Report No. 1647-IND

Problems and Prospects for Industrial Development in Indonesia

(In Two Volumes)

Volume II: Industry Surveys

May 25, 1978

Industrial Development and Finance Department
Industrial Projects Department

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Document of the World Bank

CURRENCY EQUIVALENTS

Currency: Rupiah (Rp)

US$1 = Rp 415 (January 1978)

Rp 100 = US cents 2.4

Rp 1,000, 000 = US$2,409

PRINCIPAL ABBREVIATIONS AND ACRONYMS USED

BAPPENAS	Government Planning Agency
BKPM	Badan Koordinasi Penanaman Model (Investment Coordinating Board), also ICB
BPS	Biro Pusat Statistek (Central Bureau of Statistics), also CBS
CBS	Central Bureau of Statistics
GOI	Government of Indonesia
ICB	Investment Coordinating Board
IDFC	Indonesian Development Finance Corporation
KIK	Kredit Investasi Kecil (Small-Scale Investment Credit Program)
KMKP	Kredit Model Kerja Penanaman (Working Capital Credit Program)
NAFED	National Agency for Export Development
PDFCI	Private Development Finance Corporation of Indonesia
PLN	State Electricity Corporation
PMA	Penanaman Modal Asing (Foreign Investment Projects)
PMDN	Penanaman Modal Dalam Negeri (Domestic Investment Projects)

PROBLEMS AND PROSPECTS FOR INDUSTRIAL DEVELOPMENT IN INDONESIA

Volume II: Industry Surveys

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This report is based on the findings of an industrial mission that visited Indonesia in November-December 1976. The mission included: Frederick T. Moore, Chief of Mission, Vladimir Dragomanovic, Economist, Andrew Ewing, Engineer, Yao-Su Hu, Economist, Anthony Johns, Engineer (Consultant), Peter MaCawley, Economist (Consultant), Has Tampubolon, Economist (Consultant).

PROBLEMS AND PROSPECTS FOR INDUSTRIAL DEVELOPMENT IN INDONESIA

Volume II: Industry Surveys

Summary

Introduction

i. The industrial mission from the World Bank visited Indonesia in late 1976; this report reviews the changes in the structure and performance of industry in the prior five years and what may reasonably be accomplished in the next five to eight years. The report is not primarily concerned with short-run problems, but in order to arrive successfully at the objectives in five to eight years, it will be necessary to take some actions to correct situations that have deteriorated and to exploit new opportunities that now exist.

ii. This report is in two volumes. Volume I, The Current Situation and Policy Issues, reviews the recent growth of industry, the characteristics of industrial investment, and policy issues concerning the planning for future growth. Volume II, Industry Surveys presents an analysis of four industries: mechanical wood products; pulp and paper; the engineering industries; and textiles.

Mechanical Wood Products

iii. The policies of the Indonesian Government have been successful in bringing about the construction of substantial new sawnwood and plywood production capacity over a relatively short period of time. However, if this capacity and the substantial addition which are planned for the next few years is to be effectively utilized to bring about the desired effect of increasing value-added and employment in this industry in Indonesia, then certain positive steps will have to be undertaken by the industry and by Government.

iv. On the basis of this preliminary overview, it has been concluded that such solutions might include:

(a) The establishment of an effective export timber marketing board. This Board would initially be set up by the Government but financed through contributions from industry to establish and monitor quality standards, and to develop markets and marketing channels. The board would

also establish links with major log importing organizations in order to assist in promoting an orderly phasing down of log exports in conjunction with a building up of processed wood exports into the same markets;

(b) The establishment of training and other technical facilities designed to assist plants to produce sawnwood and plywood to defined quality standards; and

(c) A review of taxing and pricing policies aimed at giving the industry more incentive to produce sawnwood and plywood domestically, and less incentive to export unprocessed logs.

Pulp and Paper

v. The main conclusions concerning this industry are as follows:

(a) The Indonesian pulp and paper industry has been slow to develop with the result that the country now imports over 80% of its paper requirements. No other country in the world with suitable fiber resources is so dependent on imports;

(b) Development of the industry now as in the past is confined to the construction and expansion of very small production units. Although these mills appear to be quite efficiently operated, they could never be profitable if not protected from import competition by a 60% tariff barrier;

(c) The protective tariff not only allows the existing industry to keep operating but is also attracting new private capital. New plants are also very small and this strategy is seen to be yielding a negative economic rate of return; and

(d) Large plants have been proposed for various locations in the country which would materially improve the domestic supply solution. At current world paper prices these projects are only marginally attractive but rates of return would improve substantially with the higher prices which are projected.

vi. Under these circumstances, a number of alternative development strategies could be considered but the one that appears to have the best chance of being effective would be for the Government to:

(a) Form a public sector pulp and paper company which would take over control of the five existing government-owned pulp and paper mills. The company could be staffed with people from the mills and from the Cellulose Industries Division of the Department of Chemical Industries;

(b) Empower this company to engage consultants as necessary, and to negotiate with the sponsors of the five or six major pulp and paper projects under consideration in the country;

(c) Select the best project for immediate development and form a partnership with the existing sponsor if this is deemed appropriate;

(d) Contract for a bankable feasibility study to secure loan finance for the project. Raise equity through a combination of government grant, funds generated by the existing plants, and contributions from any private partners; and

(e) Proceed to implement the project and commence evaluating a second project.

Engineering Industries

vii. In the period 1972-1976 the engineering industries have more than doubled in size and become wider-based and generally more efficient. However, comparisons of different industries within the subsector indicate that this development has taken place unevenly. In the consumer-based product areas the electronics and automotive industries have expanded rapidly over the period both in terms of output and employment, and are still expanding, though not always in an efficient way. The heavy engineering industries have expanded but excess capacity is widespread and there is currently little growth.

viii. The main causes of this apparent imbalance are: low productivity and poor, outdated machinery and equipment; shortage of skilled manpower and the lack of technical and managerial talent; difficulties in obtaining finance at reasonable terms; heavy additional costs which offset any comparative advantage from low wage rates; preference given to imported products in the capital goods sector.

ix. There is a need to have an overall strategy for developing Indonesia's engineering industries as a whole. Two major studies are recommended in this connection to assess possible measures to deal with key problem

areas and assist the development of an effective industrial strategy. These are: (1) an in-depth study of the problems in the capital goods sector; and (2) a study of the possibility of developing a strong export business.

x. Project areas suggested for early attention include:

(a) New Products: woodworking machinery; agricultural machinery; construction equipment; materials handling equipment; valves; specialist vehicles; small petrol and diesel engines.

(b) Productivity Improvement: extension of MIDC, linked to a new scheme to train graduate engineers.

Textile Industry

xi. The textile industry has been growing considerably in recent years. Its share in total industrial value added was 11% in 1970 and rose to 17% in 1973. In 1969 the output of knitting and weaving was 450 million meters and increased by 141% to 1,085 million meters in 1975/76. The number of spindles increased from around 482,000 in 1969 to 1,152,000 in 1975/76. This increase in capacity was also accompanied by an increase in productivity. The output per spindle was .07 MT p.a. in 1969, and .10 ton p.a. in 1976. The total capacity of dyeing, finishing and printing amounted to 665 million meters in 1970 and the actual output was 933 million meters in 1975/76. All non-cotton fiber was imported in 1969, but in 1975/76 there were four synthetic fiber making units with capacity totalling 59,000 MT per annum. The growth was also accompanied by the production of new products such as blended and texturized yarn, suiting and shirting, double knit, embroidery, brocade, and laces.

xii. Although the industry is in difficult times now, in the longer term, to the mid-1980's the prospects are much more favorable since present per capita consumption is low and is expected to grow steadily.

xiii. In an attempt to indicate the relative priorities or comparative advantages within the textile industry, an analysis was made of "representative" projects in weaving, spinning, fiber-making and garment making. The comparative calculations indicate quite clearly that garment making offers the best opportunities for investment within the textile industry, followed by weaving. Both spinning and fiber making appear quite unattractive. The internal rate of return is highest in garment making and the investment cost per job created is the lowest. The sensitivity measures and the foreign exchange effects are also generally the best. On these same points, weaving appears to be a favorable field by comparison to the other two.

VI. MECHANICAL WOOD PRODUCTS INDUSTRY

Introduction

6.01 In less than 10 years, log exports from Indonesia have developed from a very small base to the point where the country is now the world's largest exporter of non-coniferous sawlogs and veneer logs. The rapid development of this position, and the relative importance of Indonesia as a log exporter is revealed by the statistics in the following table:

Table 6.1

Major Exporters of Non-Coniferous Sawlogs and Veneer Logs

Country	Export Volume		
	1964	1969	1974
	(million cubic meters)		
Indonesia	0.1	3.7	18.0
Malaysia	5.1	11.1	12.2
Philippines	6.1	9.4	4.7
Ivory Coast	1.9	3.3	3.2
France	0.7	0.7	1.5
Other 1/	6.0	6.9	7.2
World Total	19.9	35.1	46.8

Source: FAO Yearbook of Forest Products, 1974

1/ Including Papua New Guinea, the United States, Cameroon, Congo, and other countries, all exporting less than 1 million cubic meters annually in 1974.

6.02 The volume of exports from Indonesia peaked in 1973 and subsequently declined. Most of this decline is due to a general slackening in the demand for timber which can be directly linked to the level of housing starts in Japan and North America. Log export data for recent years are summarized in the following table:

Table 6.2

Recent Export Figures for Indonesian Logs

Year	Volume (million m^3)	Value (US$ million)
1972	14.1	221
1973	18.7	553
1974	17.5	703
1975	13.5	469
1976 1/	15.0	550

1/ Preliminary estimate

6.03 Almost 60% of Indonesia's log exports are shipped to Japan, 20% to South Korea, and 15% to Taiwan. In these countries the logs are processed into sawnwood, plywood, and manufactured wood products, and in the case of Korea and Taiwan, most of these products are re-exported to the United States and Japan. Korea and Taiwan have become the world's largest exporters of plywood and this entire industry is based on logs from Indonesia, Malaysia and the Philippines. The Indonesian Government has recognized that by exporting unprocessed logs, the country is forsaking domestic employment potential. Therefore, all timber concession agreements now contain provisions that require the concession holder to provide for domestic processing of certain proportions of the timber harvested within a specified time.

6.04 This chapter examines the structure of the Indonesian timber industry and in particular the extent to which Government policies have been successful in promoting the growth of domestic processing as an alternative to log exports. A brief review of the forest resource base is given followed by a description of the existing industry. Finally the main factors which will determine the direction of future development are examined, including markets, economic aspects and Government policies.

Forest Resource Base

6.05 Timber is now Indonesia's second most valuable export commodity (after petroleum products). Attempts have been made to determine the extent of the resource base in order to project how long the current rate of extraction can continue, and although the information is not complete certain indicative conclusions can be drawn.

Area of Forest Land

6.06 About 120 million hectares, or over 60% of Indonesia's total land area, is classed as forest land. This is the largest forest resource in Asia and one of the largest in the world. The geographical distribution of forest land is approximately as follows:

Table 6.3

Distribution of Forest Land

Province	Total Land Area	Forest Land Area
	(million hectares)	
Sumatra	47	28
Kalimantan	54	41
Sulawesi	19	10
Maluku	8	6
West Irian	42	32
Java, Madura	13	3
Bali, Nusa Tenggara	7	2
	190	122

Source: Central Bureau of Statistics. Other sources suggest Indonesia's total land area is as much as 202.7 million hectares.

6.07 According to 1973 designations by the Directorate General of Forestry, this 122 million hectares of forest land was categorized as follows:

Table 6.4

Forest Land Categories, 1973

Type	Area (million ha)	Area (%)
Production	35.4	29.0
Protection	11.5	9.4
Production and Protection	4.7	3.8
Bare Land	12.7	10.4
Conservation	3.1	2.5
Not Categorized	54.8	44.9
Total	122.2	100.0

6.08 Up to June 1974, 50.5 million hectares or about 41% of the country's forest land had been surveyed for forest exploitation. Concessions for approximately 33.1 million hectares had been granted as follows:

Table 6.5

Forest Concessions Granted to 1974

Province	Area				No. of Concessions
	Total Forest	Surveyed	Forested	Concessions Granted	
	(million hectares)				
Sumatra	28	16.5	11.9	9.0	115
Kalimantan	41	26.7	19.7	20.2	226
Sulawesi	10	3.7	3.0	2.0	27
Maluku	6	2.6	1.9	1.3	14
West Irian	32	1.0	0.9	0.6	3
Other	5	n.a.	n.a.	n.a.	n.a.
Totals	122	50.5	37.4	33.1	385

Annual Allowable Cut

6.09 The total standing volume of logs in excess of 50 cm diameter on surveyed land has been estimated to be approximately 3,600 million cubic meters of timber of the following types:

Table 6.6

Estimate of Standing Volume, 1974 1/

Species	Volume		Percent
	Total	On Concessions	(%)
	(million m^3)		
Merchantable Species			
- dipterocarps	1,760	1,640	49.4
- others	1,090	928	30.6
- ramin	72	72	2.0
- agathis	10	8	0.3
Other species	632	549	17.7
	3,564	3,197	100.0

1/ On surveyed areas. Derived from data of the Central Bureau of Statistics.

6.10 The annual allowable cut (AAC) in Indonesia is calculated for each concession from the formula:

$$\text{AAC max.} = \frac{0.8 \times (\text{concession area}) \times (\text{volume per unit area, 50 cm and over}}{35}$$

This formula in effect will allow the volume of logs over a 50 cm diameter, except for a 20% safety factor, to be logged over a 35-year period. If timber is considered a renewable resource, the use of this formula implies that if a concessionnaire returns to a logged-over area 35 years after his original extraction operation, the timber less than 50 cm diameter which was left, together with new timber, would have restocked the area. Large scale logging operations have not been going on for long enough to test this assumption but there is some evidence to suggest that the character of the second-growth forest may be substantially different from the virgin stands, and the merchantable species now being extracted may not regenerate in substantial volumes.1/ Further examination of this aspect is outside the scope of this industrial survey but it is a matter receiving increasing attention as the areas of logged-over forest land increase.

6.11 In practice, the AAC formula is applied not to the total volume but to 100% of the dipterocarps, ramin and agathis, and 50% of the other merchantable species. Applying the formula in this way to the volume and area figures presented above gives a total AAC of some 50 million cubic meters annually. In 1973, the year of greatest logging activity so far, actual extraction was of the order of 21 million cubic meters annually. Within the framework of the Annual Allowable Cut concept therefore, there would appear to be considerable scope for increasing log production from Indonesia's forests. Moreover as more areas are surveyed and brought into production, the AAC as computed by the Forest Department may be expected to increase.

6.12 The forest data for Indonesia is not complete, and some of the figures are suspect. It is reported that certain concession operators may be logging their areas at higher rates than their Forestry Agreements allow. Nevertheless, in the country as a whole, there is little evidence of overcutting as defined by present forest management policies and it does appear that logging could continue at present or even somewhat higher rates for several decades to come.

Industrial Development

Sawmilling

6.13 Detailed statistics concerning the number of sawmills in the country are not available but there are reported to be as many as 4,000 "establishments" producing sawnwood. About three-quarters of these are very small operations using hand sawing techniques to produce sawnwood and wood products for local consumption. The 1971 Survey of Large and Medium Scale Manufacturing Industries reported information for 1053 mills as follows:

1/ In Sabah, for example, inventories of areas logged in the 1950's show a preponderance of quite different species from those found in unlogged areas.

Table 6.7

Sawmill and Wood Processing Plants[1/], 1971

Item	Units	"large" plants	"Medium" Plants	Total
No. of Plants	No.	38	1,015	1,053
Log Input				
- total	m^3/A	365,000	775,000	1,140,000
- average/plant	m^3/A	9,600	800	1,100
Production				
- total	m^3/A	205,000	410,000	615,000
- average/plant	m^3/A	5,400	400	600
Employees				
- total	No.	6,136	13,005	19,141
- average/plant	No.	161	13	18
Value of Output			6,900,000	13,300,000
- total	US$/A	6,400,000	6,800	12,600
- average/plant	US$/A	170,000		

1/ These statistics include some plants which further process sawnwood into various wooden manufactures; however about 85% of the value of the output is sawnwood.

6.14 These plants, designated "large" and "medium" in the survey are nevertheless small by world standards. At the time of the 1971 survey, most of the mills of any size were on Java and were sawing teak. About one-half of the mills in the "large" category were operated by Perhutani, a Government timber extraction and processing corporation. Total recorded timber production in recent years is not reliably available but the available data from three sources are reported in the following table:

Table 6.8

Reported Sawnwood Production

Year	Volume		
	Source 1[1/]	Source 2[2/]	Source 3[3/]
	(thousand cubic meters)		
1971	-	1,700	615
1972	-	1,700	-
1973	249	1,690	-
1974	545	1,690	-
1975	569	-	-
1976	1,100 (prelim.)	-	-

1/ Department of Industry.
2/ FAO Forestry Yearbook.
3/ Survey of Manufactguring Industries.

6.15 As previously noted, the figure of 615,000 cubic meters shown for 1971 by Source 3 (The Survey of Manufacturing Industries) applies to 1,053 medium and large sawmills in operation in that year. It is estimated that an additional 3,000 small sawmills were in operation and on the assumption that they processed an average of 200 cubic meters each during the year, total production for that year would be of the order of 1.2 million cubic meters. The FAO figures are reported as estimated and presumably include an estimate of production from all types of sawmill. The figures from the Department of Industry are substantially less than those from any other source and presumably apply only to those relatively new sawmills which have been licensed by the Department.

6.16 Although accurate estimates of sawnwood production are impossible with the available data, it would appear that in the early 1970's domestic production was between 1 and 2 million cubic meters annually. In the past 2-3 years the construction of new sawmills has been undertaken as a condition of timber concession operation and in 1976, it appears that these sawmills produced about 1.1 million cubic meters of sawnwood.

New Sawmill Construction

6.17 In 1976, there were 78 sawmills registered in the Department of Industry, 67 of these registered as domestic industries while 11 had some foreign ownership and were registered as such. Most of these plants have been constructed in the past 5 years and are not therefore listed in the data of the Survey of Manufacturing Industries presented in Para. 6.13. Some details of these new sawmills are presented in the following table.

Table 6.9

Registered Sawmills, 1976

Item	Units	PMA Plants 1/	PMDN Plants 2/
Number of Plants	No.	11	67
Capacity			
- total	m^3/A	350,000	1,500,000
- average/plant	m^3/A	32,000	22,000
1975 Production			
- total	m^3/A	n.a.	430,000 3/
- average/plant	m^3/A	---	10,500
Employees			
- total	No.	n.a.	9,700
- average/plant 3/	No.	---	145

1/ Foreign investment projects (Penanaman Modal Asing)
2/ Domestic investment projects (Penanaman Modal Dalam Negeri)
3/ 1975 production statistics were available for only 41 of the PMDN plants. Average capacity utilization in those plants reporting production was 49%.

6.18 These statistics highlight two important features of the Indonesian sawmilling industry:

(i) There have been substantial additions to capacity in the past five years. These new plants are much larger than those previously in existence and presumably have been built primarily as a result of contractual obligations under timber concession agreements; and

(ii) There is substantial underutilization of capacity in the sawmilling industry.

These aspects are discussed in a subsequent part of the chapter which deals with the present and future prospects of the sawmilling industry.

6.19 From the foregoing information, an estimate of the current structure of the entire sawmilling industry can be developed. All of the data must be considered approximate but in total they probably represented a reasonably accurate picture of the existing industry.

Table 6.10

Estimated Current Structure of the Sawmilling Industry

Sawmill type	No. of Plants	No. of Employees	Total Capacity	1976 Production
	(No.)	(No.)	(m^3)	(m^3)
Hand Operated	1,500	6,000	300,000	300,000
Small powered mills	1,000	13,000	1,000,000	700,000
Modern powered mills	78	9,700	1,850,000	1,100,000
Total	2,578	28,700	3,150,000	2,100,000

Plywood Industry

6.20 Prior to 1973 there were only four plywood plants in the country. Two of these were operated only sporadically and the other two, with a combined capacity of only about 20,000 cubic meters annually, produced at 40% or less of rated capacity. Between 1973 and 1976, 16 new plants have been constructed with a combined annual capacity of 36 million sheets equivalent to about 430,000 m^3 of plywood annually. Plywood production in recent years as reported by the Department of Industry is as follows:

Table 6.11

Plywood Production

Year	Sheets (million)	Volume (m^3)
1973	2.3	27,000
1974	6.0	71,000
1975	10.0	120,000
1976 (prelim)	20.0	240,000

Source: Department of Industry

General Assessment

6.21 The past five years have seen impressive growth in capacity in both the sawmilling and plywood industries. In 1976, out of a total log harvest estimated at 21 million cubic metres, about 6 million cubic metres or nearly 30% were processed domestically. Despite this impressive growth there is clearly sufficient scope for more domestic processing provided markets can be secured and an attractive investment climate established. These aspects are examined in the following sections of this chapter.

Development Prospects

6.22 The requirement of timber concession agreements that new timber processing plants must be built as a condition of operation of the concession have been quite effective in bringing about the construction of new domestic capacity. Furthermore, substantial new capacity is planned as shown in the following table:

Table 6.12

Proposed New Sawmills and Plywood Mills

Item	Units	Foreign Investment	Domestic Investment	Total
Plants proposed				
- sawmills	No.	25	44	69
- plywood mills	No.	6	6	12
Total Capacity				
- sawmills	m^3/A	1,400,000	1,300,000	2,700,000
- plywood mills	m^3/A	440,000	80,000	520,000
Employees				
- sawmills	No.	6,600	6,400	13,000
- plywood mills	No.	5,000	2,200	7,200
Investment				
- sawmills	$ million	64.3	60.0	124.3
- plywood mills	$ million	47.0	17.0	64.0
- Total	$ million	111.3	77.0	188.3

6.23 Assuming that these new plants are built, and that by 1980 all new and existing plants are operating at 70% of capacty, total log input to the domestic processing industry will be of the order of 12 million cubic meters annually. If annual log exports stabilize at about 15 million cubic meters, this would imply that domestic processing of Indonesian logs would increase from the present level of 30% to nearly 45%. This figure compares with about 43% in the Philippines and 50% in Malaysia and is clearly a feasible as well as a desirable objective.

6.24 Such progress would be impressive. However at the present time some of the existing plants are operating at substantially less than rated capacity and in some cases are not operating at all. To overcome these problems and to ensure that as new plants come on stream they make an effective contribution to output in this subsector, careful attention will have to be paid to ensuring that:

(i) Suitable markets are available for the processed timber; and

(ii) The industrial climate is such that the plants can be operated so as to generate reasonable rates of return on investment.

Markets

6.25 Up to the present time, all of the plywood and most of the sawnwood produced in Indonesia is consumed domestically. According to projections of the Department of Forestry, there is still considerable unsatisfied demand for these products in the country as shown below:

Table 6.13

Projected Domestic Demand of Sawnwood and Plywood

Item	1976		1980	
	Supply	Demand	Supply 1/	Demand
	(million cubic meters)			
Sawnwood	2.1	5.8	4.1	6.6
Plywood	0.24	0.28	0.7	0.31

1/ Supply in 1980 projected on basis of 70% utilization of projected capacity.

6.26 The demand figures for 1976 are based on expected figures of per-capital demand for sawnwood and plywood. Actual consumption was considerably lower and after allowing for exports, only about one-third of the reported domestic demand for sawnwood was met. This presumably reflects the inability of many Indonesians to finance timber purchases, making do with lower-cost traditional building materials. Prices of timber have risen sharply in recent months and it would seem inevitable that the actual domestic consumption of both plywood and sawnwood will be considerably less than the theoretical demand for many years to come. Thus realistically, although projections suggest a shortage of sawnwood in the domestic market for 1980, there will almost certainly be potential for an exportable surplus of several million cubic meters. An exportable surplus of plywood is also expected, in this case amounting to several hundred thousand cubic meters. These figures are disturbingly imprecise but in the absence of more definitive information concerning capacity, operating ratios and domestic consumption, it is impossible to pinpoint them with any greater accuracy. Nevertheless it is possible to briefly review the international markets for sawnwood and plywood of the types which would be produced in Indonesia and thereby assess the potential for marketing volumes of the magnitudes projected.

6.27 The Asian sawnwood trade is based on the logs of Indonesia, Malaysia and the Philippines. Statistics for 1974 based on the published data of FAO are as follows:

Table 6.14

Trade from Selected South-east Asian Sawnwood Producers, 1974

Importing Country or Region	Exporting Country				
	Malaysia	Singapore	Indonesia	Philippines	Total
	(thousand cubic meters)				
Asia					
- Japan	249	51	18	91	409
- Singapore	563	-	130	-	693
- Other	120	199	78	20	417
North America	164	68	5	74	311
Europe	636	210	85	41	972
Africa	62	175	5	-	242
Oceania	201	68	9	58	336
Total	1,995	771	330	284	3,380

6.28 These data suggest the following:

(i) The total market for South-east Asian sawnwood is only about 3.4 million cubic meters annually. There would clearly have to be some significant structural changes if Indonesia is to effectively market "several" million cubic meters; and

(ii) Japan, Singapore and Europe are the major markets for sawnwood from this region.

6.29 Similar statistics are available for plywood:

Table 6.15

Trade in Asia Plywood, 1974

Importing Country or Region	Exporting Country					
	S. Korea	China	Philippines	Singapore	Malaysia	Japan
	(thousand cubic meters)					
Japan	190	127	-	10	1	-
Other Asia	16	104	24	95	106	16
North America	643	357	78	47	29	93
Europe	23	62	12	93	55	12
Other	4	35	4	44	8	2
Total	876	685	118	289	199	123

6.30 Indonesia exported a few thousand cubic meters of plywood in 1976 but if exports are to rise to the "several hundred thousand" cubic meters projected for 1980, the country will clearly become a significant factor in this market.

6.31 Because it is a major supplier of logs to the sawmill and plywood industries of Japan, China (Taiwan) and Korea, Indonesia has the power to gradually bring about the type of structural change in the markets which will substantially increase trade in these products while at the same time lessening the trade in unprocessed logs. There is little incentive in the countries where processing is already undertaken to institute this type of structural change and it will have to be brought about by the deliberate initiation of policies within Indonesia. Such policies have been adopted with some success in Malaysia and in the Philippines. In fact the extent to which these policies have only been partially successful must be attributed to the very great increase in log exports from Indonesia over the past several years.

6.32 To date there has been little work specifically aimed at presenting "Indonesian timber" effectively in world markets. Much of the groundwork has already been accomplished in that the Indonesian species are virtually identical to those successfully marketed from Malaysia, Singapore and the Philippines. The major markets in Europe and Japan know these species and thus one of the major hurdles of marketing timber from a new supply source has been overcome. Product quality standards (the Malaysian Grading Rules) are accepted in world markets and an Indonesian version should further improve product marketability. Unfortunately, some of the early shipments of Indonesian timber did not meet specified quality standards and in some markets this has given the product a questionable reputation. To ensure that this situation does not deteriorate further and a healthy market is developed it is imperative that:

(i) The industry adopt and conform to a set of quality standards and grading rules; and

(ii) Steps be taken to ensure that the mills have the equipment and the trained personnel to produce sawnwood and plywood which conform to these quality standards.

Financial and Economic Climate

6.33 The export of unprocessed logs from Indonesia over the past 6-7 years has, for the most part, been a very profitable activity. The production of sawnwood and plywood for sale in the domestic and export markets has not. The reasons most frequently cited for this latter situation are:

(i) Capital costs are high in Indonesia because of: (a) the high cost of infrastructure associated with many of the developments; (b) rapidly escalating equipment prices; and (c) the high costs of importing equipment and materials into Indonesia due to high freight rates, and handling and other charges.

(ii) Operating costs are high in Indonesia because of (a) the cost of operating and maintaining associated infrastructure; (b) the lack of skilled labor which adversely affects operating efficiency; and (c) the high cost of importing operating and maintenance supplies due to high freight rates and handling charges.

6.34 In the past 2-3 years, world prices for sawnwood and plywood have dropped sharply as a result of declining demand due to a slowing-down in construction, particularly residential construction in Japan and the United States. Indonesian producers with new high-cost plants are in competition with existing plants in other countries which were built at lower cost, and which now have highly trained operating crews. In the future prices may be expected to rise again but at the present time it is exceedingly difficult for an Indonesia plant to compete in world markets with established plants in Malaysia, Japan, Korea and Taiwan.

6.35 This type of situation exists in many industries and in many countries but in this case, since many of the competing plants are using Indonesian logs, the means for a partial remedy is in the hands the Government. Specifically if taxation policies were reviewed to provide more incentive for domestic processing and less incentive for log exports to potential competitors in other countries, the competitive situation could be improved.

Conclusions

6.36 The policies of the Indonesian Government have been successful in bringing about the construction of substantial new sawnwood and plywood production capacity over a relatively short period of time. However, if this capacity and the substantial addition which are planned for the next few years is to be effectively utilized to bring about the desired effect of increasing value-added and employment in this industry in Indonesia, then certain positive steps will have to be undertaken by the industry and by Government. The critical problems which have been identified as impeding progress towards these goals are:

(i) The lack of well-defined markets into which large volumes of Indonesian-produced sawnwood and plywood can move; and

(ii) The lack of major financial incentive to shift from log exports to domestic processing.

6.37 Under normal circumstances it might be expected that there would be considerable incentive from within the industry to overcome these problems. However in Indonesia:

(i) The organizations who have constructed and are operating most of these plants are timber concession holders whose main business is exporting logs;

(ii) In many cases the plants were constructed reluctantly by the concession holder, merely in order to allow him to continue extracting and exporting logs; and therefore

(iii) Under these circumstances the normal motives for ensuring efficient operation of these plants are at least partially absent.

6.38 It is therefore imperative that the Government take steps to ensure that the considerable investments in sawmilling and plywood machinery are effectively and economically utilized. The first step should undoubtedly be an in-depth survey of the problems of the industry leading to recommendations for solutions. On the basis of this preliminary overview, it has been concluded that such solutions might include:

(i) The establishment of an effective export timber marketing board. This Board would initially be set up by the Government but financed through contributions from industry to establish and monitor quality standards, and to develop markets and marketing channels. The board would also establish links with major log importing organizations in order to assist in promoting an orderly phasing down of log exports in conjunction with a building up of processed wood exports into the same markets;

(ii) The establishment of training and other technical facilities designed to assist plants to produce sawnwood and plywood to defined quality standards; and

(iii) A review of taxing and pricing policies aimed at Giving the industry more incentive to produce sawnwood and plywood domestically, and less incentive to export unprocessed logs.

VII. THE PULP AND PAPER INDUSTRY

Introduction

7.01 Although the pulp and paper industry has obvious linkages to the timber industry, in the context of Indonesia the separate examination of these two subsectors is warranted because:

(i) The timber resources which constitute the major part of Indonesia's large and profitable timber trade are not necessarily those which would be most suitable for the domestic manufacture of pulp and paper;

(ii) At the present time, most of the paper manufactured in the country is produced from non-wood fibers; and

(iii) The development problems and prospects for the two subsectors are not the same.

7.02 The most significant feature of the Indonesia pulp and paper industry is the slow development of domestic production leading to a very large dependence on imports, despite the availability of a wide variety of fibers suitable for paper-making. Only 20% of the country's requirement for paper and paperboard is produced domestically, and much of this production is from imported pulp. In 1975, even though world prices were significantly depressed, imports of pulp, paper and paper products were valued at over US$70 million.

7.03 This chapter examines the history, present status and future prospects of the pulp and paper industry in Indonesia, giving particular emphasis to the factors which have constrained its development in the past, and to identifying programs and specific projects which could enhance its development in the future.

Structure of the Industry

Imports

7.04 Because 80% of Indonesia's paper requirements are imported, it is logical to begin any examination of the structure of the industry with a brief review of the paper importing business. In 1975, the volume of imports by principal grade and origin were as shown in the following table.

Table 7.1

Pattern of Paper Imports (1975) 1/

Grade Group	Amount by Origin					
	Japan	Other Asia	N.America	Europe	Other	Total
	(thousands of tons)					
Newsprint	14.1	3.3	16.0	9.2	4.1	46.7
Printing & Writing	19.0	5.5	7.2	3.5	0.1	35.3
Packaging Paper & Board	16.9	19.7	13.5	9.2	7.5	66.8
Speciality Papers	4.7	2.1	1.4	4.7	-	12.9
Paper Products	2.5	3.1	1.0	0.8	0.4	7.8
Total	57.2	33.7	39.1	27.4	12.1	169.5

1/ Foreign Trade Statistics of Indonesia

7.05 Although Japan is the largest single supplier country, it by no means dominates the supply picture. Substantial volumes of newsprint, for example, are imported from Canada, New Zealand, Norway and Finland. Kraft sack paper and linerboard are shipped primarily from the United States. Other important suppliers of various grades include China, Taiwan, Singapore, Sweden and France. The large number of suppliers make this market (and others in Southeast Asia) very competitive with few long-term contracts between the producer and the Indonesian importer or agent. Prices vary considerably, often being lower than the world prices between major trading partners during periods of over-supply, and very much higher when paper is in short-supply. The region is known as a "dumping ground" for major producers where neither formal nor informal price agreements are observed.

7.06 Imports of paper are important not only as the major source of paper supply, but also because the import price is the major determinant of the prices obtained by local producers. Most domestic production is in the printing and writing grades and the prices of competing domestic and imported supplies of these grades, after adjustment for all duties, taxes, and other charges, are generally within 5% of one another. Thus the variability of the prices of imported paper provides an element of instability in the domestic producers' market which is, however, partly offset by the system of check-pricing 1/ used to assess import duties.

Existing Domestic Capacity

7.07 At the present time there are 8 paper plants in operation in the country. In total these plants employ about 6,000 people. The current value

1/ Check-pricing is a system whereby prices are set by the Government for the purposes of computing import and export taxes. This removes the major incentive for under-invoicing to minimize these taxes.

of the assets of the industry is not known but to replace the existing capacity at today's prices would require an investment of the order of $150 million. The existing mills are as follows:

Table 7.2

Operating Pulp and Paper Plants in Indonesia

Plant and Ownership	Year Started	Capacity	1975 Production
		(tons/annum)	
Government-Owned			
- Padalarang	1923	4,900	4,700 1/
- Lejes	1940	14,000	13,800
- Blabak	1961	7,200	6,500
- Basuki Rachmat	1969	14,000	10,000
- Gowa	1967	15,000	10,900
Privately-Owned:			
- Surya Kertas	1975	9,000	- 2/
- Delta Paper Mill	1975	1,200	- 2/
- Inpama	1975	1,500	- 2/
Total		66,800	45,900

1/ Estimated
2/ These mills commenced operation in 1975; their production in that year is not known.

7.08 The Basuki Rachmat and Gowa mills have recently expanded, but the expansions were not fully operational in 1975. Otherwise, all of the Government-owned mills which are operating are running at close to full capacity. Most of this capacity is for printing and writing grades although cigarette paper, tissue, and some light boards are also produced. Two other mills are owned by the Government but are not now operating. The Pematang Siantar mill in North Sumatra was designed to produce 5,000 tons of newsprint annually and operations first commenced in 1962. It was closed down in 1965 but operated again in the late 1960's and early 1970's at very low production rates. In 1975, the paper machine from this mill was dismantled and shipped to Gowa where it formed the nucleus of that mill's expansion. The other mill which is not in operation is the Martapura mill located near Bandjarmasin in South Kalimantan. Construction of this mill commenced in 1959 and the first commercial operation was in 1972. At the present time, however, it is shut down and it is not clear whether it will ever be started up again. Brief descriptions of the operating mills are contained in the following paragraphs.

7.09 The Padalarang mill located near Bandung in West Java is the oldest in the country. Operations commenced in 1923 and were expanded

in 1938 with the addition of a second paper machine. A third paper machine to produce cigarette paper was added recently. The mill now produces up to 5,000 tons annually of printing, writing, cigarette and wrapping papers from rice-straw pulp made at the mill, supplemented with purchased pulp and waste paper. With the exception of the new paper machine, most of the equipment in the plant is obsolete and not in very good condition. Thus, although operations are as efficient as equipment limitations allow, chemical costs are high and paper quality off the older paper machines is low. The mill is reported to be modestly profitable but only as a consequence of the highly protected domestic market. The mill is located in a major rice growing region and there is apparently adequate rice straw over and above existing requirements to supply an expanded operation. However, no expansion is planned.

7.10 The Lejes mill in East Java is the country's largest and is currently expanding to a capacity of 24,000 tons through a program of pulp-mill expansion and paper machine modernization. This program is being financed indirectly by the Bank through Bapindo, the Development Bank of Indonesia. The mill produces printing and writing papers on two paper machines, from bleached rice-straw pulp manufactured at the mill, supplemented with purchased long-fibered pulp and waste paper. As part of the current expansion plan, a chlorine and caustic plant is being installed. The mill has generated profits in each year since 1972 when domestic paper prices rose sharply through the imposition of higher duties on imports. The current expansion should improve the financial position of the mill as substantial increases in production will be achieved for a relatively modest investment. The Lejes mill has tentative plans for further expansion by the addition of a new pulping line and a new paper machine with a capacity of 45,000 tons annually. There is insufficient rice straw in the region to support an expansion of this magnitude and the company proposes to use bagasse.

7.11 The Blabak mill in Central Java has the capacity to produce 7,200 tons of printing and writing papers annually using bleached rice-straw pulp manufactured at the mill together with purchased long-fibered pulp. The mill was built in the late 1950's, partially financed through Italian aid, and was later owned and operated by Bapindo. Like the four other Government-owned mills it is now run as an independent corporation under the supervision of the Directorate General of Chemical Industries. The mill was built to use the Italian two-stage Pomilio pulping process but this has been modified to a conventional soda cook, similar to that utilized in the Padalarang and Lejes mills. There is apparently ample excess rice-straw in the region and the mill is proposing an expansion of some 14,000 tons annually. Application has been made to Bapindo for assistance in financing this project. At the present time, the mill is reported to be barely profitable.

7.12 The Basuki Rachmat mill near Banjuwangi in East Java produces printing and writing papers from bleached sulphate bamboo and pine pulp. The mill was supplied under a Japanese reparation scheme and includes a chemical recovery system. With the assistance of a loan from Bapindo the

mill has recently been optimized and effective capacity increased from 9,000 to 14,000 tons annually. An electrolytic plant for producing chlorine and caustic soda was included in this project. The mill was originally designed to utilize solely bamboo as raw material but harvesting and operating problems in the early years led to the establishment of plantations of Pinus merkusii. The mill began using pine several years ago, apparently successfully. At the expanded production level, this mill is expected to be moderately profitable.

7.13 The Gowa paper mill near Ujung Padang in South Sulawesi was designed and built along with the Basuki Rachmat mill as part of a Japanese reparation scheme. The mills are similar in design and concept. The Gowa mill has recently expanded production from the original 9,000 tons annually to 15,000 tons, by adding the rebuilt machine taken from the now defunct Pematang Siantar mill. A coating line for printing and writing paper production was added at the same time, and this expansion, financed in part by Bapindo, is now in commercial operation. This mill is operated efficiently within the limitation of the available equipment. Gowa's paper is considered to be among the best of the domestically produced grades and the company generates modest profits. To decrease the problems associated with using bamboo as a raw materials, the company is also utilizing locally obtained mangrove. In addition, plantations of pine and eucalyptus are being established and in the long term, an expansion based on these raw materials is contemplated.

7.14 None of the three newly constructed private mills includes an integrated pulping facility and all use imported pulp. The Impama mill in Jakarta is designed to produce 1,500 tons per annum of tissue and in this case the pulp furnish is supplemented with waste paper. The Surya Kertas mill in Central Java will produce 9,000 tons of printing and writing paper. The Delta paper mill in North Sumatra will produce 1,200 tons of cigarette paper annually.

Current Development Activity

7.15 The Directorate of Chemical Industries reports that nine new mills, all in the private sector, are presently under construction in Indonesia, and licenses have been granted to a number of others. Key features of those mills reported to be actually under construction are summarized in the following table.

Table 7.3

New Pulp and/or Paper Mills
Under Construction in Indonesia

	Capacity (tons/A)	Type 1/	Start-up Date	Estimated Capital ($ million)
West Java				
- Bekasi Tegush	12,000	(d)	1977	n.a.
- Pindodeli	9,000	(a)	1977	4.5
- Unipa Daya	18,000	(a)	1977	5.0
- Karya Tulada	4,000	(c)	n.a.	n.a.
- Papyrus Sakti	4,000	(c)	1977	1.0
East Java				
- Tjiwi Kimia	12,000	(a)	1977	6.0
- Sarawati Bhakti	14,000	(a)	1977	9.5
- Pakerin	24,000	(b)	n.a.	n.a.
- Eureka Abad.	12,000	(d)	n.a	n.a.

1/ Type Key: (a) printing & writing, imported pulp
(b) printing & writing, pulping included
(c) other grades, imported pulp
(d) other grades, pulping included

7.16 If completed on schedule, this program will bring the installed paper production capacity in Indonesia to a total of 176,000 tons annually (equivalent to above 160,000 tons of effective capacity), of which approximately 110,000 tons would be in printing and writing grades. By 1980, the total demand for paper is expected to reach approximately 410,000 tons, so that substantial imports would still be required in all grades except printing and writing paper. Moreover, because much of the new capacity would use purchased pulp, imports of pulp would increase from a present level of 20,000 tons to about 70,000 tons annually. Although current development activity is impressive in terms of the number of projects, these are on a very small scale and in view of the growing demand, they will not materially reduce the country's reliance on imports.

Technology

7.17 The existing industrial plants, and those under construction, can be grouped in three categories according to the level of technology employed.

(i) Non-integrated Paper Mills: These are the simplest mills, comprising one or more paper machines with a stock preparation system and associated service plants. Fiber furnish for the paper machine, consisting of pulp and sometimes waste paper, is purchased externally. The three existing privately-owned mills, and six of the nine mills under construction are of this type.

(ii) Integrated Pulp and Paper Mills without Chemical Recovery: Three of the Government mills (Padalarang, Lejes and Blabak), and three of the mills under construction are of this type. All are pulping rice straw by the soda process and the spent liquor after cooking is simply discharged from the mill as effluent. Chemical recovery processes are technically feasible for these plants but they would be complicated by the high levels of silica in the rice straw, and would be of doubtful economic worth in view of the small plant sizes.

(iii) Integrated Pulp and Paper Mills with Chemical Recovery: The Basuki Rachmat and Gowa Mills are fully integrated sulphate pulp mills with chemical recovery sytems. In basic process design they are therefore similar to modern pulp and paper mills throughout the world. However, their design production capacity is perhaps one-fifth of what might be considered the minimum economic size for this type of plant and, as discussed below, the costs of production are therefore excessively high.

7.18 Basic processes in the pulp and paper industry have not changed substantially over the past 20 years although many technological improvements have led to improved yields, better product quality and lower production costs. Most of the equipment in use in Indonesian mills is thus similar in concept to the large, modern equipment constructed today and can, at least in principle, produce similar grades of paper. The newer mills in Indonesia are still very small by modern standards, and in order to keep their capital costs low the designers have patterned their equipment along the lines of that in the older mills. Again, these mills are capable of producing good quality paper but operating costs are high because:

(i) The equipment is smaller and slower and has some costs which are more-or-less fixed per piece of equipment (labor and some overheads, for example), making them much higher on a per ton of paper product basis;

(ii) Modern mills incorporate extensive facilities for the recovery and re-use of fiber and chemicals whereas older mills (or very small mills using old designs) do not;

(iii) Older mills are less efficient in terms of their utilization of heat and power; and

(iv) Older mills incorporate less sophisticated quality control features and the varying quality of paper leads to losses in the finishing operations. In Indonesia's oldest mill, Padalarang, these losses range up to 25% of the production off the paper machine; in the newer mills, 10-15 seems to be normal.

7.19 By patterning their equipment on the older designs, the engineers responsible for specifying equipment in the newer Indonesian mills appear to be able to keep investment costs per ton of production capacity comparable to those which might be expected for much larger plants and thus minimize the dis-economies of small-scale construction. However, operating costs are substantially higher for the technological reasons noted above, and also because Indonesia (in common with many developing countries) is forced to pay higher prices for many chemicals and other imported raw materials due to high transportation costs and surcharges on the relatively small volumes involved. Although there are so many variations from plant to plant that these factors are difficult to quantify, the following table has been prepared to show the approximate differences between operating costs in the existing Indonesian industry, and in an economically-sized plant in an industrialized country.

Table 7.4

Comparative Production Costs - Indonesia and an Economic-Sized Plant in an Industrialized Region

Item	Typical Costs		Difference due to:		
	Indonesia	Comparison 1/	Technology	Prices	Total
	(US$/ton)		(US$/ton)		
Fiber	115	80	25	10	35
Chemicals	105	60	15	30	45
Other Supplies	90	55	20	15	35
Fuel, Power	80	60	20	0	20
Maintenance	50	20	25	5	30
Labor	70	70	* 2/	* 2/	0
Overhead	110	25	85	0	85
Depreciation	40	40	-	0	0
Total	660	410	190	60	250

1/ A hypothetical plant about 5 years old, producing 100,000 tons per annum of printing and writing papers in a location where chemicals and other supplies are available at competitive prices.

2/ Direct wages in Indonesia are about one-tenth the levels in a "typical industrialized-country paper mill". However, the mills are so small that about ten times as much labor per unit of output is employed. Thus the potential advantages of relatively low wage rates in Indonesia is lost.

It can be seen that the existing Indonesian pulp and paper mills suffer a basic cost disadvantage due to equipment size, the lack of equipment sophistication, and their location. No matter how efficiently these plants may be operated, they suffer a substantial cost disadvantage by comparison with economically sized plants in other regions. Most of the plants now under construction in the country will suffer a similar disadvantage.

Profitability

7.20 Recent production and operating cost data were examined for four of the Government-owned mills and using this data, an approximate overall profit-and-loss statement for the existing pulp and paper industry has been developed. The following table shows the results of this analysis on a "per ton of paper" basis. The table also illustrates how the CIF cost of imported paper sets the price for the domestic industry.

Table 7.5
Economics of Pulp and Paper Production in Indonesia 1/

Item	Amount (US$/ton)	
Imported Paper		
CIF Cost		460
Duty	280	
Handling and Other Changes	80	360
Prices ex-warehouse		820
Domestic Production		
Price ex-warehouse		820
Discounts 2/	20	
Freight & Handling	50	
Commission, etc. 3/	30	100
Mill Net Sales Revenue		720
Production Costs		
Fiber	115	
Chemicals	105	
Other Supplies	90	
Fuel, Power	80	
Maintenance	50	
Labor	70	
Overhead	110	
Depreciation	40	660 4/
Total		
Profit Before Taxes		60

1/ Based on average data from operating mills.
2/ These discounts are probably given to volume customers, or for prompt payment.
3/ Commissions are paid to sales agents in the main consuming centers.
4/ Of which about US$300/ton is foreign exchange.

7.21 These data show quite clearly that:

(i) Direct operating costs exceed by a wide margin the cost of importing paper;

(ii) The profit margin of the domestic industry is substantially less than the duty applied to imported paper; and

(iii) The profit margin is extremely sensitive to the CIF cost of imported paper; a reduction in the import price of less than 10% would eliminate the profits of the Indonesian industry.

Development Potential in the Industry

7.22 Despite the fact that three of the five Government-owned mills have recently completed expansion programs, three new privately-owned mills have just commenced operation, and nine more mills are currently under construction, Indonesia imports more paper now than in 1970 and, unless a timely start is made on some of the large projects which have been proposed but not yet started, import requirements will be substantially more by 1980. This situation is illustrated in the following Table which shows demand and capacity for 1970 and 1975, with a projection to 1980.

Table 7.6

Past, Present and Projected Future 1/
Supply and Demand Balance

	Plants in Operation (No.)	Effective Capacity 2/ (tons/A)	Total Demand (tons/A)	Supply Gap (tons/A)	Approximate Import Value 4/ ($/A)
1970	5	24,000	140,000	116,000	60,000,000
1975	8	60,000	230,000	170,000	85,000,000
1980	17	160,000	410,000 3/	250,000	120,000,000

1/ Considering only those plants actually under construction.
2/ Calculated as 90% of reported rated capacity.
3/ For details of this demand projection and projections to 1985, see Annex 7-1.
4/ At 1977 prices.

7.23 Because it takes from 3-4 years to plan, design and build a major pulp and paper plant it is unlikely that the situation in 1980 will be substantially different from that projected above. After 1980, development could follow a number of alternative routes including:

(i) A halt in the construction of new capacity, with increased reliance on imports;

(ii) The continuation of the present practice of constructing and expanding small units primarily using imported pulp or agricultural residues; or

(iii) The construction of one or more relatively large units to supply both pulp and paper to the domestic market.

The Government's present policy is to attempt to promote development in the private sector. Licenses have been given for the construction of large and small mills but, up to the present time, only small mills have been built and, as illustrated above, the supply gap is widening. In implementation, therefore, development strategy lies somewhere between alternatives '(i)' and '(ii)' above. Annex 7-1 contains a preliminary comparative analysis of the costs and benefits associated with each of these strategies. 1/ The following table shows the results of this comparison.

1/ Annex 7-1 "Development Potential in the Pulp and Paper Sector" presents details of the strategies examined, analyses of the fiber resources of Indonesia as they related to the potential for pulp and paper production, and reviews of the domestic and export markets in this sector.

Table 7.7

Comparison of Alternative Development Strategies

In the Pulp and Paper Subsector

Item Brief Description	Strategy 1 No New Mill Construction	Strategy 2 Continue Small Mill Construction	Strategy 3 Large and Medium Mill Construction
Domestic Supply (thousand tons)			
1980 (Demand: 410)	146	146	146
1985 (Demand: 600)	160	210	446
1990 (Demand: 880)	160	320	650
Self-Sufficiency (percent)			
1980	36%	36%	36%
1985	27%	35%	74%
1990	18%	36%	74%
Projected Cost of Pulp and Paper Imports in 1990 ($ million)	410	370	140
Investment Program 1978 - 1990 ($ million)	0	290	1,200
Employment Created (jobs)	0	10,000	10,000
Cost of Employment Creation ($/job)	-	29,000	120,000
Return on Investment 1/ (percent)			
Financial	-	6%	17%
Economic	-	negative	11%
Cost of Strategy 1978 - 2000 ($ million)			
Imports	10,100	9,360	5,550
Production Cost	1,300	2,050	3,550
Capital	0	290	1,200
Total	11,400	11,700	10,300
of Which Foreign Exchange	10,600	10,400	7,700
Net Benefit 2/ of Strategy, Using Economic Prices, Discounted to Present Value at 10% ($ million)			
At Current Paper Prices	0	(180)	70
At prices up by 20%	0	(140)	380
At prices down by 20%	0	(230)	(270)

1/ Financial returns estimated using current 60% duty protection on most grades. Economic return based on international prices but foreign exchange and labor shadow prices estimated at 125% and 50% of current market values.

2/ The "benefit" of Strategies 2 and 3 has been taken to be the differential net present value by comparison with Strategy 1. Thus the net benefit of Strategy 1 is by definition, zero.

7.24 The above results, although based on data assumptions which must be considered approximate, allow the following conclusions to be drawn.

(i) By 1990, imports of paper could cost Indonesia between US$140 million and US$400 million annually (in 1977 prices) depending on the development strategy adopted for the pulp and paper industry;

(ii) The present strategy of small mill construction is inefficient and expensive. It generates a low rate of financial return, a negative rate of economic return, and irrespective of paper price assumptions over a wide range, it is consistently the highest cost solution to Indonesia's paper supply problem; and

(iii) A program of large mill construction considered overall is not outstandingly attractive in terms of financial or economic rate of return but it would substantially reduce the foreign exchange cost of supplying paper. If the paper prices used in the analysis are reasonably representative of the real price level (in relation to production costs and capital costs) then building large pulp and paper mills generates an economic rate of return slightly better than 10% and the incremental net present value of this strategy (at a 10% discount rate) is $70 million. If paper prices increase in relation to other costs, however, then the construction of large mills becomes a much more attractive alternative.

7.25 The generally low rates of return which are projected for any investment in Indonesia's paper industry are typical of the results obtained at the present time when evaluating investments in this industry in most areas of the world. The costs of building and operating pulp and paper mills have increased more rapidly than product prices and at the same time the demand for paper has slumped as a result of the world economic slowdown. Present price levels are not sufficiently high to warrant construction of new capacity and as demand begins to pick up, a supply shortage in the medium term future, leading to price increases, appears inevitable.

Project Analysis

7.26 The tentative program of large mill construction evaluated in the preceding analysis included: four medium-sized, partially integrated mills to produce printing, writing and packaging grades; a chemical pulp mill; a kraft paper and board mill; and a newsprint mill. The overall profitability of this program was shown to be marginal, by comparison with importing paper, but would become more attractive if world paper prices increases. If a program of large mill construction is to be embarked upon, it is evident that some ranking of the projects within such a program should be undertaken in order that priorities can be assigned.

7.27 At least six mills which would fit into such a program have been proposed as projects in Indonesia. In some cases foreign partners have been found, the necessary licenses obtained, and timber concession agreements reached. Nevertheless, at the present time not one of these projects is being implemented and there has been no notable progress towards implementation in the past 1-2 years. Reasons for this include:

(i) The high cost of the infrastructure which would be required for some of the projects;

(ii) The large amount of investment capital required, which in some cases may be beyond the resources of the present sponsors to mobilize; and

(iii) The rather modest projections of profitability of the previous projects.

7.28 In order to analyze these projects more closely, updated estimates of costs and benefits have been developed and are presented in Annex 7-1. The projects have been reviewed more or less as proposed although in some cases the capacity and product line were modififed to better suit the projected domestic market. The projects are listed below. It should be noted that some of them would be complementary in supplying the domestic market in Indonesia whereas others would be competing for the same market.

(i) Aceh: an unbleached kraft paper and board mill which at full capacity would produce 170,000 tons per annum of sack kraft paper, linerboard, and other kraft paper for the domestic market.

(ii) South Sumatra: a bleached kraft pulp and paper mill which at full capacity would produce 80,000 tons per annum of printing and writing paper, and 100,000 tons per annum of pulp, all for the domestic market.

(iii) Central Java: a newsprint mill which at full capacity would produce 160,000 tons of newsprint for the domestic market. The 24,000 tons of chemical pulp required for this production would be manufactured elsewhere.

(iv) East Java: a bagasse-line addition to the Lejes mill to produce 45,000 tons of printing and writing paper for the domestic market.

(v) South Central Kalimantan: a 200,000 ton per annum long and short fibered bleached kraft pulp mill. By 1990, as much as 140,000 tons of this product could be sold in Indonesia, the balance would have to be exported.

(vi) East Kalimantan: a 200,000 ton per annum short-fibered bleached kraft pulp mill. By 1990, approximately 70,000 tons of this product could be sold in Indonesia, the balance would have to be exported.

7.29 The following table summarizes the key features and the results of preliminary financial and economic analyses for each of the six projects examined. The financial rates of return were estimated using 60% duty on all paper grades except newsprint, where a 10% duty was applied. No duty was applied to pulp prices. The economic rates of return were estimated using international prices except that unskilled labor and foreign exchange were respectively shadow-priced at 60% and 125% of current market prices.

Table 7-8

Comparison of Potential Pulp and Paper Projects

Project	1	2	3	4	5	6
Location	Aceh	South Sumatera	Central Java	East Java	South/Central Kalimantan	East Kalimantan
				(US$ million)		
Production (thousand tons)						
- Kraft Paper and Board	170	-	-	-	-	-
- Printing and Writing	-	80	-	45	-	-
- Bleached Pulp	-	100	-	-	200	200
- Newsprint	-	-	160	-	-	-
Exports						
- Bleached Pulp	-	-	-	-	60	130
Capital Cost ($ million)	410	375	225	140	350	350
Employment Created (jobs)	3,200	3,200	2,000	1,000	1,600	1,600
Cost of Employment Creation ($/job)	128,000	117,000	112,000	140,000	187,000	187,000
Return on Investment						
- Financial (%)	17	15	10	9	10	9
- Economic (%)	10	12	12	7	14	13
Factor by which costs or benefits must be multiplied to obtain a 15% Economic Rate of Return						
- Paper Prices	1.27	1.13	1.09	1.36	1.06	1.10
- Capital Costs	0.72	0.83	0.85	0.57	0.90	0.86
- Production Costs	0.12	0.63	0.82	0.24	0.83	0.71

Discussion

7.30 The data contained in the preceding table is of a preliminary nature, and based on tentative estimates of markets, prices, and capital costs. Nevertheless, comparison with other projects for which detailed analyses have been undertaken shows the results to be of the right order. The results lead to the following conclusions:

(i) The two projects which show a reasonably attractive financial rate of return (Aceh and South Sumatra) are those which would be selling in the domestic market with 60% duty protection;

(ii) The two projects which show a reasonably attractive economic rate of return (the pulp export projects on Kalimantan) would be selling significant tonnage into rather uncertain international markets. Moreover a significant part of the return is derived from the 125% valuation of foreign exchange which may or may not be realistic. Without this adjustment, the economic rates of return for these two projects would drop by 2-3 percentage points.

(iii) All projects are quite sensitive to market price changes, and less sensitive to changes in capital costs or production costs; and

(iv) As might be expected, the larger mills generate the highest rate of return.

7.31 None of the projects stands out as being particularly attractive in financial and economic terms. Nevertheless, all would provide the country with needed supplies of pulp and paper and provide insulation against fluctuations in world supply and prices; all would contribute to the transfer of technology to Indonesia; all would generate attendant benefits in associated industries such as paper converting, construction, engineering, transportation and chemicals; and with the exception of the two projects in Java, all would have a substantial development effect in regions which are presently underpopulated and underindustrialized. Moreover, relatively modest increases in world prices would raise the rate of return for several of these projects to acceptable levels. Given the small amount of new capacity which is being installed worldwide, and the expected steady increases in the demand for paper and paperboard, such prices increases would appear to be inevitable if capital for new capacity is to be attracted back to the industry.

7.32 The main conclusions which can be drawn from the analysis of development prospects presented in Annex 7-1 and summarized in the preceeding paragraphs are:

(i) Indonesia has the fiber resources for a wide range of pulp and paper projects. Of particular value are the long-fibered resources (both natural and planted) which are rare in Asia; and

(ii) The domestic market in Indonesia is large enough to provide immediate opportunities for large-scale development producing a variety of products. The export market for long-fibered grades is also attractive, and could provide a temporary outlet for excess production from large-scale plants.

Conclusions

7.33 The main conclusions which can be drawn from the material contained in this Chapter are:

(i) The Indonesian pulp and paper industry has been slow to develop with the result that the country now imports over 80% of its paper requirements. No other country in the world with suitable fiber resources is so dependent on imports;

(ii) Development of the industry now as in the past is confined to the construction and expansion of very small production units. Although these mills appear to be quite efficiently operated, they could never be profitable if not protected from import competition by a 60% tariff barrier;

(iii) The protective tariff not only allows the existing industry to keep operating but is also attracting new private capital. New plants are also very small and this strategy is seen to be yielding a negative economic rate of return; and

(iv) Large plants have been proposed for various locations in the country which would materially improve the domestic supply solution. At current world paper prices these projects are only marginally attractive but rates of return would improve substantially with the higher prices which are projected.

7.34 Indonesia has many development options and the pulp and paper sector is only one of them. It is hoped that the material contained herein will be of assistance to the Government in determining:

(i) What priorities should be given to promoting development of this sector in relation to others; and

(ii) What projects (or types of project) should be considered of highest priority within the sector.

Recommendations

7.35 If development of the pulp and paper sector is given priority by the Government, there are a number of steps which should be taken to facilitate the implementation of projects which would provide an economic benefit to the country. Recent experience shows that leaving such development to the private sector is not an effective way to secure the desired results, primarily because of the high investment costs of an economic-sized plant, the high costs of related infrastructure, and the relatively marginal rates of financial return. Under these circumstances, a number of alternative development strategies could be considered but the one that appears to have the best chance of being effective would be for the Government to:

(i) Form a public sector pulp and paper company which would take over control of the five existing government-owned pulp and paper mills. The company could be staffed with people from the mills and from the Cellulose Industries Division of the Department of Chemical Industries;

(ii) Empower this company to engage consultants as necessary, and to negotiate with the sponsors of the five or six major pulp and paper projects under consideration in the country;

(iii) Select the best project for immediate development and form a partnership with the existing sponsor if this is deemed appropriate;

(iv) Contract for a bankable feasibility study to secure loan finance for the project. Raise equity through a combination of government grant, funds generated by the existing plants, and contributions from any private partners; and

(v) Proceed to implement the project and commence evaluating a second project.

INDONESIA

INDUSTRIAL MISSION

ANNEX TO CHAPTER VII

DEVELOPMENT POTENTIAL IN THE PULP AND PAPER SECTOR

A. Introduction

1. At the present time, capacity in the Indonesian pulp and paper subsector is limited to a number of relatively small production units and although plans have been announced for the construction of some large plants, none of these appear to be sufficiently far advanced to have any impact on the projected supply gap before 1980. In that year, projections suggest that although 17 plants will be in operation with a combined annual capacity of 160,000 tons, (compared with 8 plants and 60,000 tons capacity at present), paper and paperboard imports will have risen from a current level of 170,000 tons to 250,000 tons annually. Moreover much of the new capacity will use imported pulp causing pulp imports to increase from 20,000 to 70,000 tons.

2. By 1980, the country will be producing most of its requirements for printing and writing papers and for some packaging grades. However, large quantities of newsprint, kraft packaging grades and pulp will still have to be imported. The most efficient way to avoid these imports would be to construct large plants using wood as a raw material. Projects of this type have been identified but progress towards their implementation has been slow. This Annex supports and expands the material contained in Chapter VII dealing with the potential for development of the pulp and paper sector in Indonesia. It begins with an examination of the fiber resource base and a review of the domestic and export market potential. The alternative sectorial development strategies and potential project opportunities compared in the Chapter are then described.

B. Fiber Resources

3. Indonesia's forest and non-wood fiber resources suitable for pulp and paper manufacture have been examined in a number of studies undertaken by the Bank and others during the past five years. 1/ No detailed coverage

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1/ IBRD; Agricultural Sector Summary, 1972.
IBRD; Planning for Industrial Development in Indonesia, 1972.
FAO; Forest Resources in the Asia and Far East Region, 1976.
CIDA; National Pulp and Paper Survey, 1972.
University of Gadjah Mada, Indonesia; Foreign Investment in the Forest Based Sector of Indonesia, 1975.
Government of Indonesia; Sumatra Regional Planning Study, 1976.

of this material is presented here because the quantity and diversity of the available resources, together with the potential for the development of industrial forest plantations, are substantial enough to allow the establishment of almost any conceivable pulp and paper industry. The following paragraphs therefore merely summarize the significant factors concerning each major type of fiber resource.

Natural Forest Resources

4. About 120 million hectares, or over 60% of Indonesia's total land area, is classed as forest land. This is the largest forest resource in Asia and one of the largest in the world. The geographical distribution of forest land is approximately as follows:

Distribution of Forest Land

Location	Total Land Area	Forest Land Area
	-----(million hectares)------	
Sumatra	47	28
Kalimantan	54	41
Sulawesi	19	10
Maluku	8	6
West Irian	42	32
Java, Madura	13	3
Bali, Nusa Tenggara	7	2
	190	122

Source: Central Bureau of Statistics. Other sources suggest Indonesia's total land area is as much as 202.7 million hectares.

5. The total growing stock of timber in excess of 50 cm diameter on land for which concessions have already been granted 1/ has been estimated by the Directorate General of Forestry to be about 3,200 million cubic meters. An approximate breakdown by region and major species group has been prepared from a variety of sources as follows:

1/ Based on 1974 data when 385 concessions covering about 33 million hectares had been granted.

Distribution of Growing Stock

Location	Volume					
	Dipterocarp	Ramin	Agathis	Pine	Other	Total
	(million cubic meters)					
Sumatra	394	1	-	21	344	760
Kalimantan	1,166	74	6	-	834	2,080
Sulawesi	3	-	2	-	175	180
Maluku	77	-	1	-	62	140
West Irian	-	-	-	-	40	40
Java, Madura	-	-	-	8	n.a.	n.a.
Bali, Nusa Tenggara	-	-	-	-	-	-
	1,640	75	9	29	1,455	3,200

6. The figures are approximate but they indicate that more than one-half of the standing wood volume in Indonesia is in the dipterocarp species family whereas most of the remainder, designated "other", is made up of a large number of mixed tropical hardwood species. The figures also show that almost 90% of the country's surveyed timber resources are in Sumatra and Kalimantan.

7. The use of dipterocarps and mixed hardwood species for manufacturing pulp and paper is a reasonably well established practice. A mill in the Philippines is producing newsprint and packaging paperboard using a large percentage of dipterocarp species, and for several years Japanese pulp and paper producers have been importing chipped wood from southeast Asia. Nevertheless it must be recognized that these woods are not preferred species for papermaking, primarily because of their short fibers (which do not provide much of the strength necessary in many grades), their dark color, and the lack of uniformity which results from an uncontrollable mix of species. The mill in the Philippines is overcoming these problems by switching to fast-growing plantation species as quickly as they become available, and in the meantime by doing some sorting of the tropical hardwood finish. The Japanese mills are confining their usage of these woods to a limited number of grades where their shortcomings are of relatively minor importance, and to minor proportions of the total fiber furnish. In both countries the paper products manufactured from dipterocarps and mixed tropical hardwoods are consumed domestically and do not face international competition in world markets. Thus, although there are a number of countries which, like Indonesia, have large resources of tropical hardwoods, generally believed to be suitable for producing pulp and paper, there has been relatively little activity in this area, particularly if the product is to be sold in international markets. Instead many countries are establishing plantations of fast-growing eucalyptus and other hardwood species which can generally be grown and harvested at costs comparable to or cheaper than those which would be encountered when logging a natural tropical forest.

8. Despite these reservations, it would certainly be possible to establish a project using indigenous Indonesian hardwoods, and several such projects, particularly in Kalimantan, have been proposed. However in considering any such project, certain factors should be kept in mind:

(i) The project would benefit by having as much as possible of its market within Indonesia, to avoid the problems of entering international markets with an unknown product;

(ii) To the extent that the project would sell in international markets, price discounts should be anticipated; and

(iii) Any such project should be carefully compared with a plantation pulpwood alternative which would not face the same marketing problems.

9. In addition to the very large quantities of dipterocarps and other mixed hardwoods, there are also substantial amounts of ramin, agathis and pine in various parts of the country. Ramin has been tested and found to be quite suitable for the manufacture of certain grades of paper but its occurrence in the natural forest is rather scattered. Thus, although there are an estimated 70 million cubic meters or more of ramin in Kalimantan, it could not be economically harvested as a single species. Agathis and pine, on the other hand occur in relatively consolidated areas. The natural pinus kerkusii forest of northern Sumatra is the basis for one project under consideration, and the relatively large areas of agathis which are reported to occur with dipterocarps and ramin in Central and South Kalimantan are being considered for another. In Central Java, plantations of pine and agathis are said to be large enough to provide the fiber resource for a large paper mill producing newsprint or other grades of paper.

10. The close attention by the pulp and paper sector to the available stands of natural and planted pine and agathis is technologically very sound. These species possess the valuable characteristics of having a relatively long fiber enabling them to be used in many grades of paper and paperboard where short fibers would be less desirable or, in some cases, just not suitable. Specific examples of such grades are newsprint and kraft paper and board, which together account for over 40% of Indonesia's total paper and paperboard consumption. In addition most other grades benefit from the addition of some proportion of long-fibered pulp. Moreover, all of Asia is deficit in long-fibered pulpwood resources and although plantations are being established in a number of countries, the region will be a net importer for many years to come. Thus, from the point of view of both domestic markets and regional export potential, the long-fibered pine and agathis resources of Indonesia are the country's most valuable raw material for pulp and paper manufacture.

Agricultural Residues

11. Agricultural residues used for pulp and paper manufacture include straw from rice and various grains, bagasse from sugarcane, and cotton linters. In Indonesia, rice straw has been the most important domestic fibrous raw material for pulping and is used in the Lejes, Padalarang and Blabak mills. In addition, several of the mills now under construction will use rice straw. Bagasse is not used at present but a major expansion proposed for the Lejes mill would use bagasse, and two mills under construction are planning to use bagasse as one part of their fiber furnish.

12. Rice straw fibers are short and for that reason pulps manufactured from it are best used in grades where strength it not of primary importance. In particular, printing and writing papers of good quality can be made from rice straw and because of its relative abundance in Java, the principal direction of Indonesia's pulp and paper industry development has been the manufacture of printing and writing papers from rice straw. The better grades of printing and writing paper produced from straw include some proportion of long-fibered pulp which at present, must be imported. Another grade which can be produced satisfactorily from short fibered raw materials is corrugating medium, where the quality of principal importance is stiffness. In Europe and elsewhere, considerable quantities of corrugating medium are made from straw. However, although good quality paper of various types can be produced from rice straw, its use on a large scale has particular economic and technical disadvantages.

13. The principal technical disadvantage of rice straw is its relatively high silica content which makes the recycling and recovery of cooking chemicals difficult. This leads to high costs for pulping chemicals and a pollution problem which increases as plant size increases. The principal economic disadvantage is the relatively high cost of collection and transportation operations; if enough rice straw is to be collected for a moderately large-sized plant than the area over which it must be collected becomes so large as to raise transportation costs to prohibitively high levels. Moreover, because rice is a seasonal crop, rather large inventories must be kept at the plants during certain times of the year which further adds to the cost.

14. In Indonesia, there is enough rice straw (particularly in Java) to support substantial expansion of this segment of the industry. However, for the reasons noted above, such expansion is likely to be limited to small additions to existing mills or the construction of new small-scale mills. Moreover the market requirements and proposed new construction are such that it is conceivable that the demand which can satisfactorily be supplied by paper produced from rice straw may be fully supplied. If some of the proposed mill developments which would use wood and bagasse were to proceed, there could be a real danger of an oversupply in the short-fibered portion of the domestic market. Under these circumstances, the rice-straw mills with their high cost structure and possibly lower product quality could be the most seriously affected.

15. Bagasse is the fibrous residue left after sugar cane has been crushed to remove the sucrose and is used on a large scale for pulp and paper manufacture in many areas of the world. The bagasse is not usually a waste material as it is used as fuel in the sugar mills for steam and power production. Thus to the extent that the bagasse is used in this way, its cost is the cost of an alternative fuel in the sugar mill. The material can be readily pulped by a variety of processes. It is short-fibered, but within the range of products which can be satisfactorily produced with this type of fiber resource, it is one of the more highly regarded. Grades produced from bagasse to date have been primarily printing and writing paper and corrugating medium but plants are under construction in Mexico and Peru which will produce newsprint from bagasse. At this stage, however, this development is in its early stages and its technical and economic feasibility has not been fully demonstrated.

16. The Indonesian sugar industry is primarily in Central and East Java and thus pulp and paper developments based on bagasse are most likely to be located in these regions. The Lejes mill (which proposes a bagasse-based expansion) and the two mills under construction which will reportedly use some bagasse are all located in East Java. From a technical point of view, the construction of bagasse mills poses no particular difficulties but the economics require careful evaluation, particularly in considering the cost of fuel replacement in the sugar mills. Moreover, from the domestic market point of view, there is some danger of an oversupply of short-fibered grades as noted above. In this respect, bagasse-based mills are likely to be somewhat better off than those using rice-straw.

Other Fibers

17. Other fibers of importance to the Indonesian pulp and paper industry are bamboo and waste paper. Bamboo is used in the Banjuwangi and Gowa mills and these mills are producing satisfactory grades of paper. However, because the harvesting of bamboo is often expensive, and regeneration is not always assured, both of these mills are investing in plantations of pine and hardwood species and thereby hope to improve both the security of their fiber resource supply and the quality of their products. So long as other less troublesome fiber supplies are available or can be developed, no new developments based on bamboo are likely.

18. Waste paper is widely used throughout the world in the manufacture of most grades of paper. The existing mills in Java use waste to the extent that they can obtain it, and at least two small mills in the Jakarta area produce cheap grades of tissue and board from a combination of waste paper and imported pulp. No estimates are available of the amount of waste paper recovered for this use in Indonesia but recovery rates in most countries of the world range between 20 and 40% of total paper consumed. Because of its basic low-cost advantage, Indonesian paper producers, particularly those favored by locations near large consumption centers, are expected to continue to develop the mechanisms for waste paper collection.

General Assessment

19. The preceding review of the various types of fibrous resources available to the pulp and paper industry shows that coniferous forest resources offer the best potential for the large-scale development of a domestic or export oriented industry. Among the available short-fibered resources, bagasse probably offers the best potential for development but any bagasse-based project should be carefully evaluated against the alternative of developing fast-growing plantations of short-fibered pulpwood species.

C. Markets

20. Given the very large current levels of imports, the principal objective of any expanded production program should clearly be to increase the supply of paper and paperboard to the Indonesian domestic market. Never-the-less because Indonesia has substantial fiber resources, in particular long-fibered resources which are in short supply in Asia, the possibilities for exports should not be overlooked.

Domestic Market

21. The most recent detailed study of the domestic market for paper in Indonesia was undertaken as part of a CIDA-financed study in 1971. The projections produced as part of this study remain the official estimates of the Department of Chemical Industries, but recent experience has shown that they are somewhat on the high side. The CIDA projections, and actual experience, are compared in the following table.

Projected and Actual Market for Paper and Paperboard, 1970-75

Year	Consumption	
	Actual 1/	Projected
	(thousand tons)	
1970	148	140
1971	161	160
1972	183	190
1973	233	220
1974	234	260
1975	216	300

1/ Apparent consumption: domestic production plus net imports.

22. The slackening in the rate of growth of demand which has been evident since 1973 is believed to be due to some slowing down in the rate of expansion of the Indonesian economy, coupled with the effect of very sharp increases in paper prices. 1/ Although the demand for paper and paperboard is expected to increase substantially over the next decade it is unlikely that the demand levels formerly projected can now be attained. Thus, in order to provide a reasonable basis for examining possible development strategies in the Indonesian pulp and paper industry, a reassessment of the likely market growth over the next decade must be undertaken. Any detailed market projections is beyond the scope of this survey but it is possible to review the assumptions upon which the previous projections were made, modify them in the light of recent experience, and thereby prepare a new set of preliminary projections which should be reasonably indicative of market demand in the medium term future.

23. The CIDA projections for the period to 1975 were based on an anticipated real economic growth rate (measured in terms of GNP) of 6.5% annually, and an elasticity of the per capita demand for paper with respect to per capita GNP of 4.1. In fact, over this period the economy grew at an average rate of 6.7% annually in real terms, but the income elasticity of paper demand was only about 2.0. Demand growth expectations in the CIDA study were clearly, in retrospect, overoptimistic. It would appear that the projections were influenced too much by the growth experienced during the period 1960-1970 when demand elasticity averaged a very high level of 5.8. Moreover, the dampening effect of the increase in paper prices was not anticipated. 2/

24. To make new estimates of future demand, new assumptions regarding the growth of the economy, population increases, and the income elasticity of paper demand have to be made. The Second Five-Year Plan (April 1974 to March 1979) anticipates an overall growth in the economy of 7.5% annually. The official current estimate of population increase is 2.5% annually. Recent experience with actual paper consumption in the country show that the income elasticity of paper demand has averaged about 2.0. Projection of those data through 1980 give an overall figure for paper and paperboard consumption in that year of about 470,000 tons, compared with a current level of about 230,000 tons. This could be considered a somewhat optimistic projection of demand.

25. Other assumptions can be used to give a somewhat less optimistic view. Analysis of 1975 data for paper demand and per capita GNP in 26 Asian

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1/ World paper and paperboard prices increased substantially during the period 1972-74 and this effect was compounded in Indonesia by increases in both duty and sales tax. Thus 1975 domestic prices for some grades are 2-3 times 1971 levels.

2/ Recent fluctuations in paper prices appear to have had some effect on demands in most areas of the world. However, this is a relatively new phenomena and price effects have not been reliably quantified.

countries shows a cross-sectional income elasticity of demand of 1.4 1/. In individual countries, the elasticity is higher at low consumption levels but may eventually be expected to approach this figure. Thus for the next five-year period, lowering the elasticity from the recent experience figure of 2.0 to, say, 1.7 might be considered appropriate for Indonesia. If, over the same period, real economic growth averaged only 5% annually, then paper and paperboard consumption by 1980 could be expected to reach a level of about 350,000 tons. This could be considered a somewhat pessimistic projection of demand.

26. The best estimate of actual demand in 1980 probably lies somewhere between the two rough projections developed above. The arithmetic average of the two projections (410,000 tons total demand in 1980) implies a growth rate over the next 5 years of about 10% per annum. This seems reasonable in the light of the rates of growth which have been experienced in the past, as shown in the following table:

Overall Growth in Consumption of Paper and Paperboard

Period	Average Annual Growth
1965-70	Actual 15%
1970-75	12%
1975-80	Projected 10%

The observed gradual decline in the rate of growth is normal, reflecting a lowering income elasticity at higher income levels. Thus, for the period 1980-85, a somewhat lower rate of growth, say 8%, would appear to be appropriate.

27. The following table shows tentative projections on this basis for 1980 and 1985, broken down into major grade groups using current grade distribution experience in Indonesia together with observed trends from other countries. A detailed market review would analyze the plans and prospects of paper-consuming industries to relate these abstract statistical projections to physical developments within the country. However, even without this refinement, the demand projections tabulated should be realistic enough to provide at least a tentative market framework within which a number of development stategies can be formulated.

1/ Cross-sectional analysis also shows that the present level of paper and paperboard consumption per capita of about 1.8 kg is very close to the level which would be anticipated from the GNP, suggesting that there are no major distortions in the Indonesian paper and paperboard market.

Tentative Projection of Domestic Paper and Paperboard Demand

Grade	Demand		
	Current 1/	1980	1985
	(thousand tons)		
Newsprint	50,000	82,000	110,000
Printing	75,000	123,000	166,000
Kraft Packaging Grades	40,000	82,000	130,000
Other Packaging Grades	31,000	67,000	114,000
Cigarette Paper	8,000	10,000	12,000
Other Grades	26,000	46,000	68,000
Total	230,000	410,000	600,000

1/ Approximate: based on recent production and import data.

Export Market

28. Although world production and consumption of paper and paperboard is currently of the order of 140 million tons annually, a great deal of this is produced and consumed in the same country, and a substantial amount of the balance moves between neighboring countries within Europe, or between Canada and the United States. Thus the true extra-regional market for paper, in which exported products from Indonesia would have to compete, is only about 8 million tons annually, or 5% of total world production. Similarly, the extra-regional market for pulp is about 7 million tons out of a total production of 120 million tons. About three-quarters of this tonnage of both pulp and paper originates in Scandinavia and North America, and is shipped to a variety of countries throughout the world.

29. Detailed grade information concerning those shipments is not reliably available but the following estimates have been developed from a variety of sources.

Approximate Current Extra-Regional Trade in Pulp and Paper

Grade	Shipments (million tons)
Paper	
- Newsprint	2.9
- Printing & Writing Paper	1.2
- Kraft Paper & Board	2.6
- Other Paper & Board	1.3
- Total	8.0
Pulp	
- Bleached Kraft	4.0
- Unbleached Kraft	0.7
- Dissolving Pulp	0.9
- Sulphite Pulp	0.8
- Other	0.6
- Total	7.0

30. Among the paper grades, newsprint and kraft paper and paperboard dominate and these could readily be produced in Indonesia using the pine and agathis resources previously described. Imports of these grades in the region are as follows:

Imports of Kraft Grades and Newsprint in Selected Asian Countries, 1974

	Imports	
	Newsprint 1/	Kraft Grades 2/
	-----(thousand tons)-------	
Indonesia	63	40
Malaysia	32	40
Singapore	36	40
Thailand	56	2
Hong Kong	57	50
Total of Selected Countries	244	172

1/ FAO Yearbook of Forest Products.

2/ Estimated.

31. Indonesia is one of the major importers in the region and clearly any program of domestic production should be initially aimed at filling domestic demand. Nevertheless, the regional deficit in these grades is substantial and is unlikely to diminish significantly in the medium term future because of the lack of suitable fiber resources in the countries listed. It is apparent that production of these grades from any new plant which may be built could be marketed in neighboring countries where Indonesia is likely to have a freight advantage over the traditional suppliers in Scandinavia and Canada.

32. Of the pulp grades listed, bleached kraft pulp is dominant in world trade. Moreover almost all of the growth which has taken place in world pulp trade has been in this grade. Both long-fibered and short-fibered grades of bleached kraft pulp are marketed. While it is conceivable that Indonesia could produce long-fibered pulp for export, the domestic demand for all-long-fibered grades is so great as to make this development unlikely. The international market for short-fibered pulp has grown rapidly in recent years and FAO estimates that some 4 million tons of new capacity (much of it in Latin America) will come on stream in the next five years. The recent downturn in the major economies of the world sharply reduced pulp and paper demand during 1975 and 1976 and while there has been a substantial recovery, it now appears that there could conceivably be some excess short-fiber pulping capacity in the early 1980s. If this situation occurs, then competitive advantage and disadvantage will determine which supplies are the most seriously affected and for Indonesia, the following factors would have to be considered.

(i) At least initially, any short-fibered pulp produced in Indonesia in a plant scaled for the export market would have to be produced from dipterocarps and mixed tropical hardwoods. The competitiveness of these grades in international markets is not known;

(ii) Wood costs from indigenous tropical forests are usually found to be higher than wood from plantation forests in those countries (such as Brazil) which are developing substantial export pulp industries using established plantation species; and

(iii) New plant construction costs have risen dramatically in the past 2-3 years and a new Indonesian producer would be competing, at least to some extent, with the owners of older, lower cost plants.

33. While these factors do not exclude the possibility of an export-oriented pulping operation in Indonesia they do suggest that in view of the danger of possible over-supply, prior marketing arrangements for a substantial proportion of the tonnage would have to be made. This is particularly important because there is little justification for believing that Indonesia would have any competitive advantage in producing and marketing short-fibered bleached kraft pulp.

34. In general, export markets for pulp and paper are likely to be quite good for the long-fibered grades (such as newsprint, kraft paper and pulp) and not so attractive for the short-fibered grades. Whereas Indonesia does have long-fibered pulpwood resources, these are not so extensive as to allow the contemplation of a large-scale export-oriented pulp and paper industry, particularly since the supply to the domestic market is so seriously deficient. Nevertheless, the export market could provide a valuable outlet for a proportion of the output for plants aimed primarily at the domestic market, allowing them to be built in an economic size range.

B. Development of Alternative Development Strategies

Alternatives for Consideration

35. Future development of the pulp and paper sub-sector in Indonesia could follow one of a number of alternative strategies and the following analysis is an attempt to ascertain the costs and benefits associated with these alternatives. Considering only the supply to the domestic market, the strategies which could be considered include:

(i) A halt in construction of new capacity after those plants already started are completed. Under this alternative capacity would remain at the 160,000 ton level, and paper requirements above this figure (together with the 70,000 tons of pulp required to support this domestic production) would be imported;

(ii) A continuation of the construction and expansion of small plants, using agricultural residues and imported pulp, to maintain the anticipated 1980 level of self-sufficiency in specified grades. Other grades, and the pulp required to support domestic production, would continue to be imported; and

(iii) The construction of suitable large integrated pulp and paper mills to obtain a high degree of self-sufficiency in most paper grades. These mills could also supply pulp to the existing plants.

36. Actual development could, and probably will, encompass all of these strategies to some extent. The following preliminary comparative analysis treats them as independent options and provides some insight into the relative merits of each. It is hoped that the results will be useful to the Government in making decisions aimed at influencing the development of this sub-sector.

Basic Assumptions

37. The assumptions basic to the formulation of the strategies are as follows:

(i) The construction of new plants required would take place over a 10-year period beginning in 1978, with all new plants in operation by 1988 to meet supply objectives based on the projected 1990 market;

(ii) Fibrous resources would be available to meet the projected needs of the various plants discussed below; and

(iii) All costs and benefits are projected in terms of constant 1977 prices for the period 1978-2000.

Market Assumptions

38. Tentative projections of the domestic market to 1985 have been developed previously in this Annex (para. 27). Consumption in subsequent years has been estimated by applying a further overall 8% annual growth rate to the 1985 figure, with some adjustments for individual grades. Total consumption of paper and paperboard in 1990 would thus be 880,000 tons.

39. Under the alternative development strategies proposed, the requirements of the market in 1990 would be met as follows:

Supply and Demand Balance in 1990
under Alternative Development Strategies

		Supply					
		Strategy 1 1/		Strategy 2 2/		Strategy 3 3/	
Grades	Demand	Domestic	Imports	Domestic	Imports	Domestic	Imports
Newsprint	160	-	160	-	160	160	-
Printing & Writing	240	112	128	190	50	190	50
Kraft Packaging	190	-	190	-	190	170	20
Other Packaging	170	45	125	120	50	120	50
Cigarette Paper	17	3	14	10	7	10	7
Other	103	-	103	-	103	-	103
Total	880	160	720	320	560	650	230
Pulp Imports	4/	-	70	-	140	-	0
Self-sufficiency		18%		36%		74%	

1/ No new plants after 1980.
2/ Continue building small plants to maintain 1980 level of self-sufficiency.
3/ Construct large plants.
4/ Pulp demand varies according to strategy.

40. The prices used to measure the cost of imports in this analysis are an average of the very high prices which prevailed in 1974, and the much lower prices which are in effect at the moment as a result of a temporary oversupply in Japan and elsewhere. The values are an attempt to represent a true "1977 price" (CIF) in terms of long-range trends and are shown in the following table:

CIF Prices for Imported Paper

Grades	Price 1/ (US$/ton)
Newsprint	450
Printing & Writing	650
Kraft Packaging	500
Other Packaging	350
Cigarette Paper	900
Other	700
Pulp	500

1/ Average for various types included in the broad grade categories listed.

Details of Strategy 1

41. By 1978, all of the mills presently under construction would be in operation giving an effective domestic production capacity of 160,000 tons of paper and paperboard. Actual production would reach this level in 1982. Under this strategy no new mills would be constructed in the period 1978-2000, and thus no investment would be required. Costs incurred during the period would comprise:

(i) The cost of pulp and paper imports; and

(ii) The cost of production in the existing mills, estimated to average $500 per ton for paper produced from domestic pulp, and $150 per ton (excluding the cost of pulp) for paper produced from imported pulp.

Details of Strategy 2

42. In this strategy, domestic production would continue to increase as small mills are constructed to maintain a high level of self-sufficiency for those grades which can readily be produced with the technology and fibers available for this type of mill. Based on experience in Indonesia and else-

where, it has been assumed that 80% of the total demand for printing and writing papers, 70% of the demand for non-kraft packaging papers and 50% of the demand for cigarette papers are levels which can be realistically reached and maintained in Indonesia. Thus in projecting costs for this strategy, it has been assumed that new mills would be built between 1978 and 1990 to maintain those levels of self-sufficiency in the face of growing demand over this period. Domestic production in 1990 would amount to 320,000 tons annually; imports would be 560,000 tons. (It is obvious that new mills would continue to be built after 1990; however, in this analysis construction after that date has not been considered as the benefits of further new mills would not be substantially realized before the end of the projection period).

43. Cost incurred during the period would comprise:

(i) The cost of importing pulp and paper not supplied by the domestic industry;

(ii) The cost of constructing the new capacity required, estimated to be $550,000 per daily ton of capacity; 1/ and

(iii) The cost of production in the existing and new small mills estimated to average $500 per ton for paper produced in mills manufacturing their own pulp, and $150 per ton (excluding the cost of pulp) for paper produced from imported pulp.

Details of Strategy 3

44. For this strategy it is assumed that domestic mills would be constructed to produce by 1990:

(i) 100% of all newsprint;

(ii) 80% of all printing and writing paper;

(iii) 90% of all kraft packaging grades;

(iv) 70% of all other packaging grades;

(v) 50% of all cigarette paper; and

(vi) 100% of all pulp.

1/ This is a relatively low figure, reflecting the experience of actual small-mill construction in Indonesia to date, and the fact that some of the new capacity is for paper-making only, using imported pulp and not requiring integrated pulping capacity.

Overall, this represents 74% of all of Indonesia's projected pulp and paper requirements which is a realistically attainable objective.

45. In physical terms, it has been assumed that this capacity would be achieved by:

(i) Building four moderately-sized mills, which would use a mixture of agricultural residues and pulp from another mill to be established to maintain projected self-sufficiency levels in packaging, cigarette, printing and writing grades;

(ii) Building one chemical pulp mill in the early 1980's to supply the existing industry and the four mills described above, and subsequently expanding it;

(iii) Building one large kraft paper and board mill in the early 1980's, and subsequently expanding it; and

(iv) Building one newsprint mill in the early 1980's and subsequently expanding it.

46. Costs for this strategy include:

(i) The cost of importing the paper grades which would not be supplied by the existing industry;

(ii) The cost of constructing the new capacity required. For the moderately-sized mills without full pulping capacity, an average of $550,000 per daily ton of capacity has been used. For the large integrated mills, $650,000 per daily ton has been used. These figures reflect experience in other regions and allow for a moderate degree of associated infrastructural development; and

(iii) The cost of production in the new large mills estimated at an overall average of $220 per ton, in the existing small mills estimated at the same levels as for Strategy 1, and in the new moderate-sized mills at $150 per ton for the non-integrated and $300 per ton for the integrated capacity.

Comparison of Strategies

47. The three strategies are compared and the results discussed in Paras. 7.22 - 7.25 of Chapter VII.

E. Potential Pulp and Paper Products

48. The tentative program of large mill construction developed in the preceding paragraphs included: four medium-sized, partially integrated mills to produce printing, writing and packaging grades; a chemical pulp mill; a kraft paper and board mill; and a newsprint mill. The analysis in Chapter VII shows the overall profitability of this program to be somewhat more attractive than importing paper, with substantial improvement if world paper prices increase as expected. If a program of large mill construction is to be embarked upon, it is evident that some ranking of the projects within such a program should be undertaken in order that project priorities can be assigned.

49. At least six mills which would fit into such a program have been proposed as projects in Indonesia. In some cases foreign partners have been found, the necessary licenses obtained, and timber concession agreements reached. Nevertheless at the present time, not one of these projects is being implemented and in most cases, there had been no notable progress towards implementation in the past 1-2 years.1/ In the following analysis, the projects are taken more or less as proposed, and preliminary cost and benefit analyses are presented.

Outline of Projects

50. The six projects to be compared are listed below. It should be noted that some of these projects would be complementary in supplying the domestic market in Indonesia, others would be competing for the same market.

(i) Aceh: an unbleached kraft paper and board mill which at full capacity would produce 170,000 tons per annum of sack kraft paper, linerboard, and other kraft paper for the domestic market;

(ii) South Sumatra: a bleached kraft pulp and paper mill which at full capacity would produce 80,000 tons per annum of printing and writing paper, and 100,000 tons per annum of pulp, all for the domestic market.

(iii) Central Java: a newsprint mill which at full capacity would produce 160,000 tons of newsprint for the domestic market. The 24,000 tons of chemical pulp required for this production would be manufactured elsewhere;

1/ The reasons cited for this lack of progress include high costs of infrastructure, high costs generally, low profitability projections and the difficulties of assuring a wood supply.

(iv) East Java: a bagasse-line addition to the Lejes mill to produce 45,000 tons of printing and writing paper for the domestic market;

(v) South/Central Kalimantan: a 200,000 ton per annum long and short-fibered bleached kraft pulp mill. By 1990, as much as 140,000 tons of this product could be sold in Indonesia, the balance would have to be exported; and

(vi) East Kalimantan: a 200,000 ton per annum short-fibered bleached kraft pulp mill. By 1990, approximately 70,000 tons of this product could be sold in Indonesia, the balance would have to be exported.

The Aceh Project

51. A 40,000 hectare concession of natural pine forest has been granted to P.T. Atlas Helau, an Indonesian company. Preliminary studies have been undertaken which suggest that a kraft paper and board mill in this region could be feasible. The mill would initially be constructed to use the existing resource, but concurrently pine plantations would be established close to the mill site for future utilization. At the present time, the company is carrying out some nursery and plantation trials but detailed studies for the project have yet to be prepared.

52. For this analysis, it has been assumed that the mill would be designed to produce 90% of the projected Indonesian demand for kraft paper and board in 1990, namely 90,000 tons of sack kraft paper, 60,000 tons of linerboard, and 20,000 tons of other kraft paper for a total production of 170,000 tons per annum. Having regard to the projected growth pattern of the demand, the mill would logically be constructed in two stages. The first stage would come on stream in 1982, with a design output capacity of 120,000 tons annually. Provision for expansion would be included where appropriate and the whole mill would be expanded to its ultimate capacity of 170,000 tons in 1987.

53. The estimated capital cost of the project in terms of 1977 prices, is as follows:

Estimated Capital Cost of
Aceh Kraft Paper and Board Mill

Item	Amount (US$ million)
Plant Capital	335
Working Capital	15
Training and Management	12
Logging Operations	10
Plantation Establishment	27
Townsite	11
Total	410

The South Sumatra Project

54. This project was conceived as a productive way to utilize large areas of degraded forest land in South Sumatra, by establishing plantations of pine to supply a pulp and paper mill. This concept was developed as part of a Sumatra Regional Planning Study undertaken for the Government of Indonesia by an American consulting company, Robert Nathan Associates Incorporated of Washington, D. C. As proposed by Nathan the mill would produce 300,000 tons annually of a mixture of bleached pulp and printing and writing papers, using pine from the plantations to be established and existing resources of mangrove.

55. For this analysis, the project has been scaled down to match the projected domestic demand for printing and writing papers and for bleached pulp in 1990. This gives a total capacity of 180,000 tons annually, 80,000 tons of which would be printing and writing paper, the balance pulp for sale. This mill would commence operation in 1985.

56. The total estimated capital cost of this project, in terms of 1977 prices, is as follows:

Estimated Capital Cost of South Sumatra
Pulp and Paper Mill

Item	Amount (US$ million)
Plant Capital	300
Working Capital	20
Training and Management	5
Logging Operations	8
Plantation Establishment	27
Townsite	5
Total	365

The Central Java Project

57. A concession to cut Pinus merkusii located in Central Java has been granted to an Indonesian company (PT Anem Kesong Anem) together with a license to build a 60,000 ton per annum newsprint mill. A subsequent expansion to 99,000 tons capacity has been proposed. The company has made partnership agreements with a Canadian company (Kruger) and a Hong Kong company (UDI) but the project is not progressing at the present time, probably because of the high cost of plant construction and infrastructure development. The project as conceived would use the pine from Central Java for the mechanical pulp portion of the newsprint furnish, and would import semi-bleached long-fibered pulp as required for the chemical pulp portion.

58. For this analysis, the project concept has been modified slightly to better meet the projected newsprint requirements in Indonesia. It has been assumed that the mill would be constructed with an initial capacity of 120,000 tons annually, to commence operation in 1982, and would subsequently expand to 160,000 tons to match the projected 1990 market demand.

59. The total estimated capital cost of this project (including the expansion), estimated in terms of 1977 prices, is as follows:

Estimated Capital Cost of
Central Java Newsprint Mill

Item	Amount (US$ million)
Plant Capital	180
Working Capital	20
Training and Management	8
Logging Operations	12
Townsite	5
Total	225

The East Java Project

60. This project has been conceived by the Government-owned Lejes Pulp and Paper Mill as a major expansion project raising output from 24,000 tons to 69,000 tons annually. The addition would, in effect, be a completely new pulp and paper mill which would utilize bagasse from adjacent sugar mills. The current operations at Lejes are using rice straw. The company has discussed possible financing for this project with Canada and Abu Dhabi but at the present time, no full scale feasibility study has been undertaken.

61. For this analysis it has been assumed that the project would consist of 45,000 ton per annum mill producing printing and writing paper from bagasse pulp. All of this output would be consumed in the domestic market. The mill would commence operation in 1982.

62. The total estimated capital cost of this project, in 1977 prices, is as follows:

Estimated Capital Cost of East Java Fine Paper Mill

Item	Amount (US$ million)
Plant Capital	124
Working Capital	8
Training and Management	4
Townsite	4
Total	140

The South/Central Kalimantan Project

63. This project is being promoted by a French company who has formed an Indonesian subsidiary (Sopramar) to act as project sponsors. Its design is based on the belief that in a region which is presently being exploited for export logs, primarily dipterocarps and ramin, there are large stands of long-fibered agathis and araucaria. As conceived, the proposed pulp and paper mill would use non-commercial trees of both hardwood and softwood species to produce 200,000 tons of paper annually for the domestic and export markets.

64. For this analysis, the project concept has been modified to better meet the needs of the Indonesian market.n-commercial trees of both hardwood and softwood species to produce 200,000 tons of paper annually for the domestic and export markets.

64. For this analysis, the project concept has been modified to better meet the needs of the Indonesian market. Specifically it has been assumed that the mill would produce 200,000 tons of pulp (about one-half of which would be from softwoods), but no paper, and that 70% of this pulp could be marketed domestically. The remaining 30% would be exported but because this would be a little-known grade of pulp produced from tropical hardwoods, a 10% discount below current world prices for hardwood pulp has been allowed. The mill would commence operations in 1982 and reach full production in 1987. It would not be until 1990, however, that the domestic market could absorb 140,000 tons of pulp and in the intervening years additional exports would be required.

65. The total estimated capital cost of this project, in terms of 1977 prices, is as follows:

Estimated Capital Cost of South/Central Kalimantan Pulp Mill

Item	Amount (US$ million)
Plant Capital	302
Working Capital	19
Training and Management	10
Logging Operations	8
Townsite	11
Total	350

The East Kalimantan Project

66. This project is being investigated by the Austrian Government as a prelude to possible Austrian involvement in its implementation. It would produce pulp and paper for the domestic market and for export, using those grades of tropical hardwoods which are not now commercially exploited. The project has no formal sponsor as yet but Inhutani, a Government-owned forestry company, has large concessions in the area under consideration and is working closely with the Austrians in evaluating the project.

67. For this analysis the project has been considered as producing only pulp, at a capacity of 200,000 tons annually. Because this pulp would be entirely a hardwood grade, a smaller proportion of it could be consumed domestically than in the case of the South/Central Kalimantan mill. It has been assumed that the mill would start-up in 1982 and that domestic sales would reach and stabilize at 70,000 tons by 1990. The balance of production would be exported, at prices discounted from current world prices by 10%. Although there would undoubtedly be physical differences between this project and that of South/Central Kalimantan, it has been assumed for this analysis that overall capital investment requirements would be the same.

Summary of Results

68. Paragraphs 7.29 - 7.32 of Chapter VII contain a presentation and discussion of the results of preliminary financial and economic analyses for each of the six projects examined. The overall conclusions and recommendations arising from this study of development options in Indonesia's pulp and paper industry are also presented in Chapter VII.

VIII. THE ENGINEERING INDUSTRIES

Introduction

8.01 The engineering industries are an important element of the manufacturing sector in Indonesia, with products ranging from fabricated steel and other metals to complex machinery, components and intermediate goods, vehicles, small ocean-going ships and, recently, light aircraft assembly. Despite various economic and technological difficulties, this subsector has grown considerably since the 1950s and now employs more than 100,000 people. In addition to an assessment of problem areas and reviews of specific project, this report drew attention to the need for an effective long-term strategy in planning its future development.

8.02 The objectives of the 1976 subsector study were to assess the progress made by the industry and to identify possible project or investment opportunities for the next stage of development. The latter was taken to cover the period five to eight years ahead. Particular emphasis was given to the major constraints or obstacles affecting development to determine possible measures to deal with them. The study has concentrated on metal products, mechanical machinery and electrical industries although some aspects of the automotive industry were also covered. In this connection, visits were made to typical firms in the Jakarta, Surabaya and Bandung industrial centers. Discussions were also held with the Ministry of Industry and representatives from leading manufacturers' associations.

8.03 This chapter is in two parts. First, it contains a general review of the engineering industries in Indonesia in terms of structure, technology, and existing constraints on performance. Particular reference is made to the problem of imports and the factors which affect the ability of domestic firms to compete. It then discusses questions of overall strategy, emphasizing important areas of uncertainty which need to be resolved. It also outlines a number of possible development projects which would strengthen the existing product range and facilitate the industry's future growth.

Present Status of the Industries

Size and Structure

8.04 The engineering industries have expanded steadily over the five years since 1971. Whilst accurate statistics covering the whole of this period were unfortunately not available to the 1976 mission, it is clear that the subsector has more than doubled in size. This is confirmed by the growth in output that has taken place, the production rates of key engineering products that have been achieved, and the increases in employment recorded since then. Table 8.1 shows that output in value added terms from large- and medium-scale

engineering firms, other than the automotive industry, increased from Rp 14.4 billion in 1971 to Rp 28.9 billion in 1973 (at constant 1973 prices). This is based on the relevant surveys of manufacturing industries. 1/ Also shown are estimates for 1975, indicating further growth in line with the data presented in Chapters I and II of this report.

8.05 This growth has been achieved despite cutbacks associated with the world-wide recession in 1973/74 which affected the demand for steel products and heavy equipment. The explanation for this is to be found in the increases in sales of consumer goods since then, notably household appliances, and the emergence of new industries in the electrical equipment and electronic product areas. An indication of the volume and range of engineering products currently made in Indonesia is given in Table 8.2. These items account for a large proportion of gross output from the whole subsector which totalled Rp 601 billion in value during 1975. Production rates for 1969 are also shown.

8.06 Significant increases in production have been made in nearly every case. Output of heavy steel structures, for example, rose by a factor of five between 1972 and 1975 to reach 40,000 tons. Production of machinery and spares advanced from 3,000 tons in 1971 to an estimated 8,000 tons in 1976. The output of road rollers also increased, boosted by the introduction of 100% protection. Considerable expansion has taken place in electronics, where the production of radio and television receivers increased from 416,000 and 65,000 respectively in 1971 to 1,100,000 and 166,000 in 1975. In 1976, the number of television sets produced is expected to reach 200,000.

8.07 The growth of the automotive industry has been spectacular, especially since the ban on CBU cars was imposed in January 1974. Primarily an assembly operation, the output of passenger cars and commercial vehicles now totals some 86,000 units compared with 16,000 in 1971 and only 5,000 in 1969. This has, however, been achieved more by the introduction of new makes and models than the expansion of existing lines. Operating costs remain extremely high, with average prices more than three times the landed equivalents. Despite the proliferation of vehicle types, production of a limited range of automotive components began during the period. These included mufflers (15,000 in 1975), shock absorbers (30,000), pistons (50,000) and brake linings (19,000 sets). A number of truck chassis were also made (1,000).

1/ The data for the automotive industry has been excluded to minimize the distortion that would otherwise occur because of differences in operating margins and taxation levels, and the changes resulting from the total ban on CBU passenger cars from January 1974.

Table 8.1

INDONESIA: Output from Large - and Medium - Scale Engineering Industries, 1971-75

Item	Value Added		
	1971	1973	1975 /1
	billion Rupiah		
At Current Prices			
Metal Products	4.2	12.4	21.8
Mechanical Machinery	0.6	4.0)	
Electrical, Electronics	3.5	9.3)	24.6
Transport Equipment /2	0.7	3.2)	
Total Engineering	9.0	28.9	46.4
Total Manufacturing	181.3	402.9	693.0
At Constant 1973 Prices			
Metal Products	6.7	12.4	17.3
Mechanical Machinery	1.0	4.0)	
Electrical, Electronics	5.6	9.3)	19.5
Transport Equipment	1.1	3.2)	
Total Engineering	14.4	28.9	36.8
Total Manufacturing	289.2	402.9	548.7

/1 Growth rates of 18% per annum estimated for engineering and 16.7% for manufacturing industry as a whole between 1973-75.

/2 Excludes automobile and motorcycle industries.

Source: CBS Surveys of Manufacturing Industries.

Table 8.2

INDONESIA: Production of Selected Engineering Products

Product	Unit	1969	1971	1973	1975	1976 Est.
Metal Products						
Light Steel Construction	000 tons	-	-	-	1.5	N/A
Heavy Steel Construction	000 tons	-	8(1972)	N/A	40	N/A
Bolts and Nuts	000 tons	-	-	-	2	N/A
Steel Wire	000 tons	-	-	-	36	N/A
Mechanical Machinery						
Machinery and Spares	000 tons	2.4	3	8	8	8
Hullers	000 pcs.	2.3	-	3.5	4	5
Sprayers	000 pcs.	20	-	-	20	25
Water Pumps	000 pcs.	0.9	-	-	2	2
Sewing Machines	000 pcs.	14	292	500	520	550
Diesel Engines	000 pcs.	-	-	-	11	12
Road Rollers	units	200	200	360	575	600
Electrical, Electronics, Etc.						
Transformers	units	N/A	N/A	N/A	630	N/A
Electrical Cable	000 tons	-	-	7	9	9
Lamps	000 pcs.	3.5	6	18	21	25
Radio Sets	000 pcs.	363	416	900	1,100	1,200
Television Sets	000 pcs.	4	65	70	166	200
Refrigerators	000 pcs.	-	21	10	37	40
Air Conditioners	000 pcs.	4	32	20	23	25
Car Batteries	000 pcs.	32	262	140	220	240
Dry-Cell Batteries	Mill. pcs.	54	72	132	180	250
Transistors	Mill. pcs.	-	-	-	3.8	N/A
L.E.D.s	Mill. pcs.	-	-	-	2.4	N/A
Transport Equipment						
Automobiles	000 units	5	16	37	79	86
Motorcycles	000 units	21	50	150	300	350
Shipbuilding	000 Dwt.	-	-	-	19	23
Ship Repairs	000 Dwt.	-	-	-	775	N/A
Aircraft	units	-	-	-	1	24

Note: The years are fiscal years.

Source: Department of Industry 26 August 1976 and Almanak Industri 1976.

The Production shown for heavy steel construction in 1972 is taken from the 1973 Sector Study by FGU-KRONBERG/KU Gummersbach.

8.08 Several new products have appeared since 1971 and some examples of these are also shown in the table. Perhaps the most notable development in terms of the engineering know-how and skills required is the start of diesel engine manufacture in Indonesia. In 1977 no less than six different types are expected to be in production. The project being undertaken by the State-owned P.T. BBI to make Deutz diesel engines under license at Surabaya is particularly interesting. With assembly already underway, new machinery is being installed which will enable 45% of the machining content to be done locally. Buying imported materials in the first instance, they hope to use domestically produced castings and forgings when these become available. At a later stage, local content is planned to rise first to 60% and then to 80%.

8.09 By far the greatest number of new products to be manufactured over the last three to four years has come from the fast-growing electronics industry. A high proportion of these are sold to domestic consumers, such as locally assembled televisions and cassette players, but there is a small but increasing range of electronic products being made exclusively for export. Two examples of these are light emitting diodes and linear integrated circuits. It must be pointed out, however, that the three major suppliers simply "sell" their output to another subsidiary of the parent company (e.g., Monsanto, Fairchild) and are not generating genuine markets. They are simply one stage in an integrated operation. Manufacturers of this type of product are able to import materials and equipment duty free on the bonded warehouse principle. As a result of these and other measures to promote exports in this subsector, the value of electronics goods other than instruments shipped abroad has risen rapidly and in 1975 totalled US$6.6 million. Preliminary results for 1976 suggest that this will be more than doubled. Exports from other engineering industries were negligible in comparison.

Employment

8.10 The numbers employed in the engineering industry almost doubled between 1971 and 1973, before the economic recession took full effect. This is clear from the comparisons for large- and medium-scale firms shown in Table 8.3, where the industry totals rose from 36,000 in 1971 to 71,000 in 1973. The fastest growth in employment was recorded by the mechanical machinery and electrical industries which both increased by a factor greater than three times. Employment in the transport industries also more than doubled. In contrast, the metal products group while still dominant in the total number of establishments and employment, expanded by less than a third.

8.11 The results for 1975 indicate a much more modest rate of growth from 1973 compared with 1971-73, with a virtual standstill outside the metal products group. It must be emphasized, however, that these statistics are based on preliminary data which probably underestimate the true position - possibly by as much as 20% for a particular group. This view is based on previous experience, and is supported by the significant increases in output reported for a wide range of engineering products between 1973 and 1975. The results for 1975 are also complicated by a change in classification affecting medium- and small-scale firms. Formerly, establishments with five to nine workers not using power were excluded from the returns. This appears to account for much of the increase in employment shown for the metal products group.

Table 8.3

INDONESIA: Employment in Large- and Medium-Scale Engineering Firms, 1971-75

Industry Group	No. of Establishments			Employment (000's)		
	1971	1973	1975	1971	1973	1975
Metal Products	720	942	2,490	21	27	42
Mechanical Machinery and Equipment	44	155	245	4	13	11
Electrical Machinery, Electronics, etc.	78	95	160	5	16	15
Transport Equipment	305	182	337	6	15	18
Total	1,147	1,374	3,232	36	71	86

Note: The 1971 statistics cover power-using establishments with five or more workers and establishments with ten or more using no power. The statistics for 1975 are preliminary results, and include all establishments with five or more workers.

Source: CBS Surveys of Manufacturing Industry.

Technical Considerations

Technological Change

8.12 Perhaps the most striking of the many changes that have taken place in the engineering industry over the last five years or so has been the way in which technology has developed. Much of this, of course, has resulted from the introduction of new products especially in the electronics industry. But there have also been significant advances in the more traditional metal products and heavy engineering areas. Some of these were foreshadowed earlier, for example, the regional foundry centers which should make a considerable impact in terms of improved product quality when fully operational. Several factories using modern technology and equipment have also been built to make such products as diesel engines and electric power cables.

8.13 Technological change is also noticeable in many of the older engineering concerns, although some that were originally set up as repair shops.

Although there is still a demand from the industry's customers for pre-war machinery spares, they are increasingly replacing obsolete plant by more up-to-date equipment. The requirement for modern designs has also been boosted as a result of various projects undertaken during Repelita I and II. In line with this trend, considerable product diversification has taken place in engineering. In some instances, joint ventures have been established with foreign partners to manufacture machinery and equipment which would otherwise have to be imported. Agricultural tools and centrifugal pumps are examples of these. Several firms have turned to making structural steelwork as the demand for some of the foundry-based products has declined or become unprofitable.

8.14 The process of technological change is continuing, but it is also expensive. Some indication of the order of investment likely to be made in the engineering subsectors over the next two years or so is given by Table 8.4. This is based on the applications registered with the Directorate-General of Basic Industries as of November 1976, and summarizes the foreign and domestic capital requirements for various projects in the four main product groupings. It can be seen that the projected investment for the transport subsector is considerably more than the others. However, almost half this is accounted for a single shipbuilding project worth US$29 million.

8.15 The investment projected for the mechanical machinery group is significantly higher than that for the electrical and electronic industries and approximately equal to that for transport equipment other than shipbuilding. The range of products includes tea processing and sugar machinery,

Table 8.4

INDONESIA: Projected Investment for the Engineering Industry (as at November 1976)

	Foreign Investment		Domestic Investment	
	No.	Value US$ Million	No.	Value Rp Billion
Metal Products	5	19.7	-	-
Mechanical Engineering and Equipment	13	31.2	-	-
Electrical Machinery, Electronics, Etc.	10	21.6	5	3.12
Transport Equipment	13	53.5	3	2.31
Total	41	128.0	8	5.43

boilers and overhead travelling cranes, and two projects involve diesel engine manufacture. Small electric motors and generators are notably new products in the electrical industry group, whereas the main emphasis in the transport subsector is on automotive components. The latter includes radiators, pistons, filters and brake linings, and also front forks and shock absorbers for motorcycles.

Condition of Plant and Machinery

8.16 The poor condition of machine tools and other plant continues to give cause for concern. Although re-equipment has taken place since 1971, out-dated and badly maintained machinery still predominates in the small- and medium-size firms. Several examples were noted during visits by the mission, and it is clear that little progress is being made in dealing with this problem. There is, however, one notable development - the rehabilitation center now being established in Surabaya by P.T. Barata. When fully operational this will be capable of reconditioning about eight machines a month. Unfortunately, with an estimated 60% of their own machines requiring attention, there is unlikely to be any capacity for other companies' machines for at least three years unless the planned facilities are considerably expanded.

8.17 In 1972 it was estimated that 8,500 machine tools out of a total of some 14,000 needed repair, although of these only 6,000 were worth overhauling. 1/ The remainder of 2,500 should be scrapped. Thus a single unit processing some 100 machines a year is unlikely to make a significant difference. However, at the time the original survey was carried out, the mix of machine types was found to be at variance with that commonly found in industrialized countries, particularly with regard to lathes, drills, and shapers used in repair and rehabilitation work. These accounted for 48% of the total, half as much again in comparison to industrialized countries, which reflects the heavy demand for repair work in Indonesia. With the changes in technology that have already occurred and are likely over the next decade, many of the existing machine tools will almost certainly become redundant thereby reducing the numbers to be overhauled. Although this would clearly ease the problem, it would by no means eliminate it.

Machine Utilization

8.18 It was clear from the visits to various factories that machine utilization, other than possibly in the electronics industry, is still a major problem. Whole departments or machine sections were found to be idle for lack of work; single shift work is also predominant. This is true of factories built within the last five years as well as old established concerns, and applies to both public and privately-owned companies. Data for machine utilization were difficult to obtain. Some information was, however, provided by the Department of Industry. Typical usages stated were: steel

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1/ FGU-KRONBERG/KU Gummersbach (Sector Study, Engineering Studies in Indonesia).

wire manufacture - 27%, machine shops - 25%, electric cable manufacture - 50%, automotive assembly - 92%, and motorcycle assembly - 63%. The problem is, of course, closely related to the level of demand. The overwhelming opinion among many senior executives with whom this question was discussed was that the problem centered on industry's failure - for a variety of reasons - to secure an adequate share of the market against foreign competition rather than over-capacity.

Productivity Levels

8.19 Productivity also remains a cause for concern except in the newer, better-equipped firms. In 1973 a comparison among a wide-ranging sample of jobs done in Indonesia and the same type of work in Holland showed that the average time taken differed by a factor of six to one. Poor equipment and tooling, lack of work preparation and the use of oversize materials were found to be the main contributory reasons. 1/ It was not possible during the visit to check whether these findings were still relevant, but the mission formed the opinion that productivity in heavy engineering was typically one-third to one-fifth that was found in European plants.

8.20 Several instances were noted where productivity in terms of physical effort and skill compared favorably with European experience. Commenting on this aspect, a number of managers attributed it to the general employment situation and the scarcity of jobs. And there seems little doubt that this is an important factor. Management at one electronics factory which employs several hundred female workers stated that they had proved their staff could match the output levels achieved in other developing countries such as Korea and Taiwan, provided workflow was maintained. The latter, of course, depends on efficient management; that is one of the critical problems in trying to increase the indigenous staff.

8.21 Outside the new, more advanced industries, methods leave a great deal to be desired in terms of efficient production, and it is clear that substantial improvements could be made. The problems are well known and have been reported at length by different agencies, as indeed, have their remedies. But the inescapable fact remains that productivity in many areas of industry is seriously impaired by poor methods, equipment, tooling, etc., so that much of Indonesia's so-called comparative advantage in terms of low wage rates is largely if not totally eroded. Typical examples noted during the visit were:

- a general lack of suitable handling and lifting equipment in the small/medium size companies. Dirt floors are common; overhead hoists or cranes are found only in the larger factories;

- badly laid-out and congested shops with too much work being done on the floor instead of on benches;

1/ Bandung Institute of Technology with Dutch technical assistance.

- poor metal-removal rates. Much of the machinery unsuitable, in a bad state of repair or outdated. There are still large numbers of pre-war, belt-driven machine tools in operation;

- little modern tooling;

- the frequent use of oversize or poor-quality imported materials. Because of time constraints and other factors, many of the smaller firms obtain their requirements through local markets where the range of sizes is restricted and the control of material specifications often totally inadequate.

8.22 Fortunately, the picture is not wholly black. One of the encouraging findings from visits to different factories was the remarkable ingenuity exercised on the part of some firms in adapting little-used machinery or making special purpose equipment. To meet the delivery and quality requirements of a contract to supply thin pre-formed stainless steel panels for a new mosque, one company had designed and made its own set of powered rolls to shape the intricate sections that were needed. Another small firm had built its own stamping machinery and also a simple low-cost wire forming machine to manufacture fencing. But perhaps the most important development that has taken place has been the setting up of formal production/industrial engineering departments in some of the bigger firms. This has led to increased attention being given to method specification and improvement, and ensuring the shop-floor is made aware of the way in which jobs should be done. Examples of the useful progress being made in this area were seen during visits to the machine shops of two large engineering concerns in Surabaya. In line with best modern practice, information on the equipment and tooling reuired, machine settings and sequence of operations to be followed to complete each job is set out on detailed method sheets given to the operator. Optimum speeds and feeds are adjusted to take account of machine tool condition, available tooling, etc; standard times determined by study and including a bonus element where required are also specified.

8.23 In cost terms, no advantage is gained from improved labor productivity or methods of working if the net result is simply to increase the level of non-productive time. Conversely, significant improvements in output and hence lower operating costs can be achieved by reducing the nonproductive or idle time of the key resource - machine or manpower. Thus utilization is an important aspect of productivity. The main factors here are (i) workload, which depends ultimately on sales, and (ii) work-flow, which can be improved by better production planning and control. Progress has clearly been made in these areas since the previous visit, particularly by some of the bigger firms. The need for a separate marketing function is now more widely accepted, and greater importance is attached to the need for effective controls in the manufacturing area. The contribution made by the Metal Industries Development Centre (MIDC) at Bandung both in training and in a consultancy capacity in these fields is to be commended.

Product Standards and Quality Aspects

8.24 Two aspects of technical performance which continue to be frequent subjects for discussion are standardization and quality. Taking standardization first, the problem here is essentially external in that there is a large measure of agreement on standards amongst producers but still a wide divergence on the part of certain major consumers especially in the public sector. Sometimes difficulties arise because of differences in international standards. On other occasions problems are caused by wide variations in technical requirements for similar products specified by different users. These can be particularly acute in the case of certain volume producers such as electronics and cable manufacturers.

8.25 The problem is currently being tackled on an industry-by-industry basis through the various manufacturers' associations by MIDC. Despite Government backing it is doubtful whether real progress can be made without directly involving the various ministries and other public bodies concerned. This might be difficult to arrange for administrative, commercial and other reasons, and some other approach may be needed. One alternative which might prove acceptable to the interested parties would be to set up an independent Standards Institute, on which manufacturers, customers in both the public and private sectors, universities and other technical interests would be fully represented. This would necessarily comprise several groups, for example: materials, mechanical, electrical, electronics, instrumentation, etc., with cross links through the various operating committees that would be needed.

8.26 There is, of course, a close relationship between standards and quality in an engineering context. Inadequate or over-exacting standards can result in inferior goods being made on the one hand or excessive costs arising on the other, both of which lead to problems in marketing. Much of the improvement is due to investment in new plant and equipment, better training, and the installation of more effective controls. One of the difficulties now facing some companies is that of convincing their customers that the quality and reliability of Indonesian products are equal to those of most foreign competitors. This is clearly a difficult problem and one which could take several years to overcome.

Market Factors

8.27 As already stated, the new consumer-based industries are expanding at a faster rate than their counterparts in heavy engineering. The reaons for this and possible steps to promote more even growth were discussed at length with senior officials and company executives. Indeed, more time was spent on this topic than on any other aspect. Whilst various internal weaknesses have undoubtedly tended to limit output in the metal products and mechanical machinery industries, it is clear that 'lack of sales' rather than problems in the production areas has been the major cause of this situation. The ability of a company or an industry to compete successfully in the market place depends on many factors. These are often complex and frequently interact one with another.

The Type of the Market

8.28 The market for capital goods in Indonesia is dominated by large-scale public sector programs to develop the country's economy. Much of the finance for this type of investment is obtained through foreign governments, with the donor countries often providing hardware and know-how as integral parts of an aid package. Thus, apart from some local building construction and other site work, domestic industry is often precluded from the manufacture of any plant and equipment required, regardless of technical capability, price, or other considerations.

8.29 Major projects are also financed by international banks and other agencies. The supply of plant and machinery in these cases is usually subject to competitive tender, and is therefore open to domestic as well as foreign manufacturers. Although some degree of preference is usually given to Indonesian industry - 15% on capital equipment in projects funded by the World Bank, for example - overseas companies are also favorably dealt with in that their equipment is exempt from import duties and other taxes. Another form of public sector project is one in which the funding is largely or wholly sourced internally. In this instance, local industry does not receive any preferential financial treatment. Foreign-made equipment, on the other hand is still exempt from duty and taxes.

8.30 Price, of course, is not the only factor which determines a sale. For example, one design of machine may be unable to meet the specified requirements or perhaps running costs are too high in comparison with another manufacturer's product. Quality and reliability are other obvious, important considerations. There is a widely-held view among Indonesian producers that sales are lost to imports because the officials concerned with public sector programs wrongly believe that local products must be inferior. Although it would be difficult to prove or disprove this assertion, the implications are such that further investigation would almost certainly prove worthwhile whatever the outcome.

Domestic Marketing

8.31 From discussions with various firms, there appears to be some competition among domestic producers, especially amongst the larger privately-owned companies. At the same time, there is increasing collaboration between them through their respective trade associations, and quasi-cartel arrangements are beginning to emerge. Perhaps, not surprisingly, the electronics and automotive firms have led the way in building up selling organizations to develop their markets. There is little doubt that this is due to the influence of the overseas companies and their managers involved in setting up these new businesses.

8.32 There is, however, still a general lack of marketing effort by the smaller firms that typically rely on taking orders from a few regular customers instead of going out to sell new business. As a result, opportunities are lost and expansion is stifled through a failure to compete.

MIDC is conscious of the problems faced by this type of company which often has very limited resources and whose markets tend to be confined to nearby geographical areas. Professional assistance is currently being given to three such firms in the Bandung area on a pilot-study basis to improve their effectiveness in marketing, product design and manufacturing. The scheme is planned to be extended to other engineering companies during 1977.

Imports and the Ability to Compete

8.33 The main competition in the engineering sector comes from abroad in the shape of imports. In 1975 the value of engineering products (excluding the automotive categories) imported during 1975 was Rp 625 billion (US$1,505 million) more than four times greater than the combined output from Indonesian manufacturers in value added terms. This is based on the estimates shown in Table 8.5. The ratio has doubled since 1972 when the corresponding imports totalled Rp 196 billion. 1/ At that time, the greatest imbalance was found in the mechanical machinery product group where the volume of imports was seven times that of domestic production. As Chapter III shows, in 1971 in the "machinery" industry only 5% of total supplies were domestically produced. Unfortunately, it was not possible to make up-to-date comparisons of imports and production levels in this particular category because of the lack of data. But the available evidence suggests that the situation has probably changed very little in the interim.

8.34 Various measures have been taken to contain imports. In certain instances a total ban on imports has been instituted, namely passenger cars and commercial vehicles other than C.K.D. units, galvanized iron sheets, and road rollers (6-12 tons). In other cases, varying levels of duties and import sales taxes have been applied. Some examples of these are given in Table 8.6. Part of the import total can be accounted for by the high proportion of foreign produced materials and components used by local manufacturers. This applies not only to the assembly-based automotive and electronic industries, but also to the metal products and machinery groups though to a lesser extent. Typical requirements are:

Raw Materials

Wire rod, steel forgings, hot and cold rolled steel sheet, steel plate and sections, aluminum plate, copper wire and rods.

Components

Diesel engines, fasteners, instruments, and parts for the automotive and electronics industries.

With very few exceptions, import duties and taxes have to paid for materials or components procured from abroad. These can result in significant additions to product costs and, in turn, adversely affect prices.

1/ FGU-Kronberg/KU Gummersbach.

Table 8-5

INDONESIA: Imports of Engineering Products During 1975

	Imports $ Million	Imports Rp Billion	Value Added Content of Imports Rp Billion	Value Added Domestic Production Rp Billion
Metal Products	172	72	27	25
Mechanical Machinery and Equipment	824	342	137	
Electrical Machines, Electronics, etc.	396	164	66	28
Transport Equipment	113	47	19	—
	1,505	625	249	53

Notes:
1. Individual figures are rounded
2. Value added coefficients of 0.37 and 0.40 respectively were used to calculate the value added content of imports.
3. Estimates of domestic production taken from Table 1 adjusted to small-scale and cottage industries output.

Source: CBS, Import 1975.

Table 8.6

INDONESIA: Import Duties and Taxes for Various Engineering Materials and Products

Item	Duty	Import Sales Tax
	----------%----------	
Steel billets/scrap	5	5
Steel wire/pipes	40	15
Aluminum sheet	5	5
Aluminum extrusions	55	15
Diesel engines	30	10
Water Pumps	30	10
Hullers	40	10
Sewing machines	70	10
Copper wire	5	5
Cable	60	10
Refrigerator/air conditioners	60 (built up)	20 (built up)
" " "	30 (CKD)	10 (CKD)
Automobiles	100 (CKD)	20 (CKD)
Commercial vehicles	-	-
Motorcycles	30 (CKD)	10 (CKD)

8.35 It is widely believed that, because wages are low in comparison to other countries, Indonesian manufacturers ought to be able to compete successfully against foreign producers. Whilst there are, indeed, instances where this is true, this is demonstrably not the general case. The fact is that the wage cost advantage is more than offset by a variety of other factors including: inadequate and poorly maintained equipment; poorly trained labor in many industries which leads to low productivity; uncertain market demand leading to poor work scheduling; dependence on imported inputs whose costs include duties and excise taxes; and weak marketing organizations which in turn reflect back on production scheduling. These are all interrelated factors.

8.36 Accurate price comparison, which are also representative, between locally-made and imported products are difficult to make without undertaking a fully detailed survey. 1/ There are also considerable differences in

1/ The Germany Study Team made a detailed analysis of 21 engineering firms and 23 workshops in 1973, but were only able to make direct comparisons of prices with imported products in a few instances. Generally, heavy engineering products were considerably more expensive than imports. Domestic appliances were relatively competitive.

import charges and taxation as has been shown. At one end of the scale, some electronic components are made as cheaply as anywhere in the world. At the same time, automobiles cost three times the C&F equivalent because of uneconomic production rates and high taxation levels. From the data available, heavy engineering products as a group are estimated to cost between 25% and 60% more than their imported counterparts. It will require a concentrated development program to improve the competitive position in these industries.

Major Constraints on Development

8.37 In addition to current problems, considerable attention was given to the key factors likely to inhibit further growth in the engineering industry. Although there were differences in emphasis, a surprisingly wide measure of agreement was found between those who took part in the various discussions on this important aspect. The factors can be grouped together under two main classifications, internal and external. The internal category covers the kind of problem which can be tackled to some extent by an individual firm provided, of course, it has or can be given the necessary resources. External factors, on the other hand, concern the wider issues facing industry over which it has little or no control. These are discussed in turn below.

Internal Factors

8.38 Apart from a widespread need to overhaul or replace machine tools and other plant in many firms, the main internal problem facing industry concerns the continuing lack of key people. This covers both skilled production workers and the technical and managerial staff. Considerable efforts have been made to deal with this problem by expanding and uprating training facilities and programs. In the case of skilled workers, extensive use has been made of the Regional Training Centers and other bodies such as MIDC, along with in-plant training. One large engineering company has spent some Rp 4.5 million on training 500 machine operators and welders during 1976 as part of a long-term plan to ensure it has the skills it needs. This has proved a successful form of investment so far as this firm is concerned.

8.39 Although the supply of skilled labor has undoubtedly increased, there is still an underlying shortage. This is evident from the frequent complaints of 'hi-jacking' from the larger firms by companies unable or unwilling to train their own staff, and is reflected in the high rates of pay that are offered. At one end of the scale, unskilled laborers and helpers receive a minimum of around Rp 12,500 per month excluding overtime and other cash payments. This compares with gross earnings of Rp 50,000 to Rp 100,000 a month quoted for top-skilled welders and other engineering grades. These figures were obtained partly from official sources and partly from companies visited. In most instances the variation between the lowest and highest earnings within a single company was of the order 2.5 to 1. In one case it was as much as 5 to 1. It would also appear that differentials have widened over the last five years or so in contrast to the reverse trend in other countries.

8.40 Substantial fringe benefits are also paid to induce workers to stay with their employers. These include family allowances, transport to-and-from work, free meals, overalls, medical care, and, in some instances, accomodation. Special bonuses of one month's wages or more are paid at the 'Idul Fitri' day or Christmas holiday as appropriate. Long service awards may also be given. The value of these benefits varies from firm to firm. In terms of production costs, they can add some 15-25% to the labor cost.

8.41 The availability of good technical and managerial staff remains a problem in the industry. The salary levels offered to newly qualified graduates, Rp 100,000 and higher per month, reflect their scarcity value. Extensive and costly industrial training is also necessary for these men, much of it abroad, because of their lack of practical experience at university. There is particular difficulty in finding suitable men for design and production engineering work because of the time it takes to acquire the necessary depth of knowledge and experience. As a result, many engineering companies lack the technical staff to adapt or extend their product ranges themselves. Similarly, only limited effort is devoted to the major task of improving production methods and efficiency in the heavy engineering areas.

External Factors

8.42 There is almost universal agreement that the lack of funds at reasonable terms is restricting the growth of the engineering industry in Indonesia. Some private firms have extreme difficulty obtaining any money for expansion, others are forced to limit their borrowing because of the high interest rates that have to be paid. As a result, long-term development is very largely dependent on short-term profitability. A director of one small firm was justifiably proud of the fact that they were able to finance expansion, albeit slowly, out of trading profits. He was doubtful whether many others could make a similar claim and was generally worried about the industry's future. Interest rates are currently 18% per annum for investment capital, and 24% for working capital. The problem is accentuated where debt/equity ratios are high, as in the case of certain state-owned enterprises which were found to have ratios greater than nine to one.

8.43 In the capital goods sector, competition from imported products is regarded as the biggest single factor limiting expansion. This is blamed for the heavy underutilization of plant and the consequent loss of employent opportunities. A good deal of criticism is levelled at the duty and tax exemption given to foreign suppliers. There is also concern at the apparent unwillingness of some public bodies to specify machinery and equipment made by Indonesian firms, even where this is cheaper and manufactured to the required international standards. Although there is no doubt that the market for heavy engineering products has been badly distorted by the level of imports, no one seems able to quantify this in meaningful terms. There is, of course, no shortage of specific examples where local firms have failed to secure contracts against foreign competition. But much more information would appear to be needed to prepare a case convincing enough to bring about any desirable changes in policy.

8.44 Day-to-day operations and the development of new ventures in the engineering industry are both badly affected by the unnecessary delays that occur in dealing with various public authorities. The excessive time required to obtain customs clearance for production materials imported by sea, for example, can result in significant 'hidden' costs with multiple payments required in order to get official approvals. In one instance this involved 84 checkpoints, and 10 signatures were required before a consignment was released. By contrast, items sent by air freight are processed with very little delay. Problems frequently arise in the interpretation of tariff rates. Duties on items not specifically listed are often set at arbitrary high levels, which are seldom challenged to avoid even more delays and consequent costs. Problems also occur when exporting. In general, little incentive is given to the industry to export and, in many respects, there appear to be positive disincentives. In particular, the time taken to recover duties paid on imported materials and components subsequently re-exported in finished product form is almost absurd in comparison with the situation found elsewhere. Delays of twelve months are common; drawback took three years in the case of one electronics company. If the engineering sector is to become export-minded - an essential long-term requirement for an efficient industry - considerable changes are clearly going to be needed in this area.

Future Trends and Project Identification

8.45 Although a good deal of attention was necessarily directed towards the present-day problems of the engineering industry, the mission was primarily concerned with development needs. Particular consideration was given to assessing the broad requirements five to eight years ahead to improve and expand this important sector, and to identifying possible projects or investment opportunities of a type compatible with this program. This section of the report considers those aspects, looking first at the question of overall strategy. Particular emphasis is given here to important areas of uncertainty which need to be taken into account.

The Need for an Overall Strategy

8.46 A comprehensive ten-year strategy to develop Indonesia's engineering industry was set out earlier. This was based on the manufacture of key products mainly for the public sector, with priority given to the following areas:

- agricultural equipment
- construction equipment
- trucks and buses
- industrial electrical equipment

- railcars
- ships.

Light engineering products such as bicycles, sewing machines and home appliances were excluded from the list because of their capacity for development under private initiative and what was considered to be their relatively small effect on industrialization. Preference was given to the manufacture of commercial vehicles as opposed to passenger cars, because of the enormous difficulties in achieving economic car production with the profusion of makes that existed.

8.47 The development of primary and intermediate products, or 'building blocks' to promote a balanced industrial base formed an integral part of the strategy. Examples of some of the principal components and subassemblies which were identified are shown in the flow chart re-produced in Figure 1. A three-stage program was envisaged comprising:

Stage 1 - Expansion of existing industries (e.g, trucks and buses) and the manufacture of new products (construction equipment, power transmissions, electrical products). Also, the reorganizaton of the foundry industry, rehabiliation of the shipyards and the development of a forging capability.

Stage 2 - Expansion of construction equipment manufacture with production of farm tractors to be added. Expansion of foundry output with the addition of steel and non-ferrous casting capabilities, and the setting up of a stamping industry. Reorganization of the automobile industry. Also, the building of oceangoing ships.

Stage 3 - Establishment of precision component production, also machine tools. Development of four large-scale manufacturing complexes for motor vehicles, other mobile equipment, stationary machinery and ships.

8.48 Although some progress in this direction has clearly been made, the timescale estimated in 1971 has proved to be overoptimistic. With some notable exceptions (the development of construction equipment is one example) Stage 1 can be said to be largely complete. However, few of the projects envisaged in Stage 2 have so far materialized. Local component manufacture is held back by the lack of stamping and forging facilities. Indeed, many of the projects which formed part of the original strategy are unlikely to be completed until the mid-1980s or later.

FIGURE 1

BUILDING BLOCK FLOW CHART

RAW MATERIALS	PRIMARY CONVERSIONS	PRIMARY COMPONENTS	GENERAL SUB-ASSEMBLIES	SPECIAL SUB-ASSEMBLIES	END PRODUCTS
Steel Mill* Products	Foundry Products	Fasteners	Boilers tanks, etc.	Structures	Agricultural Equipment
Special Alloy Steel	Forgings	Bearings	Transmissions	Parts for Processing Mills	Construction* Equipment
Foundry Pig Iron	Stampings	Transmission Components	Pumps & * Compressors	Industrial Hardware	Trucks, Buses
Non-Ferrous Material		Valves, etc.	Hydraulic Devices	Accessory Equipment	Electrical* Equipment
			Engines*	Brake Systems	Ships
			Electrical* Components	Suspension Systems	Railcars
				Control Systems	
				Deck Machinery	

Note: Products underlined designate sectors where there was a significant activity or capability in 1971. Areas where substantial development has subsequently taken place are marked with an asterisk.

8.49 A different approach was adopted by the FGU-Kronberg/KU Gummersbach Group in a major study of the engineering sector in 1973. The study did not attempt to define a comprehensive strategy or framework for the development of the industry. Instead, more emphasis was given to the development of finished products. It covered both consumer and capital goods industries; a large number of possible projects was identified using import substitution as a starting point of the selection process. In the supply areas, feasibility studies were undertaken of plastic mould manufacture, the production of machine cutting tools, and the production of carbide metals. The rehabilitation of machine tools and measures to improve the efficiency of a number of existing enterprises were also studied.

8.50 Having considered the problems of Indonesia's engineering industry at length for a second time, the mission is convinced that the need for an overall strategy is as important as ever. This should cover the whole sub-sector, from the manufacture of raw materials and components through to finished products. It should also include consumer items as well as capital goods and make provision for the small-scale industries. There are obvious advantages for developing such a strategy as opposed to a piecemeal approach. For instance:

- industrial planning would be facilitated; the relevant part of the strategy could be incorporated into Repelita III.

- uneconomic use of scarce resources, particularly local funds and talents, would be minimized.

- technology transfer would be achieved more cohesively and rapidly.

- a broad-based, more efficiently managed industry would result which should attract much higher overseas investment.

8.51 The thinking behind the ten-year plan referred to above is still valid, and could be readily adapted to the current situation. The matrix of building block products would, of course, need to be modified as would timing. There are, however, a number of factors which need to be taken into account before a revised strategy can be determined in other than general terms. For example, action is required to deal with the problems of heavy engineering which are holding back development in this key area. Also, the fragmentation of automobile assembly is affecting the growth of component manufacture. The longer-term possibility of exporting selected products is also a relevant question. Each of these is discussed more fully below.

Areas of Uncertainty

8.52 Some of the changes that have occurred in the engineering subsector since the date of the previous visit could have an important bearing on

the industry's future development. The comparatively explosive growth in electronics is a case in point. This has created new employment, involved new technology, and established a thriving business. There are signs, though, that the rate of expansion in this area will be less dramatic over the next five years unless some stimulus is given.

8.53 In the metal products and engineering machinery areas, the failure of domestic industry to secure a bigger share of the capital goods market is clearly a cause for concern. Underutilization of capacity is widespread, even amongst the newer companies. Indeed, some of these could founder if present levels of production are not increased. With trading at or near break-even point, many firms are unable to generate sufficient funds to finance future growth. Whilst the reasons for this situation are known well enough, the full extent of the problem is not. The industry has no doubt that the problem is serious, but cannot begin to answer such questions as:

- what proportion of the market is accounted for by imports which have no Indonesian equivalents?
- of the remainder, what is the proportion of imports?
- how much of this is tied to foreign investment which might otherwise be lost?
- how much is exempt from import duties and sales taxes?
- how much potential business is lost because no one is aware of a requirement or responds to the inquiry?

8.54 The automotive industry has also expanded rapidly over the last five years. However, this has been achieved at the expense of much needed rationalization, by allowing too many firms to establish local assembly operations. By 1975, the number of assemblers had increased to 18. A year later this had risen to 28 firms who, between them, produced 23 makes of car and 27 makes of commercial vehicle. As a result production rates are grossly uneconomic. In 1974 the cost of assembling small- and medium-size passenger cars was approximately equal to the landed cost of CKD components after the payment of all import duties and taxes. 1/ Present day indications are that the ratio is close to 1.5 to 1 despite increased import tariffs. Not surprisingly, only limited progress has been made towards the local manufacture of components. Also, the plan to divert resources from car assembly to commercial vehicle manufacture has only been partially successful.

8.55 In an attempt to regulate the situation, the Department of Industry announced new curbs in June 1976. The numbers of makes of passenger cars and commercial vehicles would be reduced to ten each by the end of 1984; no

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1/ R.S. Sharma. Department of Industry Report on the Automobile Industry in Indonesia, May 1974.

new licenses would be issued for at least a year. At the same time, the import duty on C.K.D. commercial vehicles was abolished while the duty on C.K.D. sedans was doubled to 100%. The import sales tax and the tax on assembled cars were also increased from 10% to 20%. The Government's policy for this subsector, if successful, will have profound effect on the industry. However, the situation is so complicated that major difficulties are likely to arise unless the process is very carefully planned and managed. There could also be repercussions for the engineering industry in general. For these and other reasons, the special problems of the automotive industry are likely to become a critical element in any future development strategy.

Areas for Further Investigation

8.56 It is clear from the above that, unless action is taken to deal with the special problems of the engineering industries, further progress will be seriously retarded for years to come. Unfortunately, it is not possible at this stage to determine the precise action required in each area because of an almost total lack of data, but suggestions are given below.

Review of the Market for Heavy Engineering Products

8.57 An in-depth study of the capital goods sector is urgently needed, to investigate the reasons for the present high levels of imports and to determine the scope for greater participation by domestic suppliers. The study should concentrate on the public authorities and state-owned corporations which, collectively, are industry's main customers but should also include the private investment sector where appropriate.

8.58 In addition to answering questions on market trends, particular attention should be given to the effects of customs duties and exemptions, taxation and the like on price levels. Assuming the necessary cooperation could be obtained, the tenders submitted for a number of specific projects should be examined to determine the reasons for price variances. Ordering policies in the public sector should be carefully studied, especially the criteria used in the assessment of competitive quotations. The study should also cover problems of product quality and standardization, and probe attitudes towards locally made engineering products. The findings should quantify in detail the potential for increasing Indonesian manufacturers' share of the heavy engineering market, and set out the policy changes and other action that would be necessary to achieve this.

Review of Longer-Term Prospects for Exporting Engineering Products

8.59 Essentially a marketing study, this review should determine the possible scope for exporting engineering products over the next decade. It should identify in broad terms: the markets offering the best potential for export sales, including possible opportunities in an ASEAN context; the structure of these markets; the types of product likely to be competitive; the probable competition in both qualitative and quantitative terms; possible problems in pricing, tariff barriers and other forms of protection.

8.60 The review should also consider problems of overseas representation, distribution and necessary after-sales back-up. The question of incentives and other forms of assistance for the industry should also be examined. This would include, for example, waiving of export taxes, improving the draw-back arrangements on materials re-exported, streamlining documentation, and the provision of special credit facilities. The role that could be played by new offshore joint venture companies in the export field should be carefully assessed. This project should not take longer than the proposed study of the capital goods sector in terms of elapsed time as much of the basic fact-finding work could be done by desk research.

Specific Project Possibilities

8.61 In addition to the broad-based studies described above, a number of possible development projects should merit early attention. These include some new ideas along with others previously canvassed. The list is based on observations and information obtained during the visits to engineering firms and other relevant data. Account has also been taken of the findings and recommendations made by the 1971 Mission and the 1973 German Study Team. The projects are grouped under two main headings: new products and service-based industries. Additionally, a possible program to tackle the problem of low productivity is discussed.

New Products

8.62 The following group of products is considered well within the capabilities of the engineering industry, although extensive external design and manufacturing know-how would be necessary at the outset. Detailed studies would, of course, need to be undertaken to establish the full market potential, manufacturing facilities required, probable viability, employment prospects, capital costs, etc.

(a) Woodworking Machinery

8.63 Long-term development of the country's wood-based industries in such areas as sawmill products, pre-finished building materials including flooring and wall panelling, and furniture could create a substantial demand for woodworking machines of all types (see Chapter VI). Currently imports of this machinery are running at an annual rate of around US$3.6 million - three times that of 1971. The product range includes sawmill machinery, small and medium size circular saws, band saws, other woodworking machines.

8.64 The feasibility of manufacturing woodworking machinery was examined by the FGU-Kronberg/KU Gummersbach Group in 1973. They estimated that the market for sawmills and woodworking machinery would comprise 6,000 to 7,000 machines by 1979 based on an annual growth rate of 30%. While the manufacture could start as an assembly-based operation, a high proportion of domestically produced components should be possible within three years. Associated with this development, there should also be scope for other wood-processing equipment to be made in Indonesia. Kiln driers are one example. The sophisticated control instrumentation these require would still need to be imported.

(b) Agricultural Machinery

8.65 The continued emphasis on agricultural development in Repelita II has led to an increased demand for agricultural machinery and related products. Excluding tractors, imports of this equipment are likely to total more than $3 million in 1976. An interesting development in this area is the attention now being given to crop diversification outside the island of Java. This could lead to a requirement for a wide range of light agricultural equipment very different from the machinery currently produced in Indonesia for rice and sugar processing plants. There may also be the possibility of export business later on. Relevant data is, however, not available. Because of the undoubted long-term potential in this area, a full-scale study should be undertaken.

(c) Construction Equipment

8.66 Infrastructure is another major development area which has resulted in large investments in machinery and equipment. During 1976 bulldozers, mechanical shovels and excavators and levelling and tamping machines were being imported at the rate of US$95 million per annum. Dumper trucks imports were likely to be worth an additional $40 million. One project to make the heavier type of equipment is being considered by P.T. Barata who already manufacture road rollers. They are currently looking for a suitable overseas partner for a joint venture operation. With the wide range of construction equipment that is used, there should also be scope for other manufacturers - particularly in the lighter, more specialized equipment which includes, for example, tractor-based equipment, small rollers and levellers, and dumper trucks.

(d) Materials Handling Equipment

8.67 Requirements for this type of equipment go hand in hand with industrialization. The range of products is considerable and covers, for example, overhead travelling cranes and hoists, tower cranes, mobile cranes, screw conveyors and other bulk handling equipment, roller conveyors, warehousing and storage equipment including racking. There are also several marine applications such as winches and deck cranes. It is difficult to obtain a detailed breakdown of imports but the category which includes cranes accounted for $38 million in the year up to August 1976. In the case of overhead cranes and hoists, a project has already been submitted to the authorities for approval. Three other product groups could also provide substantial scope for development, namely: conveyor systems, warehousing and storage equipment and desk handling equipment.

(e) Valves

8.68 Although several types of pumps are made in Indonesia, very few valves for pipeline and other applications are manufactured locally. This is surprising as valve bodies and pump casings are often similar in design and require the same production processes, whereas the moving parts of a valve

are generally much simpler than a rotating pump impeller. In terms of imports, valves currently account for some US$14 million per annum - 40% of that for pumps. There is, of course, a wide range of applications and designs, depending on flow rates, pressures, and the liquids involved. With the high rate of investment in two public sector areas, namely oil production and distribution, and irrigation systems, the manufacture of valves appear to be an area of investment opportunity that has been overlooked. From the point of view of linkages, the main components are castings and would provide additional outlets for cast-iron, steel, and non-ferrous foundries.

(f) Specialist Vehicle Manufacture

8.69 With bus and truck assembly now well established, there is scope for extending the product range by adding specialized body-building and vehicle manufacture. The range of products envisaged included: mobile airport equipment such as transporters, loaders, recovery vehicles, and crash tenders, etc,; refrigerated vans and trailers; refuse and sewage collection vehicles. Unfortunately statistics are difficult to obtain for the whole range. Some indication of demand is given, however, by the current import data for road-sweeper trucks. In 1976, imports in this category were averaging US$15 million on a yearly basis.

(g) Small Petrol and Diesel Engines

8.70 The possibility of manufacturing a range of small engines for the home market has previously been examined. Typical applications include: semi-submersible and other pumps; small standby generating sets, air compressors, and machine tools and other equipment. Inboard and outboard motors for small boats are additional possibilities. A production rate of some 5,000 units a year was envisaged in the project studied by the FGU-KRONBERG/KU Gummersbach Group in 1973, on the basis of domestic consumption. The potential for exporting was not considered, but could add significantly to the market, especially in the longer term.

8.71 The list of projects could well be extended to include the manufacture of light electrical equipment (transformers, circuit breakers, electric motors, etc.) for the utility and other industries, as well as a greatly expanded shipbuilding and repair activities. It is clear that even for the somewhat limited number of product groups described above, development priorities would need to be established within each group covering not only the items identified but also the related components that could be locally manufactured. In addition, the present system of incentives may require modification to encourage existing Indonesian firms to participate in these projects.

Service-Based Industries

8.72 The requirement for engineering spares and service back-up has changed in line with the changes in technology that have occurred in recent years. As a result, new opportunities for investment in this field are now becoming apparent. The following three areas are considered to offer particular opportunities in this connection.

(a) Textile Machinery Spares

8.73 Although detailed statistics are difficult to obtain, it is clear that there is a substantial demand for textile machinery spares. There are a number of firms that can make some of the items required but a high proportion of the parts still have to be imported. Although some precision machinery is called for, the work is well within the capability of many firms except in one respect. There is a significant lack of gear cutting and grinding facilities to cover the wide range of spare gears that are needed. A small production unit initially is envisaged producing spur, helical and other types of gearing which should provide a very useful service to the textile industry. The machine tools required include: hobbers, gear shapers, lathes, internal and external grinders, and a key-seater. Heat treatment and hardening facilities would also be needed.

8.74 In addition to textile spares, there is likely to be a considerable demand for gears from other industries. Production quantities would, however, be small, and could not be mixed with the manufacture of high volumes of gearing for, say, automotive industries. Ideally, such a venture should be undertaken with an existing medium-sized engineering firm which has reasonably up-to-date machine shops. Further study would, of course, be needed to establish the viability and probable costs involved.

(b) Machine Tool Rehabilitation

8.75 Reference has been made earlier to the problem of out-dated and poorly maintained machinery. Although some progress is being made at last with the center established by P.T. Barata, it is clear that this will only partly solve the problem. Additional facilities are likely to be needed if many of the older medium- and smaller-sized engineering firms are to become efficient. The feasibility of constructing a second rehabiliatation workshop was examined by the German Study Team in 1973. They concluded that a center capable of overhauling 200-250 machine tools a year was justifiable provided also there was a long-term aim both to manufacture spare parts and to build new machines.

(c) Electrical Re-winds

8.76 There is likely to be a growing requirement for a repair capability in the electrical area. Motor re-winds is one such example. This is a specialized operation but one involving less technical know-how and capital equipment than that required for original manufacture. Although similar in many respects, it would differ from a machine tool overhaul facility in one key aspect - the need to offer a very fast service. It could be coupled with an agency for selling spares and new equipment, and possibly also form part of a broader-based electrical contracting business involving site wiring and other installation work.

Productivity Improvement

8.77 Low productivity is holding back progress in a number of areas, particularly among some of the older mechanical engineering companies. As

already stated, MIDC has begun to make a significant contribution in this direction but much more needs to be done if industry is to become efficient, especially in the context of import competition. MIDC is active in two important areas here. Firstly, it provides training in management techniques and controls. And secondly, it offers a consulting service to industry. The lack of staff and funds, however, largely restricts their present field of operations to the Bandung area.

8.78 The MIDC approach is proving to be very successful and in the view of the mission, deserves to be extended. This could be accomplished in two ways, by expanding the present facilities, or by setting up separate centers in other key locations such as Jakarta, Surabaya and Jogyakarta. The first of these alternatives has obvious advantages in that it would be based on an organization that is already operating effectively. Of course, it would need to establish branches in the other main industrial centers, but could continue to use Banoung as a central training facility.

SUMMARY AND CONCLUSIONS

8.79 In the five-year interval since the visit by the previous mission, the engineering industries have more than doubled in size and become wider-based and generally more efficient. However, comparisons of different industries within the subsector indicate that this development has taken place unevenly. In the consumer-based product areas the electronics and automotive industries have expanded rapidly over the period both in terms of output and employment, and are still expanding, though not always in an efficient way. The heavy engineering industries have expanded but excess capacity is widespread and there is currently little growth.

8.80 The main causes of this apparent imbalance are:

Internal Difficulties

- low productivity and poor, out-dated machinery and equipment;
- shortage of skilled manpower and the lack of technical and managerial talent.

External Problems

- difficulties in obtaining finance at reasonable terms;
- heavy additional costs which offset any comparative advantage from low wage rates;
- preference given to imported products in the capital goods sector.

The external problems are particularly important. And, if present policies remain unchanged these are likely to retard further development of the subsector especially in the heavy engineering areas.

8.81 Looking ahead, the mission is convinced of the need to have an overall strategy for developing Indonesia's engineering industries as a whole. Although the broad guidelines set out in the 1971 report are generally still valid, these need to be revised and updated to take account of the changes since 1971 and the factors likely to inhibit progress. Two major studies are recommended in this connection to assess possible measures to deal with key problem areas and assist the development of an effective industrial strategy. These are: (1) an in-depth study of the problems in the capital goods sector; and (2) a study of the possibility of developing a strong export business.

8.82 Project areas suggested for early attention include:

(a) New Products: woodworking machinery; agricultural machinery; construction equipment; materials handling equipment; valves; specialist vehicles; small petrol and diesel engines.

(b) Service-based Industries: textile, machinery spares; machine tool rehabilitation; electrical motor rewinds.

(c) Productivity Improvement: extension of MIDC, linked to a new scheme to train graduate engineers.

8.83 Progress has been achieved so far despite many difficulties and constraining factors. Opportunities for further expansion also look promising, but there is a need to have an effective strategy and program of action to guide the development of this important subsector of manufacturing industry through the 1980s.

IX. THE TEXTILE INDUSTRY

Current Status of the Industry

9.01 The textile industry has been growing considerably in recent years. Its share in total industrial value added was 11% in 1970 and rose to 17% in 1973. In 1969 the output of knitting and weaving was 450 million meters and increased by 141% to 1,085 million meters in 1975/76. The number of spindles increased from around 482,000 in 1969 to 1,152,000 in 1975/76. This increase in capacity was also accompanied by an increase in productivity. The output per spindle was .07 MT p.a. in 1969, and .10 ton p.a. in 1976. The total capacity of dyeing, finishing and printing amounted to 665 million meters in 1970 and the actual output was 933 million meters in 1975/76. All non-cotton fiber was imported in 1969, but in 1975/76 there were four synthetic fiber making units with capacity totalling 59,000 MT per annum. The growth was also accompanied by the production of new products such as blended and texturized yarn, suiting and shirting, tricot double knit, embroidery, brocade, and laces.

Weaving

9.02 The weaving industry grew rapidly during 1969 - 1975/76. The number of power looms increased from around 35,000 in 1969 to around 60,000 in 1975/76 as can be seen in Table 9.1. Total output (excluding knit goods) more than doubled from around 372 million meters in 1969 to around 877 million meters in 1975/76. And capacity also doubled from around 682 million meters in 1969 to around 1,637 million meters in 1975/76. This increase in capacity and output was one of the main programs in Repelita I and continued in Repelita II.

9.03 The Directorate General of the Textile Industry (Ditjentek) defines a weaving unit with hand looms, or 100 or less power looms as small scale. By this definition 81.5% of the existing mills in 1975/76 and 40.6% of power looms belong to small scale. The average size of weaving mill is 78 power looms.

9.04 As regards locational distribution, most of these weaving mills are located in Java, particularly in West Java. The data in Table 9.3 shows that 94.2% of the mills, 96.8% of the power looms and 97% of the output were located in Java. Only a very small part is located in other islands. Out of the total in Indonesia, 65.0% of the mills, 56.3% of the looms, and 58.4% of the output were in West Java. These figures also show that the size of the mills on the average in West Java is smaller than in the rest of Java or Indonesia as a whole.

Table 9.1

The Weaving Industry

	1969	1973	1975/76
Power looms (000)	35	50	60
Handlooms (000)	166	50	69 /4
Total output (m. meters)	372	769	877 /1
Output per looms:			
Power looms (000 meters)	6.54 /2	-	13.62
Handloom (000 meters)	.87 /2	-	.87
Capacity:			
Powerlooms (m. meters)	420	1000 }	1637 /3
Handlooms (m. meters)	262	75 }	

/1 Consist of 816 m. meters of power looms and 60 m. meters of hand looms.
/2 Estimated.
/3 Calculated from Repelita II for 1977/78 and 1978/79.
/4 The numbers shown are those registered and may not be in operation.

Source: The 1969 and 1973 figures are basically from Ditjentek: "Pola Pembangunan Industri Tekstil Repelita Tahap II" and Draft of R.G. David: "Notes on Textile Subsectors". The figures for 1973 are targets, except the total output figure is the realized figure taken from CAFI No. 621, Oct. 1976 less the estimate of knitting output. The 1975/76 figures are from the Feb. 1976 census of Ditjentek.

Table 9.2

Distribution of Power Looms in 1975/76

Size	Mills		Looms	
(No. of Looms)	Number	Percentage	Number	Percentage
0-100	630	81.5	24,500	40.6
101 or more	143	18.5	35,872	59.4
Total	773	100.0	60,372	100.0

Source: February 1976 Census of Ditjentek.

Table 9.3

Locational Distribution of Weaving Mills

	Mills		Power looms		Output	
	Number	%	Number	%	(000 meter)	%
Java	727	94.2	58,459	96.8	792,200	97.0
DKI	27	3.5	3,456	5.8	63,621	7.8
West	503	65.0	33,974	56.3	470,802	58.4
Central	136	17.6	13,577	22.5	158,811	19.4
DIY	19	2.5	1,735	2.9	30,681	3.8
East	43	5.6	5,711	9.5	68,283	8.4
Others	46	5.8	1,913	3.2	24,859	3.0
Total	773	100.0	60,372	100.0	817,057	100.0

Source: February 1976 Census of Ditjentek.

9.05 There have been some significant changes in employment as a result of the increase in power looms and a decline in the number of hand looms. The additional power looms during 1969 - 1975/76 were around 25,000. Taking 1.1 as the ratio of workers per loom, the labor force absorbed would be around 27,500. The number of hand looms dropped to 69,000 in 1975/76 from 166,000 in 1969. If 1.3 is taken as the ratio of workers per hand loom, this means that around 126,100 workers lost employment as a result of the displacement of hand looms by power looms located in larger-sized units. 1/

9.06 The displacement took place in 1969 to 1973; after that the small and large mills specialized in different products. After 1973 the small mills specialized in products such as sarung, singket and other traditional products. Thus it seems likely that no further sharp decrease in hand looms will occur.

9.07 As has been indicated, a significant part of the weaving industry is in the hands of small enterprises. They suffer from many disabilities, compared to the larger units, including low productivity per loom or per worker, difficult access to credit, lacking production planning and control, and in other management aspects. Also, all the weaving industry has had to contend with competition from cloth illegally smuggled into the country. In 1974 and 1975 it is estimated that smuggled cloth amounted to 765 million meters and 443 million meters respectively. This amounted to roughly 75% - 80% of domestic output and has led to severe competitive pressures on the domestic producers. In 1976 the incidence of smuggling apparently decreased rather sharply, and the industry is beginning to rebound. But there have been many complaints and requests for total bans on imports and tighter control of smuggling.

1/ The figure of 1.5 workers per loom is used by the Ministry of Industry.

9.08 Imposing total import bans does not appear to be an appropriate solution to the problems. It would remove competitive pressure on the industry to rationalize and improve its competitive position. Moreover, as is shown later, a strong growth in market demand is expected over the next five to ten years and in those circumstances adjustments may be easier.

Knitting

9.09 The knitting industry was started in 1952. Up to 1967, the products were limited to coarse products such as T shirts, socks, underwear. Output amounted to 90.8 million meters in 1972 and rose to 208.0 million meters in 1975/76. The annual rate of growth was 25.8%. This growth was also accompanied by the introduction of new product lines such as tricot, double knit, laces, etc., and most of the new mills were using synthetic yarn such as nylon, polyester and acrylic bulky yarn as raw materials.

9.10 Almost all of the mills are concentrated in Java, particularly in DKI and West Java, as can be seem from the following table. In terms of numbers, 95.3% of the mills were in Java and 73.6% were in DKI and West Java. In terms of machines, DKI and West Java have 100% embroidery, 83.3% raschel, 82.8% flat and 69.2% circular knitting.

Table 9.4

Knitting Industry in 1975/76

Region	No. Enterprises	Output (m. meters)	No. Machines			
			Circular	Flat	Raschel	Embroidery
1. Java	224	207.0	5,418	939	570	52
DKI	73	65.3	2,000	399	78	30
West	100	78.9	1,877	455	412	22
Central	16	27.1	752	7	41	-
DIY	3	6.6	51	-	27	-
East	32	29.0	738	78	12	-
2. Others	11	1.0	182	92	18	-
Total	235	208.0	5,600	1,031	588	52

Source: Ditjentek, February 1976 Census.

9.11 The machines in the knitting industry can be divided into two groups. The first includes those established prior to 1967. These were mainly circular knitting machines of old and low technology producing coarse products. In 1972 there were 3,741 machines in this group. The second group includes those established after 1967. These consisted of raschel, warp, circular, and flat knitting. Their products are of much better quality.

9.12 During 1969-75, the total number of knitting machines proposed to be installed and approved by the Government amounted to about 11,000, including both foreign and domestic investments. Out of all foreign investment projects in that period, 58.3% in terms of mills and 44.9% in terms of investment have been producing. For domestic investment the corresponding figures were 61.5% and 74.4%. 1/ The number of new knitting machines already producing would be 6,625 (based on mills percentage) or 6,678 (based on investment volume). Combined with the old machines in place prior to 1969, the total machines in 1975/76 should have been much larger than 7,271, the figure shown in Table 9.4. These figures suggest that the replacement of old machines was taking place. This happened by the displacement of old mills, and apparently many entrepreneurs moved to other businesses.

9.13 Despite the competition from a large volume of imports in 1974/75, the impression from the interviews and the factory visits was that the mills are making a profit. The profit and cost calculations for some mills are given in Appendix I. Some of the products have even been exported. At present the knitting industry enjoys nominal tariffs ranging from 50 to 90% with 10 to 60% nominal tariff for raw materials. The real value is likely to be lower due to the presence of smuggling.

Spinning

9.14 This industry has grown rapidly from 1969 to 1976 as figures in the following Table 9.5 show. From 482,000 spindles in 1969 it increased to 802,000 in 1973 and then to 1,238,500 in February 1976. Repelita II sets the target at only 1,222,000 spindles by 1978/79. With this growth, the output of the spinning industry can now supply around 83% of the total yarn and filament input for weaving and knitting as opposed to around 55% in 1973. 2/

1/ Dept. Parindustrian, Team Investarisasi Perizianan Proyek 2, PMDN dan PMA Buku I, Laporan Umum, Jakarta, March 1, 1976.

2/ The 83% was calculated from the Census data. The 55% was directly taken from Repelita II.

Table 9.5

Spinning Industry

	Ownership	Number of spindles (000) 1969	1975	1976
P.N. Sandang Group	Government)		242	302
Pinda Sandang Group	Regional Gov.)		135	
GKBI	Private)	482	44	53
Private	Private)		441	789 /1
Other	Government)		8	8
Total		482	870 /2	1,152 /3
Total output (000 ton)		33	80 /4	116 /5
Capacity (000 tons)		48	97.2 /4	137 /6

Source: Ditjentek and R.G. David notes on Textile Subsectors.

/1 Including the Pinda group.

/2 With the addition of 5 spinning mills at the end of 1975, the number of spindles became 982.

/3 This data was for January 1976. The census in February 1976 shows that the figure was 1,238,500 spindles.

/4 Commercial Advisory Foundation in Indonesia (CAFI) No. 621, Oct. 13, 1976.

/5 February 1976.

/6 Estimated. The data from Ditjentek is only .06 Ton/sp. (see Ditjentek: "The Development of Textile Industries in Indonesia", May 1976.

9.15 In 1971, there were 18 mills with 484,000 installed spindles. In 1976, there were 56 mills with over 1.2 million installed spindles. The average size dropped from 27,000 to 22,000 spindles per mill. This means that the investment in spinning taking place during 1971 to 1976 has been in many smaller size mills. Taking 30,000 spindles/mill as a rough optimum size, this seems to imply that the spinning industry may have lost some competitive edge.

9.16 In 1971, 89% of the mills and 88% of the spindles were concentrated in Java. In 1976 the concentration increased to 93% in terms of mills as well as spindles. In 1976, 96% of the total output of the spinning industry was produced by mills located in Java and 65% were in West Java.

9.17 The factory visits show that in general the mills were working three shifts per day, seven days per week. But spinning is less labor-intensive than weaving and knitting, and its competitiveness is less. The size of the new mills is smaller than 30,000 spindles on the average which would perhaps explain part of the problem. The factory visits tend to support this view. From the four mills whose cost data are presented in Appendix II, only two of them (B and D) could cover their full costs while the other two (A and C) could not. Spinning also has a lower nominal tariff protection than does weaving and knitting, and although the coarse cotton yarns are banned from import, supplies from smuggling are available in the market.

9.18 Many if not most spinning mills are high cost producers. This is due partly to the high price of cotton. But it also results from the rather high waste in converting cotton into yarn. All in all, the competitive position of the spinning industry is weaker than for weaving and knitting.

Fiber Making

9.19 In 1976 there were four mills producing synthetic fiber. Their capacity as a whole for several kinds of products are given in the following table.

Table 9.6

Fiber Making Industry in 1976

Product	Capacity (Ton/year)
Polyester staple fiber	41,790
Polyester filament yarn	10,950
Nylon filament yarn	6,330
	59,070

Source: Ditjentek.

All of the mills are located in West Java.

9.20 This industry is facing competition from imported products. According to a team recently sent by Indonesia to several countries in Asia, import was based on a dumping price which was much lower than the price and the production cost in the exporting countries. The data obtained by the team is given in the following table.

Table 9.7

Inter-Country Comparison on Polyester Staple Fiber

	Taiwan	Thailand	South Korea	Indonesia
Production Cost (US$/Kg.)	1.60	1.80	1.75	1.90
Selling Price (US$/Kg.)				
In the Country	1.24	1.70	1.55	1.32
Export (f.o.b.)	.88	.95	.93	-

Source: Laporan Team Evaluasi Kalkulasi Polyester staple fiber, November 1976. These figures suggested that the main source of the problem was not the difference in production cost but in the pricing policy.

9.21 The fiber plants are in a somewhat poor position now, and the existing plants seem to have enough capacity to satisfy current demand. Competition from imports has made plans for domestic expansion appear unfavorable. But it is expected that in the future the demand for blended fabrics (involving synthetics) is likely to rise more rapidly than for cotton fabrics, and the long-term prospects for capacity expansion appear much more favorable, providing that domestic producers can compete with imports at prices comparable to those applying to the home markets of exporters (i.e., not at a dumping price). At present domestic producers suffer cost disadvantages vis-a-vis imports primarily because of raw material freight costs, higher interest charges in Indonesia, higher electric power charges (per Kg. of product), and even higher labor charges per unit output (because of low productivity).

Finishing, Dyeing and Printing

9.22 The finishing, dyeing and printing industries are concentrated in West Java. Many enterprises are quite small and concentrate on traditional products such as batik. In 1970, the capacity of the existing printing units was around 352 million meters. This capacity was higher than the output in 1975/76. The capacity of the existing dyeing and finishing units in 1970 was around 313 million meters.

9.23 The finishing, dyeing and printing mills can be divided into two broad categories: those not integrated and those integrated with weaving and knitting mills. The latter have processed their own knitted and woven products and sold services to others that did not have the facilities. On the other hand, the non-integrated mills have had to rely on buying materials from the market or have undertaken job orders. They are facing difficulties both in getting consistent quality of material from the internal market and in getting continuous job orders. Almost all the new mills are integrated units with balanced capacities. Excess capacity has prevailed in this industry, and the new demand in the next ten years is expected to be satisfied by the integrated type of investment. The non-integrated mills will continue to have difficulty in maintaining production.

Garment Making

9.24 Compared to other segments in the textile industry, garment making is still a very small segment. In 1975/76 there were 123 enterprises and 4,267 sewing machines in this segment of the industry as given in the following table.

Table 9.8

Garment Making Industry

	Number of Firms	Number of Sewing Machines
1. Java	119	3,843
DKI	71	2,076
West	22	872
Central	9	501
DIY	2	35
East	15	359
2. Others	4	424
Total	123	4,267

Source: Textile Industry Census, February 1976.

In 1974, it was estimated that around 85% of the domestic clothing consumption was bought in the form of cloth which was then given to local tailors to be sewn. Only 3% of this consumption was supplied by the real garment industry, while 7% was supplied by the home industry and the rest 5% was underwear.

9.25 It is very clear that the garment industry in Indonesia is in its infancy. It has not developed at all. The present capacity is miniscule by any standards. As is shown later, the major change in the whole of the textile industries should be a very rapid growth in garment making. It is, without doubt, the major industrial sector that could absorb labor in the future.

Batik

9.26 The batik industry is one of the traditional industries of Indonesia and will continue to grow at a slow but steady rate. Most of the batik undertakings are under one association called GKBI (Indonesian Batik Cooperative Association). The GKBI supplies the raw material and the finishing services to the undertakings and in some cases also helps in marketing. The labor employed 1975/76 is estimated at about 43,000 in block printing and 250,000 in traditional batik. Most of these products are domestically consumed. In 1974 the total batik output was estimated at 29.4 million pieces or around 73.5 million meters.

Future Trends

9.27 The consumption per capita of textiles in 1969/70 was 6.2 meters, and in 1974 rose to about 10 meters. The growth rate of consumption per capita during Repelita I 1969/70 - 1973/74 was around 11.3% per year. The projected figure for Repelita II 1974/75 - 1978/79 is 10 meters in 1974 to 11.5 meters in 1978/79 or a growth rate around 3.9% per year. For the period 1979/80 - 1983/84, the consumption per capita is projected to be 18.0 meters in 1983/84 or a growth rate around 9.4% per year. These growth rate projections are suspect. The 11.3% growth rate in Repelita I followed by a drop to 3.9% in Repelita II and then an increase to 9.4% as projection for Repelita III seems inconsistent. It appears that the projection figure in Repelita II is too low.

9.28 In order to make a projection of textile consumption per capita for the future, a comparison was made to the experience of other (tropical) countries. Data were collected on 62 countries and consumption per capita was related to income (as measured by the GDP). Several functional forms for the relationship were tested and finally an equation that is linear in logarithms was chosen. This gave the best fit and has the advantage that the coefficient of the independent variable shows the elasticity of consumption of textiles per capita to income. In this way a projection of future consumption based on the average or normal experience of other countries was derived. The results of this statistical analysis are as follows:

$$\ln y = -2.8332 + .6775 \ln x$$

$$(.3113) \quad (.0510)$$

$$R^2 = .65$$

$$F = 112.0$$

where y equals consumption of textiles per capita
x equals GDP per capita in 1970 US$.

9.29 The results indicate an income elasticity of demand of only .68, which is lower than other estimates that have been made for Indonesia, which typically have been greater than one. But even with what may be a conservative estimate of the income elasticity of demand at Indonesia's level of per capita income, the projected rate of growth of consumption of textiles is substantial. Per capita income in 1986 is estimated at $250 based on recent growth trends. Then the estimated value of consumption per capita in 1986 is 2.5 Kg. If Indonesian consumption per capita 1986 is assumed to be on the regression line, and taking the consumption per capita in 1973 as 1.3 Kg., then the consumption per capita growth rate is 5.2% per year. With the population growth rate 2.1% per year, the total consumption growth rate is 7.3% per year.

9.30 The total knitting and weaving output was 63% of domestic output plus import in 1969 and then increased to 70% in 1975/76. In 1986, this figure is expected to be higher and is taken to be around 80% for the subsequent discussion in this paper. In 1975, the census showed that knitted output was 19.2% of total Indonesian knitting and weaving production. It is assumed that the percentage of knitting output is still increasing and that in 1986 will settle at about 25%. Then with a figure on exports, the output of Indonesian production could be broken down into knitting and weaving products.

9.31 The export figures for textile products so far are very small. They were less than 1% of the corresponding consumption figures. Based on their assessment of the Indonesian textile industry, H.J. Blydenstein and M. Minke said: "Provided a sizeable percentage of the present applications for new investments are approved and effectuated at a reasonable machine utilization, an estimate of an export volume of 250-400 m. meters in 1979 does not seem unrealistic. This metrage undoubtedly can be more competitively exported in the form of garments rather than piece goods". 1/ If the consumption in 1979 is estimated from the regression above, this level of export is 13.6% - 21.7% of total consumption in that year.

1/ H.J. Blydenstein and M. Minke, Observations on Garment Making in Indonesia, Jakarta, September 1974, p. 10.

9.32 The fiber composition of output has been changing. In 1970 cotton accounted for 79% of output, synthetics (nylon, polyester, acrylics) for about 17%, and rayon for about 4%. By 1979 it is estimated that cotton will account for just under 60%; synthetics will increase to about 35% and rayon to 5%.

9.33 Several other targets are also acceptable for the analysis. The production target for yarn is taken at 80% of the yarn consumption. In the conversion of yarn into woven and knitted fabrics it is assumed that the waste is 10%. The same assumption is also applied for fiber. The production target for synthetic fiber is 80% of consumption.

Analysis of Representative Projects

9.34 Based on the foregoing estimates of future total consumption, exports, the level of self-sufficiency in domestic production, and the other points raised above, in the remainder of this chapter an analysis is made of "representative" projects in each of the main divisions of the industry: spinning, weaving, garment making, and fiber making. The objective is to analyze potentially efficient projects in each of the divisions, but not to attempt to identify these with a specific project with all the details that that requires. For example, in the spinning industry the representative project is one that has 30,000 spindles and has investment costs derived from estimates made for such a plant in 1972, as updated to 1976. Product prices are those existing typically in 1976.

9.35 The purpose of this type of analysis is not primarily to identify a specific investment project, but to compare the relative profitability and/or comparative advantages that Indonesia has in the different divisions of the textile industry. It is an attempt to provide a rough screening whether investments in spinning, weaving, garment making, or fiber production are apt to be best. This is a rough screening since calculations of economic (as opposed to market) prices and costs often had to be treated in a crude fashion or ignored entirely. Consequently, the results of the analysis are useful primarily as indicators of directions for further detailed analyses. The results are very definitely not intended to recommend operational decisions on investment programs.

9.36 In the project analyses that follow, many assumptions are made for simplification:

- The scrap value at the end of the lifetime of the project is taken to be zero.
- The project lifetime is assumed ten years.
- Depreciation is taken straight line.
- Working capital equals three months output and this is released at the end of the lifetime of the project.

- No loan is assumed (all equity investment).
- No reinvestment is assumed.
- Investment is evenly spread over three years.
- Production starts in Year Three, directly at full capacity.
- Wage and salary on the average is taken at Rp. 216,000 per man year.

9.36 The characteristics of representative investment projects have been derived from previous analyses of the textile industry and from work of the mission itself. Brief descriptions of these projects plus other pertinent market and price information are presented below.

9.37 Weaving: The representative investment project has been derived from prior work done by Werner International as updated by the mission.

No. of Power Looms:	400
Capacity:	3.7 m. lbs. or 15.6 m. meters of 26's/26's.
Warp and Weft:	60 x 60 ends and picks per sq. inch.
No. of Employees:	Supervisory 20 - Production 400.
Investment Cost per Plant:	$5.3 million.

This is not the most automated capital intensive type of plant. Based on the prior demand projections it is estimated that by 1986 543 million meters of new capacity will be justified, after allowing for the fact that the number of hand looms is assumed to stay constant and that domestic production will account for 85% of total supply (i.e., 20% of imports minus 5% exports). The largest demand will be in cotton products. The representative plant is assumed to produce 36 inch T/C shirting (annual capacity 12.8 million meters). 1/ The product price is assumed at Rp. 350 per meter (see Appendix II).

9.38 Spinning: The representative investment project is based on a plant with 30,000 spindles and the plant is assumed to produce cotton yarns with counts in the 20's, 30's, and 40's. It is recognized that by 1986 the composition of output will change toward synthetics but cotton will still be the major part of output. The 1986 demand will require 172,000 tons of new capacity on the assumption that domestic output will supply 80% of total requirements. The representative project has the following characteristics:

No. of Spindles:	30,000
Capacity:	3,677 tons per year

1/ 44 inch may be becoming more common.

Employees:	Supervisory - 30 Production - 600
Investment Cost of Plant:	$14.4 million.

Appendix II shows the cost calculation for cotton yarn, from which rates of return and other measures have been calculated.

9.39 Fiber Making: Calculations indicate that domestic production of polyester yarn is not an attractive investment in the time period up to 1986 since demand is not expected to increase sufficiently to support one plant of minimum efficient size. However, the demand for nylon filament yarn is somewhat more attractive. Current domestic production capacity is around 6,300 tons per year and by 1986 one plant of minimum efficient size (20,000 tons per year) may be justified. The characteristics of the project are as follows:

Product:	Nylon Filament Yarn
Capacity:	20,000 tons per year
Employment:	575
Investment Cost of Plant:	$119 million.

9.40 Garment Making (Shirts): As has been indicated earlier, it appears that the garment making industry may offer the most favorable market conditions for expansion. The existing mills have already been able to export, and face a growing domestic market. Many types of garments could be produced; the representative project is a plant for manufacture of shirts, with the following characteristics:

Product:	Shirts
Capacity:	180,000 dozen or 2.16 million pieces per year
Employment:	500
Investment Cost of Plant:	$3.85 million.

Preliminary calculations seem to indicate that Indonesia may have a strong competitive edge even over Japan or Taiwan in this labor intensive industry, since productivity in Indonesia (shirts in man-day) is about one-third to one-quarter the productivity in the other countries but hourly wage rates are one-twentieth as much.

9.41 Summary cost calculations for each of the four representative projects in weaving, spinning, fiber making, and garment making are given in Appendix II. These calculations are then used to compute the internal rates of return and various other measures indicating the "worth" of the projects. The results are shown in Table 9.9.

Table 9.9

Summary of the Project Analyses /1

Projects Products	Weaving Shirting /2	Spinning Cot. yarn	Fiber Making /3 Nylon FY	Garment Shirt
A. IRR & SENSITIVITY ANALYSIS				
1. Internal Rate of Return	11.8%	-5.0%	-4.7%	17.0%
2. Factor by which output price would have to be multiplied to yield 10% IRR, holding input prices constant.	.97x	1.20x	1.52x	.87x
3. Factor by which output and input prices would have to be multiplied to yield 10% IRR.	.90x	1.69x	2.10x	.71x
B. FINANCIAL RETURN				
Accounting Rate of Return /4	16.7%	-5.6%	-6.6%	25.6%
C. FX EFFECTS				
1. FX investment cost (Rp.m.)	2,169	3,861	37,842	1,334.8
2. FX cost as % of total investment	65.5%	52.6%	65.9%	55.0%
3. Annual FX saved/earned as % of 1	47.8%	38.7%	12.6%	160.4%
D. EMPLOYMENT EFFECTS				
Capital cost per direct job created (Rp.m.)	7.9	11.7	100.0	3.2

/1 - The project will last 10 years, at the end of which the scrap value is assumed 0, and the working capital, i.e., 3 months stock of output materials is released.
- Investment is evenly spread within 3 years. No loan and reinvestment assumed. Depreciation is taken straight line.
- Started producing in year 3, directly at full capacity.
- Wage and salary on the average is taken Rp. 216,000 per man year.

/2 Made of T/C, 45's.

/3 Cotton 20's, 30's and 40's.

/4 Defined as Net Profit After Taxes over average investment, i.e., working capital plus one-half of fixed capital.

9.42 The comparative calculations indicate quite closely that garment making offers the best opportunities for investment within the textile industry, followed by weaving. Both spinning and fiber making appear quite unattractive. The internal rate of return is highest in garment making and the investment cost per job created is the lowest. The sensitivity measures and the foreign exchange effects are also generally the best. On these same points, weaving appears to be a favorable field by comparison to the other two.

9.43 It is important to emphasize the limitations of the analyses that were conducted. Due to limitations of time and availability of data the analyses are crude; the absolute values, such as the internal rate of return, are not necessarily significant by themselves, but they are valid for making comparisons among projects, and that is the primary purpose. This is a rough means of attempting to screen the various alternatives and to indicate the directions for detailed analyses. For that purpose the analyses are valid and useful.

9.44 We have not attempted to shadow price the inputs nor to identify the representative projects with a specific plant location. The product lines seem relatively homogeneous and do not reflect the fact that in actual situations the product-mix might be more complex (e.g., a garment plant might produce other products in addition to shirts). Finally, the costing and price selections are based on current conditions as best we could determine them, but a closer analysis might reveal differences.

9.45 Subject to all the above qualifications, the analytical results do reveal in what directions relative priorities lie in the textile industry. Even with a more detailed analysis it is very unlikely that the relative order of the results would be changed though the margins of difference might well be less.

9.46 It is suggested that in evaluating proposals for further developments in the textile industry, a greater attention be given to the opportunities in garment making and weaving.

APPENDIX I

Profit and Cost Calculation of Some Knitting Mills

	A cost per dozen		B cost per dozen	
Variable cost	Rp.	%	Rp.	%
Raw material	1,227	47%	1,702	61%
Auxiliary materials	727	28	214	8
Direct labor	114	4	180	6
Maintenance	18	1	65	2
Selling cost	68	3	34	1
Others	57	2	-	-
Total variable cost	2,211	85	2,194	78
Fixed cost				
Depreciation	261	10	44	2
Indirect labor	64	3	108	4
Insurance	3	-	21	1
Maintenance	-	-	5	-
Interest	60	2	151	5
Others	1	-	277	10
Total fixed cost	389	15	606	22
Total cost per dozen	2,600	100	2,800	100
Product	underwear		underwear	
Total output per year	45,000 dozen		275,000 dozen	
Sales revenue per dozen	2,977		3,676	
Gross profit per dozen	377		876	
Corporate tax	165		385	
Net profit per dozen	212		491	

APPENDIX I

Cost Structure of Some Spinning Mills
(Rp/ß)

	A /1			B		C		D	
Raw material	120600	58%	71% /2	93200	70%	170200	81%	124000	87%
Aux. material	2300	1	1						
Wages	10200	5	6	8200	6	12300	6	11700	8
Salaries	5600	3	3						
Depreciation	6500	3	4	9600	7	4900	2	1500	1
Maintenance & spare parts	8500	4	5	7800	6	3900	2	4300	3
Utilities	7600	4	4			3900	2		
Interest	40500	19	-	-	-	12200	6	-	-
Others	7800	4	5	14500	11	3400	2	1300	1
Total cost	209600	100%	100%	133300	100%	210800	100%	142800	100%
Product avg. count	25.5's			29's		30's		23's	
Output	10000 ß			13000 ß		16000 ß		19000 ß	
Sales Revenue/3	172100			182000		195000		167000	

/1 A is for 1975. Others for 1976.

/2 Without interest payment.

/3 Recalling that cotton yarn of 12's and 12'2 up to 42's and 42's have been banned from import, the CIF price would likely be significantly lower than the market price. The Ditjentek data on CIF are Rp. 173000, Rp. 20300 and Rp. 220000 per ß for 20's, 30's and 40's respectively.

It is worth noting that the CIF price does not necessarily reflect the cost of standard international spinning mill.

APPENDIX II

Cost Calculations of 36" Blended Shirting

(capacity 12.8 m. meter p.a.)

Rp/meter

Material	168	
Wages and salaries	7	
Maintenance & spare parts	4	
Depreciation	17	
Others	16	
	212	
Sales tax 5%	11	
	223	
Sales revenue	275	/1
Gross Profit	52	
Taxes	23	
Net profit	29	

/1 The retail price Rp. 350.

Cost Calculation of Cotton Yarn

(a mixture of 20's, 30's and 40's, one third each)
(capacity 3,187 ton or 17,550 bales p.a.)
(Rp/₿)

Raw Material /1	127,820
Wages and salaries	7,760
Maintenance & spare parts	6,780
Depreciation	33,930
Others	14,500
	190,790
Sales tax 6%	5,724
	196,514
Sales revenue /2	182,667
Loss	13,847

/1 The price of cotton is taken 70¢/lb.

/2 The price of 20's, 30's and 40's are taken at Rp. 150,000, Rp. 195,000 and Rp. 198,000 per bale.

APPENDIX II

Cost Calculation of Nylon Filament Yarn

(capacity 20,000 ton p.a.)
(Rp/kg)

Raw material	501
Auxiliary material	77
Wages and salaries	49
Maintenance & spare parts	36
Depreciation	249
Technical fee & royalty	36
Insurance	14
Selling cost	35
Others	59
	1,056
Sales tax 5%	53
	1,109
Sales revenue	1,000
Loss	109

Cost Calculation of Shirt Making

(capacity 2,160,000 pieces p.a.)
(Rp/piece)

Raw material	675
Wages and salaries	50
Maintenance & spare parts	36
Depreciation	74
Technical fee & royalty	5
Insurance	3
Others	20
	863
Sales tax 5%	43
	906
Sales revenue	1,250
Gross Profit	344
Taxes	151
Net Profit	193