THE FEASIBILITY STUDY

ON

THE RENOVATION OF JAKARTA FOUNDRY CENTER

IN

THE REPUBLIC OF INDONESIA

FINAL REPORT

DECEMBER, 1985

JAPAN INTERNATIONAL COOPERATION AGENCY

PREFACE

In response to the request of the Government of the Republic of Indonesia, the Government of Japan decided to conduct a feasibility study on the Project for Renovating the Plant of Jakarta Foundry Center and entrusted the study to the Japan International Cooperation Agency (JICA). The JICA sent to Indonesia a survey team headed by Mr. Isamu Taki from May 30 to June 18, 1985.

The team exchanged views on the Project with the officials concerned of the Government of the Republic of Indonesia and conducted a field survey in the Project-related areas, including Jakarta, Surabaya, and Bandung with cooperation of the Indonesian officials concerned. After the team returned to Japan, further studies were made and the present report has been prepared.

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, 1985

Keisuke Arita

President

JAPAN INTERNATIONAL COOPERATION AGENCY

CONTENTS

ATTACHMENT

ABBREVIATION

ADC	Aluminium Die Casting
BKPM	Badan Koordinasi Penanaman Modal
BPPT	Badan Pengkajian dan Penerapan Teknologi
CE	Carbon Equivalnet
CIF	Cost, Insurance and Freight
CKD	Knock Down
CPI	Consumer Price Index
DCR	Discount Rate
DWT	Dead Weight Ton
EIRR	Economic Internal Rate of Return
FC	Cast Iron
FCD	Ductile Cast Iron
FIRR	Financial Internal Rate of Return
F/S	Feasibility Study
GDP	Gross Domestic Product
GNP	Gross National Product
IMF	International Monetary Fund
ITB	Institut Teknologi Bandung
JFC	Jakarta Foundry Center
JETRO	Japan External Trade Organization
JICA	Japan International Cooperation Agency
JIS	Japanese Industrial Standard
MIDC	Metal Industry Development Center
MOI	Ministry of Industry
NPV	Net Present Value
OECF	The Overseas Economic Cooperation Fund
OFFJT	Off the Job Training
OJF	On the Job Training
PPC	Production Planning & Control Department
R & D	Research & Development
REPELITA	Rencana Pembangunam Lima Tahun Kedua
SC	Steel Casting
UN	United Nations
UNIDO	United Nations Industrial Development Organization

CHAPTER 1

INTRODUCTION

CHAPTER 1 INTRODUCTION

1.1 Background circumstances

The Jakarta Foundry Center P.T. Barata Indonesia, established with yen credit provided in 1971 by the Japanese Government, is entrusted with the mission of:-

- Maintaining a high technical standard
- Furnishing foundry products of high grade
- Disseminating advanced foundry skills and practices among foundries in private industry

Records of the Foundry Center's operation since its establishment in December 1974 — summarized in Table 1.1-1 — indicate, however, that far from fulfilling the last-cited mission of transferring foundry know-how to Indonesian private foundries, the Center itself has not been able to furnish products in amounts reaching even 1/10 until 1981, on average, of the target production of 5,000 tons/year* envisaged when the center was established. The slight enhancement of production seen in the table for the years 1982 and 83 reflect the operating guidance provided by JICA experts since August 1981, but the enhancement achieved is seen to be at most 17 percent of target value.

Table 1.1-1 Production record of Jakarta Foundry Center

(Unit: Tons except otherwise indicated)

Year	1975	1976	1977	1978	1979	1980	1981	1982	1983
Iron castings	165	218	176	317	260	164	141	681	597
Steel castings	257	206	279	134	79	93	226	179	93
Total	422	424	455	451	339	257	367	860	690
Ratio to target* (%)	8	8	9	9	7	5	7	17	14

*) Target: 5,000 tons/year

(Source): Renovation Project for P.T. Barata Jakarta Foundry Center, acquired during preliminary survey, March 20, 1985.

In view of the foregoing situation, the Indonesian Government requested of the Japanese Government its cooperation in renovating and reactivating the Jakarta Foundry Center. The Japanese Government responded by carrying out a preliminary survey. The present Study constitutes the follow-up to the preliminary survey, and was undertaken by the Japan International Cooperation Agency. The Agency assigned a surevy mission composed of 6 experts, who engaged in the survey from May 30 to June 18, 1985.

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*) 5,000 tons/year: This target was envisaged by the Japan consulting Institute based on the estimated demand for foundry products amounting to 10,000 tons/year in the region of West Java, of which about one half (4,000 tons of cast iron and 1,000 tons of cast steel) was to be furnished by the Center.

1.2 Purpose of the Study

The purpose of the present Study is to establish the plan for implementing a project for renovating P.T. BARATA INDONESIA the Jakarta Foundry Center, through examination of the technical, economic and financial measures requiring to be taken to renovate the Foundry Center so as to permit its meeting the market demand to be expected for the coming decade.

The targets envisaged for the renovation project are:

(1) To reshape the business strategy and foundry operations with the view to enhancing productivity: Undertake a market survey, based on which to determine qualitatively and quantitatively the product mix (mass-produced, non-mass produced castings) to be furnished by the Foundry Center, and the equipment requiring to be possessed by the Foundry Center for furnishing the product mix thus determined.

(2) To enhance technological capability, particularly through:-

- Strengthening the quality control system to cover all stages of production

- Advancing the standardization of specifications and procedures at all stages of production

(3) To train personnel proficient in various domains relevant to foundry management and operation, and to let such trained personnel join private foundries, to disseminate their proficiency

(4) To accumulate systematized know-how — procedures and skills — and information/data; to disseminate same among private foundries.

(5) To enhance the profitability of the Foundry Center's operations and its contribution to the development of regional foundry industry.

1.3 Scope of Survey

To meet the objectives set forth above, the Study was undertaken to examine the following items:

(1) General economic situation

(2) Current status of Indonesian foundry industry

(3) Government measures for promoting the foundry industry

(4) Current situation of the Jakarta Foundry Center

(5) Market demand for foundry products

(6) Raw material supply

(7) Renovation project -

- considered from technical aspects
- considered from equipment aspects
- covering instruction/training program

(8) Financial analysis

(9) Economic analysis

(10) Conclusions and recommendations

1.4 Implementation of Study

1.4.1 Four steps leading to Draft Report

The four steps followed in compiling the Draft Report were as follows.

Step 1 - Preparatory operations in Japan

(1) Documentation was assembled to serve in determining the items and methods of surveying the Indonesian foundry industry, and in particular the Jakarta Foundry Center; reports of pertinent surveys conducted in the past were also assembled. A questionnaire was prepared for use in the foundry survey.

(2) For surveying the market demand for foundry products, the reports from past survey were reviewed, and the items needing to be surveyed in the present Study were sifted. Pertinent Japanese establishments and organizations were contacted for information and advice concerning the market survey to be performed. A questionnaire was prepared for use in the market survey.

(3) An Inception Report was prepared and submitted, containing plans for implementing the survey, envisaged substance of the survey, proposed schedule and other pertinent matters, to serve as working document in initial discussions with the Indonesian Government and the Jakarta Foundry Center.

Step 2 - Site survey

The site survey mission of 6 experts headed by Isamu Taki stayed in Indonesia during 20 days from May 30 to June 18, 1985, for carrying out the site survey. The information and data brought back from the survey were thoroughly studied and analyzed, to serve as basis for the ensuing examination and study.

During the site survey, the mission was received by Mr. H.M. Toyib, Director of Basic Metal Industry, Ministry of Industry, who expresed his view on the future of the Jakarta Foundry Center; the mission also held detail discussions with Mr. A. Prajitno, Director in charge of foundry operations at P.T. Barata, Indonesia and Mr. Z.H. Nanang, Branch manager at the Jakarta Foundry Center.

Pertinent documentation and information were gathered on the Foundry Center, which was visited for observation of current operations. The mission also visited other foundries as well as foundry customers for gathering additional information and data.

The procedures adopted for conducting the survey were as follows:

Jakarta Foundry Center: The major items surveyed included business administration/production control, market study/sales promotion, quality control, foundry equipment, production engineering/practice, materials, equipment maintenance, infrastructure/utilities.

Product market/technical capability of Indonesian foundries:

(1) The P.T. Barata Foundry Centers at Gresik and Surabaya were visited for information on their technological capabilities, manufacturing techniques, and on the demand for their products.

(2) Other foundries were visited, and information was gathered on foundry product demand.

(3) Customers for foundry products were visited, and information was gathered on the reputation of the Jakarta Foundry Center products, as well as on the trends of casting demand.

(4) The questionnaires prepared for the site survey were independently circulated to pertinent establishments and organizations through a consultant firm, to maximize the information and data that could be assembled within the limited period available for survey. Information was gathered by this means from 48 enterprises.

(5) The reports of past surveys were reviewed, as well as documentation on REPELITA IV.

The information and data thus assembled were examined and analyzed, to estimate the future demand for foundry products.

Progress Report: Upon completion of the site survey, the progress made so far in the Study was reported and confirmed in the form of meeting minutes. The results of study and analysis made of the information and data yielded through the preparatory operations in Japan and the site survey were compiled in a Progress Report, and submitted to the Indonesian Government and P.T. Barata.

Step 3 - Complementary operations in Japan

(1) The information and data yielded through Steps 1 and 2 were examined and analyzed, based on which the plan of implementation was drawn up for the Renovation Project covering:-

- The overall business strategy
- The strong and weak points in the current organization and mode of operation of the Foundry Center
- Estimated supply and demand of foundry products
- Long-term program of business development
- Requisite supply of raw materials

(2) Financial and economic analysis of the Renovation Project thus planned.

The results of the foregoing study were compiled in a Draft Report.

Step 4 - Supplementary explanations furnished on Draft Report

Supplementary explanations were furnished on the submitted Draft Report to:-

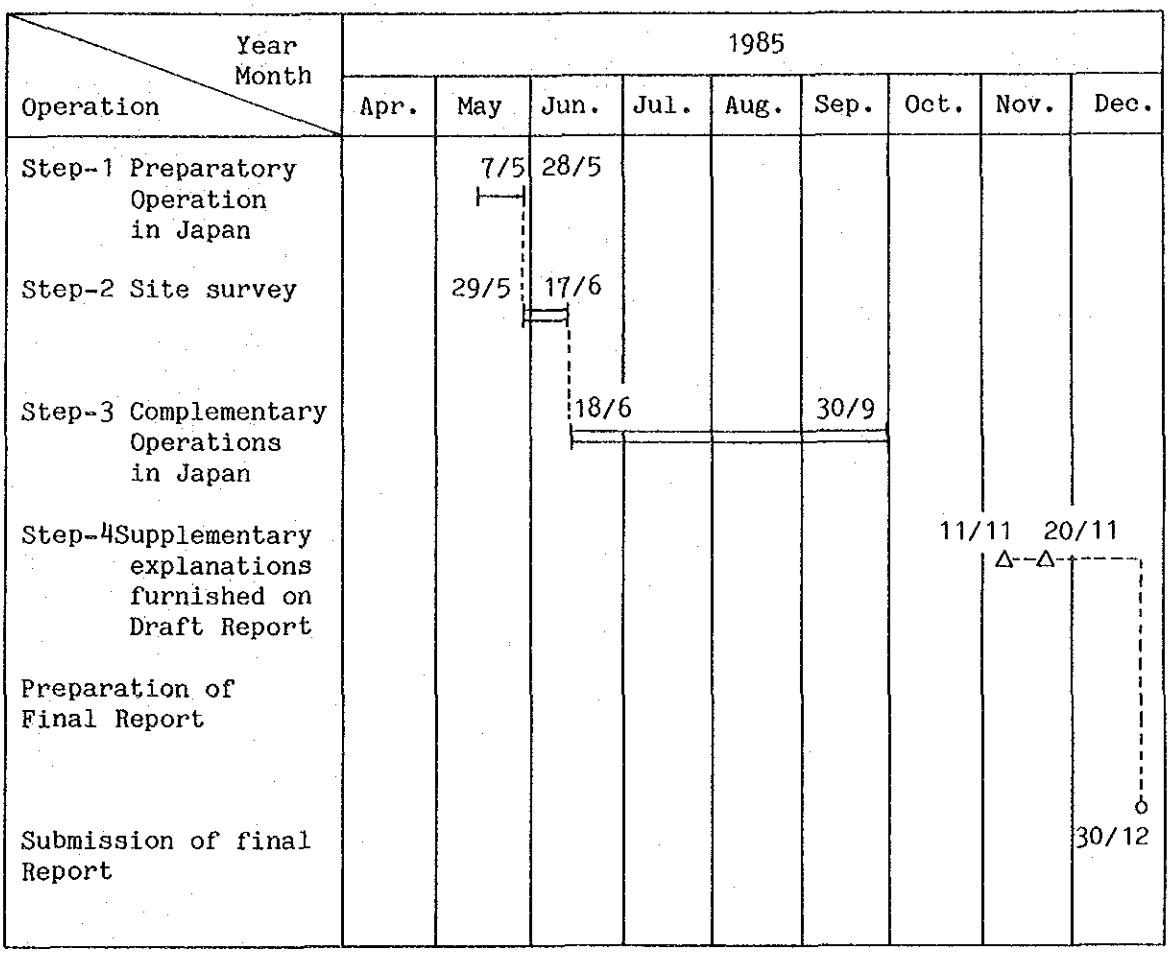
- Japan International Cooperation Agency and the authorities concerned
- Indonesian Government and P.T. Barata

1.4.2 Final Report

Following the above steps, amendments were brought as required to the Draft Report, to constitute the Final Report, which was duly submitted to Japan International Cooperation Agency and Indonesian authorities concerned.

1.4.3 Chronology of Study Implementation

The present Study was implemented following the schedule reproduced below.



CHAPTER 2

BACKGROUND OF THE PROJECT

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2.1 Economic Situation in Indonesia

2.1.1 past progress

During the past 5 years of independence — from 1960 to 1965 — the gross domestic production of Indonesia progressed at an average yearly rate of 1.7%, barely equaling the growth of national population during the same period. From 1968 onward, however, the nation's economic activity came to advance at a rate that could hardly have been foreseen in the early 1960's — averaging 7.8% annually from 1970 to 80. The change of political regime had taken place in 1966, following which the myriad problems confronting the country were energetically tackled, with measures enforced for rehabilitating and stabilizing the national economy, and a policy envisaging long-term economic development firmly established and implemented. The First Five Year Plan (REPELITA I) was set on foot in 1969, almost the very year when the rapid advance of economic activity marked its start.

In REPELITA I, priority was accorded to agriculture, particularly rice production. In excellent timing, new varieties of rice characterized by rapid growth and high yield came to be developed. The national program was coordinated to enhancing fertilizer production, to promoting irrigation works, to furnishing requisite credits. The result was an almost 6% yearly increase of rice crops consistently from 1968 to 74, and sustained thereafter at 5% average through the ensuing 13 years to 1981. This notable enhancement of rice production contributed not only directly to raising the level of living standard but also consequently to expanding the market for manufactured goods and for services, to generating new opportunities for employment, and to promoting overall economic development.

The raising of oil prices by OPEC in 1973-74 and in 1979-80 liquidated the problem of balancing international payments, which had till then been hampering the country's economic development; government revenue was enhanced, permitting the adoption of vigorous and active projects for economic and social development. Active induction of foreign capital was initiated with the enactment in 1967 of a law governing foreign capital, and with the establishment of the BKPM charged with measures for simplifying authorization procedures. The resulting influx of foreign capital has played a very positive role in the ensuing development of Indonesian economy, as described in what follows.

Data indicative of the economic growth recorded by Indonesia during the 1970's are cited in Table 2.1.1-1, and among Asean countries and Korea, Indonesia ranked second only to Korea for growth rate in the industry/mining — and in particular, the manufacturing — sectors (see Table 2.1.1-2).

The shares contributed by industry to the overall GDP changed in the 20 years from 1960 to 80 as indicated in Table 2.1.1-3, where it is seen that Indonesian industry progressed from 14 to 42% share. This remarkable enhancement of industrial production was achieved by development focused predominantly on capital-intensive industries, as evidenced by the fact that the percentage of labor force engaged in the industry/mining sector rose only from 8 to 12% during the corresponding period (see Table 2.1.1-4).

Table 2.1.1-5 compares the different Asian countries and Japan/Korea for their composition of imports and exports in the years 1960 and 79. Between these 20 years, the percentage contributed to exports by textiles and machinery rose only to 2% for Indonesia, which contrasts strikingly with the figures of 13 and 14% attained respectively by Malaysia and Thailand. The composition within the primary product exports from Indonesia, however, radically changed during the same period, with fuel and mined metal coming to contribute a predominant share.

Imports into Indonesia marked a distinct change in composition, with machinery/transport equipment rising from 17 to 32%, and relative decreases seen in miscellaneous products and foodstuff. This implies that the 20 years saw appreciable progress of industrialization, but that it was accompanied by increased importation of high value-added industrial products, and that domestic production of intermediate goods was yet to be realized. The relative decrease of foodstuff imports clearly attests to the benefit reaped from the improvements brought to the agricultural sector.

Table 2.1.1-1 Indicators of economic performance, Indonesia, 1968-81
(Percentage)

Year	GDP Growth Rate	Inflation Rate	Growth of Output			Crude Oil	Investment	Tax
			Rice	Food	Agriculture		GDP Ratio	GDP Ratio
1968	13.9	85	12.5	9.1	6.9	18.0	9	8
1969	9.0	10	5.1	1.0	1.1	23.3	12	9
1970	10.9	9	6.5	3.5	4.2	15.1	14	10
1971	6.5	2	4.7	3.4	4.0	4.3	15	11
1972	9.4	27	-3.6	1.1	2.1	21.3	19	13
1973	6.8	27	10.6	7.0	3.7	23.8	18	15
1974	7.6	33	4.7	6.9	3.7	2.8	17	16
1975	5.0	20	-0.6	0.9	0.0	-5.0	20	18
1976	6.9	14	3.9	3.5	4.7	15.3	21	19
1977	8.8	11	0.1	-1.2	1.6	11.7	20	19
1978	6.8	8	10.1	9.6	7.2	-2.9	21	19
1979	5.3	20	2.3	4.0	3.8	-2.6	21	21
1980	9.6	16	12.8	8.6	5.2	-1.1	22	24
1981	7.6	7	10.4	8.1	3.5	1.6	21	24
Annual Average 1968/81	8.2	20.1	5.1	4.0	3.4	7.8		

Source: Central Statistical Bureau

Table 2.1.1-2 Economic Performance Indicators Compared between Countries

(Unit: % average annual growth rate)

	GDP		Industry/mining		Manufacturing	
	1960-70	1970-80	1960-70	1970-80	1960-70	1970-80
Japan	10.9	5.0	10.9	5.5	11.0	6.4
Korea	8.6	9.5	17.2	15.4	17.6	16.6
Philippines	5.1	6.3	6.0	8.7	6.7	7.2
Thailand	8.4	7.2	11.91	10.0	11.4	10.6
Malaysia	6.5	7.8	-	9.7	-	11.8
Singapore	8.8	8.5	12.5	8.8	13.0	9.6
Indonesia	3.9	7.6	5.2	11.1	3.3	12.8

Source: World Bank

Table 2.1.1-3 Share Contributed by Industry to GDP in Different Countries

(Unit: %)

	Industry/Mining (I)		Of which Manufacturing		Agriculture/ fisheries (A)		I - A	
	1960	1980	1960	1980	1960	1980	1960	1980
Japan	45	41	34	29	13	4	32	37
Korea	20	41	14	28	37	16	17	25
Philippines	28	37	20	26	26	23	2	14
Thailand	19	29	13	20	40	25	-21	4
Malaysia	18	37	9	23	37	24	-19	13
Singapore	18	37	12	28	4	1	14	36
Indonesia	14	42	8	9	54	26	-40	16

Note: In the above statistics, GDP has been divided into (a) industry/mining, (b) agriculture/fisheries, and (c) services.

Source: World Bank

Table 2.1.1-4 Distribution of Labor in Different Sectors of Economic Activity

(Unit: %)

	Industry/Mining (I)		Agriculture/ fisheries (A)		Services		I - A	
	1960	1980	1960	1980	1960	1980	1960	1980
Japan	30	39	33	12	37	49	-3	27
Korea	9	29	66	34	25	37	-57	-5
Philippines	15	17	61	46	24	37	-46	-29
Thailand	4	9	84	76	12	15	-80	-67
Malaysia	12	16	63	50	25	34	-51	-34
Singapore	23	39	8	2	69	59	15	37
Indonesia	8	12	75	58	17	30	-67	-46

Source: World Bank

Table 2.1.1-5 Composition of Imports and Exports Compared between 1960 and 79

Imports (Unit: %)

	Japan		Korea		Phillipine		Thailand		Malaysia		Singapore		Indonesia	
	1960	1979	1960	1979	1960	1979	1960	1979	1960	1979	1960	1979	1960	1979
Food	17	15	10	9	15	7	10	4	29	14	21	10	23	16
Fuel	17	41	7	19	10	22	11	23	16	12	15	25	5	11
Miscellaneous primary products	49	21	25	17	5	6	11	10	13	7	38	9	10	6
Machinery/transport equipment	9	7	12	30	36	28	25	26	14	37	7	29	17	32
Miscellaneous manufactured products	8	16	46	25	34	37	43	37	28	30	19	27	45	35
Total	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Exports (Unit: %)

Textile/clothing	28	4	8	31	1	6	0	10	-	2	5	5	0	1
Machinery/transport equipment	23	54	-	20	0	2	0	4	-	21	7	26	-	1
Fuel/mined metals	28	38	30	1	10	18	7	12	20	29	1	27	33	69
Miscellaneous primary products	11	2	56	10	86	47	91	63	74	53	73	22	67	28
Miscellaneous manufactured products	10	2	6	38	3	27	2	11	6	5	14	20	-	1
Total	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Soruce: World Bank

2.1.2 Present trends

The persisting economic recession affecting particularly the OECD countries, and the associated fall of oil prices, stagnant oil exports, sluggish demand and low prices of non-oil products — particularly agricultural — have undermined Indonesian economy during recent years, though some recovery has been marked in 1983 and 84. GDP has recorded 2.2% in 1982, followed by +4.3% in 1983 and +5.0% in 1984 (at constant 1973 prices). The current account balance fell into red in 1981/82, to record -$7.1 billion in 1982/83, -$4.2 billion in 1983/84 and -$1.9 billion in 1984/85.

The Indonesian Government has noted that the slack oil market is likely to continue, and is determined to prevent persistence of the large-scale deficit in international balance of payments recorded in 1982/83. The Government has taken measures to improve the payment balance as short-term objective, and in the long term to remedy the weaknesses residing in the national economic structure. These measures include:-

- Freezing salaries in the public services; drastic cuts to subventions; severely restricted government budget for the 1983/84 fiscal year
- Deferment/cut-back of public investment projects
- Devaluation of the rupiah (28%, March 1983)
- Fiscal/financial reforms
  - = income tax reform effected April 1984
  - = value-added tax instituted in April 1985
  - = controls on financing relaxed, to remove deposit rate control and credit ceiling for national banks.

These measures coincided with the partial business recovery marked in the U.S. and Japan in 1983 and 84, to reinforce the beneficial effect of the foregoing reform measures. As a result, the low growth of GDP recorded in 1982 regained 4.3% growth in 1983, to attain +5.0% in the following 1984. Non-oil exports increased by 38% in

1983/84, and concomitantly, imports decreased. The financial reform and devaluation of the rupiah served to recover reliance on the rupiah, to contribute to enhancement of savings. Rise in prices has been retained at rates ranging from 9 to 11%, despite the increases brought to electricity, transportation and oil costs. The readjustment brought to the economic structure was continued through 1984, to result in very significant improvements recorded on various economic performance indicators for the years 1983/84 and 84/85.

These improvements, however, were not achieved without their reverse side, which has manifested itself more particularly in the manufacturing sector: Manufacturing equipment, grossly expanded postulating continued rapid economical expansion, was subsequently severely penalized by the low capacity utilization imposed by the stagnant demand; this burden on industry has been further aggravated by the devaluation of the rupiah in 1983 and by the concomitant rise in interest rates.

Through the years 1982 to 84, the growth rates recorded for total value added by the manufacturing sector has remained below those of the agricultural sector, thus bearing out the severe effects on manufacturing activity brought by the readjustment and stabilizing policy adopted by the Government.

REPELITA IV — initiated in April 1984 — envisages a distinctly lower rate of GDP growth compared with the preceding programs, of 5%, to realize which the manufacturing sector is to mark 9.5% and the machinery and basic metal sectors, in particular, 17.0%.

In order to maintain continued availability of foreign credits, and to contain debts within permissible bounds, exports of non-oil products and domestic manufacture of currently imported goods should have to be promoted with redoubled energy; newly emerging labor forces will have to be given opportunities for productive activity. A pattern of economic growth to match all these requirements will have to be found (see Table 2.1.2-1).

Table 2.1.2-1 Indonesia Basic Data

1) GNP (1984) $ 79.9 billion

2) GNP per Capita (1984) $ 493

3) Growth of GDP (in percent p.a., at 1981 prices)

1982	1983	1984 (Estimated)
2.2	4.3	5.0

4) Current account balance (4 billion at current prices)

1982/83	1983/84	1984/85 (Estimated)
-7.1	-4.2	-1.9

5) Gross merchandise exports ($ billion at current prices)

	1982/83	1983/84	1984/85 (Estimated)
Oil and LNG	14.7	14.4	14.3
Non Oil/NG	3.9	5.4	5.9

6) Gross imports of goods ($ billion at current prices)

	1982/83	1983/84	1984/85 (Estimated)
Oil and LNG	4.8	3.8	3.1
Non-Oil	15.8	14.2	12.9

7) Rates of inflation (in percent p.a.)

	1982	1983	1984
CPI	9.0	11.1	11.2

8) Growth in sectoral value added (in percent p.a. at 1981 prices)

	1982	1983	1984
Agriculture	2.1	4.8	5.0
Manufacturing (Non LNG, refining)	0.8	2.5	4.7

(Source: Report of World Bank etc.)

2.2 Current Situation of Industry and Government industrialization Policy in Indonesia

2.2.1 Indonesian industry

As indicated in Table 2.1.1-2, the manufacturing industries, which grew during the 1960's at an average annual rate of 3.3%, accelerated its pace by almost 4 times to 12.8% during the ensuing decade. Even taking the industry/mining sector as a whole, the corresponding annual growth rates were 5.2 and 11.1%, respectively, in the same periods.

The share of contributions to GDP marked by the industry/mining sector has come to exceed 40%, ahead of all the ASEAN countries, as revealed in Table 2.1.1-3, but this is due entirely to the spiraling rise of oil revenues: The share of manufacturing industries has remained below 10% even in 1980.

By 1984, this share had improved to 12% — Table 2.1.1-1 — but the preponderance scale of the country's oil industry holds down the relative importance of the manufacturing industry. In absolute amount of manufactured product value, Indonesia ranks only behind Korea and the Philippines.

The development of Indonesian manufacturing industries since 1966 owes its success to the Government's positive industrialization policy, in particular, the measures for liberalizing foreign exchange and trade, and to the vast public investments financed with revenue from oil. As indicated in Table 2.2.1-2, the production indexes have progressed far more rapidly for the manufacturing industries than for the GDP as a whole. Detailed statistics for individual industry branches are presented in Table 2.2.1-3, which reveals the traditional branches like food products, textiles and tobacco to have recorded modest progress, in contrast to the prominent figures marked by iron and steel, plastic products and machinery, while industrial chemicals (which include fertilizers), wood products and paper rank between the two. Table 2.2.1-4 gives the progress marked by the indexes for manufacturing production through the years 1975 to 84, throughout which, the figures for intermediate goods

have consistently exceeded the corresponding figures for consumer goods, even through the recession of 1982.

Of particular note are the percentage changes given for the years, 1983 and 84: While transportation equipment recorded -13.8 and -14.0% respectively for these two periods, and consumer goods 3.5 and 5.3, the intermediate goods category maintained the outstanding growth rates of 9.3 and 13.6%.

The foregoing differences in growth rate between branches of industry resulted in changes in the relative weights presented by these branches, with food and textiles replaced by chemical, wood and metal products. This evidences the shift marked by these industries from the manufacture of consumer goods toward consumer durables, and toward capital and intermediate goods.

A very notable characteristic of Indonesian industrial development is its being directed toward satisfying and expanding the domestic market and toward replacement of imported products. Food, textile and petroleum products have come to be almost completely self-sufficient; imports of cotton, fabric, caustic soda and insecticides have vanished, and of urea and paper markedly diminished. There remain chemical and metallic intermediate goods largely relying on imports, but whose domestic production is being actively promoted.

The weight laid in the more capital-intensive branches have — as already mentioned — resulted in relatively small contribution to the creation of additional employment opportunities, but it betokens on the other hand a vast enhancement of productivity. Productivity improvement was particularly marked in the typical process industries of cement, chemical, oil refining, LNG, iron and steel, and non-ferrous metal processing (see Table 2.2.1-5).

The scale of manufacturing establishments is compared between the different branches of industry in Tables 2.2.1-7 and -8, separately for the years 1974/5 and 1979. The branches of industry characterized by predominant fractions of large manufacturing establishments are those of iron/steel, chemical/petroleum/rubber, and paper/printing/publishing. In terms of total value added, more than 90% is contributed by large/medium establishments, which bears out the concentration of industrial development in large-scale indsutries.

The branches relying predominantly on small and family scale manufacturing units are represented by those associated with food/beverages/tobacco, textiles, leather, wood/furniture. Comparison between the figures for 1974/75 and 1979 reveal a shift toward larger manufacturing scale in the branches of wood/furniture, paper/printing/publishing, chemical/pertroleum/rubber and non-metallic mineral products. A converse shift toward production in smaller scale is seen for food/beverages/tobacco, textile/rubber and machinery. In terms of employment creation, it is revealed for 1979 that the large/medium scale establishments that contributed 77.6% in value added employed only 19.4% of the total labor force, thus evidencing the important part played by the small/family scale units in providing employment.

The distribution over different regions shown by the manufacturing establishments of different scales is presented in Table 2.2.1-9. The Island of Java figures prominently in terms of both number of manufacturing establishments and total value added, and particularly for the large/medium scale establishments. Roughly three quarters of the nation's manufacturing activity is concentrated in Java. Taking the particular case of Jakarta, while in terms of number of manufacturing establishments and employees, Jakarta shares only 1.5 and 3.4% respectively of the national total, these figures rise to 12.4 and 13.3% when solely the large/medium scale establishments are picked out, and to as much as 20% in terms of their gross value

produced and value added. These figures are markedly high considering that the city's population represents only 4.4% of the nation's total. The above statistics bear out the high concentration in Jakarta of the large/medium scale industries characterized by high value-added and productivity.

Mention has already been made of the important role played by foreign capital in Indonesian economic development. The measures adopted for inducing foreign capital resulted in investments attracted from abroad between 1967 and 84 totaling US$5.5 billion, of which 66% — amounting to nearly US$3.7 billion — were in the manufacturing sector (statistics excluding investments in petroleum and banking). Of the above $3.7 billion, 1/3 was in the textile/rubber branch, 1/5 in the chemical/rubber, 1/6 in metallic products, and 1/10 each in non-metallic mineral products and metals. The trend seen in the last five years was a shift from textiles/leather toward chemicals/rubber.

The overall trend resulting from the ten years of foreign capital induction policy was a marked rise in the relative importance of government-operated, joint-venture, and multinational enterprises — particularly in the large-scale heavy industries, and consequent lowering of the relative weight of domestic private enterprises (see Tables 2.2.1-10, -11).

Table 2.2.1-1 Progress of Percentage Shares Contributed to GDP by Different Sectors

(Unit: %)

	1981	1982	1983	1984
Agriculture	25.3	25.8	25.7	25.7
Mining	24.0	20.7	21.1	21.0
Manufacturing	10.8	11.2	10.8	12.5
Electricity/gas/water supply	0.5	0.6	0.6	0.6
Construction	5.8	6.1	6.2	5.4
Wholesale/retail	14.7	15.6	15.5	15.0
Transport/communication	4.4	4.7	4.6	4.6
Banking/financing	2.6	2.9	3.0	3.0
Public administration/defense	7.2	7.5	7.6	7.4
Others	4.7	4.9	4.9	4.8
Total	100	100	100	100

Source: Derived from UNIDO data

Table 2.2.1-2 Progress of GDP-Base Production Indexes
(Index datum: 100 for 1973)

	1971	'72	'73	'74	'75	'76	'77	'78	'79	'80	'81
Manufac-tured Products	75.4	86.8	100.0	116.2	130.5	143.1	162.8	190.2	214.6	262.3	293.7
GDP	82.1	89.8	100.0	107.6	113.0	122.3	131.5	141.7	150.5	165.4	180.0

Source: Derived from World Bank data

Table 2.2.1-3 Manufacturing value added by branch of industry ranked according to average annual growth 1971 - 1980 (based on values in 1975 US$ constant prices)

ISIC		Average annual growth rate
		Percentage
	- High growth -	
3710	Iron and steel	50.2
3560	Plastic products	33.2a/
3230	Leather products	31.5a/
3830	Machinery electric	30.8
3690	Other non-metallic mineral products	28.7
3820	Machinery, except electrical	27.6a/
3420	Printing and publishing	24.3a/
3550	Rubber products	22.8
3810	Fabricated metal products	20.2
	- Medium growth -	
3510	Industrial chemicals	18.9
3320	Furniture, except metal	18.7a/
3310	Wood products, except furniture	17.6
3620	Glass and products	17.4
3410	Paper and paper products	16.1
3110	Food products	14.1
3220	Wearing apparel, except footwear	12.6a/
3850	Professional and scientific equipment	12.0a/
3900	Other manufactured products	12.0a/
3210	Textiles	11.8
	- Low growth -	
3240	Footwear, except rubber or plastic	10.1
3130	Beverages	9.7
3140	Tobacco	9.4
3530	Petroleum refineries	8.0
3840	Transport equipment	5.6
3520	Other chemicals	3.2
Total manufacturing		11.8

Source: UNIDO Data Base, information supplied by the United Nations Statistical Office, with estimates by the UNIDO secretariat

a/1971-76

Table 2.2.1-4 Index of Manufacturing Production, 1979 - 84
(1975 - 100)

	Weight	Index							Percentage Change				Percentage Change
							Qtr. 1-3						Qtr. 1-3
	1975	1979	1980	1981	1982	1983	1983	1984	1980	1981	1982	1983	1984/83
Consumer goods	0.6576	130	150	161	161	167	166.2	175.2	15.3	7.6	--	3.5	5.3
Krutek cigarettes	0.2071	120	151	180	186	196	190.7	218.3	25.8	19.2	3.3	5.4	14.5
White cigarettes	0.1377	131	130	124	115	120	118.0	117.0	-0.8	-4.6	-7.3	4.3	-0.8
Molt liquors	0.0338	118	129	147	170	193	190.7	207.7	9.3	14.0	15.6	13.5	8.9
Milk and butter	0.0164	201	234	235	239	261	266.7	235.3	16.4	0.4	1.7	9.2	-11.8
Cloth	0.1282	122	126	138	132	121	118.0	123.0	3.3	9.5	-4.3	-8.3	4.2
Yarn	0.0344	111	118	126	121	115	113.7	124.0	6.3	6.8	-4.0	-5.0	9.1
Butik	0.0119	117	117	99	110	105	105.3	118.0	--	-15.4	11.1	-4.5	12.1
Knitting	0.0068	77	88	89	81	82	80.7	81.3	14.3	1.1	-9.0	1.2	0.7
Footwear	0.0345	112	130	123	124	125	156.3	180.7	16.1	-5.4	0.8	0.8	15.6
Radios, TVs and Cassettes etc.	0.0347	230	340	348	333	351	359.3	311.7	47.8	2.4	-4.3	5.4	-13.2
Dry cell batteries	0.0107	180	228	231	267	328	323.0	309.0	26.7	1.3	15.6	22.8	-4.3
Matches	0.0024	139	179	189	230	291	300.0	306.3	28.8	5.6	21.7	26.5	2.1
Intermediate goods	0.2273	251	327	356	358	391	388.4	441.3	30.4	8.8	0.5	9.3	13.6
Group A	0.1032	287	386	405	409	455	459.3	567.8	34.5	5.0	0.9	11.5	23.7
Fertilizer	0.0780	336	466	492	496	560	563.0	698.0	38.7	5.6	0.8	12.9	24.0
Basic chemicals	0.0154	124	128	127	130	132	130.7	159.0	3.2	-0.8	2.4	1.5	21.7
Paper	0.0098	151	153	152	152	136	145.3	171.3	1.3	-0.7	--	-10.5	17.9
Group B	0.1241	222	279	315	315	337	329.6	336.0	25.9	13.0	0.1	6.8	1.9
Cement	0.0491	314	367	395	419	461	447.0	460.0	16.9	7.6	6.1	10.0	2.9
Structural metal products	0.0365	154	172	188	196	203	202.7	191.3	11.7	9.3	4.3	3.6	-5.6
Iron and basic steel	0.0033	443	1,034	1,248	970	1,147	1,121.0	1,155.3	133.4	20.7	-22.3	18.2	3.1
Paint	0.0192	98	115	159	168	146	143.0	162.3	17.3	38.3	5.7	-13.1	12.9
Glass	0.0087	171	208	257	217	227	223.0	249.0	21.6	23.6	-15.6	4.6	11.7
Plywood	0.0073	220	392	471	424	438	438.0	418.3	78.2	20.2	-10.0	3.3	-4.5
Transportation equipment	0.1151	129	177	228	228	196	206.8	177.2	37.4	28.5	0.2	-13.8	-14.0
Motor vehicles	0.0353	117	194	255	227	198	210.0	175.0	65.8	31.4	-11.0	-12.8	-16.7
Motor cycles	0.0488	75	114	161	187	130	137.0	95.5	52.0	41.2	16.1	-30.5	-30.7
Tires	0.0310	227	257	301	294	300	311.7	310.0	13.2	17.1	-2.3	2.0	-0.5
Total	1.0000	158	194	214	214	222	271.4	235.9	22.8	10.2	0.2	3.6	6.5

Source: Central Bureau of Statistics

Table 2.2.1-5 Progress of Production (in value Added) and of Labor Productivity by Different Branches of Industry

ISIC	Branch	Value-added (Rp billion)			Share contributed (%)			Ratio of increase		Labor productivity (Rp 1,000 per worker)		
		1970	1975	1980	1970	1975	1980	1970-75	1975-80	1970	1975	1980
311/2	Food	33.25	119.99	235.9	31.8	24.9	11.1	3.6	2.0	122.9	835.6	1,536.8
313	Beverages	176	11.81	32.1	1.7	2.4	1.5	6.7	2.7	338.5	1,874.6	4,458.3
314	Tobacco	26.97	65.73	406.7	25.8	13.6	19.1	2.4	6.2	159.5	496.8	2,562.7
321	Textiles	11.29	71.74	263.4	10.8	14.9	12.4	6.4	3.7	68.1	311.5	1,115.7
322	Clothing	1.01	0.88	9.1	1.0	0.2	0.4	0.9	10.3	206.1	220.0	587.1
323	Leather	0.19	1.4	3.3	0.2	0.3	0.2	7.4	2.4	95.0	482.8	1,064.5
324	Footwear	1.62	12.04	16.4	1.6	2.5	0.8	7.4	1.4	437.8	2,075.9	2,186.7
331	Wood products	0.92	16.62	149.8	0.9	3.4	7.0	18.1	9.0	89.3	497.6	2,513.3
332	Furniture	0.23	1.7	3.6	0.2	0.4	0.2	7.4	2.1	53.5	351.2	631.6
341	Paper products	0.24	8.02	31.9	0.2	1.7	1.5	33.4	4.0	51.1	990.1	2,680.7
342	Printing/publishing	0.89	9.19	31.9	0.9	1.9	1.5	10.3	3.5	58.9	516.3	1,603.0
351	Chemicals	1.29	33.12	90.8	1.2	6.9	4.3	25.7	2.7	238.9	3,600.0	6,532.1
352	Chemical products	4.46	24.68	151.3	4.3	5.1	7.1	5.5	6.1	202.7	815.2	3,708.3
355	Rubber products	10.96	8.6	102.6	10.5	1.8	4.8	0.8	11.9	91.8	914.9	2,780.5
356	Plastics	0.31	5.3	15.5	0.3	1.1	0.7	17.1	2.9	48.4	368.1	875.7
361	Ceramics	0.05	0.93	5.1	0.0	0.2	0.2	18.6	5.5	62.5	456.0	750.0
362	Glass products	0.16	3.01	22.5	0.2	0.6	1.1	18.8	7.5	50.0	463.1	2,528.1
369	Non-metallic mineral products	3.24	21.76	125.1	3.1	4.5	5.9	6.7	5.7	203.8	891.8	4,074.9
371	Iron/steel	-	1.1	67.0	-	0.2	3.1	-	60.9	-	379.3	7,613.6
381	Metallic products	3.24	16.89	74.2	3.1	3.5	3.5	5.2	4.4	194.0	757.4	1,818.6
382	General machinery	0.42	8.03	33.4	0.4	1.7	1.6	19.1	4.2	87.5	912.5	2,806.7
383	Electrical machinery	0.38	18.28	112.6	0.4	3.8	5.3	48.1	6.2	108.6	1,757.7	3,010.7
384	Transport equipment	0.86	20.27	136.1	0.8	4.2	6.4	22.6	6.7	121.1	1,050.3	4,551.8
385	Precision instruments	-	0.18	1.4	0.0	0.0	0.1	-	7.8	-	450.0	1,400.0
390	Others	0.77	1.09	6.3	0.7	0.2	0.4	1.4	7.6	101.3	242.2	1,456.1
3	Total	104.51	482.36	2,100	100.0	100.0	100.0	4.6	4.4	120.3	642.5	2,211.8

Source: U.N. Yearbook of Industrial Statistics for the relevant years.

Note : Enterprises employing 20 or more (exceptionally 10 or more for 1970)

Table 2.2.1-6 Progress of Numbers of Manufacturing Establishments and of Employees in the Different Branches of Industry

ISIC		Numbers						Share (%)					
		establishments			Employees (x 1,000)			Establishments				Employees (x 1,000)	
		1970	1975	1980	1970	1975	1980	1970-75	1975-80	1970	1975	1980	
311/2	Food	5,530	1,613	1,674	270.6	143.6	153.5	33.25	18.6	20.8	31.1	19.1	15.9
313	Beverages	174	78	100	5.2	6.3	7.2	1.76	0.9	1.2	0.6	0.8	0.7
314	Tobacco	1,125	1,069	715	173.4	132.3	158.7	26.97	12.3	8.9	20.0	17.6	16.5
321	Textiles	4,698	2,754	1,957	165.7	228.1	229.9	11.29	31.7	24.3	19.1	30.4	23.9
322	Clothing	130	106	134	4.9	4.0	15.5	1.01	1.2	1.7	0.6	0.5	1.6
323	Leather	62	51	40	20	2.9	3.1	0.19	0.6	0.5	0.2	0.4	0.3
324	Footwear	63	45	57	3.7	5.8	7.5	1.62	0.5	0.7	0.4	0.8	0.8
331	Wood products	668	487	483	10.3	33.4	58.9	0.92	5.6	6.0	1.2	4.4	6.1
332	Furniture	222	123	137	4.3	4.8	5.7	0.23	1.4	1.7	0.5	0.6	0.6
341	Paper products	89	77	84	4.7	8.1	11.9	0.24	0.9	1.0	0.5	1.1	1.2
342	Printing/publishing	511	295	279	15.1	17.8	19.9	0.89	3.4	3.5	1.7	2.4	2.1
351	Chemicals	88	84	97	5.4	9.2	13.9	1.29	1.0	1.2	0.6	1.2	1.4
352	Chemical products	389	276	297	22.0	29.2	40.8	4.16	3.2	3.7	2.5	3.9	4.2
355	Rubber products	654	97	222	115.6	9.4	36.9	10.96	1.1	2.8	13.3	1.3	3.8
356	Plastics	194	225	221	6.4	14.4	17.7	0.31	2.6	2.7	0.7	1.9	1.8
361	Ceramics	12	12	21	0.8	2.0	6.8	0.05	0.1	0.3	0.1	0.3	0.7
362	Glass products	46	53	49	3.2	6.5	8.9	0.16	0.6	0.6	0.4	0.9	0.9
369	Non-metallic mineral products	790	588	570	15.9	24.4	30.7	3.24	6.8	7.1	1.8	3.2	3.2
371	Iron/steel	-	13	23	-	2.9	8.8	-	0.1	0.3	-	0.4	0.9
381	Metallic products	556	282	363	16.7	22.3	40.8	3.24	3.2	4.5	1.9	3.0	4.2
382	General machinery	108	98	132	4.8	8.8	11.9	0.42	1.1	1.6	0.6	1.2	1.2
383	Electrical machinery	66	77	113	3.5	10.4	37.4	0.38	0.9	1.4	0.4	1.4	3.9
384	Transport equipment	313	118	178	7.1	19.3	29.9	0.86	1.4	2.2	0.8	2.6	3.1
385	Precision instruments	-	15	25	-	0.4	1.0	-	0.2	0.3	-	0.1	0.1
390	Others	193	58	83	7.6	4.5	5.7	0.77	0.7	1.0	0.9	0.6	0.6
3	Total	16,681	8,694	8.054	868.9	750.8	963.0	104.51	100.0	100.0	100.0	100.0	100.0

Source: U.N. Yearbook of Industrial Statistics for the relevant years.

Note : Enterprises employing 20 or more (exceptionally 10 or more for 1970)

Table 2.2.1-7 Shares of Large/Medium, Small and Family Scale Establishments Constituting the Different Branches of Industry — 1974/75 and 1979

(Unit: %)

		By number of establishments				By number of employees				By gross product value				By value added			
		Large/ medium scale	Small scale	Family scale	Total	Large/ medium scale	Small scale	Family scale	Total	Large/ medium scale	Small scale	Family scale	Total	Large/ medium scale	Small scale	Family scale	Total
	(1974/75)																
31	Food/beverages/ tobacco	0.5	5.3	94.2	100.0	14.7	8.3	77.0	100.0	73.1	11.6	15.3	100.0	78.3	8.8	12.9	100.0
32	Textile/leather	1.4	3.9	94.7	100.0	26.2	8.3	65.5	100.0	85.6	7.8	6.7	100.0	84.4	7.3	8.3	100.0
33	Wood products/ furniture	0.1	1.0	98.9	100.0	1.3	2.4	96.3	100.0	34.1	19.6	46.2	100.0	30.2	16.9	52.9	100.0
34	Paper/printing/ publishing	7.6	22.9	69.5	100.0	55.6	20.4	24.0	100.0	86.8	10.7	2.5	100.0	84.0	12.4	3.5	100.0
35	Chemical/ petroleum/ rubber products	11.8	18.2	70.0	100.0	71.5	10.6	17.9	100.0	94.4	4.2	1.3	100.0	93.3	5.0	1.7	100.0
36	Non-metallic mineral products	0.5	7.7	91.5	100.0	7.3	14.0	78.6	100.0	55.5	17.2	27.3	100.0	54.2	14.7	31.1	100.0
37	Iron/steel products	100.0	0.0	0.0	100.0	100.0	0.0	0.0	100.0	100.0	0.0	0.0	100.0	100.0	0.0	0.0	100.0
38	Machinery	2.6	15.7	81.7	100.0	41.8	16.5	41.7	100.0	92.1	4.8	3.1	100.0	89.8	5.8	4.4	100.0
39	Others	0.3	3.1	96.6	100.0	10.0	6.5	83.5	100.0	77.6	6.3	16.1	100.0	79.1	5.4	15.5	100.0
	Total	0.5	3.7	95.7	100.0	13.5	7.0	79.5	100.0	78.3	9.5	12.2	100.0	77.9	8.7	13.5	100.0
	(1979)																
31	Food/beverages/ tobacco	0.4	8.5	91.2	100.0	14.3	19.6	66.1	100.0	67.3	14.4	18.4	100.0	75.8	9.3	15.0	100.0
32	Textile/leather	1.1	5.1	93.7	100.0	37.2	14.9	47.9	100.0	84.3	9.3	6.4	100.0	81.1	10.8	8.1	100.0
33	Wood products/ furniture	0.1	3.4	96.5	100.0	5.7	12.4	81.9	100.0	51.6	19.5	28.9	100.0	41.8	19.5	38.7	100.0
34	Paper/printing/ publishing	22.1	77.9	0.0	100.0	71.5	28.5	0.0	100.0	92.0	8.0	0.0	100.0	91.4	8.6	0.0	100.0
35	Chemical/ petroleum/ rubber products	31.5	68.5	0.0	100.0	85.7	14.3	0.0	100.0	97.5	2.5	0.0	100.0	96.8	3.2	0.0	100.0
36	Non-metallic mineral products	0.5	15.8	83.7	100.0	10.8	33.6	5.6	100.0	71.6	13.0	15.4	100.0	71.7	11.6	16.8	100.0
37	Iron/steel products	100.0	0.0	0.0	100.0	100.0	0.0	0.0	100.0	100.0	0.0	0.0	100.0	100.0	0.0	0.0	100.0
38	Machinery	2.0	17.2	80.8	100.0	45.0	21.1	33.0	100.0	90.0	4.5	5.5	100.0	85.7	5.4	8.8	100.0
39	Others	0.2	2.3	97.5	100.0	5.1	7.4	87.5	100.0	22.7	5.1	72.2	100.0	13.5	4.9	81.6	100.0
	Total	0.5	7.3	92.1	100.0	10.4	18.4	6.22	100.0	77.4	10.1	12.5	100.0	77.6	8.8	13.6	100.0

Source: CBS, Statistical Yearbook of Indonesia, 1983.

Table 2.2.1-8 Shares of Different Branches of Industry Constituting the Large/Medium, Small and Family Scale Manufacturing Establishments — 1974-5 and 1979

(Unit: %)

		By number of establishments				By number of employees				By gross product value				By value added			
		Large/ medium scale	Small scale	Family scale	Total	Large/ medium scale	Small scale	Family scale	Total	Large/ medium scale	Small scale	Family scale	Total	Large/ medium scale	Small scale	Family scale	Total
	(1974/75)																
31	Food/beverages/ tobacco	33.4	50.4	35.2	35.7	40.6	44.0	35.9	37.1	42.0	54.6	56.8	45.0	47.5	48.3	45.2	47.3
32	Textile/leather	29.1	12.0	11.3	11.4	20.3	16.1	11.2	13.6	18.0	13.4	9.1	16.5	15.1	11.8	8.6	14.0
33	Wood products/ furniture	5.7	11.3	43.3	41.9	3.4	12.1	42.2	34.8	2.2	10.5	19.4	5.1	2.6	13.2	26.6	6.8
34	Paper/printing/ publishing	4.1	1.8	0.2	0.3	3.3	2.4	0.2	0.8	2.3	2.4	0.4	2.1	2.4	3.2	0.6	2.2
35	Chemical/ petroleum/ rubber products	12.7	2.9	0.4	0.6	12.7	3.6	0.5	2.4	16.5	6.1	1.5	13.7	13.1	6.3	1.4	10.9
36	Non-metallic mineral products	6.8	14.0	6.5	6.8	3.7	13.7	6.7	6.8	2.5	6.3	7.9	3.5	3.5	8.5	11.5	5.0
37	Iron/steel products	0.3	0.0	0.0	0.0	0.3	0.0	0.0	0.0	1.5	0.0	0.0	1.1	0.8	0.0	0.0	0.7
38	Machinery	7.1	6.1	1.3	1.5	8.4	6.4	1.4	2.7	13.4	5.7	2.9	11.4	12.6	7.3	3.6	11.0
39	Others	0.9	1.5	1.8	1.7	1.3	1.6	1.8	1.7	1.5	1.0	2.0	1.5	2.2	1.4	2.5	2.2
	Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	(1979)																
31	Food/beverages/ tobacco	30.4	50.7	43.6	44.0	33.8	48.8	48.8	45.9	34.9	57.4	58.9	40.1	40.6	44.0	45.7	41.6
32	Textile/leather	27.0	8.6	12.5	12.3	26.2	11.1	10.5	13.0	14.5	12.3	6.8	13.3	12.5	14.8	7.1	11.9
33	Wood products/ furniture	8.0	13.4	30.6	29.3	5.9	13.4	26.3	20.0	4.1	11.9	14.2	6.1	3.8	15.6	19.9	7.0
34	Paper/printing/ publishing	4.5	1.1	0.0	0.1	3.4	1.4	0.0	0.9	2.8	1.8	0.0	2.3	3.0	2.5	0.0	2.5
35	Chemical/ petroleum/ rubber products	10.3	1.6	0.0	0.2	11.9	2.1	0.0	2.7	19.2	3.8	0.0	15.3	15.9	4.7	0.0	12.8
36	Non-metallic mineral products	8.5	17.5	7.4	8.2	4.9	16.2	7.9	8.9	4.5	6.3	6.0	4.8	6.9	9.9	9.2	7.5
37	Iron/steel products	0.3	0.0	0.0	0.0	0.9	0.0	0.0	0.2	4.6	0.0	0.0	3.6	3.6	0.0	0.0	2.8
38	Machinery	10.0	6.0	2.3	2.6	12.1	6.0	2.8	5.2	15.0	5.8	5.7	12.9	13.5	7.6	7.9	12.2
39	Others	1.1	1.1	3.6	3.4	0.7	1.0	3.7	2.6	0.4	0.7	8.4	1.5	0.3	0.9	10.2	1.7
	Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: CBS, Statistical Yearbook of Indonesia, 1983.

Table 2.2.1-9 Distribution over Different Regions of Large/Medium, Small and Family Scale Manufacturing Establishments (1974/75)

		number of establishments				Number of employees				Gross product value (100 million Rp.)				Value added (100 million Rp.)			
		Large/ medium scale	Small scale	Family scale	Total	Large/ medium scale	Small scale	Family scale	To tal	Large/ medium scale	Small scale	Family scale	Total	Large/ medium scale	Small scale	Family scale	Total
Number of establish- ment by regions	SUMATRA	552	7,578	101,325	109,465	54,871	52,752	317,424	425,047	173,353	35,653	26,494	235,499	57,758	10,871	13,005	81,031
	JAVA	6,035	33,851	944,763	984,648	572,208	244,451	3,000,630	3,817,280	1,012,253	105,543	141,758	1,289,554	395,200	35,630	54,670	485,900
	Jakarta	879	1,983	16,345	19,206	87,943	18,510	57,940	164,402	288,013	13,008	12,689	313,799	92,906	4,870	5,223	102,999
	Java. West	1,598	10,077	149,500	161,175	116,690	71,467	472,300	660,495	205,187	28,326	27,444	260,958	90,636	9,687	11,176	111,496
	Java, Central	1.584	9.212	520.892	531.688	147.862	74.026	1,633.451	1,855.339	224,210	29,484	58,977	312,679	72,976	9,675	22,691	105,347
	Jogyakarta	155	1,160	86,310	87,625	13,804	9,291	267,860	290,055	20,166	3,693	9,756	33,616	6,354	1,209	3,110	10,679
	Java. East	1,819	11,410	171,716	184,954	205,070	71,157	568,971	816,008	304,669	30,942	32,893	368,504	132,326	10,198	12,462	154,987
	KALIMANTAN	162	1,344	36,693	38,199	14,638	9,573	119,539	143,750	37,654	5,436	8,531	51,621	13,026	2,096	3,940	19,063
	SULAWESI	167	3,663	97,053	100,883	8,316	23,581	307,836	330,735	25,155	4,753	16,078	45,986	9,166	2,073	7,967	19,206
	OTHERS	166	1,751	54,677	56,594	11,669	12,883	154,427	178,979	15,372	8,765	7,963	30,101	3,297	2,318	2,982	8,627
	Whole country	7,082	48,187	1,234,511	1,280,788	661,704	343,240	3,800,856	4,001,800	1,203,787	157,558	200,827	1,652,171	476,947	53,028	82,565	612,539
Share of different regions for establishment scale	SUMATRA	7.8	15.7	8.2	8.5	8.3	15.4	8.1	8.7	13.4	22.6	13.2	14.3	12.1	20.5	15.8	13.3
	JAVA	85.2	70.2	76.5	76.3	86.5	71.2	76.9	77.8	80.6	67.0	70.6	78.1	82.9	67.2	68.2	79.3
	Jakarta	12.4	4.1	1.3	1.5	13.3	5.4	1.5	3.4	22.3	8.3	6.3	19.0	19.5	9.2	6.3	16.8
	Java. West	22.6	20.9	12.1	12.5	17.6	20.8	12.1	13.5	15.9	18.0	13.7	15.8	19.0	18.3	13.5	18.2
	Java. Central	22.4	19.1	42.2	41.2	22.3	21.0	41.9	37.8	17.3	18.7	29.4	18.9	15.3	18.2	27.5	17.2
	Jogyakarta	2.2	2.4	7.0	6.8	2.1	2.7	6.9	5.9	1.6	2.3	4.9	2.0	1.3	2.3	3.8	1.7
	Java. East	25.7	23.7	13.9	14.3	31.1	20.7	14.6	17.3	23.5	19.6	16.4	22.3	27.7	19.2	15.1	25.3
	KALIMANTA	2.3	2.8	3.0	3.0	2.2	2.8	3.1	2.9	2.9	3.5	4.2	3.1	2.7	4.0	4.8	3.1
	SULAWESI	2.4	7.6	7.9	7.8	1.3	6.9	7.0	6.9	1.9	3.0	8.0	2.8	1.9	1.9	9.6	3.1
	OTHERS	2.3	3.6	4.4	4.4	1.8	3.8	4.0	3.6	1.2	4.3	4.0	1.8	0.7	4.4	3.6	1.4
	Whole country	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Share in individual regions of different scale establish- ments	SUMATRA	0.5	6.9	92.6	100.0	12.9	12.4	74.7	100.0	73.6	15.1	11.3	100.0	70.8	13.3	15.9	100.0
	JAVA	0.6	3.4	95.9	100.0	15.0	6.4	78.5	100.0	80.8	8.2	11.0	100.0	81.4	7.3	11.3	100.0
	Jakarta	4.6	10.3	85.1	100.0	53.5	11.3	35.2	100.0	91.8	4.2	4.0	100.0	90.2	4.7	5.1	100.0
	Java. West	1.0	6.3	92.8	100.0	17.7	10.8	71.5	100.0	78.6	10.9	10.5	100.0	81.3	8.7	100.0	100.0
	Java. Central	0.3	1.7	98.0	100.0	8.0	4.0	88.0	100.0	71.7	9.4	18.9	100.0	69.3	9.2	21.5	100.0
	Jogyakarta	0.2	1.3	98.5	100.0	4.7	3.2	92.1	100.0	60.0	11.0	29.0	100.0	59.5	11.3	29.2	100.0
	Java. Est	1.0	6.2	92.8	100.0	24.3	8.4	67.2	100.0	82.7	8.4	8.9	100.0	85.4	6.6	8.0	100.0
	KALIMANTAN	0.4	3.5	96.1	100.0	10.2	6.7	83.2	100.0	72.9	10.5	16.5	100.0	68.3	11.0	20.7	100.0
	SULAWESI	0.2	3.6	96.2	100.0	2.4	6.9	90.6	100.0	54.7	10.3	35.0	100.0	47.7	10.8	41.5	100.0
	OTHERS	0.3	3.1	96.6	100.0	6.5	7.2	86.3	100.0	51.1	22.5	26.5	100.0	38.2	27.2	34.6	100.0
	Whole country	0.5	3.7	95.7	100.0	13.5	7.0	79.5	100.0	78.3	9.5	12.2	100.0	77.9	8.7	13.5	100.0

Source: CBS. 1974/75 Industrial Census, Large, Medium and Small Manufacturing Establishments. 1977.
and 1974/75 Industrial Census, Household and Collage Industries, Vol. I. 1976.

Table 2.2.1-10 Progress of Foreign Capital Induction —1967 - 84

(Unit: US$ million)

	1967-79	1980	1981	1982	1983	1984	Total 1967-84
Manufacturing sector	2,317.8	235.4	243.5	378.9	358.0	77.2	3,664.8
All investments	3,693.3	346.6	379.0	449.9	516.9	139.6	5,525.3

Notes: (1) The above figures do not include investments in petroleum and banking.
(2) Figures for 1984 cover only January - June.
Source: IMF DATA

Table 2.2.1-11 Progress of Foreign Capital Induction in Different Branches of Industry

(Unit: US$ million)

	1967-79	1980	1981	1982	1983	1984	Total 1967-84
Food/beverages/tobacco	7.2	3.1	6.5	1.9	1.3	2.1	5.6
Textile/leather	34.5	33.4	42.1	18.4	7.1	6.2	30.0
Wood/wood products	0.9	1.4	0.9	6.3	3.8	11.9	2.0
Paper/paper products	1.7	2.6	1.0	0.4	1.6	-	1.5
Chemical/rubber products	16.1	13.6	18.3	43.5	49.6	26.5	22.4
Non-metallic/mineral products	11.2	12.7	12.7	13.0	10.3	15.6	11.6
Iron/steel	9.5	10.2	3.2	7.5	16.0	14.0	9.7
Metal products	17.9	22.1	14.5	9.0	9.6	20.4	16.3
Others	1.0	0.9	0.8	-	0.7	3.3	0.9
Total	100	100	100	100	100	100	100

Notes: (1) The above figures do not include investments in petroleum and banking.
(2) Figures for 1984 cover only January - June.
Source: IMF DATA

2.2.2 National policy on industrialization

1) Changes through successive periods to REPELITA III

Indonesian national policy on industrialization has changed with the succeeding political regimes — marking 3 distinct periods.

The first period extended from the Japanese surrender in August 1945 to national independence in December 1949, during which period the Netherlands Authorities and the indigenous Government in Jogjakarta existed simultaneously. It was during this period that the first steps in industrialization were marked, through such moves as the establishment by the Netherlands Authorities of a fund for small enterprises, to promote the textile industry, and the drafting of a 10-year program of rehabilitation by the Jogjakarta Government.

The second period followed independence in December 1949. An emergency economic program was drawn up to cover the years 1951 - 52, holding in view the promotion and expansion of industry, enhancement of national income, increase of employment and the establishment of a stable economic structure.

The foregoing emergency program was succeeded by a 5-year plan for economic development, to cover the period 1956 - 60. This plan retained the emphasis on industrial development, but with moderation of measures for rapid industrialization, and with additional consideration accorded to improving the infrastructure, and promoting agriculture.

The experience of the foregoing two programs was reflected in a shift of emphasis to increasing food production and promoting the textile industry in the ensuing 8-year program (1961 - 68) for overall economic development, in which the target set for GNP growth was held down to the moderate figure of 3.5% per year. In this program, the promotion of all heavy industries was to be undertaken by nationalized corporations, which were to operate also some of the light industry establishments.

The third period of Indonesian industrialization started from 1969. The national policy on industralization underwent a radical change, to uphold encouragement of private enterprise, and liberalization of the financial market to foreign capital. This new policy was embodied in a new 5-year plan (REPELITA), and initiated a new era of economic development. The 5-year plans have been succeeded consecutively — the current plan being the 4th — to firmly reestablish the nation's economic structure.

REPELITA I — 1969/70 - 73/74 — held as targets increasing the domestic production of food and clothing, improving and extending the infrastructure, fostering industries associated with agriculture, restraining inflation — with particular emphasis on the agricultural sector.

For the industrial sector, priority was accorded to:-

- Domestic manufacture of currently imported products
- Manufacture of products related to agriculture
- Utilization of indigenously available raw materials
- Creation of additional employment opportunities

REPELITA I resulted in growth of GDP surpassing envisaged target, particularly in the mining and construction branches; good progress was also marked by the manufacturing industries.

The ensuing REPELITA II (1974/5 - 78/79) followed up the results gained with REPELITA I, by setting the aim on consolidating the foundations of Indonesian economy through improvement of food and clothing quality, more ample supply of housing materials and ambient facilities, extension of infrastructure, enhancement and diffusion of social welfare,and augmentation of employment opportunities.

For the industry/mining sector, encouragement of private enterprise was upheld to foster industrialization, with the targets set on:-

- Augmentation of employment opportunities (protection of the economically unendowed)
- Supply of daily commodities, of materials for other industries
- Domestic production of currently imported goods, to diminish currency outflow and eventually promote currency inflow through exportation
- Dispersion of industry toward outlying regions, to constitute industrial centers in the different districts, to reduce distribution costs, to promote mutual dependence among different branches of industry and to establish effective division of work among them
- To minimize the deleterious effect of industrialization on the living environment

In respect of foreign capital, the previous polilcy was radically changed to one of limited induction of investments from abroad.

REPELITA II concluded with both GDP and gross product value marking growths close to target. This success can be attributed to industrial equipment that had been rehabilitated/extended in REPELITA I coming into full production, and to the contribution of machinery/chemical manufacture initiated by foreign capital. It resulted in almost 100% self-sufficiency attained for txtiles, cement, fertilizer, and predominant coverage by domestic manufacture for many other products.

REPELITA III (1979-80 - 83-84), while following up the results gained in the previous two programs, aimed at remedying the strains occasioned in the industrialization process, and at realizing more equitable distribution of the fruits of development.

The principles adopted this time were:-

- More equitably apportioned development; more equitably shared fruits of development, toward social equity for the people
- High economic growth

- A sound dynamic people's economy.

For the industrial sector, while maintaining the principle of giving free rein to private enterprise, the priority was shifted toward encouragement of domestic medium/small enterprises, and toward promotion of export-oriented industries.

The principles underlying REPELITA III were:-

- Priority to labor-intensive industries, to enhance opportunities for employment, and for domestic capital to undertake business
- More abundant supply of daily commodities
- Enhanced self-sufficiency of final and intermediate products; consolidation of the export-oriented industries
- Promotion of industries manufacturing agriculture-oriented products — agricultural machinery/implements, fertilizer, insecticide.

Concrete measures adopted in support of REPELITA III included:

- Instruction/training of young workers
- Establishment of regional industrial centers
- Establishment of standards governing industrial products
- Priority to domestic products accorded in government procurements
- Remedy of the bureaucratism pervading industrial administration
- Prevention of environmental pollution, of wasteful utilization of available resources.

REPELITA III was immediately preceded in November 1978 by a substantial devaluation of the rupiah, which however did not occasion appreciable inflation; the ensuing raise of oil price in 1979 yielded a very comfortable enhancement of petroleum revenue, to contribute effectively to activation of the Indonesian economy.

During the first half of REPELITA III, marked progress was registered in economic development, accompanied by considerable expansion of the basic infrastructure, and almost complete self-sufficiency attained for rice. The second half of the period, however, coincided with the drop in oil price and the prolonging economic recession affecting the industrialized countries, to slacken exports of primary products. These factors brought about deterioration of the international balance of payments and serious diminution of financial revenue. As a result, the pace of development had to be toned down.

The foregoing changes seen in the national policy on industrialization are summarized in Table 2.2.2-1.

2) REPELITA IV and the current policy on industrialization

(1) Overall outline of REPELITA IV

The targets adopted in March 1983 for REPELITA IV (1984/85 - 88/89) are:-

- Enhancement of the levels of living standard, of learning, of welfare of the nation's population, through just and equitable means
- Consolidation of the foundations for future economic development

REPELITA IV has been drawn up to constitute the initial phase of a long-term scheme to culminate with REPELITA VI in the latter 1990's, envisaging an ultimate period of prosperity. The present initial phase is to serve in establishing the foundation framework for self-sustained development toward the above goal. Concrete development targets for realizing this aim are set for agriculture — to continue the policy of self-sufficiency in food — and for the heavy and light industries.

REPELITA IV is also conceived as a consistent follow-up of REPELITA III, maintaining the TRILOGI of balanced development and equitable distribution of the fruits, of high economic growth, and of a stabilized nation, as well as the 8 tenets for ensuring equity. The budgets appropriated to the various sectors in REPELITA IV are

cited in Table 2.2.2-2.

In the category of economic development, stabilization of national economy is accorded first place, as the prerequisite for successfully establilshing the nation on firm footing. An annual rise in price of 8% is held as target, to ensure stable supply of daily commodities without excessive inflation and currency instability.

The target for economic development is set at 5% average annual growth through the 5 years, to ensure which, while not denying the necessity of importing indispensable goods, the encouragement for using domestically manufactured products is emphasized, to minimize outflow of currency.

The target average annual growth rates envisaged for the different branches of industry are as indicated in Table 2.2.2-3, where it is seen that the highest rate of 9.5% per year is envisaged for the manufacturing industries. As a result, the contribution to GDP of agricultural products will recede from 29.3 to 26.5%, as also indicated in the same Table, with corresponding relative enhancement of non-agricultural sectors, and particularly the manufacturing industries, to advance from 16 to almost 20% in contribution to GDP.

Upon realizing the envisaged average GDP growth of 5%, the resulting enhancement of employment is expected to absorb 9 million out of the 9.3 million increase foreseen for the national population during the period to be covered.

For financing REPELITA IV, realization of the 5% yearly GDP growth is envisaged to call for 19.1% annual increase of capital formation (Table 2.2.2-4), of which 84.1% is to be raised domestically, the balance being to be sought in foreign capital. Expensive projects will be cut down, except in the strategic sectors; stress will be laid on smooth implementation of projects already taken in hand, on maximizing existing capacity utilization, and on minimizing wastage of invested capital and of utilized materials.

Savings will be encouraged by a reform of the tax system to this end, and by promoting development of the money/capital market.

During REPELITA IV, export revenue is envisaged to increase annually by 10% in average, contributed by 8.4% yearly growth of petroleum/natural gas exports, and by other exports averaging 15.8% annual increase.

(2) Policy for industrialization adopted in REPELITA IV

a) Targets set for industrialization

The policy for industrialization adopted in REPELITA IV are:-

- To continue the line adopted in past programs, toward more ample supply of daily commodities at prices matched to the people's buying power
- To accord priority to promoting industries related to machinery and to basic metal processes
- To develop a modern industrialized society; to promote the smaller industries conductive to enhancement of employment opportunities
- To encourage assimilation of higher techniques and skills.

The particular points held in view in implementing the program were:-

- Balanced development of industry and agriculture, and within industry, of the larger and smaller scale industries, of domestic and export industries, of capital-intensive and labor-intensive industries
- To further the tendency of industries utilizing locally available resources and energy to develop in the outlying regions, with beneficial impact on regional economy
- To rectify the current leaning toward the "downstream" processing industries — relying on imported materials for sustenance — by strengthening the large-scale industries producing the requisite materials, to realize more balanced vertical and horizontal division of work among the industries

- To strengthen the domestically owned industries in both financial and technical aspects.

The concrete targets envisaged for implementing the program include 9.5% annual growth of gross product value and the additional creation of 1.2 million employment opportunities — the latter mainly through promotion of small-scale industries and consumer goods industries. The targets are set separately for 4 different categories of industry:

CATEGORY OF INDUSTRY	TARGETS FOR	
	ANNUAL GROWTH	ADDITIONAL EMPLOYMENT
Manufacture of daily commodities and other consumer goods	6.5%	350 thousand
Manufacture of industrial equipment and basic metal processing	17.0%	30 thousand
Basic chemical industries utilizing domestic material resources/energy	17.2%	30 thousand
Small-scale and manual industries	3.0%	81.5 thousand

b) Measures adopted for program implementation

The measures adopted in order to achieve the foregoing targets are aimed at:-

- Lowering the dependence of Indonesian industry on imports of capital/intermediate goods and raw materials, through further extension of a rational protective system of import duties and licensing, and through priority accorded to the manufacture and supply of industrial equipment and raw/intermediate materials, in order to realize fuller coverage of domestic demand with domestic supply

- Enhancing exportation of manufactured products, by enhancing their competitiveness in the international market (in price, quality, service), through powerful assistance provided for transportation, financing, productive capacity expansion.

Practical measures include:-

- Encouraging optimized utilization of available productive capacity
- Facilities for financing
- Promoting action for labor productivity improvement
- Supply of requisite materials at reasonable prices
- Encouraging the adoption of advanced production engineering and quality control techniques
- Promoting the adoption of certificate system for quality assurance
- Promoting smaller industries, so that they should come to play an effective role in enhancing employment opportunities and aggregate value added, through apposite pricing and taxation measures
- Promoting domestic technical consultants, with view to enhancing the technical capabilities required for managing/controlling the production processes, and for planning and developing new processes and products, to permit Indonesian engineers and workers to bear the burden of industrial development.
- Promoting the creation of nationwide regional industrial centers, of character matched to the regionally available materials/energy/labor, with requisite provision by government of the necessary infrastructure
- Ensuring good coordination between the industrial and other sectors: Promotion of industries serving to enhance the value added of products from other sectors — e.g. industries making effective use of forest/agricultural/marine products or crude oil/natural gas, to raise their

product value — and industries manufacturing products to usefully serve the other sectors — e.g. agricultural machinery, equipment for mine prospection/development, for processing primary products, for power generation/supply, for gas/water supply

- Letting industrial development be undertaken with the initiative of private and corporative enterprise, the government lending assistance in such forms as infrastructure extension, instruction/training facilities (mainly for small-scale industries) to acquire requisite engineering/manufacturing/ business administration and production control capabilities, as well as directly developing strategic industries beyond the scope of private enterprise.

Table 2.2.2-1 Successive Changes Seen in Indonesian Industrialization Policies and Programs

Period	Plans for economic development	Policy on foreign capital induction	Line of policy	Measures adopted
1945 1949	10-yar rehabilitation program (Jogyakarta Government)			Promotion of textile industries through establishment of fund for small industries by Netherlands Authorities
1949 - 1965	Emergency economic program (1951 - 52)	Negative policy October 1958: Law governing foreign capital investments	Industrialization under government leadership	Establishment of program oriented toward heavy industries
	5-year economic development program (1956 - 60) 8-year overall development program (1961 - 68)	November 1959: Declaration of President on repression of foreign capital induction and preference to foreign loans April 1962: Policy of induction of foreign capital		Confiscation/nationalization of Netherlands capital (from 1957)
1965 - 1984	REPELITA I (1969-70 - 73-74) 5% GDP growth targe	Indiscriminate induction January 1967: Cabinet directive on policy for foreign capital induction	Import substitution policy	(REPELITA I) Rehabilitation/extension of existing industrial equipment — textiles/cement/paper Active induction of foreign private enterprises
	REPELITA II (1974-75 - 78-79) 7.5% GDP growth target	1967: Law governing foreign capital enacted Selective induction 1970: Foreign capital law amended Corporate taxation law amended	Promotion of export-oriented industries	(REPELITA II) Establishment of large-scale industrial centers started Measures for promoting smaller industries strengthened Domestic production of components (automobiles, household appliancs) initiated
	EPELITA III (1979-80 - 83-84) 6.5% GDP growth target	Restricted induction 1974: Decision of President restricting employment of foreign labor Policy on division of domains for domestic and foreign capital by Investment Coordination Committee 1977: Order of priorities for investment domains; thereafter revised every year	Promotion of key industries to lay the foundations for establishing chemical/ heavy industries Strengthening of export-oriented industries	(REPELITA III) 5 industrial centers established in different regions Promotion of supporting industries subcontracting work from large company Establishment of Mini Industrial Estate (MIE) Export of logs restricted; promotion of domestic wood processing industries Counter-purchase system enforced (January 1982)

Table 2.2.2-2 Budgets Allocated to Different Branches of Economic Activity in REPELITA III/IV

(Unit: Rp. billion)

SECTOR	REPELITA III (%)	REPELITA IV (%)
1. Agriculture/irrigation	3,048.9 (13.9)	10,014.3 (12.9)
(1) Agriculture	1,515.8 (6.9)	5,346.3 (6.9)
(2) Irrigation	1,533.1 (7.0)	4,668.0 (6.0)
2. Manufacturing industries	1,174.0 (5.4)	4,181.9 (5.4)
3. Mining/energy	2,943.9 (13.5)	11,875.9 (15.3)
(1) Mining	415.3 (1.9)	2,497.1 (3.2)
(2) Energy production	2,528.6 (11.6)	9,378.8 (12.1)
4. Transportation/communication/ tourism	3,384.3 (15.5)	9,573.1 (12.3)
(1) Roads	1,666.5 (7.6)	3,970.4 (5.1)
(2) Land transport	338.8 (1.6)	1,593.2 (2.0)
(3) Marine transport	524.4 (2.4)	1,964.4 (2.5)
(4) Air transport	468.5 (2.1)	1,324.4 (1.7)
(5) Post/telecommunication	340.4 (1.6)	499.5 (0.6)
(6) Tourism	45.7 (0.2)	216.2 (0.3)
5. Commerce/corporatives	191.9 (0.9)	969.2 (1.2)
(1) Commerce	55.6 (0.3)	455.5 (0.6)
(2) Corporatives	136.3 (0.6)	513.7 (0.7)
6. Labor/emigration	1,240.7 (5.7)	4,551.9 (5.9)
7. Regional urban development	2,142.9 (9.8)	5,379.1 (6.9)
8. Religion	152.5 (0.7)	507.2 (0.7)
9. Education/culture/youth	2,276.8 (10.4)	11,439.5 (14.7)
(1) Education	1,964.8 (9.0)	10,347.5 (13.3)
(2) Public training	221.9 (1.0)	743.3 (1.0)
(3) Culture	90.1 (0.4)	348.7 (0.4)
10. Health/welfare/family planning	829.1 (3.8)	3,447.1 (4.4)
(1) Health	556.2 (2.5)	2,032.2 (2.6)
(2) Social welfare	70.9 (0.3)	443.7 (0.6)
(3) Family planning	202.0 (0.9)	971.2 (1.2)
11. Housing	532.0 (2.4)	2,980.6 (3.8)
12. Jurisdiction	193.0 (0.9)	629.2 (0.8)
13. Security/defense	1,483.6 (6.8)	5,238.9 (6.7)
14. Information	151.0 (0.7)	498.6 (0.6)
15. Scientific/technical research	447.6 (2.0)	1,757.7 (2.3)
16. Administrative system	579.7 (2.7)	1,047.4 (1.3)
17. Business activity	370.3 (1.7)	1,689.7 (2.2)
18. Natural environment	707.2 (3.2)	1,958.8 (2.5)
Total	21,849.4 (100.0)	77,740.1 (100.0)

Source: Draft Plan for REPELITA IV

Table 2.2.2-3 Targets set for Shares of Different Branches Contributing to GDP and for Average Annual Growth during REPELITA IV

Branch	1983/84 (Estimated)	Target average growth rate during REPELITA IV	1988/89 (Estimated)
1. Agriculture	29.3%	(3.0%)	26.5%
2. Mining	7.0%	(2.5%)	6.1%
3. Manufacturing	15.8%	(9.5%)	19.4%
4. Construction	6.7%	(5.0%)	6.7%
5. Transport/communication	6.0%	(5.2%)	6.1%
6. Others	35.2%	(5.0%)	35.2%
	100.0%	(5.0%)	100.0%

Table 2.2.2-4 Amoumts of Investment Envisaged during REPELITA IV

(Unit: Rp. million)

	1983/84	1984/85	1985/86	1986/87	1987/88	1988/89	Total
1. GDP	72,512.9	83,114.3	95,033.7	107,870.9	121,539.2	135,917.3	543,475.4
2. Total investment	16,678.0	19,116.3	24,077.7	28,337.4	33,666.4	40,026.7	145,224.5
a. Public	(9,195.8)	(10,459.3)	(13,170.5)	(15,472.2)	(18,114.6)	(20,523.5)	(77,740.1)
b. Private	(7,482.2)	(8,657.0)	(10,907.2)	(12,865.2)	(15,551.8)	(19,503.2)	(67,484.4)
3. Total investment in reference to GDP	23.0%	23.0%	25.3%	26.3%	27.7%	29.4%	26.7%

2.3 Program for promoting machinery and basic metal industries

2.3.1 REPELITA IV

1) Overall program

The notable economic development achieved through REPELITA I to III resulted in a signal enhancement of the domestic market for ferrous and non-ferrous materials, for capital goods and for machine tools and parts, to furnish an opportune occasion for developing domestic machinery and basic metal processing industries.

As already mentioned, an outstanding annual growth of 17% is envisaged in REPELITA IV for the machinery and basic metal processing branches of industry. For effectively establishing these branches of industry in the country, it should not suffice to simply promote machinery manufaturing and metal processing establishments: An indispensable adjunct should be the promotion of associated industries bridging the two branches in question — foundry, forging, heat-treating, special steel manufacture. This fact is reflected in the inclusion of cast products among the priority domains selected for promotion in REPELITA IV:-

- Machinery/plant equipment for palm oil, sugar, rubber, tea, wood processing, food processing, textiles, basic chemicals, basic metal processing
- Lathes, presses, drills, saws and cutting machines
- Agricultural/soil conservation equipment
- Heavy equipment, construction equipment
- Electrical equipment/machinery/equipment for energy production/supply
- Electronic equipment — computers/computer components, telecommunication equipment
- Automobiles
- Railroad rolling stock
- Medium-size aircraft and maintenance of aircraft in domestic service

- Shipbuilding and offshore structures
- Steel slabs, hot and cold rolled steel, high-carbon steel rods, castings
- Aluminum bars/slabs/castings, cathode copper

2) Program for individual branches of industry

(1) Industrial and factory equipment

The types of industrial machinery envisaged for encouragement are those intended processing products from agricultural/plantation, basic chemical, basic metal industries and mining. The machinery of this category include boilers, heat exchanges, pumps/compressors/fans, conveyors, valves, power distribution equipment; The machinery envisaged also include equipment for metal shaping, for processing palm oil, sugar, rubber, tea, coffee, plywood, cement, paper, fertilizer, wood. It is also envisaged to establish service maintenance workshops, utilizing the maintenance facilities already existing in large industrial plants, to serve also other industries in the region for the maintenance of their equipment. Such workshops would be established in the various industrial centers to serve the regional industries (cement, fertilizer, LNG, plywood, etc.). Consultations on industrial installations and operations are to be encouraged for improving productivity in coffee, rubber, palm oil, sugar, cement, fertilizer and paper industries, to promote the establishment of independent industrial operation knowhow, with specialists serving the industrial regions organized into government consultant teams to undertake consulting surveys and visits.

Enhancement of productivity and production capacity is to be initiated with nationally-owned establishments like Barata, to enhance productive capacity and create new employment. The Metal Industry Development Center at Bandung is to enhance its role for assisting the maintenance workshops mentioned above.

(2) Mechanical equipment industry

The development of industrial machinery production requires to be promoted by enhancement of supply not only of the materials, but also of the means of processing them — rolling mills, machine tools and other capital goods. In REPELITA IV, promotion of the machine tool industry is included with the view to furnishing the large industries as well as the downstream and small establishments, as also the training centers with the capital goods required to equip them. This will also contribute to improving the overall industrial structure of the country and to lower dependence on imports. To this end, maximum effective utilization will be made of available production capacity, which capacity wil be extended as necessary, and basic strategic projects will be carried into effect to complement remaining insufficiencies.

Project to be given priority include scrap machine with 100 units capacity, and expansion of existing industrial capacity such as lathes from 300 to 1,000 per year, trains machines from 250 to 1,000 per year, drilling machines from 1,000 to 1,500 per year.

(3) Agricultural machinery and equipment industry

Basically, capacity has been sufficient to meet the domestic demand, such as 10,000 tractors, 2,500 threshers, 6,100 hullers and rice milling 1,570 units per annum. The demand for agricultural machinery, however, is expected to grow steadily to reach in 1989, 27,000 tractors, 2,540 threshers, polishers 83,750, and 30,000 rice milling to supply which, the domestic production capacity is to be expanded conformably in REPELITA IV. Concrete projects envisage additional facilities for producing annually 2,000 large tractors, as well as improvement/expansion of production facilities for rice milling industry for mini hand tractors, and for other agricultural equipments.

(4) Heavy equipment and construction industry

The development of this industry in REPELITA IV is aimed at raising the local content, increasing value added, improving the structure of industry, and accelerating interlinkages with the medium and small-scale industry. Priority projects include petrol engines (non automotive) with 30 horse powers with a capacity of 50,000 units per annum; and, hydraulic component project.

(5) Electrical equipment

The development programme of electric equipment in REPELITA IV is primarily directed at meeting requirements for network expansion, the national electricity system, electric machinery energy, and electric equipment for industrial purpose.

It is planned to expand capacity of existing industry in terms of designing and engineering, as well as manufacturing of electric appliances. Priority will be given to new projects and to capacity expansion of existing industries.

(6) Electronic equipment

Promotion of the electronic equipment industry envisages coverage of domestic demand to match the plans for extending the nationwide telecommunication and broadcasting network, and the rapidly expanding market for computers and other electronic equipment for industrial and educational uses, as well as to enhance the export potential.

(7) Motor vehicle industry

The development program of motor vehicle industries in REPELITA IV is aimed at meeting the country's need for commercial vehicles by utilizing domestic industrial components. The objective is that by 1986/87 all components of commercial vehicles are to be manufactured in the country. Measures to be taken, in this regard, include

maximization of existing capacity and the promotion of key motor vehicle projects, as well as supporting projects such as foundry and forging for manufacturing of machines. Key projects to be developed include a machinery project using fuel and diesel for motor vehicles having a capacity of 425,000 pieces per annum; "power train", suspension and steering system, each having capacity of 360,000 pieces per annum, foundry and forging projects to meet the need of the country's iron casting capacity of 32,600 tons per annum, aluminium casting (3,540 tons per annum) and forge blanks (12,400 tons per annum). Measures will also be taken to develop component industries such as cabin, rear body, chassis/frame, fuel tank, wheel rim, left spring, muffler and tail pipe, radiator, shock obsorber, regulator and ignition coil.

(8) Railroad equipment industry

The sole enterprise that has so far undertaken railroad rolling stock manufacture is P.T. INKA. Production started in 1981 with assembly of complete parts imported in knocked-down form. Current annual production capacity is 300 cargo carriages, which is to be expanded during REPELITA IV to 600 freight and 50 passenger cars. The aim is to satisfy the rising demand for railroad transport expected to be generated by the expansion of cement, fertilizer and asphalt production. Besides rolling stock, lowered dependence on imports is planned also for railroad equipment and parts.

(9) Aircraft

REPELITA IV envisages promoting the assimilation of manufacturing and repair capacity for aircraft, to replace imports and to seek outlets abroad.

The types of aircraft envisaged for expanding manufacture comprise the C-212 type and the BO-135 type, Puma, CN-235 and BK-117 helicopters.

(10) Shipbuilding

During REPELITA IV, shipbuilding industry is to be gradually expanded to lower dependence on foreign shipyards for new ship construction and for ship repair, through promotion of industries supplying marine equipment and fittings. To this end, the program envisages assimilation of modern techniques, rehabilitation of existing facilities, and establishment of new shipyards. The new ship docks to be constructed are with capacity of up to 10,000 DWT., divided into the following categories: 501-2,000 DWT (14 ship docks), 2001 - 5,000 DWT. (9 ship - docks), and 5,001 - 10,000 DWT. (4 ship docks). Concomitantly, facilities for repair of ships will be accelerated up to 30,000 DWT. Particularly for East Indonesia, the facility at Ujung Pandang shipyard is to be accelerated from 500 Dwt. to 5,000 Dwt. and the facility for repair from 500 Dwt to 7,000 Dwt.

(11) Basic metal industry — iron/steel industry

The iron/steel production target set in REPELITA IV is to satisfy the domestic demand for iron/steel, to dispense with reliance on imports, and to strengthen the industrial structure. To this end, investments are to be directed toward relevant key projects, as well as to realize maximum utilization of existing production capacity. The key projects include new installation of a 850 thousand ton/year iron and steel plant, a 130 thousand ton/year tin plated steel sheet project, a 160 thousand ton/year and a 10 thousand ton/year large scale steel plant. As supporting industry associated with iron/steel production, the promotion of casting/forging activities is also envisaged.

In the machinery/basic metal working branches, 18 projects were originally envisaged in REPELITA III and IV, which however were partially rescheduled or otherwise modified following the recession of world economy and deterioration of the Indonesian balance of payments. In the domain related to foundry work, the 18 original projects included one for establishing in West Java a foundry with capacity for

producing 44,000 tons/year of gray iron and 4,200 tons/year of aluminum castings, principally machinery components.

(12) Basic metal industry — non iron and steel

The aims held in view in REPELITA IV for the non iron and steel are the same as for iron/steel. Key projects include establishment of an installation for producting 100 thousand tons/year of cathode copper, 40 thousand tons/year of aluminum slab, a 15 thousand tons/year of aluminum wire plant, a 15 thousand tons/year aluminum billet plant and a 6 thousand tons/year plant for aluminum castings.

2.3.2 Promotion policy for encouragement of domestic production

A consistent policy underlying REPELITA IV is seen of vigorously furthering the replacement of imported with domestically manufactured products. The first phase of this move was largely completed during the 1970's and early 1980's, and the present stage can be considered the start of its second phase.

In what follows, the three measures adopted by the Indonesian Government in line with this policy will be outlined, in so far as relevant to the machinery and basic metal industries.

1) Restriction of imports

Restriction of imports takes the forms of (a) prohibition of import, (b) import quotas and (c) high import duty.

Articles prohibited importation are listed in Table 2.3.2-1, and are not numerous. Industrial products include automobiles/motor cycles in completed form, and radio/television sets.

Import quotas apply to 7 product groups, for which importers are subject to registration. Among the articles coming under this restriction are piston rings of

diameter not exceeding 60 mm, rice husking machines, hand sprayers, hand-tractors, certain large-machinery (wheel loaders, crawler cranes, bulldozers, hydraulic excavators, motor graders), which since February 1985 have practically been banned, with their quotas all reduced to zero.

The main impetus of import restriction is provided by the import duty barrier. With the establishment in April 1985 of the Value-Added Tax system, imported articles have been classified into 4 groups according to their indispensability to the Indonesian economy:-

- Group A: Most indispensable items — rice, flour, agricultural/industrial equipment, certain raw materials
- Group B: Necessary items — raw materials, spare parts for industrial equipment
- Group C: Items of low necessity; items produced domestically that call for protective import restriction
- Group D: Certain consumer goods; luxury articles; goods produced domestically.

Of the foregoing items, those with particular relevance to the present Jakarta Foundry Center Renovation Project include:-

The following shows the import duty on base metals.

ITEM	IMPORT DUTY (%)
Base metals and articles of metal	
- Pig iron	5
- Cast iron	5

2) Replacement of imported with domestically manufactured products in individual branches of industry

The program for replacing imported with domestically manufactured products is currently being implemented (1) for heavy/chemical industries mainly in the hands of

government-operated enterprises and (2) for equipment components under regulatory measures.

(1) Heavy/chemical industries

a) Cement: Initially promoted under the leadership of government-operated enterprises, but consequently complemented by private enterprises that grew to contribute to complete suppression of imports, and further to exportation since 1978 (to Bangladesh and other countries).

b) Oil refining: Extension/new construction of installations at Cilacap (300,000 bbl/day), Balikpapan (260,000 bbl/day), Dumai (260,000 bbl/day) have culminated in practically complete self-sufficiency.

c) Petrochemical (including fertilizer): Various projects implemented with view to replacing imports and envisaging ultimate exportation.

d) Paper: Same as above. Exportable surplus already available in respect of tissue paper, and exportation is foreseen.

e) Iron/steel: Imports markedly reduced in 1982, through system of channeling all imports through the Government-operated Krakatau Steel, and of fixing steel prices based on Krakatau Steel sales price (cf. Table 2.3.2-2).

f) Aircraft: Promoted through massive investment in the Government-operated P.T. Nurtanio. Nurtanio, established in 1976 with 500 employees, had expanded its workforce to 12,000 by 1984. Exports of the 22-passenger CN-122 and 35-passenger CN-235 are reported to have amounted by end 1984 to 53 for Turkey, 20 for Thailand, 12 for Pakistan, 12 for Burma and 8 for Malaysia, evidencing the capability of this enterprise to satisfy not only the domestic civil and military needs, but also to compete successfully in the international market.

g) Shipbuilding; This industry has always been accorded priority in Indonesia, in view of the vast potential market presented by the myriad islands constituting the Indonesian territory and the consequently predominant importance attached to the extension and promotion of maritime transport by the Indonesian Government. The principal shipbuilders are Government-operated, count among the 8 existing major shipyards. The available dock facilities had in the past limited ship construction to 1,000 ton-class ships, but recent technical assistance provided by Japanese shipyards is today permitting construction of ships up to 3,000 tons. The Craka Jaya project covering the years 1985-89 envisaged the construction of 80 ships during this period (30, 17, 12 and 21 ships each in the four successive phases). For the 30 Phase-1 ships, BPPT has invited from 16 domestic shipyards separate tenders covering engine/auxiliary machinery, other equipment/materials, and hull construction.

(2) Replacement of imported with domestically manufactured products through regulatory measures

The Indonesian Government adopted the line of working toward rapid enhancement of the percentage of domestically manufactured components constituting the products of key industries — automobiles, electrical/electronic equipment. A schedule for successive enhancement of domestic component percentage was published for commercial vehicles in 1976, followed in 1978 for electrical/electronic equipment. Similar schedules are to follow for other key products.

a) Automobiles

The original schedule for advancing the domestic component percentage published in 1976. In 1979, a revised schedule was published, which is today being fulfilled roughly as planned. In 1983, it was decided to require mounting domestically

manufactured engines starting from 1985, and from 1987 domestic axle/propeller shafting, clutch, brake and steering systems, as well as chassis/frame. This is to be followed by completely domestic manufacture of the entire vehicle (cf. Table 2.3.2-3). The plans for domestic machine tool manufacture included in REPELITA IV, referred to earlier, is said to time in with the above schedule for domestic manufacture of automobile components.

b) Motorcycles

Motorcycles also are to become 100% domestic except for engine by 1985, with engine replacement to follow in 1987. Five manufacturers including 3 Japanese, are already engaged in the construction of their engine factories.

c) Electrical/electronic equipment

For electrical/electronic equipment, the Ministry of Industry set forth in 1978 the schedules for replacement with domestic components separately for 3 groups of products under which the 11 items — including radio and television sets, cassette and radio cassette tape recorders, refrigerators and air conditioners, electric fans, telecommunications equipment — have been divided:

Group A: Articles authorized continued importation

Group B: Domestic production from 1981

Group C: To be replaced first.

Replacement by domestic components is steadily progressing.

In April 1984, a regulation was issued calling for the use of domestically manufactured components in single-phase 2 kWh meters. This was followed a year later by a similar regulation covering industrial meters of 7 to 75 kW.

d) Agricultural machinery

The regulations issued in 1983 by the Ministry of Industry on the replacement of imported with domestically manufactured components in agricultural machinery prescribed the schedules for replacement of different components of (a) hand tractors, (b) mini-tractors and (c) medium/large agricultural tractors, to be completed replacement respectively by 1985, 1987 and in the future.

Similar schedules were published in 1984 for rice mill units and husking machines.

e) Industrial machinery

Two regulatory schedules were issued in 1983 concerning diesel engines respectively of 2 - 25 and 26 - 375 kW output, providing for completion of replacement by 1985 and 87, respectively.

In respect of machine tools, similar schedules were issued in 1985 governing lathes, milling machines, column-type boring machines, and surface planing machines, specifying the successively restricted ranges of components to be permitted importation in 1985, 86 and 87, to promote replacement with domestically manufactured components.

f) Construction machinery

The regulatory schedule for construction machinery issued in 1984 concerned crawler bulldozers, hydraulic excavators, motor graders and wheel loaders. The components subject to regulation were:

27 types constituting frame attachments

16 types constituting under-carriage

4 types constituting power train

1 type constituting prime mover

5 types constituting hydraulic system

8 types constituting other parts

The Decree of the Minister for Overseas Trade of February 1985 reduced the import quota to zero — i.e. practically prohibited importation — of:-

- Crawler bulldozers of 100 - 300 HP
- Wheel loaders of 100 - 300 HP
- Hydraulic excavators of 60 - 150 HP
- Motor graders of 100 - 150 HP

The regulations aimed at replacing imported with domestically manufactured components as listed in Table 2.3.2-4.

3) Promoting the use of domestically manufactured products

In 1980, an administrative team was established in the SECRETARIAT NEGARA for controlling government purchases, vested with decisive power on purchase orders. This was followed in 1983 by the appointment of a Minister charged with promoting the use of domestically manufactured products, to strengthen the measures for according priority to domestically manufactured articles in the procurements of Government and of Government-operated enterprises.

In 1984, the authority over Government purchases was concentrated in the central Government where administrative teams were established also in the different Ministries, and the articles subjected to promoting the use of domestically manufactured products have been specified in a very wide range of capital goods, equipment and components.

Table 2.3.2-1 Attachment to the Decree of the Minister of Trade and Cooperatives No. : 29/KP/I/82 DATED: January 18, 1982.

LIST OF THE KINDS OF GOODS WHICH ARE PROHIBITED TO BE IMPORTED

No.	Description of Types of goods	CCCN Heading Tariff No.	Remarks
1.	2.	3.	4
1.	Printing Industry Products ex Chapter 49		
	a. Books, magazines & all kinds of other printed matter of paper in the Indonesian language as well as other regional dialects.		Expected from the prohibition of import : a. Normal matters in diplomatic relations.
	b. Printed matter: books, magazines, leaf-lets, brochures and newspapers printed in Chinese letters/characters and language.		b. Reading matters and other printed matter for pupils and students including matters in braille according to the stipulation of the Minister of Education and Culture.
	c. Offset printed matters of paper for cigarette packaging and labels for medicines in the Indonesian language as well as partly using a foreign language.		c. Excepted from the prohibition of import are offset printed matters of paper for cigarette packaging and labels for medicines attached on the said goods.

1.	2.	3.	4
2.	Television and Radio Receiving sets in built-up condition:		
	a. Television broadcast receiving sets including those incorporating sound recorders or reproducers, coloured.	85.15.219.1	Excepted from the prohibition of import are removal goods according to the Letter of the Director General of Foreign Trade No. 120/DIR/DAGLU/I/77.
	b. Television broadcast receiving sets including those incorporating sound recorders, monochrome (black & white).	85.15.229.	
	c. Radio broadcast receiving sets including those incorporating sound recorder, or sound reproducers, made or adjusted for usage in motor-vehicles.	85.15.319.	
	d. Portable radio receivers	85.15.329	
	e. Other radio receivers	85.15.399	
3.	Motor vehicles for transporting passengers and goods, besides sedans and station wagons in built-up condition.		
	a. Jeep	87.02.222	Excepted from the prohibition of import: for regions outside the Islands of Java and Sumatra. The confirmation of the letter of the Director General of Trade No. 0156/DDP/I/II/71
	b. Trimobiles	87.02.223	
	c. Other passenger motor-vehicles with a capacity for 7 persons (including driver) or less.	87.02.229	
	d. Other passenger motor-vehicles with a capacity for 8-14 persons (including driver).	87.02.490	

1.	2.	3.	4
	e. Other passenger motor-vehicles with a capacity for more than 14 persons (including the driver).	87.02.610	)
	f. Delivery vans.	87.02.610	)
	g. Truck with a payload of 2 tons and above.	87.02.621	)
	h. Truck with a payload of less than 2 tons.	87.02.622	)
4.	Motor-cycles in built-up condition :		
	a. Motor cycles, equipped with a side car	87.09.120	
	b. Motor cycles without a side car	87.09.220	
	c. Scooters	87.09.320	
5.	Sedans and station-wagons in built-up condition for the entire Indonesian Territory.	87.02.221	Exceppected from the prohibition of import: - for Foreign Representations, International Bodies as referred to in : 1. Government Regulation No. 8 Year 1957 2. Government Regulation No. 19 Year 1955

THE MINISTER OF TRADE AND
COOPERATIVES,

W.S.

RADIUS PRAWIRO

Table 2.3.2-2 Estimated Past Progress of Steel Billet Imports into Indonesia

Year	Consumption (ton)	Imports (ton)
1978	364,444	158,773
1979	652,700	246,985
1980	906,848	429,373
1981	918,603	434,520
1982	1,033,704	182,442

Source: DCI

Table 2.3.2-3 Time table for Replacement of Imported with Domestically Manufactured Components

Type of component		
- Wheel rims	As of 1 Jan. '84	Categories III and IV
- Chassis frames	As of 1 Jan. '84	Categories III and IV
- Propeller shafts	As of 1 Jan. '84	Categories I and V
	As of 1 Jan. '85	Categories II, III and IV
- Petrol and diesel engines	As of 1 Jan. '85	All categories
- Brake systems	As of 1 Jan. '85	All categories
- Transmission	As of 1 Jan. '86	All categories
- Clutch systems	As of 1 Jan. '86	All categories
- Steering systems	As of 1 Jan. '86	All categories

Notes: Category I - pay load 3/4 to 1 ton
Category II - pay load 2 to 2.5 tons
Category III - pay load 3.5 to 5 tons
Category IV - Multi-purpose vehicles (Jeeps)
Category V - KBNS (Simple Commercial Motor Vehicles)

Source: DCI

Table 2.3.2-4 Regulations Aimed at Promoting Replacement of Imported by Domestically Manufactured Products

Decree of Ministry of Industry		(A) PRODUCTS SUBJECT TO REGULATION
No. 198·202/M/SK/6/1983	6/9	(1) Diesel engines
No. 307/M/SK/8/1976	8/2	
No. 168/M/SK/9/1979	9/6	(2) Commercial 4-wheel vehicles
No. 371/M/SK/9/1983	9/28	
No. 8/M/SK/1/1977		
No. 651/M/SK/11/1981	11/25	(3) Motorcycles/scooters (70 - 200 cc)
No. 505/M/SK/12/1983	12/27	
No. 199/M/SK/6/1983	6/9	(4) Hand tractors
No. 200/M/SK/6/1983	6/9	(5) Mini-tractors
No. 201/M/SK/6/1983	6/9	(6) Medium/large agricultural tractors
No. 62/M/SK/2/1983	2/26	(7) Steel structural materials for factory construction
No. 140/M/SK/4/1984	4/23	(8) 2 kWh meters
No. 138/M/SK/4/1984	4/23	(9) Bulldozers and other construction machinery
No. 21·22·23/M/SK/1/1984	1/16	(10) Rice mill units; rice husking machines
No. 09·10·11·12·13·14/ SK/DJ·L&M/IV/1978	4/20	(11) Household electrical appliances (radio/television sets, cassette/radio cassette/tape recorders, refrigerators/airconditioners, electric fans)
No. 16/SK/DJ·L&M/IV/1978	4/20	(12) Wireless/telecommunication equipment
No. 17/SK/DJ·L&M/IV/1978	4/20	(13) Exhaust fans
No. 18/SK/DJ·L&M/IV/1978	4/20	(14) Amplifiers
No. 19/SK/DJ·L&M/IV/1978	4/20	(15) Sewing machines
No. 28/M/SK/1/1985	1/21	(16) Machine tools

	(B) PRODUCTS SUBJECT TO BKPM CIRCULAR*
BKPM CIRCULAR 666/A1/1981	(1) Sugar plant equipment
BKPM CIRCULAR 666/A1 (Aug. 27, 1981)	(2) Palm oil refinery equipment
BKPM CIRCULAR 347/A1/1982	(3) Pulp/paper plant equipment
BKPM CIRCULAR 347/A1 (Apr. 14, 1982)	(4) Urea plant equipment
	(5) Cement plant equipment
	(6) Phosphate plant equipment
BKPM CIRCULAR 355/A1/1983 (Apr. 7, 1983)	(7) Industrial boilers
BKPM CIRCULAR 55/A3/1983 (Jun 10, 1983)	(8) Heat transfer equipment
BKPM CIRCULAR 951/A1/1984	(9) Construction equipment

*) Components of equipment subject to the BKPM circulars are encouraged replacement by domestically manufactured products: Imports of components are not prohibited, but no privileges are accorded for their importation.

2.4 Foundry products in the Government policy on adoption and utilization of domestically manufactured equipment/components

As already mentioned, the policy on replacement of imported by domestically manufactured products is enforced through the measures of:

(a) Restricting imports

(b) Requiring by regulation the use of domestically manufactured components in industry

(c) Encouraging the use of domestically manufactured products.

The first moves for replacing imported by domestic products covered automobiles and household electrical appliances: Regulatory measures for promoting this move were instituted from the latter 1970's for these products, to be followed by similar regulations governing other products as described in Table 2.3.2-4.

1) Industries closely associated with foundry products

Of the measures listed in Table 2.3.2-4 those relevant to industries closely associated with foundry products are:-

Decree of Ministry of Industry	(A) Products Subject to Regulation
No. 198·202/M/SK/6/Jun. 9, 1983	Diesel engines
No. 307/M/SK/8/Aug. 2, 1976	Ditto
No. 169/M/SK/9/Sep. 6, 1979 No. 371/M/SK/9/Sep. 28, 1983	Commerical 4-wheel vehicles
No. 8/M/SK/1/1977	Ditto
No. 651/M/SK/11/Nov. 25, 1981 No. 505/M/SK/12/Dec. 27, 1983	Motorcycles/scooters (70 - 200 C)
No. 199/M/SK/6/Jun. 6, 1983	Hand tractors. complex
No. 200/M/SK/6/Jun. 9, 1983	Mini-tractors
No. 201/M/SK/6/Jun. 9, 1983	Medium/large agricultural and estate tractors
No. 138/M/SK/4/Apr. 23, 1984	Bulldozers and other construction machinery
No. 21·22·23/M/SK/1/Jan. 16, 1984	Rice mill units; rice husking machines
No. 19/SK/DJ·L&M/IV/Apr. 20, 1978	Sewing machines
No. 28/M/SK/1/Jan. 21, 1985	Machine tools

2) Measures for encouraging the use of domestically manufactured products

Equipment subject to BKPM Circulars do not have their components prohibited importation, but importation is divested of all privileges accorded to other equipment components in such forms as exemption of import duty.

BKPM Circular No.	Articles
666/A1/1981, Aug. 27, 1981	Sugar mill equipment, palm oil refinery equipment
347/A1/1982, Apr. 14, 1982	Pulp/paper, urea/phosphate/cement manufacturing equipment
355/A1/1983, Apr. 7, 1983	Industrial boilers
55/A3/1983, Jun. 10, 1983	Heat transfer equipment
951/A1/1984	Construction equipment

3) Regulatory requirements on utilization of domestically manufactured components of relevance to foundry industry

In what follows, equipment subject to regulatory requirements on utilization of domestically manufactured components of particular relevance to the foundry industry are picked out, giving the years stipulated for obligatory adoption of the relevant components (casting components only are picked out and listed).

(1) Diesel motor

Diesel motor of 2 - 25 kW output

1983: Oil pan, bearing cover, oil filter body, rocker cover, piston, piston ring, oil ring, pulley, flywheel, governor, hopper

1984: -

1985: Crank case, cylinder liner, gear case, cylinder head, crankshaft

Diesel motor of 26 - 375 kW output

1984: Oil pan, flywheel, piston, piston ring, pulley

1985: Cylinder liner, cylinder head, cylinder head cover

1986: Crank case, crankshaft

The principal cast components of interest are:-

- Crank case (cast iron)
- Oil pan (cast iron/steel plate)
- Cylinder liner (cast iron)
- Cylinder head (cast iron/cast aluminum)
- Piston (ditto)
- Crankshaft (forged steel/cast steel/ductile cast iron)
- Flywheel (cast iron)
- Bearing cap (cast iron/steel)
- Cover (cast iron/cast aluminum)
- Manifold (cast iron).

(2) Commercial 4-wheel vehicles, motorcycles, scooters

Commercial 4-wheel vehicles

1984: Axle, propeller shaft (Categories I, V)

Wheel rim (Categories III, IV)

Cab, chassis, frame (Categories III, IV)

1985: Engine (both gasoline and diesel)

Axle, propeller shaft (Categories II, III, IV)

brake system

1986: Transmission, steering system, clutch system

NOTE: "Category I" : 0.75 - 1 ton capacity

"Category II" : 2 - 2.5 ton capacity

"Category III" : 3.5 - 5 ton capacity

"Category IV" : Multipurpose (jeeps)

"Category V" : Handy-type commercial vehicles.

The principal cast components of interest are:-

- Cylinder block (cast iron)
- Cylinder head (cast iron/cast aluminum)
- Cylinder liner (cast iron)
- Piston (cast iron/aluminum alloy)
- Flywheel (cast iron)
- Intake manifold (cast iron/ductile cast iron)
- Exhaust manifold (aluminum alloy)
- Clutch housing (cast aluminum)
- Bearing cap (cast iron)
- Timing gear (cast iron)
- Crank shaft (forged steel/cast steel/ductile cast iron)
- Camshaft (forged steel/cast iron)

Motorcycles/scooters

1986: Crank case cover, crank case, cylinder, cylinder block, piston, cover, flywheel

1987: Cylinder sleeve

The principal cast components of interests are:-

- Crank case (cast aluminum)
- Crank case cover (ditto)
- Cylinder (ditto)
- Cylinder block (ditto)
- Piston (ditto)
- Cylinder sleeve (cast iron)
- Cover (cast aluminum)
- Flywheel (ditto)

(3) Agricultural tractors

Mini-tractors

1985: Engine

1986: Brake drum, pump casing

1987: Transmission casing, axle

Hand tractors

1983: Engine

1984: Pulley

1985: Transmission casing

Medium/large agricultural/plantation tractors

Importation is authorized only in knocked-down condition.

1. Frame adn Body Assy
2. Engine Assy
3. Power Conductor
4. Center Rea Axle Assy
5. Right/Left Rear Axle Assy
6. Stearing
7. Front Axle
8. Wheel and Tire

The principal cast components of interest are:-

- Cylinder Block (FC, ADC)
- Cylinder Head (ADC)
- Crank Case Cover (ADC)
- Crank Shaft (FCD)
- Fly Wheel (FC)
- Balance Weight (FC)

- Clutch Case
- Mission Body (FC, ADC)
- Crank Case (ADC)
- Timing Gear Case (FC, ADC)
- Crank Case Cover (FC, ADC)
- Cylinder Liner (FC)
- Piston (FC, Al-alloy)

(4) Construction machinery

Bulldozers

1984: Bracket, counterweight

1985: Shoe

1986: Front idler, idler rod/shaft, yoke, piston

1987: Sprocket, engine.

Hydraulic excavators

1985: Counterweight, engine

1986: Idler, idler rod/shaft, yoke, piston

1987: Sprocket.

Motor graders

1985: Blade block

1986: -

1987: Cutting edge, bracket, transmission, engine

Wheel loaders

1985: Counterweight, cutting edge, cutting teeth, pulley

1986: Bucket link

1987: Engine

1988: Transmission.

The principal cast components of interest are:-

- Boom cylinder boss (cast steel)
- Boom point (ditto)
- Link boss of arm (ditto)
- Side cutter (ditto)
- Driving sprocket (ditto)
- Boom foot (ditto)
- Reduction gearbox (ductile cast iron)
- Idler (cast steel)
- Rotary joint (ductile cast iron)
- Crawler shoe (forged or cast steel)

(5) Rice mill machines, rice husking machines

Domestically manufactured products are required to be used for the components specified below:

Rice mill unit machines:

Frame body, hexagonal bolts/nuts, ring springs, pins, rivets, gaskets, seals, tank/rubber roll sets.

The principal cast components of interest are:-

- Feeder roll (white cast iron)
- Polishing roll (ditto)
- Frame (cast iron)
- Pulley (ditto)
- Hopper mouth (ditto)
- Motor base plate (ditto)

Rice husking machines:

Frame body, rubber roll, bolts/nuts/screws, rings, pins, rivets, induction fans, regulators, gear box sets

The principal cast components of interest are:-

- Rubber roll core (cast iron)
- Bearing block (ditto)
- Pulley (ditto)
- Bevel gear (ditto)
- Spur gear (ditto).

(6) Sewing machines — straight sewing models for domestic use (excluding zigzag sewing and industrial machines)

Sewing machine components are classified into 3 groups, for which different degrees of restriction are imposed governing the utilization of domestically manufactured components:

Group A (Importation authorized): Components/parts found on head (arm/bed)

Group B (Domestically-manufactured components mandatory from January 1981): Cabinet, leg part

Group C (Domestically manufactured components mandatory from outset): Head, leg, table.

The principal cast components of interests in the case of house-use sewing machines are:-

- Bed (cast aluminum)
- Arm (ditto)
- Feed shaft (cast iron)
- Oscillating shaft (ditto)
- Cam (ditto)
- Metal (ditto)
- Forked rod (ditto)

- Longitudinal rod (ditto)
- Feed base (ditto).

(7) Machine tools

Lathes

1986: Bed, rear support, tool post slide, cabinet leg, rear leg, front leg, aluminum cover

1987: Casing, saddle, cross slide, copying attachment

Surface grinding machine

1985: Table leg

1986: Sliding head, column, base

Column-type boring machines

1985: Pulley

1986: Base, table, column.

4) Measures for encouraging the use of domestically manufactured products and casting components

Representative examples of cast components normally used in the equipment.

Sugar industry:-

- Roll mill (cast iron/steel)
- Frame (cast iron)

Palm oil industry

- Mill (cast iron/steel)
- Frame (cast iron)

Paper industry

- Dryer cell (cast iron)
- Dryer head (ditto)

- Shaft (ditto)
- Bearing housing (ditto)
- Gearbox (ditto)
- Gear frame (ditto)
- Suction roll shell (cast steel)
- Suction box (cast iron)
- Calender frame (ditto)
- Cutter (cast steel).

Urea Fertilizer/phosphoric acid plant

- Valve (cast iron/steel)
- Pump casing (ditto)
- Compressor casing (cast iron)
- Flange (cast steel)

Cement plants

- Hammer (cast steel)
- Impact plate (ditto)
- Tire (ditto)
- Roller (ditto)
- Kiln end casting (ditto)
- Cooler gate hammer (ditto)
- Tranion (ditto)
- Liner (cast chromium iron)
- Ball (ditto)

Boiler

- Valve (cast iron/steel)
- Elbow (cast steel)
- Tube support lug (ditto).

CHAPTER 3

MARKET DEMAND FOR FOUNDRY PRODUCTS AND STRATEGY FOR FILLING THIS DEMAND

CHAPTER 3 MARKET DEMAND FOR FOUNDRY PRODUCTS AND STRATEGY FOR FILLING THIS DEMAND

3.1 Market survey and techniques for forecasting future demand

Survey of the market for foundry products and forecasts of the future demand for the products constitute essential factors in establishing a rational plan for Project implementation. The difficulty inherent in forecasting the demand for foundry products stem from the fact that these products form in most cases integral parts of machinery and equipment, so that statistics concerning the importation and domestic production of foundry products as such are not directly available, and this impairs the accuracy of data that are available in any country on foundry product utilization and consumption.

In Indonesia, the United Nations International Development Organization (UNIDO) and the Government of Indonesia undertook in 1969 a survey on the Indonesian foundry industry. Other data reviewed in the course of the present study include the report from a survey performed by the Japan Consulting Institute in connection with a project for establishing a foundry center in the Medan region, and data reported to a conference organized by the Japan External Trade Organization.

These and many other pertinent data were reviewed in the course of the present study, and in order to propose a truly rational project, the plan was drawn up through integration of approaches made from three directions - global, semi-individual and individual (see Figs. 3.1-1 and -2). From the results of the above market study, the strategy of product sales was drafted for the renovated Foundry Center. At this stage, the sales strategy that had been drawn up by the Indonesian Government was also reviewed. In the analyses approached from semi-individual and individual levels, the roles to be played by the Gresik and Surabaya Foundry Centers were also taken into account.

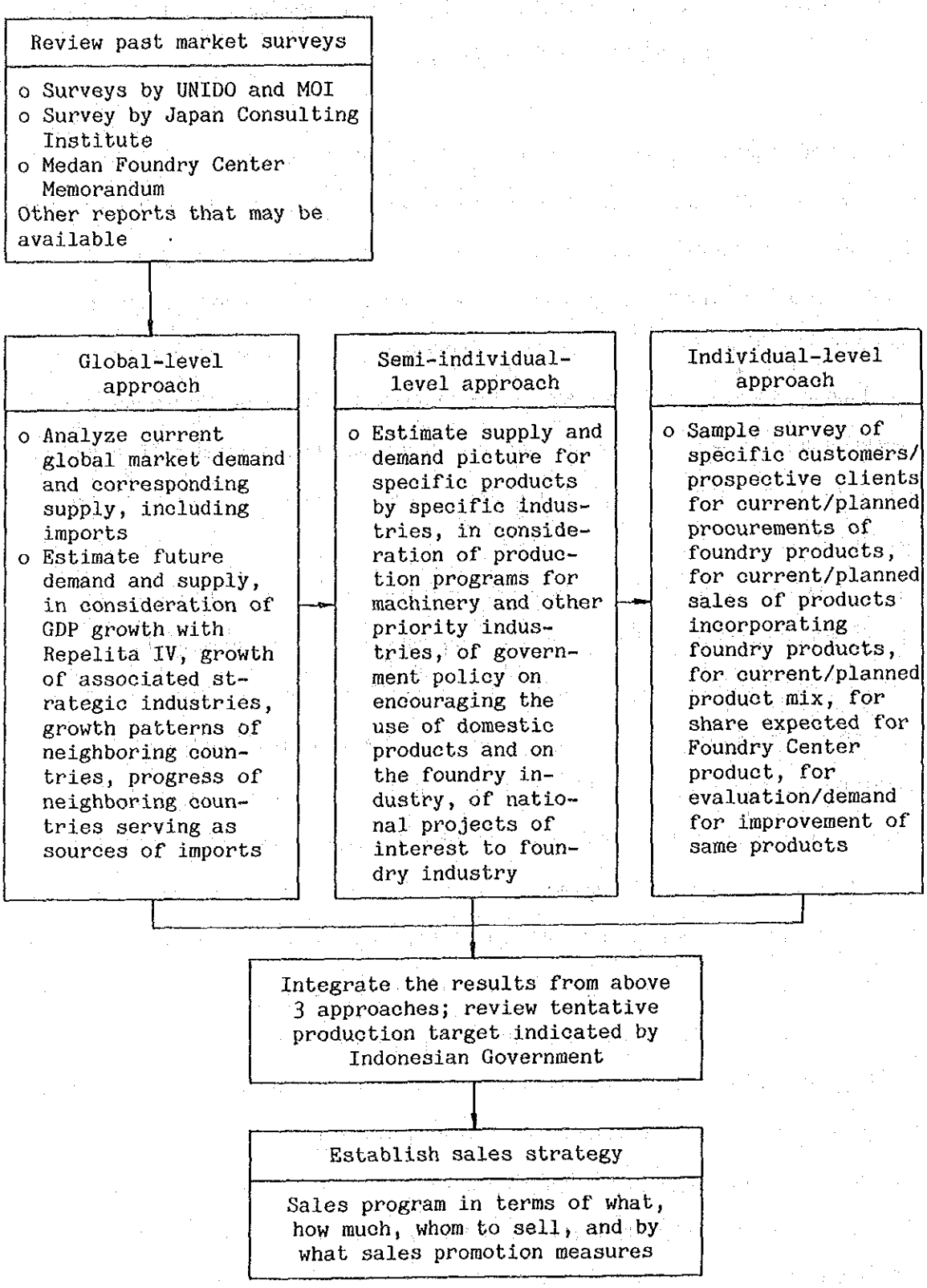

Fig. 3.1-1 Process to be followed for market survey and market demand estimation

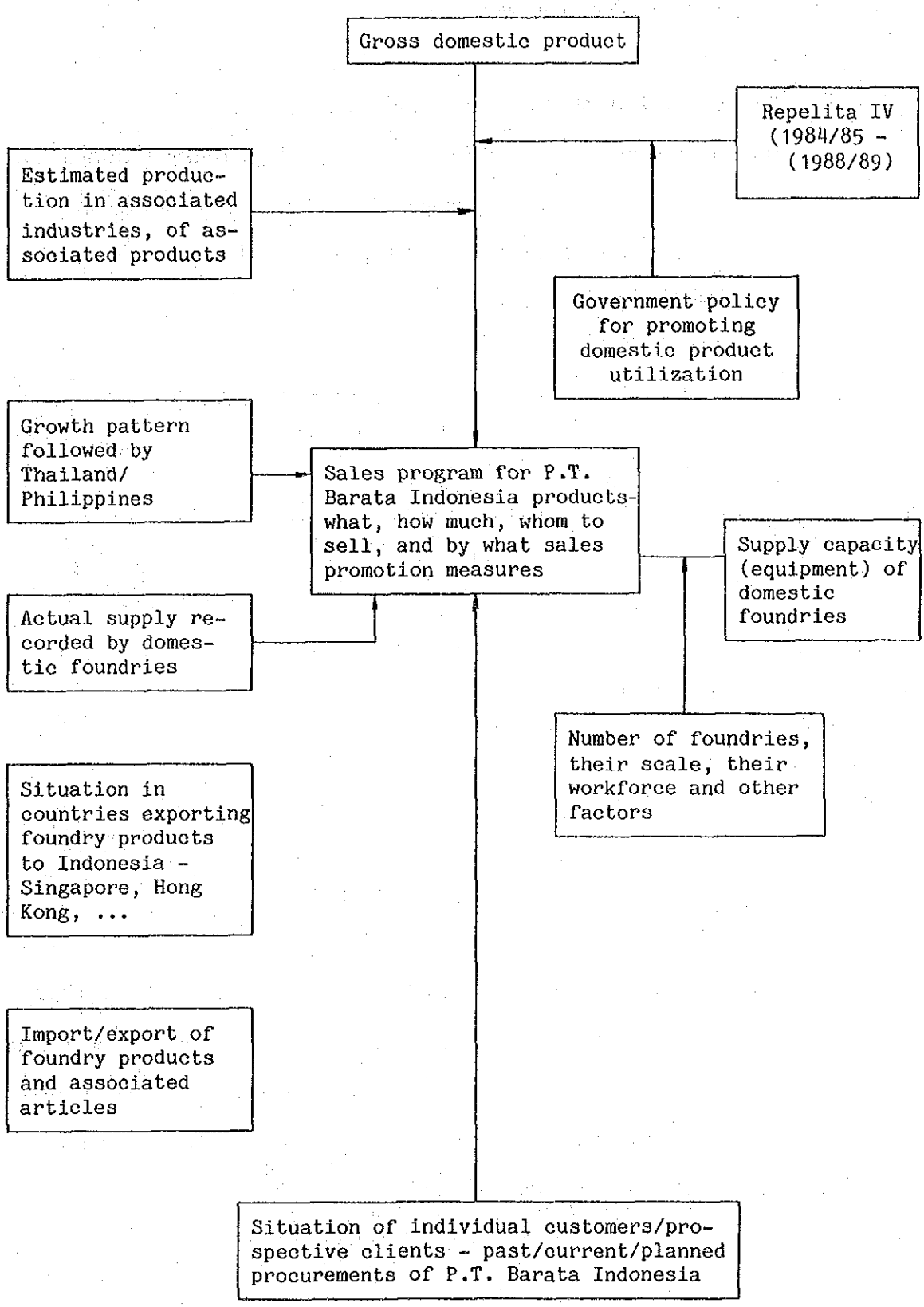

Fig. 3.1-2 Flow chart of market survey and market demand

3.2 Review of results from past surveys

1) Demand forecasts

a) Survey by UNIDO and Indonesian Ministry of Industry

The survey undertaken in 1969 jointly by the United Nations International Development Organization and the Ministry of Industry of the Indonesian Government yielded the figures reproduced in Table 3.2-1 as potential demand for foundry products in Indonesia.

Table 3.2-1 Potential Demand of Iron and Steel Castings in Indonesia

(Unit: Ton/Y)

Area	Cast Iron	Cast Steel
East Java	9,000	2,000
West Java	6,000	2,000
North Sumatra	5,000	2,000
South Sumatra	2,000	500
Bangka (Tin mines)	1,500	900
Belitung (Tin mines)	1,000	700
Singkep (Tin mines)	500	500
Southeast Kalimantan	500	200
Others	1,100	1,500
Total	26,600	10,300

The estimated latent annual demand in 1969 is seen to have been 26,600 tons of iron and 10,300 tons of steel castings. For East and West Java alone, the annual demand totaled 19,000 tons, of which 15,000 tons of iron and 4,000 tons of steel castings. It is thus indicated that half of the total national demand for foundry products occurs in Java.

b) Demand forecast by Ministry of Industry

Estimates were made by the Ministry of Industry for the years 1970/71 and 1973/74 covering the expected demand for foundry products by different industries, which gave the figures cited in Table 3.2-2, totaling 14,000 tons/year for 1970/71 and 18,000 tons/year for 1973/74.

Table 3.2-2 IRON CASTING DEMAND OF INDONESIA
1970 - 1974 (x)

	Consumers	1970/1971	1973/1974	Average annual growth prior to 1970
1.	Sugar Mill & Other Agriculture mach.	1.400	2.000	10
2.	Tin Mine	1.200	1.400	5
3.	Rubber and other estates machinery	2.100	2.600	5
4.	Rice Mill, Irrigation pump & diesel engine	1.500	2.000	N.A.
5.	Textile machinery & spare parts	1.300	2.000	N.A.
6.	Sewing machine	4.000	5.000	5
7.	Manufact sector, incl. pipe fittings	2.500	3.000	N.A.
	TOTAL	4.000	18.000	

(x). Source: DIRECTORATE GENERAL OF BASIC INDUSTRY

N.A. : Not Available

2) Production

a) 1969 survey by UNIDO/MOI

The UNIDO/Ministry of Industry survey of 1969 resulted in the production figurs given in Table 3.2-3, totaling 11,532 tons/year, of which 8,616 tons/year - approximately 75% - made in Java.

Table 3.2-3 Production of Castings in Indonesia
(UNIDO/MOI Survey of 1969)

Area	Number of Foundries	Output (ton/yr)
West Java (Jakarta, Bandung, Tirebon)	9	3,240
Central Java (Jogia, Solo, Tegal, Semerang)	4	900
East Java (Surabaya, Malang)	13	4,476
North Sumatra (Medan)	4	660
Central Sumatra	4	576
Bangka and Belitung	2	1,560
Kalimantan	1	120
Total		11,532

b) 1975 figures given by "Modern Casting"

The journal "Modern Casting" has given for 1975 a figure of 31,579 tons/year, of which 30,473 tons/year - 96% - of iron castings.

Table 3.2-4 Production of Castings in Asian Countries (given by "Modern Casting")

(Unit: Ton/Y)

Country	Cast Iron	Cast Steel	Copper Alloy Casting	Alumi-nium Alloy Casting	Other Kind of Casting	Total
India (1975)	490,000	68,000	-	-	-	558,000
Korea	420,200	51,400	-	-	-	471,600
Taiwan	296,260	24,100	5,850	7,250	4,800	338,260
Philippines (1976)	58,264	34,890	2,610	2,830	610	99,204
Indonesia (1975)	30,473	300	756	50	-	31,579
Malaysia (1976)	-	-	-	-	-	30,000
Thailand (1976)	-	-	-	-	-	25,000
Singapore (1976)	-	-	-	-	-	25,000

c) 1975 figure reported at JETRO Conference

As the 5th Study Meeting for Market Development, organized by the Japan external Trade Organization in Tokyo, October 1977, the Indonesian representative reported for his country an annual production of 30,000 tons of castings manufactured by about 300 foundries, mostly located in Java.

d) 1977/78 survey by OECF

A survey undertaken in April/May 1977 with the Japanese Overseas Economic Cooperation Fund indicated an annual production of 33,000 tons for 1977/78, of which 80% in iron, 6% in ductile iron and 5% in steel castings. Details of the figures reported on this occasion are given in Table 3.2-5.

Table 3.2-5 ESTIMATE PRODUCTION S1977 - 1970 (April - Mach)
(OECF Survey)
(Unit: tons/year)

	Locations	Gray Cast Iron	Cu Alloy	Steel	White Cast Iron	Al Alloy	Hi Cr Co	Sn Alloy	Zn Alloy	Maliable Cast Iron	Ferro & Non ferro	Note
1	2	3	4	5	6	7	8	9	0	11	12	13
I	JAKARTA	4116	132	300	-	0.01	-	-	75	2000	3	Non Ferro
II	WEST JAVA	2054.7	37.7	22.4	-	4.0	-	-	5.9	-	-	
III	CENTRAL JAVA	887.5	76.8	-	4	5.0	-	-	-	-	0.42	Non Ferro
IV	EAST JAVA	3208.63	354.85	1300	-	45.2	0.003	-	55.56	-	4.52	Non Ferro
V	NORTH SUMATERA	050.1	77.0	-	-	24	-	-	1486.6	-	15	Non Ferro
VI	WEST SUMATERA	3.3	2.5	-	-	-	-	-	-	-	-	
VII	SOUTH SUMATERA	1817.7	25.75	-	-	-	-	13	0.54	-	-	
VIII	KALIMATAN PTC	120	-	-	-	-	-	-	-	-	-	
IX	SHALL SCALE INDUSTRI	13064	719.91	-	-	30	-	-	-	-	-	Togal, Klate
	Total	26,126.93	1427.31	1622.4	4	108.21	0.003	13	1623.6	2000	22.94	

Source: Institute of Technology Bandung

e) 1979 figures by Bandung Institute of Technology

At a seminar organized by the Institute of Technology Bandung in 1982, the production in 1979 was given to be 28,129 tons/year of iron and 1,622 tons/year of steel castings, contributed by foundries located in the different regions as detailed in

Table 3.2-6 Domestic Production in 1979 (BIT)

No.	Location	Iron Casting (Ton)	Steel Csting (Ton)
1.	Jakarta	6,116	300
2.	West Java	2,054	22
3.	Central Java	887	-
4.	East Java	3,208	1,300
5.	North Sumatra	858	-
6.	South Sumatra	1,817	-
7.	Small Scale Industry	13,064	-
8.	Others	125	-
	TOTAL	28,129	1,622

f) 1981 survey by JICA

A survey undertaken by the Japan International Cooperation Agency in 1981, on the occasion of a feasibility study for establishing a foundry center at Medan, indicated estimated production of 26,000 tons/year of iron and 1,100 tons/year of steel castings in 1981, of which 19,800 tons/year of iron castings - 76% - produced in Java.

Details are reproduced in Table 3.2-7.

Table 3.2-7 Production of Castings in Indonesia (1981) (JICA Survey)

Area	Numbers of Foundry	Output (Ton/Y)	
		Cast Iron	Cast Steel
West Java	15	12,000	360
Central Java	30	3,600	-
East Java	13	4,200	720
North Sumatra	20	3,600	20
Central Sumatra	6	600	-
Bangka, Belitung	2	1,800	-
Kalimantan	1	200	-
Total	87	26,000	1,100

g) Figures reported at 1981 JICA Conference

At the 3rd Training Meeting organized by the Japan International Cooperation Agency in Bangkok, August 1981, participants from the Indonesian Ministry of Industry gave as current total annual production of castings of all kinds the figure of 35,000 tons, contributed by 357 foundries, among which 157 produced iron and 218 produced nonferrous castings.

h) Figures for 1980 - 83 by MOI

Data given out by the Ministry of Industry for 1980 - 83 are as cited in Table 3.2-8.

Table 3.2-8 Domestic Production Figure given by Ministry of Industry

(Unit: 1,000 tons)

No.	Items	1980/1981	1981/1982	1982/1983	1983/1984
1.	Iron Casting	55	70	71	71
2.	Steel Casting	2,0	2,5	2,8	3,23

Source: Ministry of Industry.

Remark: The production figures cited in the foregoing Sections would appear rather high, and the actual production could well have been considerably lower.

3) Foundries in Indonesia

It is revealed from the foregoing data that a very large majority of foundries are located in Java. It was further indicated in Section 3.2.2.7 that there were more than 300 foundries in Indonesia, among which 157 were producing iron and 218 nonferrous castings.

For the future, it can be expected that a larger expansion of demand should be raised for iron castings, and in anticipation of such demand, two foundries of modest scale but furnished with the most modern equipment have come into operation in the vicinity of Jakarta, envisaging the mass production of automobile parts.

The foundries surveyed by the Japan External Trade Organization in 1977 are as detailed in Tables 3.2-9 to -12.

Table 3.2-9 Foundries Located in West Java

Enterprise	Production recorded (t/yr)	Product	Production capacity (t/yr)	Branch of industry served	Personnel	Melting equipment
P.T. Indomachine	2,000	Gray cast iron	4,000	Sewing machines	450	Cupola
P.T. Bakri Tube Maker		Ductile cast iron	2,000	Pipe joints	-	2 induction furnaces
P.T. Kaliurang		Ditto		Ditto	-	Hot blast cupola
P.T. Alam Raya	4,500	Ductile cast iron	6,000	Sewing machine	-	Cupola
Jakarta Foundry Centro	85	Ditto		Textile/cement plant/sugar plant mining machinery	120	2 induction furnaces
P.T. Berdikari	250	Ditto	300	Mining/sugar plant machinery	23	Cupola
P.T. Celco	30	Ditto	30	Agricultural machinery	12	Cupola
Fa. Teha	200	Ditto	400	Tea manufacturing/textile/ sugar plant machinery		
P.T. Buma Sakti	150	Ditto		Textile/agricultural/sugar plant machinery		Cupola
Pindad		Ditto		Tin mining/agricultural/ textile/chemical plant machinery		
Balai Yasa		Ditto		Railroad equipment		Cupola, arc furnace
Hiap Thay Woo	60	Ditto	120	Sugar plant machinery	15	Cupola
P.T. Malabar	67	Ditto	67	Textile machinery	6	Cupola

Table 3.2-10 Foundries Located in Central Jawa

Enterprise	Production recorded (t/yr)	Product	Production capacity (t/yr)	Branch of industry served	Personnel	Melting equipment
P.T. Dwika	230	Gray cast iron	380	Tile presses, pumps, sugar plant machinery	0	Cupola
P.T. Purosani	390	Ditto	650	Sugar plant machinery, household utensils		Cupola
C.V. Karya Hidup Sentausa	170	Gray cast iron, copper alloy castings	400		50	Cupola
N.V. Sudono	5	Gray cast iron	25	Agricultural machinery	4	Cupola
Small foundries in Tegal area		Ditto		Pumps, sugar plant machinery		Cupola
Small foundries in Ceper area (near Yogyakarta		Gray cast iron, copper alloy castings		Pumps, sugar plant machinery		Cupola

Table 3.2-11 Foundries Located in East Java

Enterprise	Production recorded (t/yr)	Product	Production capacity (t/yr)	Branch of industry served	Personnel	Melting equipment
P.T. BBI	220	Gray cast iron	850	Sugar plant/agricultural/ mining machinery		Cupola
P.T. Barata M&E		Ditto	1,000	Sugar plant/agricultural/ mining/chemical plant machinery		Cupola converter
P.T. Kumala Geni	360	Ditto	360	Agricultural/sugar plant machinery	60	Cupla
Pinda Tosana	120	Ditto	180	Agricultural/sugar palnt/ chemical machinery		Cupola
P.T. Tiga Serangkai	60	Ditto	60	Textile/sugar plant/ agricultural machinery		Cupola
P.T. Kalimas	120	Ditto		Txtile/sugar plant machinery		Cupola
P.T. Gruno Nasional	160	Ditto		Sugar plant/agricultural machinery		Cupola
Balai Yasa		Ditto		Railroad equipment		

Table 3.2-12 Foundries Located in West Sumatra

Enterprise	Production recorded (t/yr)	Product	Production capacity (t/yr)	Branch of industry served	Personnel	Melting equipment
P.T. ATMINDO	68.5	Gray cast iron	100	Agricultural/mining machinery		Cupola
P.T. Hari Subur & Sons	100	Ditto	150	Agricultural/palm-oil plant/ rubber plant machinery	11	Cupola
Andalas	60	Ditto	150	Rubber plant machinery	26	Cupola
Tenaga Baru	60	Ditto	120	Ditto	23	Cupola
C. V. Glugur	48	Ditto		Rice mill/coconut oil/ industrial machinery		Cupola
C. V. Logam	36	Ditto	70	Rubber plant machinery	9	Cupola
P.T. Sumatra Raya	250	Ditto	600	Ditto	21	Cupola
Growth Sumatra	-	Ditto		Pumps, agricultural/ rubber plant machinery		Induction furnace
Balai Yasa	-	Ditto		Railroad equipment		Cupola

The following is a list of foundrie in Indonesia, obtained quite recently (June 1985) in the course of the present Study.

Table 3.2-13 LIST OF FOUNDRY COMPANIES

No.	Company	Address
1	P.T. Buma Sakti	Jl. Suriani 8, Bandung
2	P.T. Celco	Jl. Gatot Subroto 23A, Bandung
3	P.T. Malabar	Jl. Halte Andir, Bandung
4	P.T. Purna Sadhana, PINDAD	Jl. Gatot Subroto, Bandung
5	Fa. Teha	Jl. Arjuna 23-25, Bandung
6	P.T. Tisco	Jl. Arjuna, Bandung
7	P.T. Barata Cab. Bandung	Jl. Industri 15, Bandung
8	Fa. Hiep Thay Woo	Jl. Gada, Cirebon
9	P.T. Alam Raya	Jl. Swadaya IV, Pulogadung, Jakarta
10	P.T. New Foundry Centre Jakarta	Jl. Raya Bekasi KM 21, Pulogadung
11	BAKTI	Jl. Dean Mogot 168, Jakarta
12	P.T. Indomachine	Jl. Dean Mogot KM 14, Jakarta
13	P.N. Dok Tanjung Priok	Jl. Penambangan Pelabuhan I Tanjung Priok, Jakarta
14	P.T. Madona	Jl. Rawa Angke, Jakarta
15	P.T. Kaliurag	Jl. Raya Bekasi, Jakarta
16	P.T. Bakri tube Maker	Jl. Raya Bekasi KM 27, Jakarta
17	P.T. Karya Hidup Sentausa	Jl. Magelang 144, Yogayakarta
18	P.T. BLIMA BARU	Jl. Brigjen Sugiarto 305, Solo
19	C.V. Borobudur	Pekalongan
20	P.T. Dwika	Jl. Kol. Sudiarto 2,, Tegal
21	P.T. Kaliagung Utama	Jl. A.R. Hakim 10, Tegal
22	Koperasi Batur Jaya	Ceper,Klaten
23	P.T. Cahaya Surabaya	Jl. Pengenal 1, Surabaya
24	P.T. B.B.I. Unit Indra	Jl. K.H. Mansyur 229, Surabaya
25	P.T. Gruno Nasional	Jl. Gembong 8, Surabaya
26	P.T. Kumala Geni	Jl. Ngagel Timur 42, Surabaya
27	P.T. Barata M & E.	Jl. P. Lumumba 109, Surabaya
28	P.T. Tiga Serangkai	Jl. Kranggan 90, Surabaya
29	Pinda Tosana Unit Kalimas	Jl. Kebalen Timur 98, Surabaya
30	P.T. Warujaya	Jl. Raya Waru, Surabaya
31	P.T. PAL	Tanjung Perak, Surabaya

No.	Company	Address
32	P.T. Barata Foundry Centre	Gresik, Jatim, Surabaya
33	P.T. Singer	Jl. Raya Modoeng, Sidoarjo
34	P.T. B.B.I. Unit Boma	Pasuruan
35	P.T. Subur & Son	Jl. Thamrin 20, Medan
36	P.T. Atmindo	Jl. Yos Sudarso 1, Medan
37	C.V. Logam	Jl. Yos Sudarso 130, Medan
38	C.V. Tenaga Baru	Jl. Yos Sudarso 87/92, Medan
39	C.V. Glugur	Jl. Yos Sudarso 9 L, Medan
40	Fa. Sumatra	Jl. Tembaga 70-80, Medan
41	C.V. Andalas	Jl. Karo 2, Medan
42	P.T. Barisan	Jl. Pemuda Sei Mati, Medan
43	Kwong Heng Cheong	Jl. Yos Sudarso 51, Medan
44	P.T. Intan Nasional Iron	Jl. Semarang 102,Medan
45	P.T. Bakti	Jl. Bilai Pusar XI/50, P. Berayan Darat, Medan
46	P.T. Sentosa	Jl. Industri 27-29, Medan
47	Fa. Growth Sumatra	Jl. Belawan Medan
48	P.T. Tambang Timah Bangka	Sungai Liat - Bangka
49	P.T. Tambang Timah Belitung	Manggar - Belitung
50	Banjarmasin Industri Co.	Banjarmasin
51	Balai Yasa PJKA Jakarta	Manggarai, Jakarta
52	Balai Yasa PJKA Medan	P. Brayan, Medan
53	Balai Yasa PJKA Padang	Padang

3.3 Current demand and future forecast

a) The estimated current demand for foundry products is roughly 100,000 tons/year, of which 35,000 to 40,000 tons/year are produced domestically, and 50,000 to 60,000 tons/year imported.

b) The corresponding figures given by the Branch Manager at Gresik Foundry Center were 90,000 tons/year, of which 72,000 tons/year of iron and 18,000 tons/year of steel castings. According to the same source, domestic production covered 18,000 tons/year of iron and 4,500 tons/year of steel castings, totaling 22,500 tons/year.

c) The forecasts published by the Ministry of Industry give total demands for iron and steel castings of 96,200 tons/year for 1982/83, 144,250 tons/year for 1984/85,and 206,620 tons/year for 1986/87. The demands actually recorded, however, are very appreciably lower than these forecasts.

The Ministry of Industry estimates cited above are presented graphically and summarized numerically in Fig. 3.3-1/Table 3.3-1.

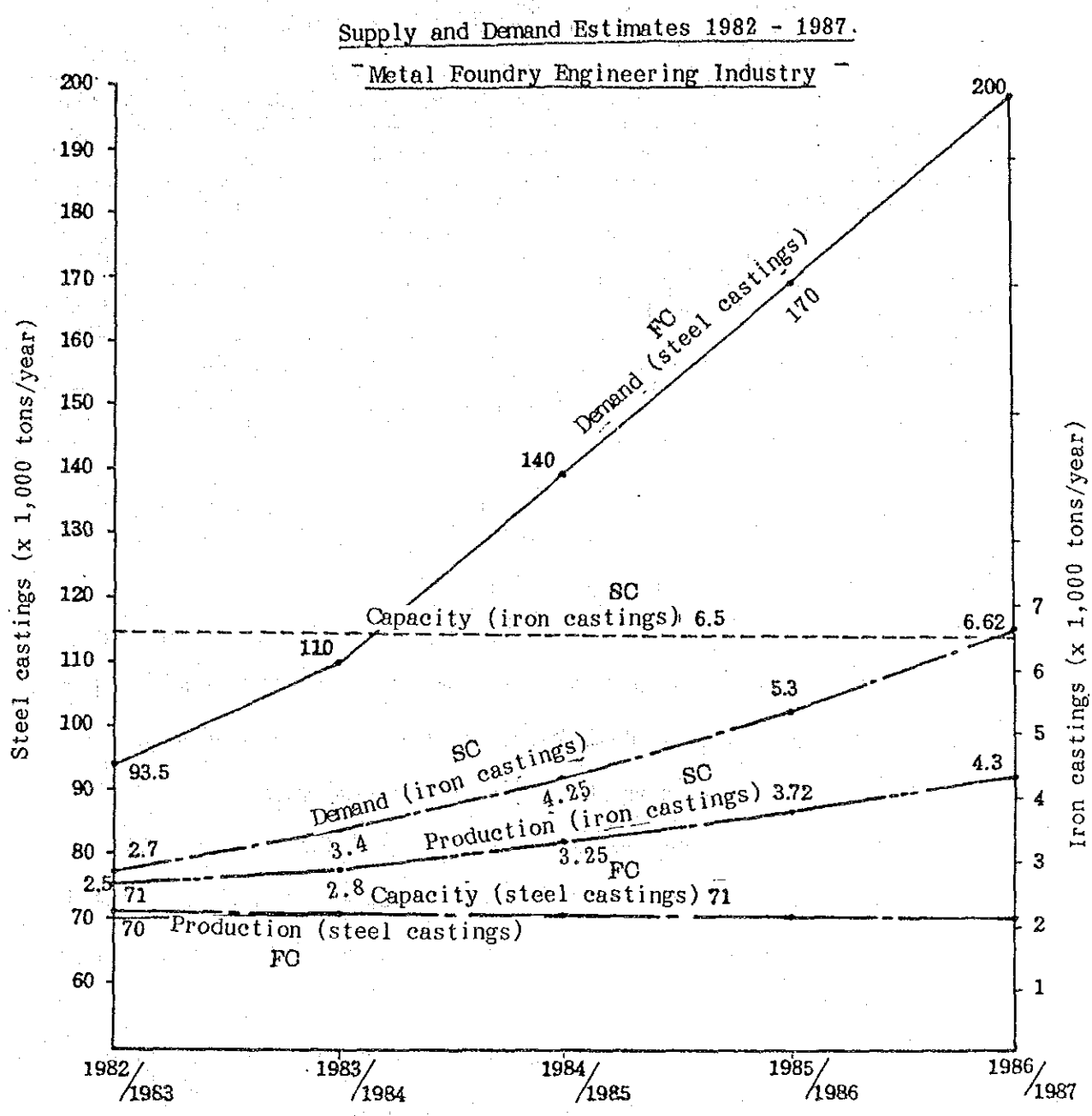

Fig. 3.3-1 Supply and Demand Estimates 1982 - 1987

Metal Foundry Engineering Industry

Table 3.3-1 Supply and Demand Estimates 1982 - 1987

(Unit: Tons/year)

		1982/1983	1983/1984	1984/1985	1985/1986	1986/1987
Iron castings	Capacity	71,000	71,000	71,000	71,000	71,000
	Production	70,000	71,000	71,000	71,000	71,000
	Demand	93,500	110,000	140,000	170,000	200,000
Steel castings	Capacity	65,00	6,500	6,500	6,500	6,500
	Production	2,500	2,800	3,230	3,720	4,300
	Demand	2,700	3,400	4,250	5,300	6,620

Source: The Development of Nacional Capacity in Industry for 1983 - 1986, Summary, Ministry of Industry, Republic of Indonesia

d) The foregoing data from various surveys and studies made in the past are seen to have given appreciably different figures. A point requiring to be noted in this connection is that the REPELITA IV currently under way has adopted a policy for vigorously promoting the replacement of imported by domestically manufactured products, and the fruits already being reaped of this policy should justify expectations for appreciable acceleration of the growth in demand for foundry products compared with the progress seen in past years.

To gain some insight into what might be expected of future growth in foundry product demand, Fig. 3.3-2 plots the averaged trends of growth in demand and production during the past years, extrapolated linearly into the future.

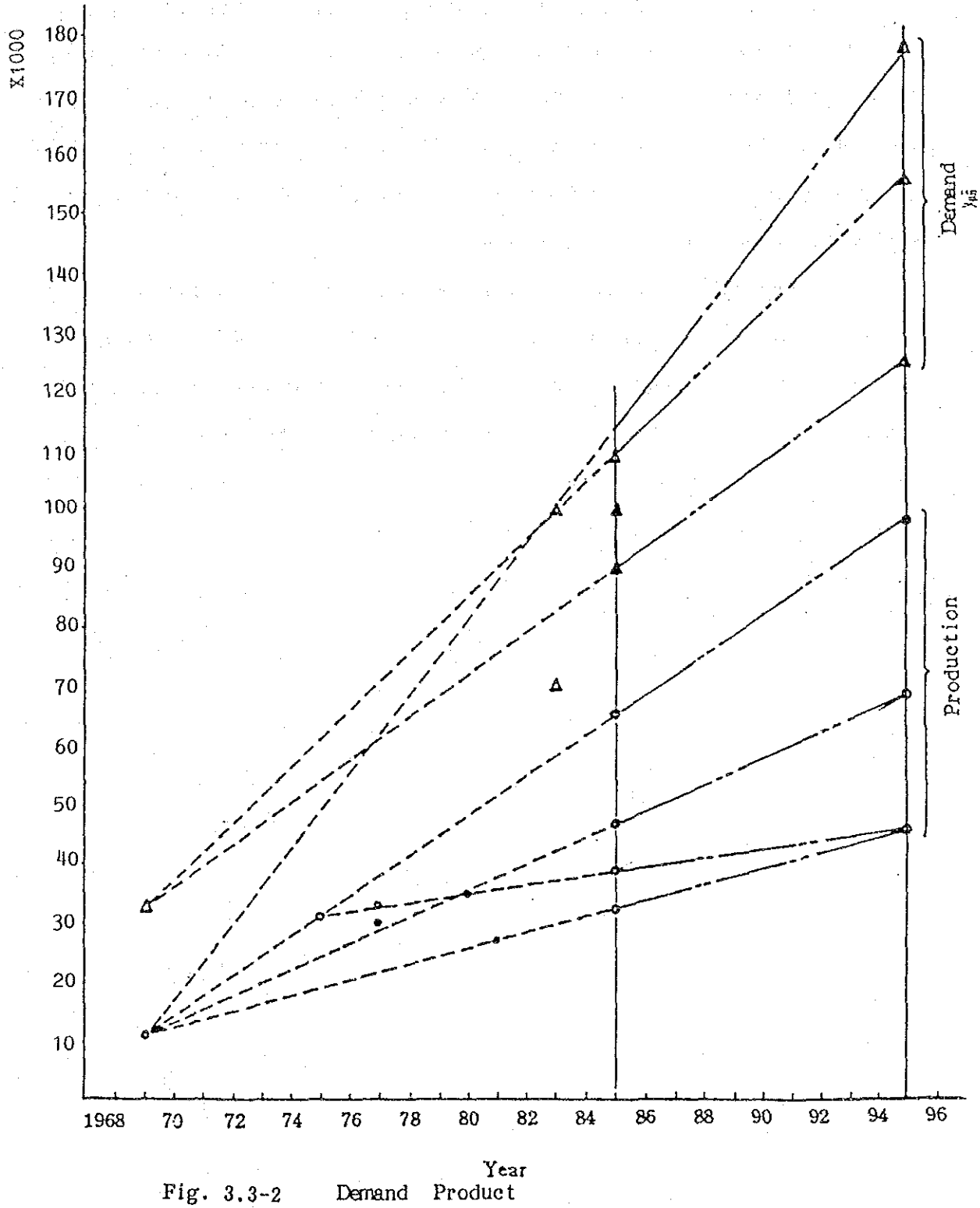

Fig. 3.3-2 Demand Product

In full awareness of the rough nature of forecasts made on such basis, a figure between 45,000 and 100,000 tons/year might be considered to give the production of foundry products 10 years hence. The corresponding figure for demand should lie between 130,000 and 180,000 tons/year. The figure could well be improved by 100,000 tons/year or so if the current policy on the adoption of domestically manufactured equipment/components proves fully successful.

The foregoing figures have been estimated well on the conservative side, and yet domestic supply is seen to fall short of demand by anything between 30,000 and 135,000 tons/year promising a market of at least 80,000 tons/year, even taking a simple average between these two figures. From this, it can be definitely stated that there should be no room for fearing shortage of demand for foundry products in Indonesia during the coming 10 years.

3.4 Future demand forecast from global approach analysis

1) Statistics

a) Imports of foundry products (1973 - 78)

The BIRO PUSAT has published the figures reproduced in Table 3.4-1 for imports of iron and steel castings through the years 1973 to 78. These figures, widely fluctuating from year to year, give an average for the period of 78,400 tons/year of foundry products, of which 38,400 tons/year of iron, and 40,000 tons/year of steel castings.

Table 3.4.1 Imports of Iron and Steel Castings (1973 - 1978)

No.	TEAR / Commodity (Ton) / Country of Onioin	1973		1974		1975		1976		1977		1978	
		Cast Iron	Cast Steel	Cast Iron	Cast Steel	Cast Iron	Cast Steel	Cast Iron	Cast Steel	Cast Iron	Cast Steel	Cast Iron	Cast Steel
1	JAPAN	24,691	3,431	15,338	108,248	14,695	6,292	7,949	11,051	10,863	20,712	16,856	81
2	NORTH KOREA	-	7,124	-	1,793	100	6,007	-	300	-	-	-	-
3	SOUTH KOREA	248	987	457	2,701	483	7,119	128	-	444	-	3,000	-
4	TAIWAN	474	24	550	-	4,776	1,820	2,446	152	208	15	92	-
5	SINGAPORE	867	391	-	382	3,478	6,315	2,780	212	1,313	18	2,396	2
6	U.S.A.	1,909	55	4,950	896	2,949	1,018	816	31	1,743	-	10,322	-
7	UNITED KINGDOM	1,607	187	1,444	49	60	4	10	-	10	-	6,411	-
8	NEDERLAND	1,021	139	56	42	1,210	-	22	-	3	-	65	1,005
9	GERMANY F.R.	3,662	14,696	2,277	3,840	114	109	411	550	2,288	20	7,083	1,489
10	AUSTRALIA	17,477	66	686	4,143	2,417	8,790	2,003	202	2,924	10	5,982	2
11	MALAYSIA	649	-	71	-	78	1,608	-	10	124	-	-	-
12	THAILAND	1,450	-	321	-	257	157	1,458	7	608	-	-	-
13	HONGKONG	3	1,874	-	450	4	40	-	10	-	-	-	
14	INDIA	-	-	238	-	11	7,246	10,404	3,370	27,406	-	12,996	-
	TOTAL	52,973	27,484	26,388	127,167	31,632	46,525	26,221	15,895	37,934	20,773	53,217	2,579

Source: PIRO PUSAT STATISTIC

b) Recent trends in foundry product import (1981 - 83)

Statistics covering all imports of foundry products - including castings incorporated into machinery and equipment - are not available, and the figures cited here represent solely castings in the form of independent pieces.

Table 3.4-2 Imports into Indonesia of Independent Castings

		1981年		1982年		1983年	
		cast iron	cast steel	cast iron	cast steel	cast iron	cast steel
1	JAPAN	525,382kg	245,611kg	893,969kg	479,873kg	256,495kg	284,016kg
2	TAIWAN	9,290	11,776	15,160	1,442	60,262	84,083
3	S. KOREA	50,000	182,750		36,188	7,500	19,517
4	CHINA	865,497	580	693,540	1		276,500
5	HONG KON	4,825	346			2,100	
6	PHILIPIN		400,000		280,660		95,412
7	SINGAPORE	124,112	50,054	147,135	1,047,430	60,695	37,547
8	MALAYSIA		1,680				
9	INDIA						1,330
10	U. S. A	63,895	54,205	102,366	133,209	76,160	204,215
11	CANADA	2,000	31,332				
12	U.KINGDOM	3,780	222,008	35,190	330,345	6,548	211,335
13	W.GERMANY	36,829	46,575	1,381	12,321	13,054	219
14	FRANCE	50	12,874		6,500	600	65
15	ITALY	2,555	165,000	8,750	25,000	1,200	158,000
16	NETHERLAND	20	4,650	804		2,281	
17	DENMARK				530,475	55	750
18	SWEEDEN				60		
19	BERGIE				120,592	4	115,000
20	SPAIN					10,447	2,298
21	AUSTLARIA	13,976	140,609	678	82,718	233	17,380
22	NEWZELAND		95			5	
	Total	1,702,221kg	1,570,145kg	1,898,972kg	3,086,794kg	497,639kg	1,507,667kg

Source: BIRO PUSAT STATISTIC

If castings incorporated into other units were included, the total import figures might amount to 50,000 - 60,000 tons/year.

Examined by country of origin, imports from Japan, U.S., Singapore and Taiwan accounted for 91% of iron castings in 1983, and in the same year 65% of steel castings came from Japan, China, U.K. and U.S. What calls for attention are the imports from neighboring countries. These countries represent potential markets for foundry products, and once castings can come to be produced in Indonesian foundries at internationally competitive price and quality, there should be no lack of market in these countries for Indonesian foundry products. This provides further justification for apposite measures to promote the foundry industry in Indonesia.

c) Supply of foundry products

It was seen in Fig. 3.3-2 that foundry product demand currently amounts to around 100,000 tons/year in Indonesia, and domestic production to around 35,000 tons/year, with the balance furnished by import. Unless measures are taken to enhance the competitiveness of Indonesian foundry products in terms of quality, price and delivery period, the reliance on imports will be likely to continue into the future.

2) Economic growth

a) Past progress of economic growth

The growth of GDP has stagnated in the years following 1980 (Table 3.4-3): From 7.9% in 1981, it fell in 1982 to 2.25%, with a small recovery to 4.4% seen in 1984. The set back was particularly severe in the mining and manufacturing industries, and this had its effect on the demand for foundry products.

Table 3.4-3 Net Growth of GDP and of Various Economic Sectors

(Unit: %, evaluated at 1973 prices)

	70	79	80	81	82	83	70 - 82
GDP	7.5	6.3	9.9	7.9	2.25	4.2	7.5
Agriculture	4.1	3.9	5.2	4.9	2.1		3.8
Mining	15.5	-0.2	-1.2	3.3	-12.1		5.0
Manufacturing	9.0	12.9	22.2	10.2	1.2		13.1
Utilities	14.8	20.6	13.6	15.4	17.4		13.7
Construction	25.4	6.4	13.6	12.7	5.2		14.9
Transport/ communications	4.4	8.9	8.9	11.1	5.9		13.0
Commerce/finance services	8.7	7.5	12.3	9.5	5.2		8.8

Source: NOTA KEUANGAN

b) Relation between growth rates of GDP and of industrial sectors

Throughout REPELITA I to III, the recorded growth rates for the industrial sector were consistently higher than for the overall GDP, as seen from Table 3.4-4.

Table 3.4-4 Relation between Growth Rates of GDP and of Industrial Sector

AVERAGE GROWTH RATE (%)

	AVERAGE GROWTH RATE (%)	
	GDP	INDUSTRIAL SECTOR
REPELITA I	8.8	12.98
REPELITA II	7.0	13.70
REPELITA III	5.7	9.6
REPELITA IV (target)	5.0	9.5

c) Target grwoth rates set for REPELITA IV

The target growth rates set for REPELITA IV are 5% for overall GDP, and 9.5% for the industrial sector, as seen in Table 3.4-5, which is indicative of the high expectations held for industrial development in REPELITA IV.

Table 3.4-5 Target Growth Rates Set in REPELITA IV

(Unit: %)

SECTOR	CONSTRUCTION		AVERAGE ANNUAL GROWTH RATE
	1983/84	1988/89	
Agriculture	29.3	26.5	3.0
Mining	7.0	6.1	2.5
Manufacturing	15.8	19.4	9.5
Construction	6.7	6.7	5.0
Transport/communications	6.0	6.1	5.2
Others	35.2	35.2	5.0
Total	100.0	100.0	5.0*

*) = GDP (estimate)

3) Growth of individual industrial branches in REPELITA IV

(1) Growth of main Industrial Products in the past

a) Metal/machinery industries

In products from these branches of industry, castings are found incorporated in:-

- Water/gas/oil piping
- Rice mill units
- Diesel engines
- Power generator sets
- Road rollers

b) Chemical plants

The products of interest to foundries would be pulp/paper and cement plant components. These plants represent industrial branches that are developing steadily, and which promise continued progress in the future.

c) Consumer goods

For the industries producing consumer goods, those in which foundry products are frequently used in the products themselves and in the equipment for their manufacture would include:-

- Fabric
- Yarn
- Coconut oil
- Motorcycles
- Sewing machines

As seen in Table 3.4-8, production has largely remained stagnant in 1981/82, with the impact of economic recession - and this applies particulary to coconut oil and sewing machines. Motorcyles, on the other hand, have maintained a brisk pace of progress.

d) Mining

Products of interest in industries associated with mining are slurry pumps used in tin mining. Tin production recorded steady increase from 1978 to 1981, but dropped in 1982. Rapid re-establishment of a brisk rising pace cannot be expected in the future.

Table 3.4-6 Progress of Production in Metal/Machinery Industries of Relevance to Foundry Products

PRODUCT	UNIT	1977/78	1978/79	1979/80	1980/81	1981/82	1982/83
1. Water/gas/oil piping	1,000 tons	45.0	47.3	47.3	63.1	102.0	122.2
2. Rice mill units	1,000 units	0.3	2.2	2.5	1.8	1.1	1.7
3. Diesel engines	Ditto	25.3	30.4	25.0	34.1	69.4	64.6
4. Power generator sets	Units	-	-	8,279	8,820	16,875	20,859.0
5. Road rollers	Ditto	400	120	450	316	431	404.0
6. Hand-tractors	Ditto	44	280	550	877	1,074	1,271.0
7. Mini-tractors	Ditto	-	25	150	192	65	116.0
8. Automobiles	1,000 units	83.9	108.7	102.5	172.5	209.9	188.4
9. Steel ships	1,000 GT	13.2	11.5	24.0	27.5	28.9	22.0

Table 3.4.-7 Progress of Production in Chemical Industries of Relevance to Foundry Products

PRODUCT	UNIT	1977/78	1978/79	1979/80	1980/81	1981/82	1982/83
1. Pulp/paper	1,000 ton	83.5	155.2	214.2	232.0	246.6	296.9
2. Cement	Ditto	2,878.6	3,629.0	4,705.1	5,851.8	6,844.2	7,650.1

Table 3.4-8 Progress of Production in Consumer Goods Industries of Relevance to Foundry PRoducts

PRODUCT	UNIT	1977/78	1978/79	1979/80	1980/81	1981/82	1982/83
1. Fabric	Million m	1,332.5	1,576.0	1,910.0	2,027.3	2,094.0	1,708.9
2. Yarn	1,000 bales	678.3	837.3	998.0	1,184.0	1,233.0	1,370.0
3. Coconut oil	1,000 tons	276.3	319.1	452.0	610.0	480.8	442.1
4. Motorcycles	1,000 units	271.8	320.0	221.6	410.0	503.3	577.4
5. Sewing machines	Ditto	484.0	600.0	477.6	525.4	551.6	393.5

Source: NOTA KEUANGAN 1984/85.

Table 3.4-9 Past Records of Mineral Production and Exports

(Unit: 1,000 tons/year)

	Tin		Nicel (ore)		Copper (concentrate)		Iron sand		Bauxite	
	Production	Export	Production	Export	Production	Export	Production	Export	Production	Export
1978/79	24.3	25.6	1,778.0	887.6	184.9	167.8	120.2	66.5	964.9	981.6
79/80	28.4	27.2	1,771.5	1,192.4	188.5	187.1	78.5	9.5	1,160.7	1,168.3
80/81	31.2	31.3	1,399.3	1,238.7	178.3	176.6	68.3	35.1	1,269.9	1,197.9
81/82	33.0	32.8	1,598.1	1,207.5	197.5	209.7	105.6	25.5	1,015.1	885.1
82/83*	30.2	27.7	1,591.2	897.3	221.5	211.6	129.9	10.3	721.0	792.6

Source: NOTA KEUANGAN 1984/85

(2) Branches of industry of particular interest to foundries in REPELITA IV

Among the branches of industry to be promoted in REPELITA IV, those that should constitute the largest market for foundry products are those associated with:-

- Industrial machinery
- Shipbuilding and shiprepair
- Cement manufacture

Among the above, industrial machinery would present by far the greatest market for castings. It is further to be noted that a high priority is accorded in REPELITA IV to machine tools, and this is of particularly relevance to the foundry industry, in that castings constitute up to 70% (in weight) of machine tool components.

Machine tool manufactures should consequently constitute an important market on which to direct the sales activity for foundry products.

Table 3.4-10 Target Values of Annual Production Set in REPELITA IV for Individual Branches of Manufacturing Industries of Interest to Foundries

BRANCH OF INDUSTRY	UNIT	TARGET PRODUCTION		AVERAGED ANNUAL GROWTH RATE (%)
		1983/84	1988/89	
Industrial machinery	Units	1,550	3,600	18.36
Shipbuilding	1,000 DWT	195	493	20.38
Shiprepair	Ditto	1,150	3,150	22.33
Cement	1,000 tons/year	10,290	21,000	15.33

Source: Background data on REPELITA IV

4) Foundry industry in similary industrializing countries

a) Philippines

The Philippine Republic has since long led the ASEAN countries in the development of foundry industry, reflecting the efforts directed toward industrialization in this country ever since the time of U.S. administration. Relatively large shipyards and automobile factories conspicuously mark the suburbs of Manila.

Progress at the pace envisaged by the Philippine government has not however been realized in the current industrialization program, which covers development of domestic resources, textiles, pulp/paper, plywood, flour milling, further promotion of the automotive industry, as well as the establishment of copper refining and integrated steel plants.

The foundries in the Philippines mainly produce iron castings. Their general level of technical capability is not high, although exceptionally, castings of high quality are being produced at automobile factories operated with foreign capital.

The progress of foundry product manufacture in the Philippines is presented in Table 3.4.4-11.

Table 3.4-11 Progress of Foundry Product Manufacture in the Philippines

(Unit: Tons)

Year / Material	1973	1974	1975	1976	1977*	1980*	1981*
Iron castings	42,519	47,440	58,527	58,264	57,000	65,000	65,000
Steel castings	22,090	27,724	31,552	34,886	30,450	37,000	6,000
Copper alloy castings	2,073	2,407	2,483	2,613	3,810	2,300	-
Aluminum alloy castings	2,055	2,292	2,643	2,827	3,210	3,700	-
Zinc alloy castings	364	385	449	466	600	-	-
Lead alloy castings	126	126	137	142	-	-	-
Other castings	-	-	-	-	-	-	3,100
Total	69,227	80,374	95,791	99,198	95,070	108,000	74,100

Source: Metal Casting Industry of The Philippines, 1977 (MIRDC), except where marked by asterisk
*) : Modern Casting

Statistics on the foundries and on their sizes are presented in Tables 3.4-12 - 14. The products cover components/parts for:-

- Mining/construction equipment/machinery
- Marine machinery/fittings
- Sugar plant equipment/machinery
- Agricultural machinery/implements
- Logging/woodworking equipment/machinery

Table 3.4-12 Numbers of Foundries in the Philippines Producing Castings in Different Materials (1976)

OPERATION / MATERIAL	INDEPENDENT	AFFILIATED	TOTAL	%
Iron	85	12	97	67
Steel	11	7	18	12
Aluminum alloy	26	50	76	52
Copper alloy	20	46	66	46
Zinc alloy	2	10	11	8
Lead alloy and others	2	1	3	2
Total	145	126	271	-

Table 3.4-13 Shares of Foundries of Different Scales Constituting the Philippine Foundry Industry

ITEM / WORK FORCE	NUMBER OF FOUNDRIES	%	WORK FORCE	%	AVERAGE WORK FORCE PER FOUNDRY
Below 20	37	25	421	4	11
20 - 49	58	39	1,931	19	33
50 - 99	27	18	1,865	18	69
100 - 199	20	13	2,890	29	144
200 or more	7	5	3,034	30	433
Total	149	100	10,141	100	68

Table 3.4-14 Numbers of Philippine Foundries of Different Scales Producing Castings in Different Materials

Material / WORK FORCE	TOTAL	IRON	STEEL	ALUMINUM ALLOY	COPPER ALLOY	OTHERS
Below 20	37	15	-	11	9	2
20 - 49	58	36	4	10	8	-
50 - 99	27	18	3	5	1	-
100 - 199	20	16	2	-	2	-
200 or more	7	5	2	-	-	-
Total	149	90	11	26	20	2

b) Thailand

The Thai Ministry of Industry has given a figure of 25,000 tons/year for the total production of castings during 1977. The number of registered foundries was 253 in 1976, of which 60% produced iron, 10% steel and the remainder nonferrous castings.

The corresponding figures for 1980 given by the Thai Government representative at a conference held in Bangkok in 1981 were 86,000 tons/year of castings, produced in 200 iron, 12 steel, 5 ductile cast iron and 30 die casting foundries.

The foregoing figures are summarized in Table 3.4-15.

Table 3.4-15 Thai Foundries and Foundry Production

	1977	1980
Production (tons/year)	25,000	86,000
Foundries -		
- Iron	150	200
- Steel	10	12
- Ductile iron		5
- Die casting	(Remainder)	30
- Nonferrous		
Number of foundries	253	247

The statistics given above indicate a prodigious development between 1977 and 80, from 25,000 to 86,000 tons/year, corresponding to an annual growth averaging as much as 86%.

The Thai industrial structure, centered around agriculture, forestry and fishery, is firmly supported by the staple products of rubber, tin and sugar.

Promotion of manufaturing industries has been taken up by the Thai Government in recent years with such measures as prohibition of primary product exportation and incentives for exporting manufactured products. Measures have also been enforced for replacing currently imported components/parts with domestically manufactured products in such industrial branches as automobile, agricultural machinery, electrical appliances and construction equipment. In keeping with this development, the foundry industry is steadily converting itself from classical to modern shop practices and techniques. Foundries equipped with the most modern facilities, and operated with the most advanced management systems have come into being, including the Nawaloha Foundry (which used to be a division of Thai Cement) and the Siam Machinery and Equipment.

The market for Thai foundry products is constituted by manufacturers of such machinery as tin mine and sugar plant equipment, automotive plants and construction equipment.

Foundry technology is administered in Thailand by the Industrial Service Institute under the Ministry of Industry, which is currently planning to further establish a Technical Service Center for Metalworking, to include foundry work in its coverage. The Service Center will undertake research in foundry techniques, send out experts on visits of foundries to provide pertinent technical advice and guidance, as well as organize training courses for foundrymen, with the view to raising the level of technical capability of Thai foundries, and to disseminating modern foundry practices and techniques.

Foundry research is currently performed at the Thailand Institute of Science and Technology, while foundry management and productivity enhancement is being promoted by the Thai Management Development and Productivity Center.