346	6,095	5,279	2,736	2,438	3,837	22,731
76/77	1,907	10,111	7,187	2,136	953	3,527	25,821
77/78	1,386	6,356	7,914	1,681	805	3,275	21,420
78/79	536	5,352	5,277	1,229	1,320	4,300	18,014
79/80	3,100	14,000	15,000	1,300	1,444	5,150	39,994
PACO's Forecast 1984/85	5,000	22,000	24,000	2,000	5,600	8,000	66,600

Data Source: Pakistan Automobile Corporation.

Table 3-4. Number of Automobile Registered

	Pasenger Car, Etc.	Bus	Truck	Total	Comparison with Previous Year (%)
1973	177,346	29,713	49,345	256,409	5.5
1974	189,169	33,477	53,467	276,113	7.7
1975	203,473	36,150	57,219	296,842	7.5
1976	220,850	38,669	60,537	320,056	7.8
1977	340,543	49,259	69,882	459,684	43.6
1979	370,900	53,800	91,200	515,900	1977 – 79 Annual Growth Rate 5.9
1984	574,700	77,800	157,500	810,000	1979 – 84 Annual Growth Rate 9.4

Remarks: 1. Data Source: Pakistan Statistical Year Book, 1978 Edition. Figures for 1979, 1984 were estimted by the Survey Mission.

2. Commercial Vehicles and Jeeps are included in Passenger Cars, Etc.

Special steels for producing leaf springs for buses and trucks, also for the domestic manufacture of automobile parts as planned by National Motors Ltd. are expected to increase rapidly in order to meet these needs.

The volume of special steel demand for automobiles was calculated by the follwoing method:

1) Special Steels for Manufacture of Buses and Trucks

i) Special steels for making leaf springs

(Number of new cars to be produced) x (number of springs per car) x (unit weigh of leaf spring)

ii) Special steels for making automobiles parts domestically

On the basis of the nationalization project of part for Bedford Trucks and Buses (Table 3-5), the gross weight of special steel parts to be made domestically was calculated for each stage of the nationalization project, as shown in Table 3-6. The demand in 1984/85 was calculated by multiplying the number of trucks and buses to be produced by 617 kg/vehicle.

Table 3-5. Nationalization Project of Parts for Bedford Trucks and Buses

Period	Stage	(£)	Name of Parts
1972 1979	Already Nationalized (Deleted from CKD, Packs)	40	Radiator, Air Cleaner, Tyres, Batteries, Battery Box, Fuel Tank and some metal contents, Gear Box, Leaf Spring, Bolt, Front Shock Absorber, Door Aperture, Sheet Metal Component, etc.
1979 1980	Components Developed and under Commercial Production	20	Rear Axle Complete, Rear Brake, Bonnet, etc.
1981 1983	Source Developed/ Contract under Negotiation. Source yet to be developed New Facilities to be set up under Various Products.	28	Frame Assembly, Rear Brake Complete, Steering Gear, Front Axle, Front Brake Complete, Master Cylinder Assembly, Propeller Shaft Complete, Steering Knuckle, Steering Arm, Pivot Pins, etc.
	BOF Parts which will continue to be imported	12	Roller, Ball Bearings, Special Bearing, Seals, Electrical Item, Viz Switches, etc.

Remark: Underlined parts to be produced mainly with special steel.

Table 3-6. Weight of Special Steel of Nationalized Parts for Bedford Trucks and Buses in Three Nationalization Periods (Estimate)

Unit: kg/Car

Period	1972–79	1979–80	1981–83	Import	Total (A)+(B)
Unit Weight by Nationalization Stage	132	201	284	(B) 81	698
Unit Weight Accumulated	132	333	(A) 617		

2) Special Steels for Manufacture of Commercial Vehicles and Passenger Cars

Whereas commercial vehicles and passenger cars are now being produced by assembling imported parts, the plan is to gradually increase the use of domestically manufactured parts. However, since the parts produced domestically from special steels up to 1984 and leaf springs only (as informed by Suzuki Automobile Industrial Co., Ltd. of Japan), the special steel demand was calculated by the following formula: (number of units manufactured) x (number of springs/vehicle) x (unit special steel weight/spring).

3) Special Steels for Manufacture of Repair Parts

In order to calculated the special steel demand for the manufacture of repair parts, it is necessary to classify the parts used for repairing by type and to obtain information on the repairs ratio (hereinafter referred to as repair ratio) necessary with respect to the number of registered automobiles. However, since no information on repair ratio other than for springs was available and considering the present extent of domestically produced parts and the state of roads in Pakistan, the volume of special steel demand for the manufacture of repair parts was limited to springs and calculated by the following formula:

(Number of registered automobiles) x (repair ratio) x (unit weight of one leaf spring).

(2) Special Steels for Manufacture of Motorcycles

Motorcycles are being assembled in Pakistan by four companies including the state-managed Sind Engineering Ltd. (technical licence agreement with Suzuki) and the private-owned Atlas Autos Ltd. (technical licence agreement with Honda). According to PACO, the outlook of motorcycle output for the future is as follows:

Table 3-7. Outlook of Production of Motorcycles

1979–80	1980–81	1981–82	1982–83	1983–84
68,000	79,000	91,000	100,000	110,000

Date Source: Pakistan Automobile Corporation

PACO's information revealed that it plans to enforce a policy by which parts successfully produced domestically by one company be adopted by other companies in order to improve the ratio of domestic production. It was learned that shafts, drop-forged armed gears and other are now being considered.

The special steel weight of domestically produced motorcycle parts was calculated on the basis of drawings for the parts earmarked for domestic production, obtained from PACO during our field survey, and the mean weight was found to be about 15 kg/vehicle.

Accordingly, the volume of special steel consumption for the manufacture of motorcycles, calculated from th above-mentioned number of vehicles manufactured and unit consumption of special steel, is 1,650 t/y in 1983/1984. The same volume of 1,650 t/y was adopted for 1984/1985.

The special steel bars required for the production of motorcycle range in diameters from 14 to 90 mm, roughly 40% of which have a diameter of 22 – 40 mm, and their materials are carbon steel and alloy steel.

(3) Special Steels for Manufacture of Farm Tractors

Agricultural production accounts for roughly 30% of the GDP of Pakistan, and is the leading industry in the country. Supported by the government's agriculture promotion policy and the will of farmers for mechanization, there is a big demand for farm tractors in Pakistan. However, the number of tractors available is limited owing to the tight foreign exchange situation.

Table 3-8 shows the recent number of tractors imported.

Table 3-8. Import of Agricultural Tractors

1976–1977	1977–1978	1978–1979	1979 (July) – 1980 (Jan.)
15,112	15,095	13,448	16,653

Data Source: Statistical Division, Government of Pakistan

In order to meet domestic demands for farm tractors while conserving foreign exchange in such a situation, it is important to increase the ratio of domestic manufacture of tractor parts.

Interview with Pakistan Tractor Corporation (PTC) revealed that PTC had, asked several foreign tractor makers to survey the feasibility of producing agricultural tractors in Pakistan, and received reports indicating that the present production of 10,000 tractors per year be increased to 20,000 tractors per year in the course of next few years. PTC is planning to increase the present domestic production rate (Fiat type: 0%, Massey Ferguson type: 20%) to 85%, and is presently studying a plan to construct a parts manufacturing plant.

The unit requirement of special steels at a domestic production rate of 85% is estimated at about 380 kg/tractor based on the information obtained from PTC and manufacturers in Japan.

Calculating the expected volume of requirement of special steel materials for the

manufacture of tractors from the above-mentioned number of tractors manufactured and the unit requirement of special steel, the present volume of demand of 1,300 t/y will increase to 7,600 t/y in 1984/1985, registering a mean annual rate of increase of over 42%.

(4) Special Steels for Other Purposes

Regarding special steels for other purposes, it was learned that the munitions industry presently consumes about 11,900 t/y, or close to 30% of the entire volume of national consumption. In furture, with the progress of the machinery industry in the field of manufacturing automobiles, farm tractors and other products, the relative weight of special steel consumption by the munitions industry is expected to decrease to about 25%, but the industry will still assume a major source of special steel demand in Pakistan. However, roughly 90% of the special steel materials used by the munitions industry is of dimentions that SSP cannot produce at present.

Next to the munitions industry, there is a big demand for special steels for the manufacture of household utensils including knives. While a portion of these household utensils is being exported, the greater part is for the domestic market.

Based on Pakistan's import statistics, information obtained from several domestic manufacturers and estimation by the survey mission, the present volume of consumption of 7,400 t/y of special steel materials for the manufacture of household utensils is expected to increase to 8,400 t/y in 1984/1985, registering a mean annual rate of increase of 2.6%.

Regarding other sources of demand for special steels, the volumes of consumption by various kinds of users, obtained through field surveys, were arranged by type of industry and the total national volume of demand was estimated for the respective industries. Based on these figures, and by referring to information supplied by users and the Fifth Five-Year Plan (1978–1983), the volumes of consumption of special steels for 1984/1985 were estimated as shown in Table 3-2.

By calculating the estimated volumes of consumption of the respective sources of demand described above, the survey mission considers that the total volume of demand for special steels in Pakistan is expected to emerge from the stagnancy of the last several years and the present demand of 40,400 t/y would increase to 75,300 t/y in 1984/1985, marking a mean annual rate of increase of 13.2%.

However, the realization of this estimated volume of demand will depend on the degree of development of the machinery industry as previously stated. Namely, the volumes of

demand estimated for the respective industries using special steels are essentially based on the future outlooks projected from the plans and estimates of the industrial organizations of Pakistan, estimates of special steel users and the Fifth Five-Year Plan presently in progress. Consequently, the attainment of these estimated volumes of demand depends largely on how well these plans and programs will be carried out.

What bringing about a rapid increase in special steel demands in Pakistan is the demand to be realized by producing trucks, buses and farm tractors. This demand is susceptible to rapid increase by the multiple effects of an increase in the number of vehicles produced and the growing rate of domestic production of parts for vehicles. It is, however, feared that the estimated volume of demand may not be realistic for the following two reasons:

The first concerns with the rate of domestic production, which can be attained only by smooth transfer of manufacturing know-how, quality control techniques and other technologies, requiring a suitable know-how supplier and foreign exchange to do so. The second relates with the speed of increase in the vehicle production. The future of Pakistan's automobile industry will be influenced by the industry's own plans but its operations will be largely restrained by the country's economic problems, inasmuch as it has to operate within the framework of the domestic economy of Pakistan.

The outline of Pakistan's economy and trade was given in the preceding chapter. Since various serious problems exist, such as national finance, international balance of payments and rising prices, much difficulty will have to be surmounted before it will be possible to achieve smooth economic development.

Regarding the problem of international balance of payments, in particular, the lack of foreign exchange reserves inevitably imposes serious restraints on the production activities of enterprises in the form of restrictions on the import of raw materials, with few exception of special enterprises engaged, for example, in export.

3.1.4 Breakdown of Demand for Rolled Special Steels by Kinds and Sizes

The demands for rolled special steel materials, which had been estimated by sources of demad in Item 3.1.3, were tabulated by kinds and sizes for the periods 1979/1980 and 1984/-1985, as follows.

(1) Breakdown of Demands for Special Steels by Kind and Size for 1979/1980

Table 3-9. Demand of Round Bar, Square Bar, etc. (1979/80)

Unit: t/y

	Size Classification (mm)				
	8 – 21	22 – 40	41 – 90	91 – 150	Total
Round Bar					
– Drawing	930	1,160	220	10	2,320
– Hot Rolled	1,380	520	620	8,990	11,510
Sub Total	2,310	1,680	840	9,000	13,830
Square Bar, etc.					
– Drawing	265	70	50	0	385
– Hot Rolled	220	350	2,070	10,120	12,760
Sub Total	485	420	2,120	10,120	13,145
Total	2,795	2,100	2,960	19,120	26,975

Remark: Square Bar, etc. shows Square Bar, Billet, Octangonal Bar, Hexagonal Bar, etc.

Table 3-10. Demand of Flat Bar (1979/80)

(i) Alloy (Spring) Steel for Automobile Industry

Width: 57.2 – 63.5 mm
Thickness: 9.5 – 12.7 mm ..... 3,810 t/y

(ii) Alloy Steel for Hand Tool

Width: 25 – 70 mm
Thickness: 10 – 15 mm ..... 1,200 t/y

(iii) Stainless Steel for Surgical Instrument

Width: 12.7 mm
Thickness: 4.76, 6.95, 9.52, 15.88, 10.05 ..... 1,300 t/y

Table 3-11. Demand of Plate and Sheet (1979/80)

Unit: t/y

	Size Classification (Thickness)				
	< 0.7mm	0.7 – 2.3mm	2.4 – 6.0mm	> 6.0mm	Total
Stainless Steel	4,120	2,842	13	25	7,000
Other Special Steel	2	–	65	–	67
Total	4,122	2,842	78	25	7,067

(2) Breakdown of Demands for Special Steels by kind and Size for 1984/85

Table 3-12. Demand of Round Bar, Square Bar, etc. (1984/85)

Unit: t/y

	Size Classification (mm)				
	8 – 21	22 – 40	41 – 90	91 – 150	Total
Round Bar					
– Drawing	1,770	1,870	400	0	4,040
– Hot Rolled	3,700	1,710	3,300	15,040	23,750
Sub Total	5,470	3,580	3,700	15,040	27,790
Square Bar, etc.					
– Drawing	590	140	110	0	840
– Hot Rolled	2,220	3,680	6,950	14,830	27,680
Sub Total	2,810	3,820	7,060	14,830	28,520
Total	8,280	7,400	10,760	29,870	56,310

Table 3-13. Demand of Flat Bar (1984/85)

(i) Alloy (Spring) Steel for Automobile Industry

Width: 57.2 – 63.5 mm
Thickness: 9.5 – 12.7 mm ..... 6,370 t/y

(ii) Alloy Steel for Hand Tool

Width: 25 – 70 mm
Thickness: 10 – 15 mm ..... 1,930 t/y

(iii) Stainless Steel for Surgical Instrument

Width: 12.7 mm
Thickness: 4.76, 6.95, 9.52, 15.88, 19.05 mm ..... 2,615 t/y

Table 3-14. Demand of Plate and Sheet (1984/85)

Unit: t/y

	Size Classification (Thickness)				
	<0.7mm	0.7 – 2.3mm	2.3 – 6mm	>6mm	Total
Stainless Steel	4,700	3,230	8	32	8,000
Other Special Steel	2	–	89	–	91
Total	4,702	3,230	97	32	8,091

3.2 Steel Castings and Forgings

The survey mission visited various leading manufacturers of transportation machinery, industrial machinery, agricultural machinery, railway rolling stocks, cement machinery and electrical machinery and obtained replies to the survey mission's questionnaire on the present demands and future demand estimate. In addition, the list of customers prepared by SSP was also studied in order to grasp the situation of demands for steel castings and forgings in Pakistan.

Owing to their very nature, steel castings and forgings are produced in a wide variety of unit types, shapes, sizes and weights. Their import and production statistics are unavailable not only on their gross volumes but also on those classified by sector of demand, kind, shape, etc. UNIDO statistics are also unavailable.

Many users of steel castings and forgings possess their own production facilities, or rely on the facilities of their affiliated manufacturers, and are self-sufficient. The operation rates of these production facilities are extremely poor, and the actual situation of steel casting and forging industry is that it has a large surplus production capacity.

The automobile, motorcycle and transportation machinery industries are expected to account for a considerable increase in future demads for steel castings and forgings owing to their trend to increase the rate of domestic production of parts, as mentioned earlier.

These manufacturers generally aim at standardization and interchangeability of parts for various vehicle models, and plan to produce these parts themselves or by their affiliated manufacturers, or to establish exclusive-purpose parts manufacturing plants.

Since the situation surrounding end user industries is as described above, there was no means of obtaining information relating to demands for steel castings and forgings through replies to questionnaires, and since their consumption cannot be the object of SSP's production. Therefore, the existing and estimated demands for castings and forgings, respectively, are indicated hereunder for other industries only.

1) Steel Castings

Table 3-15 shows the demand for steel castings.

In the table, the cement industry's demand for wearing parts is calculated on the premise that it will increase at the same rate as that of the cement output, which is expected

Table 3-15. Demand for Steel Castings

Unit: t/y

End User Industry		Demand	
		1979/80	1984/85
Cement Industry	Wearing parts	330	621
	Grinding media ball	12	139
Automobile Industry	Trailer parts	—	22
Miscellaneous		30	48
Total		372	830

to increase from 3,070,000 t/y in 1979/80 to 5,800,000 t/y in 1984/85. Regarding the demand for grinding balls, for which forged steel has been used hitherto, the recent trend is to gradually switch to the use of cast stainless iron balls of greater wear resistance. Accordingly, the demand for cast stainless iron balls in 1984/85 is calculated on the premise that the switch-over to this material will come about at an annual rate of 10%.

The demand for trailer parts is deduced from replies to the survey mission's questionnaire. An additional other miscellaneous demand of 30 t/y is anticipated in 1979/80 in the SSP's List of Customers. This demand is for diversified castings in small lots, and cannot be considered stable and continuous demand. The volume of other miscellaneous demand in 1984/85 was estimated on the basis of the manufacturing industry's past mean annual growth rate of maximum 10%.

2) Forgings

End users of forgings produce their own forgings. In addition the operation rate of their production facilities is extremely low.

As for the method of procuring rolled steel products for making forging, end users possessing steel making an rolling facilities produce their own raw materials, while those posses-

sing steel making facilities but no rolling facilities consign the rolling work to outside rolling mills or purchase the rolled steel materials they need.

Regarding the volume of demand for rolled steel products for making forgings, a description has been offered earlier in the section on special steel rolled products.

As for other sources of demand, the cement industry's demand for forged steel balls, is now about 1,100 t/y, will increase in direct proportion to the industry's output. But, when taking into account the trend to switch over to the use of cast stainless steel balls in the future, the volume of demand for forged steel ball in 1984/85 is expected to decrease.

There is also an existing other miscellaneous demand of 50 t/y according to SSP's List of Customers. The volume of demand from this source in 1984/85 is estimated on the basis of the manufacturing industry's maximum annual growth rate of 10%. Incidentally, the forged steel ball production capacity of Heavy Foundry & Forge Ltd. (HFF) is large and reaches about 2,000 t/y.

Table 3-16 shows the demand for forgings.

Table 3-16. Demand for Forgings

Unit: t/y

End User Industry	Demand	
	1979/80	1984/85
Cement Industy = Forged Steel ball	1,105	930
Mescellaneous	50	80
Total	1,155	1,010