

**THE PRE-FEASIBILITY STUDY REPORT
ON
THE NATIONAL IRON AND STEEL DEVELOPMENT
FOR
THE SECOND GENERATION
IN THE REPUBLIC OF INDONESIA**

DECEMBER 1987

**JAPAN INTERNATIONAL
COOPERATION AGENCY**

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PREFACE

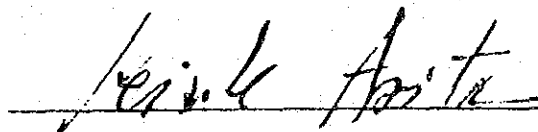
In response to the request of the Government of the Republic of Indonesia, the Government of Japan has decided to conduct a feasibility study on the National Iron and Steel Development for the Second Generation in Indonesia, and entrusted the study to the Japan International Cooperation Agency (JICA). JICA has sent to Indonesia a study team headed by Messrs. Takeo Baba (Step I and II) and Kenji Kobayashi (Step III), The Japan Iron and Steel Federation, three times since November 1984.

The team had discussions on the Project with the officials concerned of the Government of Indonesia and conducted field surveys in the project-related areas. After the team returned to Japan, further studies were made and the present report has been prepared.

I hope that this report will serve for the development of the Project and contribute to the promotion of friendly relations between our two countries.

I wish to express my deep appreciation to the officials concerned of the Government of the Republic of Indonesia for their close cooperation extended to the team.

December 1987



Keisuke Arita
President

JAPAN INTERNATIONAL COOPERATION AGENCY

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SUMMARY

1. Introduction

1-1. Object and background of dispatch of the study mission

The Government of Indonesia felt strongly necessity of the soonest possible expansion of self-supply capacity of steel as it was foreseen from the study made through cooperation of UNIDO and others on steel demand that the present shortage of domestic steel supply as against steel demand would further increase rather than decrease in future. Believing that the condition would be more crucial in 1990s particularly, the Government decided that a study be undertaken on a plan for an early realization of a project to construct an integrated steel works as the national iron and steel development for the second generation in the Republic of Indonesia.

With the above background the Government of Indonesia made a request to the Government of Japan in February 1983 to cooperate in a study for the plan.

For execution of the study, the Government of Japan decided to have Japan International Cooperation Agency (JICA) carry out the study concretely, and JICA sent study missions three times, namely, preliminary study mission for the plan for the national iron and steel development for the second generation in the republic of Indonesia (August 24 to September 3, 1983), the second preliminary study mission (March 4 to 14, 1984) and the preparatory study mission (July 23 to August 1, 1984), and concluded the scope of works with the Ministry of Industry of Indonesia. JICA dispatched Step I and II study missions to the Republic of Indonesia in conformity to the S/W.

1-2. Outline of Step I (demand study) study

Step I study aimed at the study of steel demand and supply in Indonesia and a mission was dispatched to Indonesia from November 14 to December 11, 1984. Also, as the Indonesian side requested strongly at the time of the preparatory study in July 1984 that Ombilin, one of major coal mining area in South Sumatera, be added as one of the proposed sites for a new steel works and that study be made on possibility of utilization of natural gas, experts on coal and natural gas joined the mission.

Incidentally, the S/W gives 1990 as the target year for demand and supply balance, but to help understanding of future and portraying of the steel works for the second generation, the mission decided to forecast the balance in 1995 and 2000 just for reference.

Although there were some other study outlooks for steel demand conducted by third parties such as BSC and A.D.L., it was agreed by and between MOI and JICA Step III mission that the Pre-F/S be proceeded with on the assumption that the demand for non-flat products would increase as per the study results of Step I in some years after 1990.

1-3. Outline of Step II (site survey) study

Step II study was made by field survey from July 11 to August 30, 1985, with the purpose of studying the six sites proposed by the Indonesian side for construction of the integrated steel works for the second generation in the aspects of area available, port location, transportation, fuel, cooling water, manpower, supporting industries, etc.

In making selection of the sites, the following were made premises.

- 1) Production scale: An integrated steel works specializing in production of non-flat products to the extent of 2 million tons a year, max.
- 2) Production process: DR - EAF - CC - Rolling
(Non-flat products)
- 3) Site area:

Site for steel works	300 ha.
Site for welfare	300 ha.
- 4) Port and approach channel:

Iron ore	60,000DWT
Product & scrap	5,000DWT
- 5) Electricity:

For steel works	400MW
Back-up power	400MW
- 6) Water:

For steel works (fresh water)	8,000 m ³ /h
For power plant (sea water)	80,000 m ³ /h

As a result of the above field survey and the work in Japan, the six proposed sites were classified as below and the areas which are suited for construction of the integrated steel works or have at least technical possibility are given below.

- (1) An area which is to be studied separately

Cilegon Area:

Since expansion plan of existing P.T. Krakatau Steel is unknown, the area needs a separate study from the availability of site area and industrial water, etc.

- (2) Areas which are considered unsuited, namely too early to be selected as the site

Bontang Area and Tanjung Enim Area:

Due to the absence of electricity for back-up in those areas.

Yogyakarta Area:

Due to the difficulties for port construction.

- (3) Areas which permit the project technically
Pare Pare Area and Lhokseumawe Area.

As regards Pare Pare Area and Lhokseumawe Area selected by the study mission, it was decided to conduct the F/S of the project at either site as Step III study after the Indonesian side selected one from the two.

1-4. Step III (Pre-F/S) study

The Indonesian side examined the above two areas of Pare Pare Area and Lhokseumawe Area selected by the Step II study mission, but the Indonesian side requested a review of utilization of iron sands of Yogyakarta in selection of the sites.

To this, the Japanese side explained that use of iron sands is technically impossible, and the Indonesian side withdrew the request and made a new request containing Pre-F/S for the two areas, Cilegon Area and Lhokseumawe (Arun) Area.

To consult the contents of Step III study, the Japanese Government dispatched a study team to Indonesia from December 15 to 21, 1986. As a result of the consultation, it was confirmed that the study is to be Pre-F/S for the two areas of Cilegon and Lhokseumawe (Arun), the contents of which includes rough estimation of construction cost, but excludes financial analysis and that the study is to terminate with the Pre-F/S of Step III study.

Step III study was made by field survey from March 1 to 12, 1987, with the main purposes of preparing the conceptual design and estimating roughly the cost for the construction of the integrated steel works for the second generation.

2. Selection of Plant Site

2-1. Planned sites in Step III

The study in this Step III took up Lhokseumawe (Arun) area and the Cilegon Industrial Estate as the planned plant sites.

In the recommendation of the Step II mission, evaluation of the Cilegon Industrial Estate as plant site ranked low as question was raised about availability of industrial water and natural gas in the area.

However, in compliance with the request of the Ministry of Industry of Indonesia and in expectation that completion of a planned dam in future will ensure supply of industrial water in the quantity as required for operation of the new steel works in the Cilegon area and that as described in the full report, though it is difficult to expect demand and supply of natural gas to balance even in future, natural gas may be made available by cutting its consumption at P.T. Krakatau Steel and by changing to other fuels at P.T. Krakatau Steel and neighboring plants (cement factory, etc.), the site in Cilegon Industrial Estate was added as one of the planned site in the Step III.

2-2. Characteristics of the two planned sites

(1) Arun area

1) Advantages

- a) Not much problem in ensuring necessary land
- b) No problem in availability of industrial water and natural gas

2) Disadvantages

- a) Large expenditures required for port construction
- b) With no power consumption in neighboring areas at present, a great care called for construction plan of power stations
- c) With no supporting industries in the area at present, difficulty expected in availability of materials and spares at the time of construction and start-up of the new steel works
- d) Recruitment of manpower for construction as well as for operation of the works most likely a problem
- e) Far from steel consuming centers in Indonesia

(2) Cilegon area

1) Advantages

- a) Necessary infrastructure complete now serving P.T. Krakatau Steel mainly
- b) Easy to recruit manpower
- c) Close to steel consuming centers
- d) No special problem as to land and sea transportation

2) Disadvantages (questionable points)

- a) Necessity of further study on supply of industrial water
- b) Necessity of detailed study on demand/supply balance of natural gas

3. Product Mix, Production Scale and Production Process

3-1. Conditions of production of the project

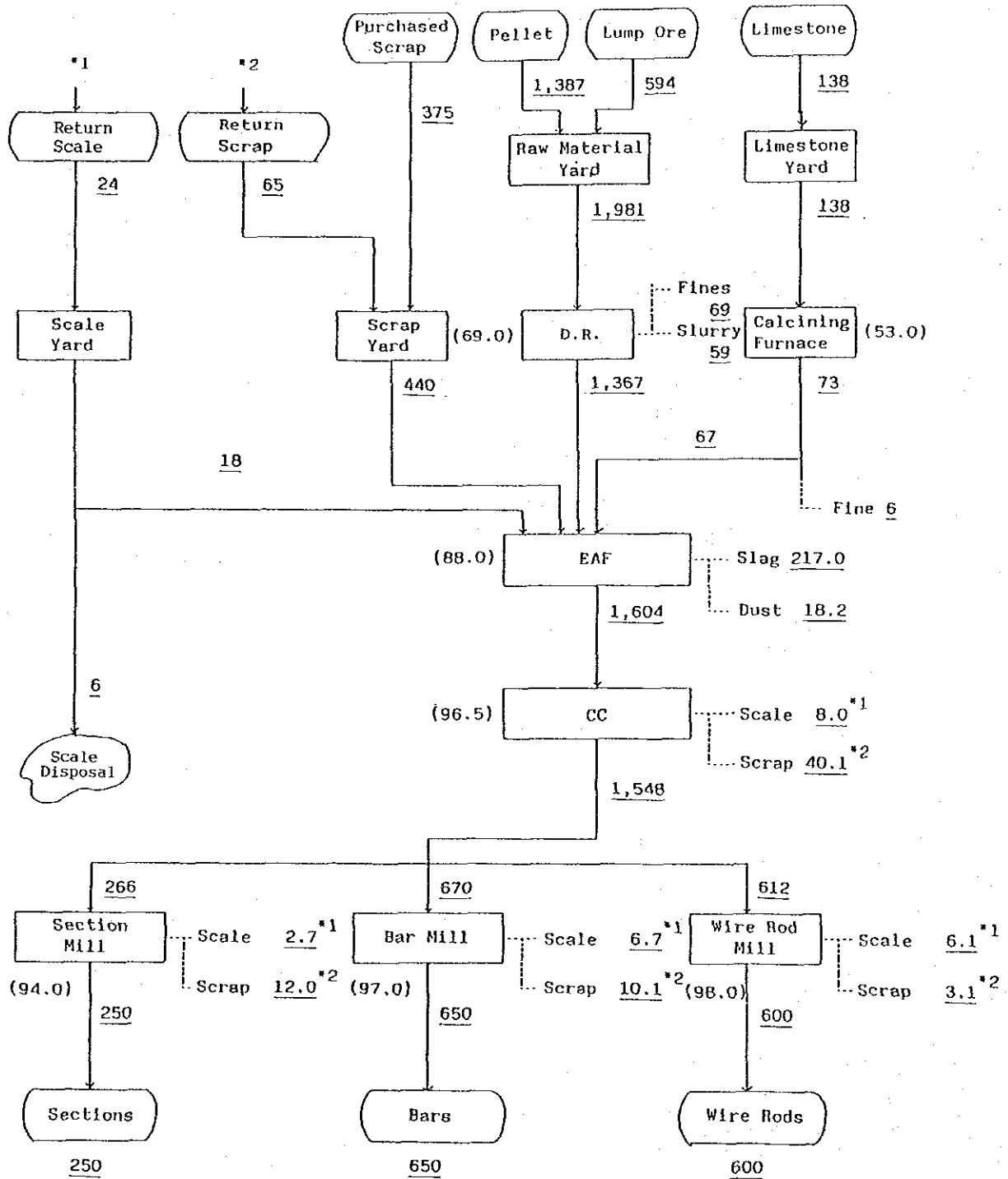
- 1) Production scale --- 1,500,000 t/y (in rolled steel)
- 2) Production and product size range by mill

Mill	Production (1,000 t/y)	Product Size Range (mm)
Sections	250	L50-120, I75-125 FB70-125, [75-125 T100-125
Bars	650	10-50 ϕ
Wire rods	600	5.5-16.0 ϕ

- 3) Scrap and scale generated in the works are to be recycled as much as possible in the works.
- 4) The ratio of lump ore:pellet at DR plant is to be as follows:
Lump ore: Pellet = 30:70
- 5) DRI blending ratio at EAF is to be as follows:
DRI:Scrap+Scale = 75:25
- 6) Billets produced at CC plant are to be all used in rolling mills of the steel works and no outside sale is planned.

3-2. Material balance

Unit: 1,000 t/y
() shows yield. (%)



Material Balance at Products 1,500,000 T/Y

3-3. Production process adopted in Step III study

From the points of production scale of the steel works and availability of raw materials and fuel, the gas based Direct Reduction Process using natural gas produced in quantity in Indonesia as reducing agent is a natural conclusion.

On the other hand, DR process based on solid reducing agent may be used only when there are coal mines developed in the vicinity of the steel works as mentioned in the full report.

Also as a result of market research, the steel works is planned to have the final production scale not exceeding two million t/y.

As it is judged from the above that adoption of natural gas based DR process is most realistic as compared with the other processes, natural gas based DR process is to be adopted in the present Pre-F/S.

4. General Layout of the Steel Works

4-1. Basic policy in planning the layout

- 1) Draft layout is to be prepared for the two sites of Cilegon and Arun areas.
- 2) Site conditions (land shape, soil condition, etc.) for the steel works in those two areas are to be set up on the basis of the study of Step II and Step III study missions.
- 3) The major part of raw materials and sub-raw materials are to be brought to the steel works by sea.
- 4) Shipping of products from the steel works in respective areas is to be made by the following methods:

	<u>Sea Transport</u>	<u>Land Transport</u>
a) Cilegon area	25%	75% (rail & truck)
b) Arun area	82%	18% (truck only)

- 5) Production scale of the steel works is to be 1.5 million t/y (in rolled steel), but the facilities are to be laid out so as to permit expansion of production scale by about 50% in the future.
- 6) Power plant, water reservoir and slag disposal area are to be installed in the compound of the steel works.
- 7) Green belt in width 50 m min. is to be created around the steel works.

4-2. General layout

- 1) In view of flow of goods such as flow between major processes, carrying in and out of raw materials and products, in-plant vehicle movement, etc., the flow of production process at both Cilegon and Arun areas is considered best if it is from berths to inland to berths.
- 2) Assuming that natural gas and raw water are brought to the steel works from inland area, the reservoir and raw water treating facilities are to be laid out, together with oxygen plant, at the inland side of the steel works and close to DR plant and EAF plant which consume much water and oxygen.

Assuming its fuel oil is carried in by sea and in view of its facilities being cooled by sea water, the power plant and substation are to be laid out at the sea side of the steel works.

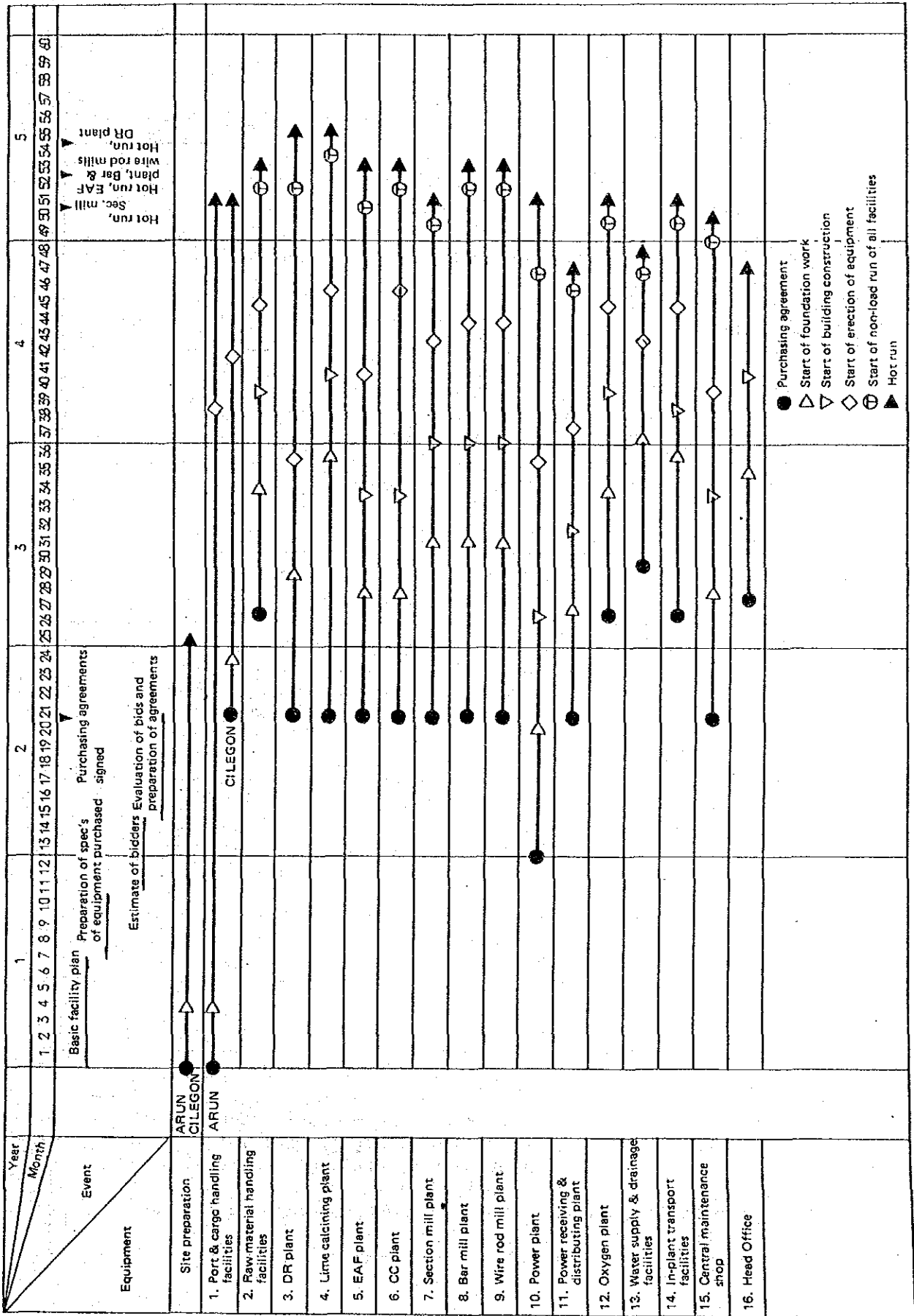
- 3) EAF plant and rolling mill plant are arranged so that hot charge can be made.
- 4) As central maintenance shop and central material warehouse are closely related each other, they are to be built close each other and also relatively close to EAF plant and rolling mill plant whose weight in maintenance jobs is high.
- 5) Facilities related to administration are to be built at the inland side of the steel works for the convenience of visitors and so laid out that the facilities are kept from effect of dust from raw materials and scrap yards, etc. as much as possible.

5. Personnel Plan and Overall Construction Schedule of
the Steel Works

5-1. Personnel plan

Facilities	Manager level	Staff level	Operator level	Total
Raw materials	2	2	38	118
DR plant		4	72	
Lime calcining plant	7	25	508	540
EAF plant				
CC plant				
Section mill plant	2	8	Cilegon 250 Arun 258	Cilegon 260 Arun 268
Bar mill plant	2	8	Cilegon 264 Arun 272	Cilegon 274 Arun 282
Wire rod mill plant	3	8	Cilegon 287 Arun 295	Cilegon 298 Arun 306
Power plant	3	11	356	370
Power rec. & distri.				
Oxygen plant				
Water supply & drainage	3	10	137	150
Instrumentation maintenance				
Transport (incl. port)	4	4	Cilegon 419 Arun 493	Cilegon 427 Arun 501
Test & analysis	3	6	56	65
Maintenance	21	16	877	914
Warehouse	4	2	76	82
Administration	52	248		300
Total	106	352	Cilegon 3,340 Arun 3,472	Cilegon 3,798 Arun 3,930

5-2. Overall construction schedule



6. Outline of Plant Description

Equipment	Outline of Plant Description
1. Port & cargo handling facilities	Material (pellet) berth 120,000 DWT ore carrier Material (scrap) berth 35,000 DWT cargo vessel Product berth 5,000 DWT cargo vessel
2. Raw material handling facilities	Ore storage capacity 300,000 tons
3. DR plant	DR plant 2 units Capacity 1,400,000 t/y
4. Lime calcining plant	120 t/d 2 units
5. EAF plant	130 t EAF x 2 units 130 t LF x 1 unit) x 2 units Capacity 1,600,000 t/y
6. CC plant	Billet CC (150φ) 6 st 2 units Capacity 1,550,000 t/y
7. Section mill plant	Reheating furnace 70 t/h 1 unit Mill 2-high tandem Product mix angles, channels, I beams, Tees, flat bars Capacity 250,000 t/y
8. Bar mill plant	Reheating furnace 130 t/h 1 unit Mill 2-high tandem Product mix plain bars, deformed bars (φ50) Capacity 650,000 t/y
9. Wire rod mill plant	Reheating furnace 130 t/h 1 unit Mill block mill with 100m/sec of finishing speed Capacity 600,000 t/y
10. Power plant	100 MW x 4 units (oil firing)
11. Utilities Transport facilities (inc. port)	Power receiving & distributing plant Ar, N ₂ and O ₂ supply facilities Water supply, drainage & natural gas supply facilities Intraworks transportation facilities

Equipment	Outline of Plant Description
12. Maintenance facilities	Central maintenance shop Central material warehouse
13. Others	Material testing and analysis facilities Administration facilities
14. Civil & building work	Quantity of fill material for reclamation Cilegon : 6 million m ³ Arun : 9 million m ³

7. Rough Estimate of Investment

Total Investment

(Unit: Rp. Million)

	Cilegon		Arun	
	Amount	%	Amount	%
1. Site preparation	58,395	2.3	46,530	1.8
2. Civil engineering & building works	343,872	13.8	456,253	17.4
3. Machinery & equipment	1,443,981	57.8	1,461,540	55.6
4. Erection works	187,338	7.5	189,395	7.2
5. Transportation & insurance	225,420	9.0	228,191	8.6
(Total of direct construction costs)	(2,259,006)	(90.4)	(2,381,909)	(90.6)
6. Engineering fee	99,866	4.0	105,082	4.0
7. Pre-operating costs	7,517	0.3	7,909	0.3
8. Spares & stores	58,694	2.4	59,717	2.3
9. Contingency	72,202	2.9	73,079	2.8
(Total of other investment)	(238,279)	(9.6)	(245,787)	(9.4)
Total investment	2,497,285	100.0	2,627,696	100.0
(Per ton of crude steel)	(Rp.1,557x10 ³)		(Rp.1,638x10 ³)	

8. Conclusion of the Pre-F/S

(1) Simplified line-up of facilities

Very simplified line-up of production facilities with DR furnace x 2 -- EAF x 4 -- LF x 2 -- CC x 2 -- Rolling mills (section mill, bar mill and wire rod mill) was planned.

(2) Compact layout and consideration for future expansion

Layout of the facilities is so planned that material flow can be smooth and that operation of hot charge connecting CC and rolling mills and others can be made for energy saving. If expansion of facilities becomes necessary in future, the layout can easily accommodate it.

(3) Facilities plan of the latest technological level

Facilities are planned to include the latest technology appropriate to the new steel works for the second generation. Namely,

1) High efficiency

Full consideration is given to have most economical productive facilities from DR furnace through rolling mills.

2) Production of quality products

High grade steels such as special steel are out of the scope of this Pre-F/S, but it is planned that production of those products, if required in future, is possible by installing a few additional facilities such as degassing facilities and billet conditioning facilities.

3) Low production cost

Factors which have effect on production cost such as basic consumption units of various materials and

services required for operation, material/product yield, etc. are planned on the basis of actual performance of operation of similar facilities in Japan.

4) Automated & computerized facilities

In planning the facilities, consideration is given to automation and computerization from the viewpoint of ensuring personnel economy and stable quality.

5) Environmental preservation

In the facilities plan, pollution control facilities (air pollution, noise, effluent, etc.) are planned with reference to the present level of pollution control facilities in Japan, which are the highest level in the world.

(4) High labor productivity

Labor productivity of the new steel works calculated on the number of personnel directly engaged in production activity only is about 400 t/man-year.

The number does not include the personnel of so-called indirect departments such as head office and others, but even if those personnel are included, the productivity is high as compared with that of similar steel mills in Japan.

(5) Effective capital investment

As one of criteria of effectiveness of capital investment in constructing a new steel works at a new site, there is the amount of investment per ton of crude steel produced annually. In this project, it is about \$1,100.

Though no suitable comparative example is available in recent years, it can safely be said it is an effective investment in the light of the instances of steel works constructed in the past.

9. Recommendations

The object and preconditions of this Pre-F/S are as mentioned already.

If the Government of Indonesia contemplates promotion of this project in future, the matters enumerated below would require further study and consideration.

(1) Review of market study

Although the interim conclusion of Step I study forecast some supply shortage of long products (non-flat products) in 1990 and crude steel shortage in 1995 and thereafter, there are some other studies for steel demand forecast conducted by other consultants.

Accordingly, a further study for future steel demand will be required.

(2) Selection and detailed field survey of the site

Two sites at Arun area and Cilegon Industrial Estate are proposed in this instance and either site must be selected finally as the site for the new steel works and detailed field survey conducted. Such survey should be made with reference to the items mentioned in Chapter VI of the full report.

(3) Detailed study of natural gas, industrial water & power

(4) Review of required construction funds by field survey

Such review should be necessary especially for civil engineering (incl. port) and equipment erection works.

(5) Curtailment of construction period

Any delay in the general construction schedule has a big effect on profitability of this project.

(6) Financial analysis and economic analysis

In implementing this project, study should be made on its profitability on the basis of required construction funds as reviewed above.

(7) Study of alternate plans

In view of natural gas production and power condition as well as infrastructure in the vicinity of the sites proposed, the idea to construct DR plant at Arun site and EAF plant and subsequent facilities at Cilegon Industrial Estate is very realistic.

In that case, stepwise construction of facilities also should be studied in order to decrease initial investment.

Chapter I. INTRODUCTION

Chapter I. INTRODUCTION

1. Object and Background of Dispatch of the Study Mission

1-1. Object and background of dispatch

Indonesia's fourth five-year development plan (REPELITA IV) (April 1984-March 1989) adopted in March 1983 has been designed as "Period for strengthening the basic framework" for growth of the national economy by its own effort, with emphasis on 1) promotion of export, 2) expansion of labor market, 3) promotion of non-oil and gas industries aiming at freeing the economy from too much dependence on oil, and 4) more emphasis on utilization of vitality of private sectors. Under the present condition that any substantial increase of the revenue cannot be expected under its dependence on oil, the plan has been drawn up on the basis of reflection of various problems in present economic structure, namely, it aims at reducing fiscal expenditures by placing emphasis on vitality of private sectors, promoting export industries for increase of hard currency earnings, expanding employment and correcting the weakness of its oil-dependent economy. It aims at also easing concentration of industry and population on Jawa Island and their migration to other islands.

The total investment during the period is planned to be Rp.145.2 trillion, which represents an average increase of 19.1% a year, and consequently, the ratio of the investment to GDP will increase from 23% in the 1983 fiscal year to 29% in the final year of 1988. More specifically, the growth of investment by private sectors is set at 20% a year, which exceeds annual average of 18% growth of public investment.

In the course of planning, the Government of Indonesia felt strongly necessity of the soonest possible expansion of self-supply capacity of steel as it was foreseen from the

study made through cooperation of UNIDO and others on steel demand that the present shortage of domestic steel supply as against steel demand would further increase rather than decrease in future. Believing that the condition would be more crucial in 1990s particularly, the Government decided that a study be undertaken on a plan for an early realization of a project to construct an integrated steel works as the national iron and steel development for the second generation in the Republic of Indonesia.

With the above background the Government of Indonesia made a request to the Government of Japan in February 1983 to cooperate in a study for the plan.

For execution of the study, the Government of Japan decided to have Japan International Cooperation Agency (JICA) carry out the study concretely, and JICA responded by sending study teams three times, namely, preliminary study mission for the plan for the national iron and steel development for the second generation in the Republic of Indonesia (August 24 to September 3, 1983), the second preliminary study mission (March 4 to 14, 1984) and the preparatory study mission (July 23 to August 1, 1984).

1-2. Process of the preliminary studies

1-2-1. Dispatch of a preliminary study mission for the plan of the national iron and steel development for the second generation in the Republic of Indonesia

(1) Original terms of reference

Terms of Reference (hereinafter called "T/R") originally proposed by the Indonesian side concerning the construction plan for the second steel works in the Republic of Indonesia was sent to Japan in December 1982. The T/R was with the title of a study for the national iron and steel develop-

ment for the second generation and characterized by the fact that "South Sulawesi" was designated as the proposed site.

T/R mentioned that considering growth of steel demand and capacity of existing steel mills at present, a considerable gap between steel demand and supply was expected to develop in 1985 and after, which would make it necessary to construct the second steel works.

According to the T/R, the forecast of steel demand and supply provided by the Ministry of Industry of Indonesia was as follows:

Projected Demand for Steel Product
(in terms of long & flat products)

Unit: Ton

	1985	1990	2000
Long product	1,689,900	2,332,320	4,154,300
Flat product	1,722,150	2,679,975	4,308,200
Total demand (in the form of sponge iron), incl. 30% scrap	3,531,406	5,137,030	8,096,700

Source: Ministry of Industry, Indonesia

The contents of the study requested by the Indonesian side to be made by the Japanese side in the T/R were roughly as follows:

- 1) Analysis of demand-supply gap by kind of rolled steel
- 2) Suggestion of measures to fill the gap
- 3) Production process
- 4) Raw materials
- 5) Labor
- 6) Finance
- 7) Preparation of time schedule for carrying out the plan

and accordingly dispatch of experts in various fields such as engineers, natural gas experts and industrial economists was requested in the T/R.

(2) Dispatch of preliminary study mission

Based on the above mentioned T/R, the Government of Indonesia requested the Japanese Government in February 1983 to make a feasibility study for construction of a steel works with a view of fostering steel industry as one of key industries. Before undertaking the F/S, a preliminary study mission consisting of five persons from JICA, MITI and JISF as consultants was dispatched to Indonesia for the purpose of confirming the background and contents of the request for 11 days from August 24 to September 3, 1983.

(3) Alteration of T/R

At the first meeting with the preliminary study mission, the Indonesian side indicated its desire for the study to be made on the basis of a new T/R, saying that the T/R sent to Japan previously was not adequate. Faced with the request for the alteration, the mission was not in a position to accept the newly proposed T/R unconditionally and was forced to respond with a stance that it would hear reasons for such alteration and at the same time explanation on the new T/R for exchange of opinions, which would be conveyed to the Japanese Government.

The reasons for altering the T/R and the contents of the new T/R as explained by the Indonesian side were as given below.

1) Reasons for altering T/R

- a) Before making a plan for construction of the second steel works, it is prerequisite to try to utilize

- existing facilities effectively, for which a master plan is necessary.
- b) When selecting plant site for the second steel works, it is necessary not to limit the site to the South Sulawesi (Pare Pare) but compare and study several proposed sites.

2) Outline of the new T/R

- a) Demand forecast
- b) A study of the present Indonesian steel industry - P.T. Krakatau Steel and private companies - and recommendation for the optimum use of the existing capacities
- c) Feasibility of construction of a new plant and selection of a plant site

- Notes:
1. As the existing steel industry in Indonesia, 12 billet and ingot makers and 3 or 4 casting shops are to be the subject of the study.
 2. Demand forecast is up to 1990.
 3. Proposed plant sites are:
 - i. South Sulawesi (Pare Pare)
 - ii. East Kalimantan (Badak)
 - iii. North Sumatera (Aceh)
 - iv. South Sumatera (Bukit Asam)
 - v. Southern part of Central Jawa
 - vi. Cilegon Industrial Estate
 4. Flat products are considered to be produced at P.T. Krakatau Steel exclusively.

The most important points in the new T/R were the proposed sites being six not limited to one and a comparative study of the six proposed sites. Also, the contents of the study under the new T/R included, among others, a market study for rolled steels up to 1990 as well as steps to fill the demand up to 1990, namely studies on optimization of the

capacity of existing production facilities and on the construction of a new steel works.

After the consultation with the Indonesian side, the preliminary study mission visited Pare Pare area of Sulawesi Island for field study according to the original T/R and also visited P.T. Krakatau Steel which is the only integrated steel works in Indonesia for a study of its present condition and future plans, which enabled the mission to obtain information and knowledge necessary for the future study.

1-2-2. Dispatch of the second preliminary study mission

Following the first preliminary study mission, the second preliminary study mission was dispatched to Indonesia for 11 days from March 4 to 14, 1984. The object of the second mission was to hear specific contents of the new T/R which was prepared by the Indonesian side in November 1983 after the first mission returned home and presented to the Japanese Government and to collect and study information required to formulate the Scope of Works (hereinafter called "S/W") to be carried out in future.

The new T/R dated November 1983 was fairly distinct in content from the old one in placing emphasis on optimization of existing capacities; namely, it contemplated optimization of existing steel mills including P.T. Krakatau Steel as the first step to fill the demand-supply gap of steel expected in future, and if found still necessary, then execution of the feasibility study for construction of a new steel works.

On the dispatch of the second preliminary study mission, various discussion was made about treating of P.T. Krakatau Steel with respect to the optimization of capacities of the existing steel mills. It arose mainly from the fact that there were a number of uncertainty about the present condition of P.T. Krakatau Steel, but eventually an understanding

was reached that required: data and information on present condition as well as future expansion plans of the existing steel mills including P.T. Krakatau Steel were to be provided by the Indonesian side as a given condition for the study. In parallel with the above, the both sides exchanged views on methods to carry out the feasibility study.

After that, the second mission visited P.T. Tosan Prima, P.T. Aneka Tambang and also Cilacap area of Central Jawa to obtain knowledge necessary for the study.

1-2-3. Dispatch of the preparatory study mission

As a result of the second preliminary study mission, the Indonesian side agreed to the condition proposed by the Japanese side, and the Japanese side, considering the F/S possible, decided to dispatch a preparatory study mission in July 1984. The preparatory study mission was dispatched to Indonesia for 10 days from July 23 to August 1, 1984.

The preparatory study mission had the object to sign a S/W with the Indonesian side and make preliminary study of 3 sites. The talk with the Indonesian side proceeded with the Japanese side presenting a draft of S/W and consulting with the Indonesian counterpart thereon. To the original draft presented by the Japanese side, the Indonesian side requested that

- 1) Ombilin area to be added to proposed sites
- 2) Coal resources in East Kalimantan be considered
- 3) The study be completed in two years

and the S/W was concluded incorporating those requests.

The preparatory study mission was divided into 3 groups and visited 3 places of East Kalimantan, South Sumatera and North Sumatera for study of condition of the sites.

2. Outline of Step I (Demand Study) Study

2-1. Scope of the study

Step I study aimed at the study of steel demand and supply in Indonesia and a mission was dispatched to Indonesia for 28-day schedule from November 14 to December 11, 1984. Also, as the Indonesian side requested strongly at the time of the preparatory study in July 1984 that Ombilin, one of major coal mining area in South Sumatera, be added as one of the proposed sites for a new steel works and that study be made on possibility of utilization of natural gas, experts on coal and natural gas joined the mission.

This study was to be made for technological as well as economical feasibility of the plan to construct the second steel works in Indonesia, but the main object of the mission was to grasp future steel demand-supply gap in Indonesia and at the same time the mission made studies on matters underlying the project including legal system and steel distribution.

Incidentally, the S/W gives 1990 as the target year for demand and supply balance, but to help understanding of future and portraying of the steel works for the second generation, the mission decided to forecast the balance in 1995 and 2000 just for reference.

2-2. Outlook of steel demand and supply and the gap in future

Production of rolled steels in Indonesia in the 1983 fiscal year was 1.64 million tons, of which bars and shapes was 0.72 million tons, 44% of the total, followed by galv. steel sheet with 0.33 million tons (20%) and wire rods with 0.28 million tons (17%). On the other hand, import of rolled steels in 1983 was 1.66 million tons, of which cold rolled and hot rolled sheet accounted for 50%, indicating no production of them at home.

Demand for rolled steels by kind of products and by demand sector in 1990 was forecasted by adding up the demand in all demand sectors estimated by production (activity) level based on the REPELITA IV which started in 1984 as well as field survey and by steel consumption per unit in the respective demand sectors. The total demand for rolled steels in 1990 was forecasted to 4.13 million tons, showing an annual growth rate of 6.2% as compared with that in 1983, and 5.37 million tons in terms of crude steel.

When supply capacity is compared with demand by kind of products in 1990, the capacity is forecasted to be a little surplus in bars, heavy and medium plate, sheet and galvanized sheet, but short of about 0.17 million tons annually for long products of shapes and wire rods and short of about 0.33 million tons for tinplate, seamless and welded pipes.

Incidentally, steel demand in terms of crude steel in 1995 and 2000 was forecasted using macro-correlation method and cross sectional method, and the both gave outlook of the demand of about 7 million tons in 1995 and about 8.9 million tons in 2000.

Considering the result of the above Step I Study, some supply shortage is expected in 2000 except part of flat products unless there is a big change in the consumption pattern of each demand sector.

3. Outline of Step II (Site Survey) Study

Step II study was made by field survey for 51 days from July 11 to August 30, 1985, with the purpose of studying the six sites proposed by the Indonesian side for construction of the integrated steel works for the second generation in the aspects of area available, port location, transportation, fuel, cooling water, manpower, supporting industries, etc.

In making selection of the sites, the following were made premises.

- 1) Production scale: An integrated steel works specializing in production of non-flat products to the extent of 2 million tons a year, max.
- 2) Production process: DR - EAF - CC - Rolling
(Non-flat products)
- 3) Site area:

Site for steel works	300 ha.
Site for welfare	300 ha.
- 4) Port and approach channel:

Iron ore	60,000DWT
Product & scrap	5,000DWT
- 5) Electricity:

For steel works	400MW
Back-up power	400MW
- 6) Water:

For steel works (fresh water)	8,000 m ³ /h
For power plant (sea water)	80,000 m ³ /h

The six areas indicated by the Indonesian side for study are as follows:

- | | |
|----------------------------|---------------------------|
| 1) Bontang Area | Kalimantan Timur Province |
| 2) Cilegon Area | Jawa Barat Province |
| 3) Lhokseumawe Area (Arun) | D.I. Aceh Province |
| 4) Pare Pare Area | Sulawesi Selatan Province |
| 5) Tanjung Enim Area | Sumatera Selatan Province |
| 6) Yogyakarta Area | D.I. Yogyakarta Province |

As a result of the above field survey and the work in Japan, the six proposed sites were classified as below and the areas which are suited for construction of the integrated steel works or have at least technical possibility are given below.

- (1) An area which is to be studied separately

Cilegon Area:

Since expansion plan of existing P.T. Krakatau Steel is unknown, the area needs a separate study from the availability of site area and industrial water, etc.

- (2) Areas which are considered unsuited, namely too early to be selected as the site

Bontang Area:

Tanjung Enim Area:

Due to the absence of electricity for back-up in those areas.

Yogyakarta Area:

Due to the difficulties for port construction.

- (3) Areas which permit the project technically

Pare Pare Area and

Lhokseumawe Area

As regards Pare Pare Area and Lhokseumawe Area selected by the study mission, it was decided to conduct the F/S of the project at either site as Step III study after the Indonesian side selected one from the two.

4. Step III (Pre-F/S) Study

The Indonesian side examined the above two areas of Pare pare Area and Lhokseumawe Area selected by the Step II study mission, but the Indonesian side requested a review of utilization of iron sands of Yogyakarta in selection of the sites.

To this, the Japanese side explained that use of iron sands is technically impossible, and the Indonesian side withdrew the request and made a new request containing pre-F/S for the two areas, Cilegon Area and Lhokseumawe (Arun) Area.

To consult the contents of Step III study, the Japanese Government dispatched a study team to Indonesia for 7 days from December 15 to 21, 1986. As a result of the consultation,

it was confirmed that the study is to be pre-F/S for the two areas of Cilegon and Arun, the contents of which includes rough estimation of construction cost, but excludes financial analysis and that the study is to terminate with the pre-F/S of Step III study.

Although Cilegon Area had been designated as the area to be studied separately by the Step II study mission, the Indonesian side pointed out that Cilegon area is now considered one of the promising sites because the use of natural gas off Cilegon has become available and also a development plan of a reservoir at Rangkas Bitung permits the expectation of industry water supply in the area.

Annex-1. List of Members of Study Mission

Preliminary Study Mission (August 24 - September 3, 1983)

Leader: Tokuo Ikura Head of Development Planning Div.,
Mining & Industrial Planning and
Survey Dept., JICA

Hiromoto Toda Deputy General Manager,
Dept. of Overseas Research and
International Cooperation,
JISF

Akira Kojima Deputy Director,
Iron Steel Production Div.,
Basic Industries Bureau, MITI

Tatsuo Tajima Section of Overseas Research,
JISF

(Miss) Noriko Shiina Development Planning Div.,
Mining & Industrial Planning and
Survey Dept., JICA

Second Preliminary Study Mission (March 4 - 14, 1984)

Takao Suzuki (Leader & Overall Management)
Head of Development Planning Div.,
Mining & Industrial Planning and Survey
Dept., JICA

Shushi Ueda (Steel Policy)
Deputy Director Technology
Iron Steel Production Div.,
Basic Industries Bureau, MITI

Hiromoto Toda (Steel Technology)
Deputy General Manager,
Dept. of Overseas Research and Inter-
national Cooperation, JISF

Kiyohiko Inoue (Raw Materials)
Manager, Energy Control Sec., Raw Materials
Dept., JISF

Yoshihisa Hino (Economy & Market)
Superint., I.E. & Personnel Development
Dept. JISF

Keizo Kagawa (Coordination)
Industrial Survey Div.,
Mining & Industrial Planning and Survey
Dept. JICA

Preparatory Study Mission (July 23 - August 1, 1984)

Takao Suzuki (Leader & Overall Management)
Head of Development Planning Div.,
Mining & Industrial Planning and Survey
Dept. JICA

Kunihiro Kitamura (Steel Policy)
Iron Steel Production Div.,
Basic Industries Bureau, MITI

Hiro moto Toda (Steel Technology)
Deputy General Manager,
Dept. of Overseas Research and Inter-
national Cooperation, JISF

Minoru Akita (Steel Demand)
Special Steel Sec., JISF

Kazutaka Yasumi (Site & Environment)
Overseas Cooperation Sec., JISF

Takao Miyake (Production Facilities & Infrastructure)
Technical Sec., JISF

Keizo kagawa (Coordination)
Development Planning Div.,
Mining & Industrial Planning and Survey
Dept. JICA

Step I Study Mission (November 14 - December 11, 1984)

- | | |
|---------------------|--|
| * Takeo BABA | Leader of the team
general management |
| Hiro moto TODA | Sub-leader
Economic analysis |
| Kunio FUJII | Coal |
| Susumu TSUKAHARA | Market research |
| Toshiyuki HATTORI | Market research |
| Yoshiaki MIZUGUCHI | Market research |
| Katsunori SHIMAZAKI | Natural gas |
| Keiichi MURASE | Distribution |
| Kazutaka YASUMI | Legal system |
| * Tsuneo MAEDA | Existing steel mills |
| Tatsuo UEHARA | Forecast of demand and supply |
| Toshihiko NAKAJIMA | Development policy |
- * Explanatory Team (May 8 - 14, 1985)

Step II Study Mission (July 11 - August 30, 1985)

- | | |
|--------------------------------|------------------------------------|
| * Takeo Baba, Leader | General management and master plan |
| * Hiromoto Toda,
Sub-leader | Economic analysis (works in Japan) |
| Ryoichi Nishihara | Technical coordination |
| Mitsuo Ogura | Transportation |
| Shinji Adachi | Land |
| Jihei Yoda | Fuel |
| Masaru Shimizu | Supporting industry |
| Koji Suenaga | Port and ship route |
| * Yoshiki Nakahara | Electric power and cooling water |
| Yoshimitsu Hosoya | Port and ship route |
| Yoshinori Ishiguro | Manpower and education |
| Akinori Gomi | Manpower and education |
- * Explanatory Team (March 3 - 8, 1986)

Study Team for the Consultation of Step III Study
(December 15 - 21, 1986)

- | | |
|--------------------|--------------------------------------|
| Yoshio Yabe | Leader |
| Yoritaka Hanashiro | Steel Policy & Technical Cooperation |
| Hiromoto Toda | Technical Coordination |

Step III Study Mission (March 1 - 12, 1987)

* Kenji Kobayashi	Leader
* Hiromoto Toda	Sub-leader (Works in Japan)
Masahiro Oishi	Technical coordination
* Itsuo Nozawa	Civil engineering
Ichiro Okumura	Civil engineering
Shigeki Sato	Raw materials
* Hiroshi Nagumo	Gas based DR plant
Jutaro Shimogo	Electric arc furnace plant
Shinya Ueda	Continuous caster plant
* Masaru Shimizu	Rolling plants
* Yoshiki Nakahara	Energy-utility
* Yoshishige Uemura	Transportation
Hideyuki Yoshii	Coordination on investment
* Yoshiki Tajiri	Demand and supply of steel
* Hideo Ohashi	Planning and coordination
* Kuniaki Nagata	Planning and coordination
* Explanatory Team (October 5 - 10, 1987)	

Annex-2. Person whom the Mission met

A. STEP I STUDY MISSION

1. Departemen Perindustrian	(Ministry of Industry)
Mr. Eman Yogasara	Directorate General of Machinery and Basic Metal Industry
Mr. H. M. Toyib	Directorate of Basic Metal Industry
Mr. Moelyadi	Head, Sub Directorate, Sector & Programming
Mr. H.A. Hutagalung	Head, Sub Directorate of Programming of Directorate of Basic Metal Industry
Mr. Syahbandi Hossen	Staff of Sub Directorate of Programming
Mr. Massaruddin	Staff of Sub Directorate of Programming
Mr. Marthen Palepangan	Staff of Sub Directorate of Programming
Mr. R. Sutito N.A.	Ka Sub Dit. Bina Sarana Direktorat
Mr. Jonosubagyo Prawirodirdjo	Dir. Jen. Industri Mesin dan Logam Dasar Dit. Industri Mesin Listrik & Elek. Onika
Mr. Turut Rahardjo	Dit. Jen. Aneka Industri Direktorat Industri Alat Listrik & Logam
Mr. A. Rasyid Lase	Directorate General of Basic Metal Industry, Standardization
Mr. T. Indra Inding	Dit. Jen. Industri Mesin dan Logam Dasar
Mr. M. Aofiansiah A.S.	Kanwil Departemen Perindustrian/Dinas Perindustrian Dati Kaltim
Mr. Lintong Manurung	Dit. Jen Aneka Industri
Mr. Buha Tambunan	Kepala Kanwil/Dinas Perindustrian Propinsi Sumatera Utara

- | | |
|---------------------------------------|--|
| Mr. Chaeruddin | Staff |
| Mr. Arif Wisaksono | Staff |
| Miss. Ludiana Lutan | Staff |
|
 | |
| 2. Departemen Pertambangan dan Energi | (Department of Mining and Energy) |
| Mr. Soembarijono | Head of Bureau of Planning |
| Mr. Razie Razak | Staff of Department of Mining Bureau |
|
 | |
| 3. Institut Teknologi Bandung | |
| Dr. Hariadi P. Soepangkat | Rektor |
| Prof. Eafa Surdia | Mechanical Engineering Dept/ITB Metallurgy Group |
| Dr. Muljowidodo | Mechanical Engineering Dept/ITB Production Engineering Group |
| Dr. Coco Ibrahim | Mechanical Engineering Dept/ITB Production Engineering Group |
| Mr. K. Gouderon | Workshop advisor, Politeknik Mekanik Swiss/ITB |
|
 | |
| 4. Metal Industry Development Center | |
| Mr. D. Soepardi | Director |
| Mr. Rosidi | Metallurgy Engineer |
| Mr. M. Padsabrata | Head of Industrial Management Sector |
|
 | |
| 5. Perusahaan Jawatan Kereta Api | (National Railway) |
| Mr. E. Luslam | Chief, Research and Development |

6. P.T. Pindad

Colonel Ir. J. Sjamsu

Director

Ir. D.F. Jatuhey

Assistant to the President for Quality Control

Mr. M. Zaimi Sinto

Forging and Casting Division

7. BKPM-DIY

Mr. Wirosaputro

Mr. Wanguneguro

8. BAPPEDA-DIY

Mr. Samirin

Mr. Iman Sanjoro

9. Biro Pusat Statistik

(Central Bureau of Statistics)

Mr. Sugito Suwito

Deputy Director General for Statistical
Development

10. Pusat Pengadaan Besi Baja

Mr. T. Ariwibowo

President Director of P.T. Krakatau Steel

Mr. Musdiono

Deputy Director of P.T. Krakatau Steel
Vice Chairman of PPBB

11. Indonesian Chamber of Commerce and Industry

Prof. Mohammad Sadli

Secretary General

Mr. Suhendro Notowidjojo Chairman, Dept. of Basic Metal Industry

Mr. Soeriyo Chairman, Dept. of Machine Industry

12. PERTAMINA

Mr. Soekarnee

Mr. Bambang Herwidi

13. Surabaya Provincial Office of MOI

Mr. A. Rachman Karim

Mr. Soekandar

Mr. Djoko Prasetyo

Mr. Yusuf Kusnandi

Mr. Aminuddin Haruna

14. P.N. Tambang Batubara, Padang

Mr. Siswo Endang

15. P.N. Tambang Batubara, Ombilin

Mr. Djoto Prajitno Deputy General Manager

Mr. Yohannes Kasoep

16. P.T. Tambang Batubara, Bukit Asam

Mr. Soetjipto Wijadi General Manager

Mr. Syamair Bacharrudin Head of General Affair Dept.

Mr. C. Situmorang

President Director

17. P.T. Aneka Tambang

Mr. L. Panggabean

Director

18. Private Enterprises

Jetro Jakarta

Mr. Oshima

Institute of Developing Economies

Mr. Mihira

Taisei P.T. Medan

Mr. Hirota

Politeknik Mchanik Swiss

Mr. K. Gauderon

P.T. Indonesia Asahan Aluminum

Mr. Katada

Mr. Yasui

P.T. Growth Sumatera

Mr. Suhendro

P.T. Intan Nasional Iron Industri

Mr. Tang Berg Chong

P.T. Federal Motor

Mr. Ishida

Departemen Perhubungan

Mr. Watanabe

P.T. Pelita Bahali

Mr. Iitoshi

GKD. IGP

Mr. Kinoshita

Mr. Hadiwidjaya

Mr. Indrajaya

P.T. Nasional Gobel

Mr. Nil

Mr. Oda

IPERINDO

Mr. Wasono

P.T. Musashi Indonesia

Mr. Kawasaki

P.T. Haka

Mr. Nakamura

Departemen Umum

Mr. Hirano

B. STEP II STUDY MISSION

1. (Departemen Perindustrian)

Mr. Eman Yogasara	Directorate General of Machinery and Basic Metal Industry
Mr. H. M. Toyib	Directorate of Basic Metal Industry
Mr. H. A. Hutagalung	Manager
Mr. Chaeruddin	Staff
Mr. Eko	Staff
Mrs. J. Ernawati	Staff
Mr. M. Kamsiananto	Staff
Mr. Massaruddin	Staff
Mr. A. Rasyid	Staff
Mr. Siahaan	Staff
Mr. S. Sudariyono	Staff
Mr. Syahbandi Hossen	Staff
Mr. Lodiana	Staff
Mr. Marthen	Staff
Mr. Moeltadi	Staff
Mr. A. G. Thahir	Staff
Mr. Firadaus	
Mr. Maryanto	
Mr. Muhidin	
Mr. K. Setiawan	
Mr. C. Triharso	

Samarinda	Mr. Herman
	Mr. H. Asranuddin
	Mr. M. Umriyansiah
Medan	Mr. S. P. Siregar
	Mr. S. Sinuhaji
	Mr. M. J. Nasution
	Miss. Herawati
Banda Aceh	Mr. A. Ghazali
Ujung Pandang	Mr. Lukmansyah
	Mr. L. Hayinegara
Bandar Lampung	Mr. P. Nazarin
Surabaya	Mr. D. Prasetyo
Yogyakarta	Mr. Winarno
Semarang	Mr. Soewarsono
	Mrs. Kushartiyah
Cilacap	Mr. Soedarwinto

2. (BAPPENAS)

Jakarta	Mr. B. Poernomo
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(BAPPEDA)

Samarinda	Mr. S. Soekardi
-----------	-----------------

	Mr. P. I. Soekirman
	Mr. A. M. Hatta
	Mr. R. A. Asia
Lhokseumawe	Mr. S. Mahmud
Ujung Pandang	Mr. S. Hadisuwarno
	Mr. H. Mappa
Pare Pare	Mr. B. Iskandar
Palembang	Mr. Mattjik
Bandar Lampung	Mr. H. Hasyim
Yogyakarta	Mr. KPH. Probokusmo
	Mr. H. Susanto
	Mr. I. Hadisanyoto
	Mr. N. Sukirdo
	Mr. Noorwijaya
	Mr. Parkond
Semarang	Mr. Soeparno
	Mr. Soeparpto
Cilacap	Mr. Soewarno
Surabaya	Mr. M. Hamsem
	Mr. Soeryanto
	Mr. D. Subagio
	Mr. Suhartono
	Mr. S. Istaat

3. (Concerned Ministries and Organizations)

Departemen Pertambangan Dan Energi	Mr. Muchtar
Departemen Pertanian	Mr W. Metra

Departemen Pekerjaan Umum	Mr. Sunarko
	Mr. Yasir (Ujung Pandang)
Departemen Perhubungan	Mr. Soemanto
Sea Communication	Mr. Sukardo
	Mr. Utama (Ujung Pandang)
	Mr. H. Musa (Pare Pare)
	Mr. I. Hudari (Cilacap)
Port Authority	Mr. A. R. Ruwadi (Palembang)
	Mr. A. M. Suud (Belawan)
	Mr. Soedibyso (Semarang)
PJKA	Mr. M. Mansyur (Bandar Lampung)
Departemen Tenaga Kerja	Mr. Luthan
United Nations	Mr. L. Richter
	Mr. P. F. Hopkyns
CEVEST	Mr. Ogawara
Balai Latihan Pendidikan Teknik	Mr. Y. Madang (Palembang)
Balai Latihan Kerja	Mr. Supardi (Medan)
Balai Latihan Kerja	Mr. Samadyo (Ujung Pandang)
Departemen Pendidikan dan Kebudayaan	Mr. P. Tobing
Universitas Sriwijawa	Mr. M. Hasjim
Badan Meterologi dan Geofiska	Mr. S. Hadiyanto
Badan Koordinasi Survey	Mr. E. Kosasih
dan Pemetaan Nasional	
Lhokseumawe Industrial Zone	Mr. Nazir
Development Board	

4. (Governments and Cities of Province)

Governor	Kalimantan Timur	Mr. Soewandi
	Sulawesi Selatan	Mr. Amiruddin
City Office	Pare Pare	Mr. A. Samad
		Mr. Syamsuoeddin Achmad
	Palembang	Mr. M. Arma
		Mr. H. T. Simantjuntak
	Muara Enim	Mr. N. A. Solichin
		Mr. A. Cikatin
		Mr. Syamsudin
	Cilacap	Mr. S. Manurung
	Mr. C. Bakri	
	Mr. Iskandar	
Kebumen	Mr. M. C. Tohir	
	Mr. Soetarno	
	Yogyakarta (Kulonprogo)	Mr. KRT. W. Hadiningrat

5. (Steel Industry)

P. T. Krakatau Steel	Mr. Ariwibowo
	Mr. J. L. Rombe
	Mr. Djoko Subagyo
P. T. Budidharma	Mr. Iwamaru
	Mr. K. Murai
P. T. Tosan Prima Murni	Mr. C. L. Cheug
P. T. Sumatera Selatan Utama Steel Industry	Mr. S. Ali, M
P. T. Industri Badja Garuda	Mr. K. Yamada
P. T. Gunung Gahapi	Mr. Kamaruddin

P. T. Growth Sumatera	Mr. F. Suhendra
P. T. Super Andalas Steel	Mr. Andalas
P. T. Serniwa Steel	Mr. A. Haddy
P. T. Sermani Steel	Mr. Kawamichi
P. T. Steel Pipe Industry of Indonesia	Mr. T. Koike
P. T. Jaya Pari Steel	Mr. B. Wijanarko
P. T. Ispat Indo	Mr. R. V. Raghavan
P. T. Inti General Jaya Steel	Mr. I. Sutandinata

6. (Concerned Industries)

P. T. PUSRI	Mr. S. Agus
P. T. Intan Sengkunyt	Mr. F. Purimahua
P. T. INALUM	Mr. T. Ueda (Power Station)
	Mr. I. Hatano (Smelter)
P. T. Morawa Electric Transbuana Medan	Mr. P. S. M. Lumbantobing
P. T. Indoporlen	Mr. B. Halim
P. T. UNINDO	Mr. J. Sidarto
P.T. Toyota Mobilindo	Mr. N. Nigitaka
P. T. Indo Bangna Prima	Mr. D. Noor
P. T. Segara Timber	Mr. S. J. Jiang
P. T. Bukuan Sawmill	Mr. Hasant
P. T. Bengkel Utama	Mr. F. Thoenger
P. T. Industri Kapal Indonesia	Mr. H. Ananda
P. T. BARATA Indonesia	Mr. Sutyanto (Cilegon)
	Mr. D. Setiawan (Surabaya)
P. T. TAPILOKA	Mr. J. A. Hattu
P. T. Bomba Bisma Indra	Mr. H. Razak

P. T. ARUN	Mr. W. Garjito
P. T. ASEAN Aceh Fertilizer	Mr. R. Subandhi
P. T. Pupuk Kalimantan Timur	Mr. N. S. Sutadji
P. T. BADAQ	Mr. I. Moeljono
P. T. JESPRA	Mr. M. Okamura
P. T. Aneka Tambang	Mr. L. Panggabean
P. T. Bukit Asam	Mr. Benjamin
P. T. Tambang Batubara Bukit Asam	Mr. S. Wijadi
P. T. PLN	Mr. K. Kontra (Head Office)
	Mr. Harahap (Ujung Pandang)
P. T. PERTAMINA	Mr. K. Machmud (Head Office)
	Mr. H. Palar (Balikpapan)
	Mr. J. Pinto (Cilacap)
Kurita Water Industries Ltd.	Mr. K. Harada
Tokyo Senpaku Kaisha Ltd.	Mr. K. Muro
Pacific Consultants Ltd.	Mr. Sasaki
JGC Incorporated.	Mr. Hoshino (Lhokseumawe)
	Mr. Gimbayashi (Jakarta)

C. STEP III STUDY MISSION

1. (Departemen Perindustrian)

Mr. Eman yogasara	Directorate General of Machinery and Basic Metal Industry
Mr. H.M. Toyib	Directorate of Basic Metal Industry
Mr. H.A. Hutagalung	Manager
Mr. Endang Dahlan	Staff
Mr. Hardippabowo SMI	Staff
Mr. Hero	Staff
Mr. Arif Wisaksono	Staff
Mr. Areto Akhmed	Staff
Mr. Rahardjo Sukarnen	Staff

2. (Concerned Ministries and Organizations)

PLN	Mr. Samhir
	Mr. Budi Pranoto
	Mr. Rumahlewang
	Mr. Adhi satriya
	Mr. Sambodho Sumani
	Mr. Husni Samsi

3. (Steel Industry)

P.T. Krakatau Steel

Mr. Ariwibowo
Mr. J.L. Rombe
Mr. Djoko Subagyo
Mr. Hari G. Soeparto
Mr. Sumantri
Mr. Made
Mr. Lamidi
Mr. Sentol Alibasyan
Mr. Kemal
Mr. Murdiyanto
Mr. Ahmad Banani
Mr. Yongsan
Mr. Bambang Sriyono
Mr. Marthen
Mr. Wibowo Kusamowuito
Mr. M. Nur Hamzah
Mr. Much. Rachmat
Mr. Zaidin
Mr. Herri
Mr. Helmiy
Mr. Tomasowa
Mr. Kuswanto
Mr. Basso
Mr. Chalik
Mr. Rohadiat
Mr. Beno Hardy

P.T. Tosan Prima Murni

Mr. Thee Ning Khong
Mr. C.L. Cheung
Mr. Andri Drasetyo Dipl Dhys

P.T. Jakarta Kyoel Steel

Mr. C.L. Cheung

P.T. Pulogadung Steel

Mr. Tsai Lie Hui

4. (Concerned Industries)

P.T. Barata Indonesia	Mr. Endy Yunus Mr. Martoyo
P.T. Indoporlen	Mr. Cahyo Yuwono
P.T. Eisai Indonesia	Mr. Saito Mr. Tajiri
P.T. Universal Metal	Mr. Suharso Suhandinata Mr. Juniarto Suhandinata
P.T. Iron Wire Works Indonesia	Mr. S. Ohashi Mr. T. Yano
P.T. Intan Pertiwi Industry	Mr. Dahlan Guanwan Mr. Sumarno
JETRO	Mr. Oshima
MIGAS	Mr. Hidayat Sutawijaya Mr. T. Sitanggang Mr. Amri Muis
P.T. UNIND	Mr. Jos Sidarto
Kajima Construction	Mr. Osabe Mr. Kawasaki Mr. Taguchi Mr. Saito
P.T. Industri Mesim Perkakas Indonesia	Mr. Husein
Sankyu Jakarta	Mr. Hamanaka
AAF	Mr. Zani Muhibat Mr. Djumharto Mr. Noordin Gade Mr. Malasan

Chapter II. BACKGROUND OF THE PROJECT

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1. Recent Economic Condition

1-1. General economic condition

Affected by the worldwide recession in 1981, the economy of Indonesia also showed slowdown, but with the start of the fourth development plan scheduled in 1984, the economy showed some sign of recovery in the second half of 1983 and made a 6.1% growth in terms of real GDP in 1984. However, due to the worldwide glut of oil, the GDP growth in 1985 slowed to 1.9%. In 1986, because of further drop of crude oil prices, considerable decrease of foreign investment, and policy of super-austere budget, particularly reduction of governmental development budget, the economy is expected to show growth slower than that in the preceding year. To cope with such condition, the Government proclaimed a new overall economic policy in May 1986 with a view of export promotion of non-oil products, encouragement of private investment and foreign investment, which went into effect in July, and besides, in September lowered the exchange rate of Rupiah by 45%. In addition, in October, in order to help alleviate business environment which worsened due to sudden price rise of imported goods and machinery resulting from the devaluation of Rupiah and encourage export of products other than oil and gas as well as foreign investment, a series of follow-up policy measures were taken by the Government.

1-2. Recent economic trend

As regards production in 1986 in Indonesia, firstly, agricultural production was generally favorable and is expected to show growth same as in 1985 though rice production showed slower growth. In mining industry, though there was a tendency to offset reduced prices by increased production, crude oil production decreased from 1.33 million barrel/day

in 1985 to 1.19 million barrel/day. Manufacturing industry showed relatively favorable production throughout the year. In particular, plywood and fiber, major export items, continued to show satisfactory production while production of steel, cement and automobiles showed increase over the preceding year.

In foreign trades, the total amount of exports in the first eight months of 1986 showed a decrease of about US\$9.9 billion, or 21% as compared with that in the same period a year earlier. While the export amount of oil and gas was US\$5.7 billion, showing a decrease of 34% from the level a year ago, the export of primary products such as coffee was favorable and the export amount of non-oil and gas products was about US\$4.2 billion, an increase of 5% over the level a year earlier. On the other hand, the amount of imports during the period, January to August, 1986, was about US\$6.9 billion, about same as that in the same period a year ago. Consumer goods and capital goods showed increase of 13% and 1%, respectively, while raw materials showed a slight decrease.

Investment in 1986 showed a considerable decrease in the first half, but was favorable in the second half thanks to the effect of the new overall economic policy. Foreign investment approved was US\$170 million in the first half, which was 60% less than that in the same period a year ago, but in the second half, it showed marked increase to US\$800 million. But the year total was about 4% less.

On the other hand, domestic investment approved was Rp.1.9 trillion in the first half and Rp.2.5 trillion in the second half and the year total exceeded the preceding year total by 19%.

As regards the Government finance, the 1986/87 budget was Rp.21.42 trillion, which was less than that of the preceding year for the first time. In particular, receipts

from the oil and gas industry and from the project aids shows a considerable decrease. Of expected expenditures, personnel cost is held at the level of the preceding year, but development expenditures shows a considerable decrease and repayment of debts shows marked increase. Those make the budget very austere one.

Table 2-1-1 Real Growth Rate of GDP

Unit: %

<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>
9.9	7.9	2.2	4.2	6.1	1.9	1.5*

Source: Biro Pusat Statistik "Statistical Year Book of Indonesia 1985", etc.

Note : * Expected

Table 2-1-2 Index of Manufacturing Production from
Selected Industry Groups

(Unit: Quarterly Average 1975=100)

Industry	Year Products	1982	1983	1984	1985	1986	
						I.Q.	II.Q.
Food	Milk & butter etc.	239	261	220	207	251	253
Textile	Cigarettes	115	120	117	97	93	101
	Weaving mills	132	121	125	127	160	130
Wood	Plywood	424	438	418	387	408	596
Paper	Paper	152	129	164	182	231	205
Chemical	Fertilizer	496	560	706	850	787	862
Non metal	Cement	419	566	616	686	675	792
Basic metal	Iron & steel	970	1,147	1,165	1,158	1,251	1,594
Fabricated metal	Structural metal products	196	203	198	214	205	239
	Radio & TV	333	351	279	243	269	224
	Motor vehicles	227	198	179	183	177	296
General		214	226	240	259	258	282

Source: Biro Pusat Statistik "Monthly Statistical Bulletin 1986",
November

Table 2-1-3 Production of Certain Minerals in Indonesia

Products Year	Petroleum (1,000 bbl)	LNG (1,000 mmbtu)	Nickel Ore (1,000t)	Bauxite (1,000t)	Coal (1,000t)
1980	577,015	453,848	1,537	1,249	304
1981	584,838	464,868	1,543	1,203	350
1982	488,189	483,881	1,641	700	481
1983	490,503	530,512	1,298	778	486
1984	516,991	757,116	1,067	1,003	1,085
1985	483,768	652,920 (Jan ~ Oct)	956	830	1,492
1986 (Jan ~ Apr)	165,484	---	395	252	417

Source: Same as the Table 2-1-2

Table 2-1-4 National Budget

(Unit: Rp. Billion)

	1985/1986 (Real)	1986/1987 (Budget)
(Domestic Receipts)		
Budget	19,793.8	24,282.4
Realization	19,252.8	17,832.5
Rate of Realization (%)	(97.3)	(73.4)
(Official Aid & Loans)		
Budget	5,098.0	5,715.3
Realization	3,572.6	3,589.1
Rate of Realization (%)	(70.1)	(62.8)
(Total)		
Budget	24,891.8	29,997.7
Realization	22,825.4	21,421.6
Rate of Realization (%)	(91.7)	(71.4)
(Routine Expenditures)		
Budget	12,042.8	14,582.5
Realization	11,951.5	13,125.6
Rate of Realization (%)	(99.2)	(90.0)
(Budgetary Development Funds)		
Budget	12,849.0	15,415.2
Realization	10,873.1	8,296.0
Rate of Realization (%)	(84.6)	(53.8)

Source: JETRO

Incidentally, the breakdown of the 1986 receipts is as shown below.

(Unit: Rp Billion)

1986/87 Budget

Routine Receipts	17,832.5
Receipts from Oil & Gas	9,738.2
Oil	8,145.5
L N G	1,592.7
Receipts from Non-Oil & Gas	8,094.3
Income tax	2,880.5
Sales tax	2,143.3
Import duties	580.0
Excises	1,054.8
Export tax	78.8
Real estate tax	284.0
Other indirect taxes	119.0
Non tax receipts	953.9
Development Receipts	3,589.1
Program aids	81.4
Project aids	3,507.7
<hr/> Total	<hr/> 21,421.6

Table 2-1-5 Trade Balance

(Unit: US\$ Million)

Year	Export	Import	Balance
1980	23,950	10,834	+13,116
1981	25,165	13,272	+11,893
1982	22,328	16,859	+5,469
1983	21,146	16,352	+4,794
1984	21,888	13,882	+8,006
1985	18,587	10,262	+8,325
1986 Jan-Aug	9,908	6,885	+3,023

Source: Biro Pusat Statistik "Monthly Statistical Bulletin 1986", November

Table 2-1-6 Share of Oil & Gas in Total Exports

(Unit: US\$ Million)

Year	Exports of oil & gas	Share
1980	17,701	(73.9%)
1981	20,663	(82.1%)
1982	18,399	(82.4%)
1983	16,141	(76.3%)
1984	16,018	(73.2%)
1985	12,718	(68.4%)
1986 Jan-Aug	5,728	(57.8%)

Source: Same as the Table 2-1-5

Table 2-1-7 Trend of Export Price of Oil

(Unit: US\$/Barrel)

1981	Jan.	35.00
1983	Mar.	29.53
1985	Feb.	28.53
1986	Jan.	25.13
	Feb.	21.00
	Mar.	14.05
	Apr.	10.66
	May	10.38
	Jun.	12.11
	Jul.	10.25
	Aug.	9.83
	Sep.	12.20
	Oct.	12.27
	Nov.	12.31
	Dec.	13.50

Source: Business News

2. Development Policy and the Present Condition

2-1. Outline

Indonesian economy entered the period of the fourth 5-year development plan from April 1, 1984. The period is designated as the "period for strengthening foundation" for growth of Indonesian economy by its own efforts. The plan succeeds the policy of the previous plan to ensure equitable distribution of the fruits of development efforts among all strata of society and includes, in addition, key points of 1) promotion of export, 2) expansion of employment, 3) promotion of non-oil and gas industries aiming at freeing it from too much dependance on oil and 4) emphasis on vitality of private sectors. Since any substantial increase of revenues cannot be expected under the present condition of heavy reliance on oil, those are solutions hammered out in consideration of various problems of the present economic structure; namely they envisage increasing employment opportunity and overcoming the weakness of oil dependent economy by reducing fiscal spending by giving emphasis on vitality of private sectors and promoting export industries to earn foreign currency.

Target of economic growth during the period was set 5% a year, more conservative than 6.5% planned for the third 5-year development plan. It is noteworthy that while the growth rate for agriculture and mining is lowered to 3.0% and 2.4%, respectively, the rate for manufacturing is set at 9.5%, the highest.

The total investment during the period is planned to be Rp145.224 trillion which represents an average increase of 19.1% a year, and consequently, the ratio of the investment to GDP will increase from 22.6% in the 1983 fiscal year to 29% in the final year of 1988. More specifically, while the growth of public investment is set at 18.3% a year, that of private investment is set at a higher rate of 20.1%.

Table 2-2-1 5-year Development Plan and Industrial Policy of Indonesia

Item	Period	1969/70-1973/74	1974/75-1978/79	1979/80-1983/84
<p>Main objects of the each development plan</p>	<p>Immediate stabilization of people's living</p> <ol style="list-style-type: none"> 1. Expansion of agriculture, in particular of food 2. Expansion of production of clothing; improvement of infrastructure; and promotion of agriculture-based industries 3. Check on inflation <p>Growth rate of GDP Target: 5% Actual: 7.7%</p>	<p>Reinforcement of foundation for economic development and balanced development</p> <ol style="list-style-type: none"> 1. Satisfaction of necessities of life and improvement of infrastructure 2. Equitable social welfare and income distribution 3. Creation of employment opportunity 4. Reinforcement of foundations for promotion of resources processing industries <p>Growth rate of GDP Target: 7.5% Actual: 6.9%</p>	<p>Economic development and fair distribution of the fruits of the development</p> <ol style="list-style-type: none"> 1. Realization of economic growth 2. Sound and dynamic social stability 3. Promotion of non-oil export 4. Promotion of labor-intensive industries and small enterprises 5. Promotion of activities of private sector 6. Attainment of food self-support <p>Growth rate of GDP Target: 6.5% Actual: 6.1%</p>	
<p>Points of policy for foreign capital</p>	<p>Open introduction of foreign capital (in important fields)</p> <ol style="list-style-type: none"> 1. Acquisition of foreign currency 2. Promotion of industries which replace import 3. Promotion of industries which can crop the development fruits in short period 4. Promotion of modernized industries 	<p>Selective introduction of foreign capital</p> <ol style="list-style-type: none"> 1. Clarification of fields which have priority in introduction of foreign capital and those which are prohibited from such introduction 2. Indonesianization and technological transfer 3. Decentralization of industrial sites 	<p>Controlled introduction of foreign capital</p> <ol style="list-style-type: none"> 1. Manifestation of open fields (Positive list) 2. Establishment of joint ventures for projects involving official aid 3. Clarification of production scale, location, partners, etc. by field 4. Tie-up with small enterprises 5. Promotion of Indonesianization 	

Period Item	1969/70-1973/74	1974/75-1978/79	1979/80-1983/84
Economy	<ol style="list-style-type: none"> 1. Quantitative expansion of production of natural resources 2. Increase of foreign investment 3. Stabilization of economy 	<ol style="list-style-type: none"> 1. Shift to high-priced resources 2. Slowdown of foreign investment 3. Expansion of factory production and progress in domestic production (mainly fertilizers & cement in final product sectors) 4. Improvement of balance of payments and crisis of PERTAMINA 	<ol style="list-style-type: none"> 1. Improvement of balance of payments 2. Good rice harvest in 3 consecutive (20 million tons) and self-supply of rice almost achieved 3. Expansion of industrial production (Fibres, elec. home appliances, automobiles, etc.)

2-2. Outline of the fourth 5-year development plan
(REPELITA IV)

2-2-1 Significance and object of the plan

It was stressed that REPELITA IV was based on guidelines of state policy adopted in March 1983 and it aims at

- 1) improving national standards of living, knowledge and welfare through more equitable and fair method and
- 2) establishing firm foundation for future progress.

The guidelines of state policy stipulate that REPELITA IV is the period when fundamental frames are formed for self-growth of the Indonesian economy. There is a long-range object to see that the foundations will be further strengthened under REPELITA V and/that through implementation of REPELITA VI, Indonesia aims at economic take-off during 1990s. The guidelines of state policy also set forth development policy to realize social equity, high growth and dynamic stability of society.

To realize the social equity, efforts will be made to achieve the following eight objectives, namely

- 1) Assurance of food, clothing and housing for the public
- 2) Equal opportunity of education and medical care
- 3) Fair distribution of income
- 4) Equal opportunity of employment
- 5) Equal opportunity of economic activity
- 6) Equal opportunity of participation
- 7) Elimination of regional differentials
- 8) Equality before the law.

Though the objectives of the guidelines of state policy form the base of the present plan, REPELITA IV follows the path of REPELITA III and its continuity is stressed.

2-2-2 Development budget

In the following, development investment budgets under REPELITA III and REPELITA IV are compared. Noteworthy in the budgets is emphasis placed on

- 1) agriculture to continue the policy for self-support of food, and
- 2) machine industry to support industries in general.

It may safely be said that emphasis is placed also on investment into labor-intensive sectors and high technology sectors through the entire plan.

However, being financially restrained under sluggish oil market condition, the economic environment is considered very hard for implementation of REPELITA IV. This is the reason why the present plan shows a strong concern about less dependence on oil, employment and sources of investment. Thus, strengthening of labor-intensive sectors, mobilization of domestic resources, emphasis on private sectors and improvement of efficiency of the economy received more attention under the plan than under REPELITA III.

Major points of the policy may be summarized in the following.

- 1) Improvement of infrastructure such as sea transportation and communication
- 2) Promotion of export of non-oil goods such as light industry products
- 3) Promotion of medium and small enterprises
- 4) Strengthening of education and vocational training
- 5) Intensification and diversification of agriculture
- 6) Diversification of energy resources.

Table 2-2-2 Development Budget by Sector under REPELITA
III & IV

(Unit: RP Billion)

Sector	REPELITA III (%)		REPELITA IV (%)	
1. Agriculture & irrigation	3,048.9	13.9	10,014.3	12.74
2. Manufacturing industry	1,174.0	5.4	4,281.9	5.45
3. Mining & energy	2,943.9	13.5	12,125.9	15.43
4. Transportation, communication & sightseeing	3,384.3	15.5	9,923.1	12.62
5. Commerce & cooperatives	191.9	0.9	969.2	1.23
6. Labor & transmigration	1,240.7	5.7	4,551.8	5.80
7. Regional & city development	2,142.9	9.8	5,379.1	6.84
8. Religion	152.5	0.7	507.2	0.65
9. Education, culture & youth	2,276.8	10.4	11,539.5	14.68
10. Health, welfare & family plan	829.1	3.8	3,516.5	4.47
11. Housing	532.0	2.4	2,980.6	3.79
12. Legal affairs	193.0	0.9	629.2	0.80
13. Security & defence	1,483.6	6.8	5,238.9	6.66
14. Information, media	151.0	0.7	498.6	0.63
15. Science & technological research	447.6	2.0	1,757.7	2.24
16. Political organization	579.7	2.7	1,047.4	1.33
17. Promotion of business activities	370.3	1.7	1,689.7	2.15
18. Natural environment	707.2	3.2	1,958.8	2.49
Total	21,849.4	100.0	78,609.5	100.00

Source: BAPPENAS "Basis draft of REPELITA IV"

2-2-3 Growth targets by main sectors

Growth rate of GDP during the plan period is set to be 5%, a little lower than 6.5% under REPELITA III. With growth of population during the period being estimated to be 2% per annum, per capita income is planned to increase 3% a year under such economic growth of 5%. Besides, inflation is planned to be held at 8%.

Growth targets by sectors and percentages of sectors under REPELITA IV are shown below.

Table 2-2-3 Target of Growth Rates by Sectors and Their Percentages under REPELITA III and REPELITA IV

Sector	REPELITA III			REPELITA IV		
	1978 F.Y %	1983 F.Y %	Annual Growth Rate, %	1983 F.Y %	1988 F.Y %	Annual Growth Rate, %
Agriculture	31.4	27.2	3.5	29.2	26.4	3.0
Mining	17.9	15.9	4.0	7.4	6.6	2.4
Manufacturing	10.2	12.6	11.0	15.8	19.4	9.5
Construction	4.9	5.5	9.0	6.3	6.3	5.0
Transportation & communication	4.6	5.4	10.0	6.0	6.0	5.2
Others	31.0	33.4	8.1	35.3	35.3	5.0
Total	100.0	100.0	*6.5	100.0	100.0	*5.0

Source: Government of Indonesia

* GDP growth rate (targets)

As regards growth rate by sectors, manufacturing sector is the highest, set at 9.5%. This manifests the objective to make economic structure more balanced, and the share of manufacturing sector in GDP will rise from 15.8% in the 1983 fiscal year to 19.4% in the 1988 fiscal. As a matter of fact, manufacturing sector achieved growth of 13% in REPELITA I, 13.7% in REPELITA II and 11% in REPELITA III, and compared to them, the growth target under REPELITA IV is set rather low.

On the other hand, the share of agriculture sector in GDP is to decline from 29.2% in the 1983 fiscal year to 26.4% in the 1988 fiscal. The growth rate of agriculture is set to be 3% annually. Overall expansion is desirable for agriculture which has the largest employment, but some progress was made already in the past development plans through investment in the fields relatively easy to handle and now there is necessity to undertake projects which require large investment. Under the present plan, importance is focussed on expansion of irrigation networks and promotion of intensive farming, which will be reinforced by diversification and enlargement of farm land.

The object of self-support of food, one of the most important items, includes an increase of rice production from 23.5 million tons in the 1983 fiscal year to 28.6 million tons in the 1988 fiscal, a growth rate of 4% a year. If this target is attained, per capita production will be 163 kg and self-support of rice will be almost achieved. For other main crops also, relatively high growth targets have been set, for example, an annual growth rate being 5.1% for maize, 5.8% for peanut and 20.7% for soybeans.

Low growth rate of 2.4% is planned for mining industry. The target is set to increase oil production from 1.48 million bpd in the 1983 fiscal year to 1.7 million bpd in the 1988 fiscal.

Production of LNG is planned to increase from 493 MMBTU in the 1983 fiscal year to 870 MMBTU in the 1988 fiscal, but this increase is based on export under long-term contracts and there will be no difficulty. Incidentally, coal is planned to increase from 0.49 million tons to 9.39 million tons during the present REPELITA period.

Target growth rates set for other sectors such as construction, transportation and communication and other services are almost same as that set for GDP, namely 5%.

It is estimated that during the plan period, new work force seeking employment will reach 9.3 million and for this it is planned to create employment of 9 million. This target can be achieved by directing the contents of the 5% GDP growth more to investment focussed on labor-intensive sectors, and it is said that employment of even 9.5 million can be created.

2-3. Industrial development plan under REPELITA IV

(1) Industrial development plan

Industrial development plan under REPELITA IV covering the 1984 fiscal year through the 1988 fiscal includes the following six objectives.

- 1) Industrial development will be continued with a view to build more dynamic and better balanced economic structure through complementary programs among industries.
- 2) In each industry, relation between small, medium and large enterprises as well as between different industries will be promoted to strengthen business constitutions.
- 3) Medium and small enterprises will make efforts to fortify their business constitutions so that they can play a major role in the solution of employment problem and also to attain businesses of higher value

added.

- 4) Efforts will be made to improve technology and obtain management technique and production technology.
- 5) Efforts will be made for export of domestic products and for improvement of competitiveness of domestic products in the international markets in all aspects of price, quality and services.
- 6) Industrial development is to be considered to form part of efforts to transform from agricultural society to industrialized society based on Pancasila.

Under REPELITA IV, the growth rate of manufacturing sector is planned to be 9.5% per annum. By subsectors, the rate is 17% per annum for metal and machinery industry, 17.2% for basic chemicals, 6% for small-scale industries and 6% for other manufacturing industries.

- (2) The development of industrial growth centers in the regions (WPPI)

In order to accelerate the development of industrial growth centers in the regions, REPELITA IV calls for the identification and development of WPPI throughout the country. These WPPI are to be fixed nationwide according to availability of raw materials, energy and manpower in specific districts. The identification of these industrial growth centers and zones of industry, facilitates the determination of the sites/locations of medium industries. Industrial zones will be built as an area to provide production facilities for each manufacturing industries.

In line with such zones, centers of small industry services (PPIK) also will be established in stages throughout the country.

(3) Specific targets of individual manufacturing industries

In the machinery and basic metal group, increased production is projected for industrial machineries, tools and agricultural machineries and emphasis is placed also on expansion of transportation sector. In the basic chemical group, the emphasis is on the development of key industries and a phosphate plant with a capacity of 560 thousand tons per annum will be constructed. Similarly, a paper pulp plant is planned to be built in East Jawa region.

New employment in manufacturing industry sector created under REPELITA IV is estimated to be 1.4 million, of which 930,000 will be employed by small-scale industries, 70,000 by existing industries and 400,000 by miscellaneous industries.

Selected targets for various manufacturing industries under REPELITA IV are as shown in the Table 2-2-4.

Table 2-2-4 Selected Targets: Manufacturing, 1983/84
and 1988/89

Sub-sector/Product	Unit	Production Capacity	
		1983/84	1988/89
A. Industrial machineries and basic metal			
Industrial machineries	Unit	1,550	3,600
Airplanes	Unit	24	35
Helicopters	Unit	48	66
Freight wagons	Unit	300	600
Passenger wagons	Unit	--	50
Ships	1,000 Dwt	195	493
Ship repairs	1,000 DWT	1,150	3,150
Steel slab	1,000 tons	1,100	1,600
Hot rolled coils	1,000 tons	1,100	1,700
Cold rolled coils	1,000 tons	--	1,150
Steel plates	1,000 tons	491	780
Steel pipes	1,000 tons	--	130
Steel profile	1,000 tons	--	100
Aluminium ingot	1,000 tons	225	300
Aluminium sheets	1,000 tons	21	40
Aluminium wire	1,000 tons	--	15
Copper cathodes	1,000 tons	--	100
Copper wire rods	1,000 tons	36	50
B. Basic chemicals			
Urea	1,000 tons	2,190	5,610
Z.A	1,000 tons	150	650
T.S.P.	1,000 tons	500	1,500
Cement	1,000 tons	10,290	21,000
Newsprint	1,000 tons	--	90
Craft paper	1,000 tons	--	90
C. Miscellaneous industry			
Car tires	1,000 units	4,335	10,290
Cooking oil	1,000 tons	1,226	1,967
Textiles	million m	2,130	2,860
Garments	1,000 dz	20,300	26,000
Weaving yarns	1,000 bales	1,540	1,740
Salt	1,000 tons	1,100	2,100

Source: Government of Indonesia

2-4. Energy policy

(1) Outline

Indonesia has developed its economy on the basis of its main property, oil resources. Indonesian population in 1983 is estimated to be 158 million, of which more than 60% lives in Jawa island whose area is only 7% of the national land. Under such condition, development of the economy was an urgent matter. Fortunately oil price soared in the latter half of 1960s and also in 1970s, and this oil revenue could be used as main source of funds needed for such economic development. Therefore, it may safely be said that the Indonesian economy has been able to achieve a high growth led by public investment thanks to a huge oil revenue. Indeed, in 1983, oil and gas accounted for 76% of the total export and it can easily be seen that oil revenue formed a very important foundation for economic development. However, the condition of world oil market in later years cannot be said so favorable to Indonesia. Stagnation of the oil export deteriorated the balance of payments of Indonesia, and its foreign exchange reserves decreased from US\$6.56 billion at the end of January 1982 to US\$4.15 billion in December 1982 and US\$3.07 billion at the end of March 1983.

In these circumstances, the pressing subject for Indonesian economy is to free itself from too much dependence on oil and the energy policy to realize the objective is a very important factor in promoting industrial development in future. The final target of the energy policy of Indonesia is to ensure transformation of the economy from mono-energy based to multi-energy based as well as to lessen dependence on oil as already mentioned.

As regards the target, REPELITA IV sets forth roughly as follows:

- 1) While ensuring that oil is an important source of foreign currency, steady supply of energy at reasonable prices to meet increasing requirement is to be assured.
- 2) From the viewpoint of use of alternate energy, study is to be made for increased use of natural gas in industry and households, promotion of coal development and use of hydraulic power, solar power generation and use of nuclear energy.
- 3) On demand side, the most effective use of energy at each demand sector is pursued.

Based on those guidelines, exploration and development of existing energy, and research and study on new energy and improvement and accumulation of technological knowhow on new energy are to be promoted concurrently to achieve the final target.

In the following are outlined plans of energy and mineral resources under REPELITA IV.

Table 2-2-5 Production Targets under REPELITA IV

Mining Product	Unit	Production	
		1983/1984	1988/1989
1. Crude oil	Million barrels	539.9	623.0
2. Natural gas	Billion c.f.	1,407.0	1,980.0
3. LNG	Million MMBTU	493.0	870.2
4. Tin	1,000 tons	26.9	37.2
5. Coal	1,000 tons	490.0	9,390.0

Source: BAPPENAS, Summary of REPELITA IV

(2) Production of crude oil

Production of crude oil is planned to increase from about 540 million bbls in the 1983 fiscal year to 623 million bbls in the 1988 fiscal. Production of natural gas also is to increase from 1,407 billion ft³ in the 1983 fiscal year to 1,980 billion ft³ in the 1988 fiscal. Natural gas is processed to LNG for export, and LNG production capacity is planned to be increased from 493 million MMBTU at the end of REPELITA III to 870 million MMBTU in the 1988 when REPELITA IV will be completed.

(3) Coal production

Production of coal under REPELITA IV is planned most intently. Namely it is to increase from 490,000 tons in the 1983 fiscal year to 9.39 million tons in the 1988 fiscal. This reflects big expectations placed on coal in the energy policy, of which the basic objective is to lessen dependence on oil.

For development of coal fields under REPELITA IV, exploration and development of Ombilin area and Bukit Asam in South Sumatera, and East and South Kalimantan areas is mentioned.

(4) Development of electric power

Under REPELITA IV, expansion of power generating capacity totalling 5,255 MW is planned to meet increasing power demand.

Hydro power plant	1,423 MW
Diesel power plant	1,100 MW
Minihydro power plant	52 MW
Geothermal power plant	220 MW
Steam power plant, coal	1,830 MW
Steam power plant, oil and natural gas	630 MW
<hr/>	
Total	5,255 MW

Of the total power generation, coal based steam power plant accounts for 35%, followed by 27% of hydro power plant and the share of oil and natural gas based steam power plant is 12%. According to REPELITA IV, improvement of power transmission networks to support such power generation plan includes construction of 9,329 km of transmission lines and transformer substations with capacity totalling 11,070 MVA.

On the other hand, power transmission lines related to rural electrification include 48,798 km of medium voltage lines and 76,594 km of low voltage lines with transformer substations with capacity totalling 5,186 MVA.

Therefore, the electric power generated under REPELITA IV is 118 million MWh, of which 96 million MWh will be sold and about 7,000 villages are planned to enjoy supply of electricity.

3. Steel Policy and Present Condition of Steel Industry

3-1. History of steel policy

Steel policy of Indonesia is characterized by three main objectives.

- 1) Regionally harmonized development of steel industry appropriate to the island nation in line with the policy to disperse industries and population in the country
- 2) Saving of foreign currency through self-supply of steel and substitution of import by domestic steel products
- 3) Development of steel industry by private sector by itself (P.T Krakatau Steel is now a state-owned company because of historical reason.)

The steel industry in Indonesia was developed according to such policy, but the basis of the policy until the end of 1970s was to promote its development by private sector by itself. But this resulted in a condition of too many small companies of electric furnace steelmaking and rolling (main products being bars) which now poses a major problem of restructuring. On the other hand, in the field of flat rolled steel products, concentration of production on Krakatau Steel is contemplated. Besides, for supply of rolled steels which is expected to fall short of demand in a predictable future, a plan for the construction of the national iron and steel development for the second generation has been developed and now a pre feasibility study is under way. At the same time, for the purpose of protecting and fostering existing steel industry, cooperative buying system has been adopted as measures against imported steels.

Brief history of steel policy may be added. A specific study for development of steel industry in Indonesia began in 1955 when a study of possibility of its development based on domestic iron ore was requested to foreign con-

sultants. The recommendation based on the study was approved by the Government in 1960 and three projects were planned, details of which will be described later.

In Indonesia, steel industry was treated as a matter of secondary importance up to 1960s and its position in economic development plan was lower than that of agricultural development, which is somewhat different from the condition in other Asian countries.

3-2. Brief history of 3 major steel projects

In 1955 the Indonesian government entered into a contract with foreign consultants about a basic study on future direction of development of steel industry in Indonesia and its feasibility and the result of such study was the basis of the three major projects for steel industry in Indonesia. Main objects of the basic study were about main raw materials for iron and steel making; namely, iron ore, coking coal and scrap, and the study report recommended mainly the following.

- 1) Construction of three steelmaking plants with open hearth furnaces capable of producing 100,000 tons of steel a year based on steel scrap
- 2) Construction of iron-making plants with small blast furnaces having annual capacity of 35,000 tons at Lampung to supply pig iron to the steelmaking plants in the above

Based on the recommendation, the Indonesian Government decided in 1960 the following three projects.

- 1) Trikora Project (Cilegon Project)
- 2) Kalimantan Project
- 3) Lampung Project

3-2-1 Outline of Trikora project

This project was to construct a steel mill with annual capacity to produce 100,000 tons of crude steel and 84,000 tons of rolled steels at Cilegon, 7 miles from Merak coast and 70 miles from Jakarta, West Jawa in the direction to the coast. The project was scheduled to be commenced in March 20, 1962, and completed within 1965. But, because of various difficulties (in particular, stoppage of assistance of USSR who was providing assistance and cooperation, and financial difficulty), the work was suspended practically in October 1965 and since May 1966, all the work excepting maintenance came to halt completely.

Since then, the construction of the mill was promoted as a state-owned under a controlling company, P.T. Krakatau steel, but the completion was delayed due to increase of construction cost brought about by oil shock and also long negotiation for cooperation with foreign countries, and it was 1979 that the mill was successfully completed as an integrated steel mill based on DR process at Cilegon area of West Jawa.

3-2-2 Outline of Kalimantan project

This project aimed at construction of an integrated steel mill with annual capacity of 250,000 tons of crude steel, and the project survey conducted under an assistance agreement with USSR dated April 1962 was completed in 1965. The site was tentatively selected at Martapura area, 40 km from Bandjarmasin Port, but is not yet decided finally.

3-2-3 Outline of Lampung project

This project was to construct an iron-making shop (annual capacity of 35,000 tons) as a preliminary step for building an integrated steel mill based on blast furnace process at Lampung area which was authorized by the

Indonesian Government in 1955, and economic and technological studies were to be made. The shop was intended to engage in production of pig iron only for the time being but expansion to an integrated steel mill was also contemplated for future. The study was conducted under an agreement made between foreign consultants and the Indonesian Government's Indonesian Planning Bureau in November 1955. The site for construction of 35,000-ton blast furnaces was 5 km north of Pandjang Harbour.

Incidentally, a 30 tons/day charcoal blast furnace was already constructed and is producing foundry pig iron.

As seen in the above, only Cilegon steel mill constructed in West Jawa as Trikora project was realized. In fact, it was a too heavy burden for Indonesia to implement the three projects concurrently because there were other projects.

3-3. Steel policy and characteristics of steel distribution organization

Steel policy of Indonesia may be summarized in promotion of domestic production and self-supply by effective utilization of domestic natural resources as one of basic industries. For this, efforts are being made to promote and strengthen the industry with P.T. Krakatau Steel, a state-owned company, as core.

In Indonesia, population and industries concentrated markedly in Jawa Island and dispersion of population and industries may be cited as one of basic strategy of Indonesia. This point is also important for steel development in the future and the Government proposed several sites other than Jawa Island for development of steel industry. But the Government has made it clear that production of flat rolled steel would be concentrated on P.T. Krakatau Steel.

3-3-1 Steel distribution under the measures to restrict import

As a specific measure to help domestic steel production, cooperative buying system for imported steel is in effect since 1979. The measure was mainly aimed at protecting the state-owned, P.T. Krakatau Steel and alleviating adverse effect of low priced import on domestic products by concentrating import of steel products which are already domestically produced or planned to be produced at home on one channel to control prices and quantity. Under the system, in December 1979, PPBB as the import channel was opened in P.T. Krakatau Steel. PPBB, based on inquiries received from all steel users, gives instruction to the users about supply of domestic or imported steels and makes all import purchases of steel products coming under the system. As such steel products under the cooperative buying system, wire rod and billet were designated in 1981, followed by scrap, hot coils, plate and slab in 1982 and cold-rolled sheet, tinplate, coated sheet and electrical sheet in 1984. Of the above, cold-rolled sheet is now handled by P.T. Giwang Selogam under the name of PPBB, the company being 100% subsidiary of Cold Rolling Mill of Indonesia (CRMI), foreign trade department of CRMI.

Table 2-3-1 History of Cooperative Buying System for Steel in Indonesia

1978	Obligation to use Indonesian agents in trade negotiation for state companies
1979	Under presidential declare No.36, PPBB (Pusat Pengadaan Besi Baja) was designated as center of procurement for iron and steel
1980	Trade negotiation for oil companies obliged to be conducted through Indonesian agents
1981	i. Cooperative buying by PPBB began for wire rod, billet and ingot ii. Counter purchase system adopted

- 1982 Cooperative buying by PPBB expanded to cover scrap, hot coil, plate, slab
- 1984 Cold rolled (C.R.) sheet/coil, coated sheet, tin-plate and electrical steel put under the cooperative buying system, but as for C.R. sheet/coil, P.T. Giwang Selogam handles the business in the name of PPBB.

In Indonesia, with a view to protecting local steel industry, quota licence system is in effect since February 1983 for steel products outside the cooperative buying system such as wire products, GI products, section and pipe. Under the system, import of the above steel products is permitted by importers within the limit of import quota given to the state trading companies (P.T. Dharma Niaga and P.T. Kerta Niaga).

3-3-2 Characteristics of steel distribution organization

(1) General condition

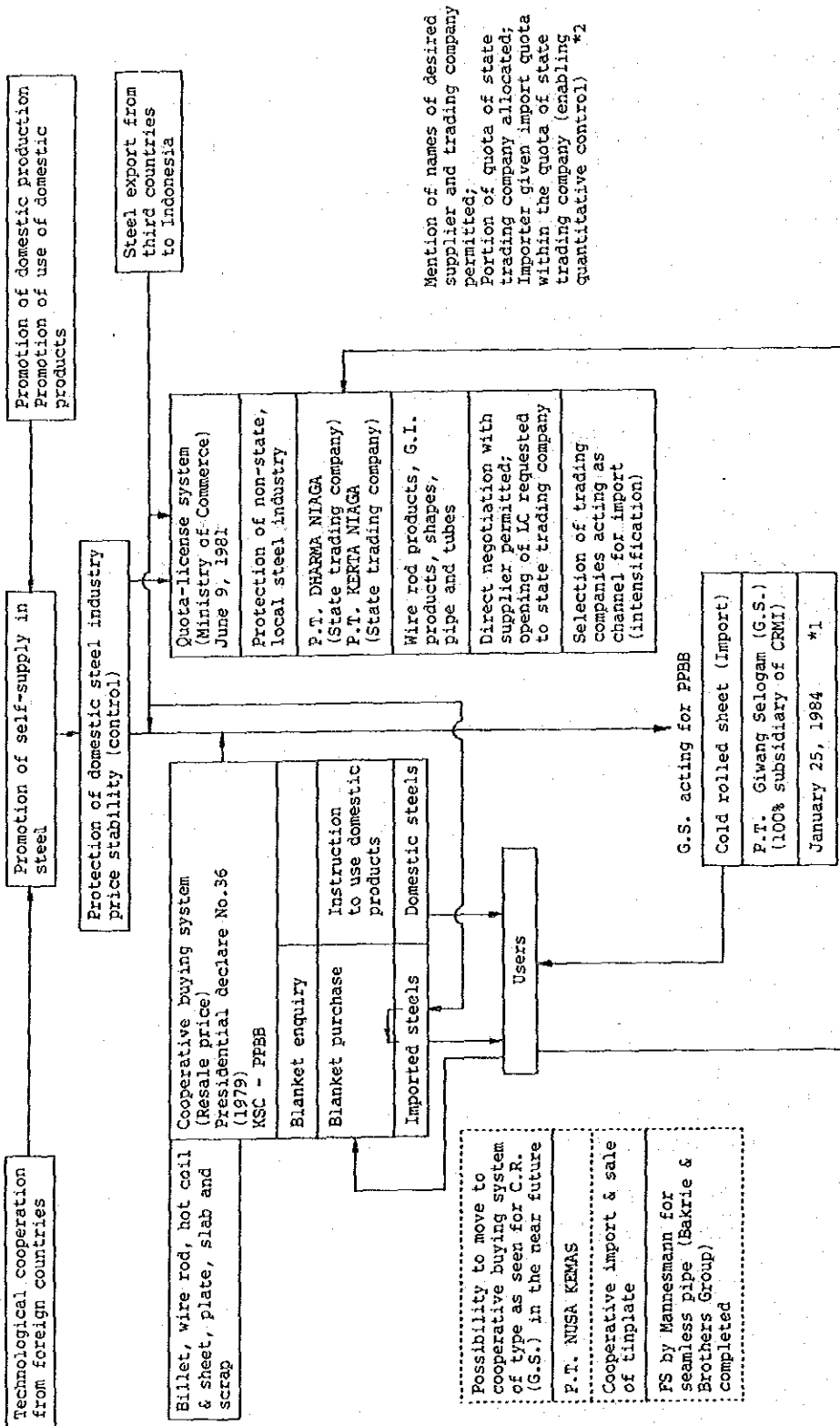
Move to restrict import gained momentum as illustrated by a shift to the cooperative buying system for cold rolled sheet/coil and others in January 1984, and now steels which are not under the restriction are limited to seamless pipe of certain sizes. As the transactions of almost all steels are under the Governmental control, the function of steel warehousers and dealers of the past pattern is very confined and some moves to reorganize steel distribution markets are expected to emerge as a result. Among domestic GI sheet makers and pipe makers, there are moves to establish joint sales companies by industry to avoid cutthroat competition resulting from excess production capacity.

With all such moves, there is possibility that steel distribution organization in Indonesia will be reorganized and steel market also will undergo a big change.

(2) Steel distribution organization

As already mentioned, PPBB was designated under Presidential Decree No.36 in August 1979 and the cooperative buying system was introduced and steels coming under the system were expanded gradually to almost all products including imported steels. Thus, entering into 1980s, steel distribution organization in Indonesia has changed considerably. Namely, the pattern of controlled distribution by special groups in the past was taken over by a new pattern of control by some new groups under basic guidance and policy of the Government.

History of the cooperative buying system for steel in Indonesia is given in Fig. 2-3-1 which is a conceptual chart giving development to the day.



Notes: *1 Until 1987 when Cold Rolling Mill of Indonesia (CRMI) begins operation, hot coils (Kratatau) will be oversupply. On the other hand, import of C.R. sheet will be necessary as material for coating (mainly for galvanized sheet). It is seen that export of hot coils from Indonesia and import of C.R. sheet are made one package.

*2 The point of this diagram is that in both quota-license system and cooperative buying system, name of buyer is disclosed and that when import license is applied, buyer may express its desire as to supplier and trading company employed.

Fig. 2-3-1 Conceptual Diagram of Cooperative Buying System for Steel in Indonesia (As of November 1984)