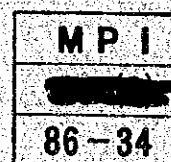


**THE STUDY REPORT
ON
DEVELOPMENT OF LINKAGE-TYPE INDUSTRY
IN
THE REPUBLIC OF INDONESIA**

MARCH, 1986

JAPAN INTERNATIONAL COOPERATION AGENCY



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PREFACE

In response to the request of the Government of the Republic of Indonesia, the Government of Japan decided to conduct a survey on the Development of Linkage-Type Industries in the Republic of Indonesia and entrusted the survey to the Japan International Cooperation Agency (JICA). JICA sent to Indonesia a survey team headed by Mr. Masayasu SAKANASHI from 10th June to 4th August, 1985.

The team had discussions on the Project with the officials concerned of the Government of the Republic of Indonesia and conducted a field survey in Java, Sumatra, Kalimantan and Sulawesi areas. After the team returned to Japan, further studies were made and the present report has been prepared.

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

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

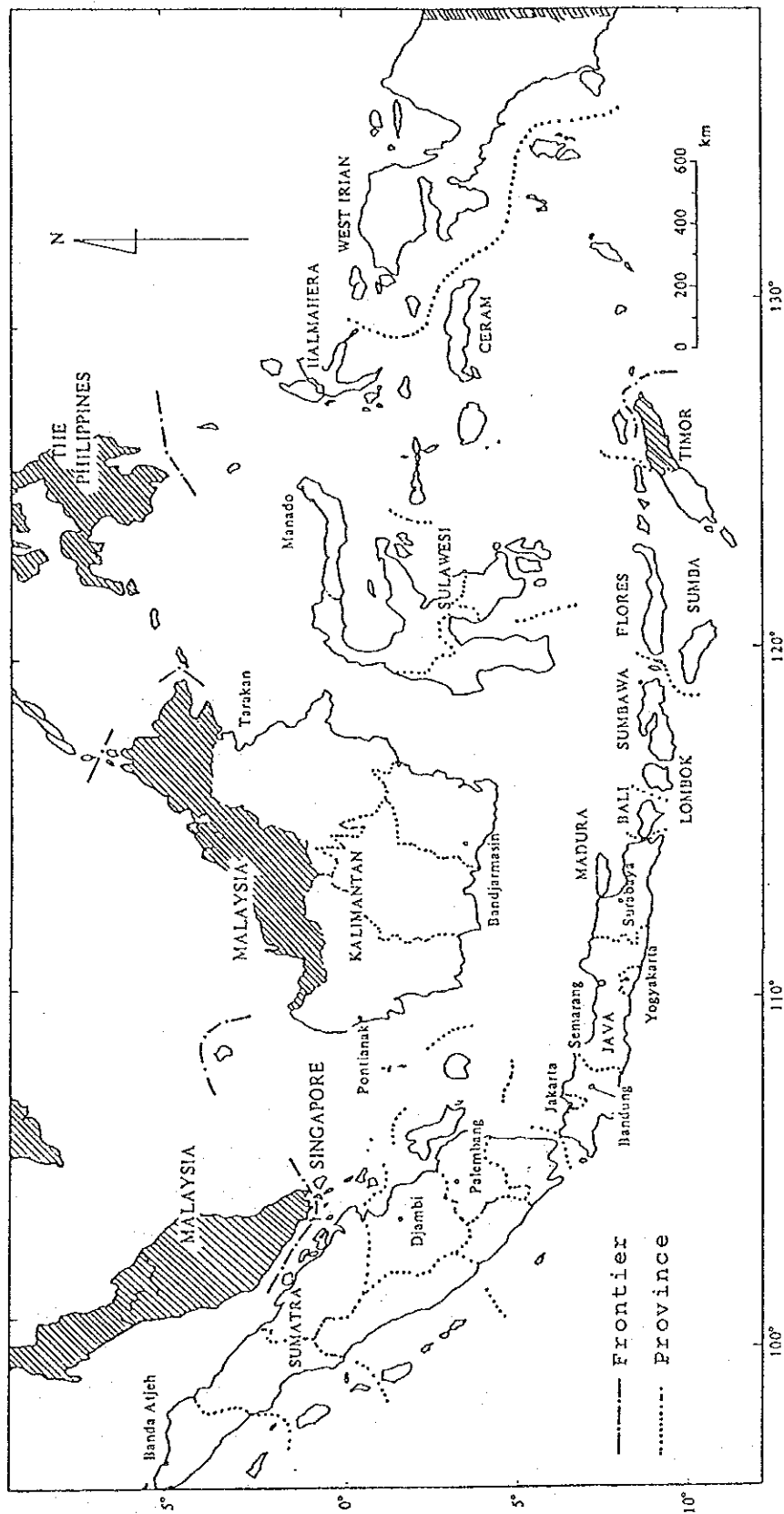
March, 1986



Keisuke Arita

President
Japan International Cooperation Agency

INDONESIA



(Source) : Atlas Indonesia, Yayasan Dwidjendra, 1976, Denpasar

ABBREVIATION AND SYMBOLS

Organization and Company

MOI	Ministry of Industry in Indonesia
MOF	Ministry of Finance
Kanwil	Cantor Wilayah (Provincial Office)
B.I.	Bank Indonesia
BKPM	Badan Koordinasi Penanaman Modal (Investment Coordinating Board)
BNI	Bank Negara Indonesia 1946
BDN	Bank Dagang Negara
BBD	Bank Bumi Daya
BAPINDO	Bank Pembangunan Indonesia
IBRD	World Bank
BEI	Bank Export Import Indonesia
BRI	Bank Rakyat Indonesia
P.T. Askrindo	P.T. Asuransi Kredit Indonesia
BDE	Bank Duta Ekonomi
OEB	Overseas Express Bank
BPD	Bank Pembangunan Daerah
KfW	Kreditanstalt Fur Wiederaufbau
ADB	Asian Development Bank
JICA	Japan International Cooperation Agency
JETRO	Japan External Trade Organization
OECD	The Overseas Economic Cooperation Fund
IMF	International Monetary Fund
BOT	Bank of Tokyo

BPS	Biro Pusat Statistik (Central Bureau of Statistics)
IDFC	Indonesian Development Finance Company (UPPINDO)
PDFCI	Private Development Finance Company of Indonesia
LJKK	Lembaga Jaminan Kredit Kooperasi (Institution of Credit Guarantee for Cooperative)
GAMMA	Federation of Indonesian Metalworks & Machinery Industry
ABI	Association of Indonesian Internal Combustion Engine Manufacturers
ALSINTANI	Association of Indonesian Agricultural Machinery
APKOBI	Association of Indonesian Steel Structure
ASPEP	Association of Workshops and Machineries
APLINDO	Association of Basic Metal Works
AIMKI	Association of Machine Tool Industry
ASIMPI	Association of Construction Machine Industry
AIPSI	Association of Pump Manufacturers
AIPPI	Association of Plant Machinery Manufacturers
APPLI	Association of Electric Instrument Producers

Financial and Economic Terms

GDP	Gross Domestic Product
GNP	Gross National Product
GDI	Gross Domestic Investment
GDS	Gross Domestic Savings
C & F	Cost and Freight
CIF	Cost, Insurance and Freight
FOB	Free on Board
M.M.	Million

M.	Thousand
KIK	Kredit Investasi Kecil (Investment Credit for Small Enterprises)
KMKP	Kredit Modal Kerja Permanen (Permanent Working Capital Credit)
SEDP	Small Enterprise Development Project
KIB	Kredit Investasi Biasa (General Investment Credit)
KCK	Kredit Candak Kulak (Working Capital Credit for Villagers)

Currency and Exchange Rate

Rp	Indonesia Rupiah (1 U.S.dollar = Rp.1,110.- August, 1985)
US\$	U.S. Dollar
Yen	Japanese Yen (1 U.S.dollar = 235 yen August, 1985)

Technical Terms and Others

CKD	Complete Knock Down
CBU	Complete Built Up
BRT	Brutto Register Tonnen (equal G.T.)
G.T.	Gross Registered Tonnage
DWT	Dead Weight Tonnage
CSF	Common Service Facilities
Q.C.	Quality Control
DCI	Ductile Cast Iron
NBR	Number
KNS	Pengembangan Kapasitas Nasional Sektor Industri (Development of National Capacity for Sector)

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Part I SUMMARY

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SUMMARY AND CONCLUSION

[SUMMARY AND CONCLUSION]

I. INTRODUCTION

1. Background

The development of manufacturing industries is one of the fundamental strategies which the Government of Indonesia has adopted for economic development in the Fourth Five-Year Development Plan (REPELITA IV) started in April, 1984. Specifically in the industrial development the Government gives high priority to the promotion of the industries which are related to the engineering industries and basic metal industries.

In order to attain the above goal, the Government of Indonesia has requested the Government of Japan to conduct a study necessary for formulating measures for the promotion of linkage-type metalworking industries. In response to this request, the Japan International Cooperation Agency (JICA) has conducted the Study on Development of Linkage-Type Industries in the Republic of Indonesia. This report summarizes the results of the Study thus conducted by JICA.

2. Objective and Scope of the Study

The objective of the Study is to examine a development program of the linkage-type metalworking industries, from technical, economic and financial points of view, for the Government of Indonesia.

The linkage-type industries can be further identified as metalworking industries which presently have or will possibly have linkage to large-scale machine assembly industries. The target industrial group to be developed is defined as the following subsectors:

- 1) Casting
- 2) *Forging/heat treatment*
- 3) Sheetworking/welding
- 4) Plating
- 5) Machining
- 6) Presswork
- 7) Repairing

The above metalworking industries are in a position to supply components and parts as subcontractors to the large- and medium-scale machine assembly

industries (hereinafter referred to as "assembly-type industry" in an opposite meaning of "linkage-type industry").

The assembly-type industry is also identified as follows:

- 1) Machine tools
- 2) Agricultural machinery & equipment
- 3) Heavy equipment and construction machinery
- 4) Process equipment
- 5) Electrical machine
- 6) Shipbuilding
- 7) Automotive
- 8) Motorcycle

The objective of the Study is first to clarify underlying problems in and between the linkage-type industry and the assembly-type industry and finally to recommend a development program, which will promote vertical and/or horizontal business linkages between these two types of industries.

The development program to be recommended for the linkage-type industry is a package of overall promotion measures including the selection of types of industries to be developed, a review of the supporting systems for the modernization of technologies and the development financing systems and implementing agencies, common services facilities necessary for development, and policy recommendations for promoting their development.

3. Methodology of the Study

The Study was initiated with a questionnaire survey and an interview survey of firms selected from both the assembly-type industry and the linkage-type industry. In the assembly-type industry 55 firms responded to the questionnaire mailed to 160 firms, while information of 219 firms categorized into the linkage-type industry was gathered through interviews and filling in the questionnaire sheets conducted by extension service workers of the regional office of the Ministry of Industry. Besides the questionnaire and interview surveys, the JICA Survey Team conducted visits to selected factories, research institutes and training centers, as well as interviews of discussions with government authorities, banks and the representatives of the industries to identify prevalent conditions and problems. Based on the thus gathered information and the Team's findings, the Survey Team made the assessment of relevant issues and problems to examine the measures to be taken for the promotion of the linkage-type industry. The development program recommended in the report was thus derived from those findings and assessment.

II. INDUSTRIAL LINKAGE BETWEEN ASSEMBLY- AND LINKAGE-TYPE INDUSTRY

1. Overviews of Prevalent Conditions of Metalworking Industries

According to the industrial statistics - 1982 published by BPS (Central Bureau of Statistics), in Indonesia there are 392 establishments engaged in the assembly-type industry, those classified in the statistics as (1) machinery and repair (2) radio, T.V., and other, (3) electrical apparatus etc., (4) ship building and repairing, (5) motor vehicles assembling and manufacturing, (6) motorcycle assembling and manufacturing, and (7) motorvehicle body and equipment. These sectors employ 80,000 employees in total (an average number of 204 employees per establishment) and generate Rp.450 billion of value-added (an average value-added of Rp.5.6 million per employee) with a local content of 24.6% in average.

The given figures exclude small-scale establishments employing less than 20 employees, since there is no published statistics showing the small-scale. Nevertheless, the figures can be deemed to represent the assembly-type industry, because the establishments engaged in that industry are the large- and medium-scale in terms of the number of employees.

There are a numerous number of establishments engaged in metalworking industries including the linkage-type industry. Although there is no statistics showing the number of establishments engaged in these sectors, it is estimated that there are approximately 2,600 establishments of the metalworking industries employing less than 200 employees, of which an overwhelming majority is small-scale establishments.

The findings on the prevalent conditions of the medium- and small-scale metalworking industries are summarized below:

(1) Casting

In Indonesia there are a numerous number of medium- and small-scale casting works. However, most of those works are based on traditional technologies. A defect rate of the produced casting products is estimated to be 10 to 20% or higher, which should be one of the factors causing high production costs. Such inferior quality of the products may be attributed to, among others, low quality of the main- and sub-materials used in the melting process, low pouring temperature, and lack of composition analysis. Analysis and measurements of molding and mechanical mixing are not commonly done for molding. Many manufac-

turers still employ floor molding, and it may cause defects such as gas flows and inclusions. There are a very limited number of manufacturers performing shot blast based on blasting in the fettling process and also having various types of grinders.

(2) Forging

For medium- and small-scale forging, die forging and free forging are suitable, but traditional blacksmith work is dominant. Most of them use mild steel, although the use of medium carbon steel and low alloy steel is required in order to provide strength and hardness. Many of automotive parts are small in size. Nevertheless they must be mass-produced for uniformity, by adopting die forging.

(3) Sheetworking/welding

The sheetworking/welding industries employ comparatively more advanced technology than other metalworking industries. However, as the present demands do not require very high accuracy or strength, the existing facilities are not modernized ones so as to be capable to produce high quality products. The welding is done manually, without testing facilities for precise pre-test such as X-ray inspection and supersonic inspection, and also without other detection equipment.

(4) Plating

The plating work is carried out as a part of the finishing process of various metalworking and machining factories which produce a variety of products each in small quantity to be sold to the general markets, and there is no specialized plating factory engaged in plating of industrial parts such as automotive parts and electrical parts. Under these situations, the existing plating work, as like as the machining factories, are not capable to meet such demands.

(5) Machining

In most cases machining process is accompanied with other metalworking process. According to the questionnaire survey, out of 219 medium- and small-scale firms, 163 firms have machining shops. However, it is observed that there is a wide gap in equipment and technology between the medium- and small-scale factories and the large-scale factories especially owned by joint-venture companies.

More than half of medium- and small-scale machining shops use conventional type lathes and bench drilling machines, and only a very limited

number of shops own grinding machine and milling machines. In addition many of those installed machines are quite obsolete so that they cannot undertake accurate and precise machining as required for producing machinery parts such as transmissions for agricultural machinery.

(6) Pressing

Most of medium- and small-scale works are producing mainly punched and bent products by using small press machines. They prepare dies by themselves, but their capability is still poor. Working life of those dies are short because of inadequate heat treatment and faulty finishing accuracies, resulting in low product accuracy. Further, most of them use traditional lever-type manual press machines.

Under the foregoing situations, there is a very limited number of modernized medium- and small-scale metalworking factories which are capable to produce high quality of components and parts as demanded by the assembly-type industry.

The operation of the existing medium- and small-scale metalworking factories is typically characterized with:

- (1) Production based on traditional or conventional technologies and also on obsolete equipment and facilities.
- (2) Manufacturing based on job-order of a variety of products each in small volume

Such operation causes inefficiency in management and production, resulting in high production costs and low quality of the produced products. It led them to be weak in competition with imports, while in turn discouraging the assembly-type industry to use local-made components and parts.

2. Present Situation of the Linkage

The assembly-type industry is engaged mainly in assembling to manufacture final goods based on components and parts largely met by imports, while the majority of metalworking industries dominated by medium- and small-scale enterprises are engaged in producing the goods for general markets, such as building materials and piping materials, by using locally available raw materials to a large extent.

The structure of the machinery and metalworking industries in Indonesia is characterised with the configuration that both the assembly-type and the

linkage-type industries manufacture the final goods for general markets, so that there is a very limited scope of business linkages existing between the assembly-type industry and the linkage-type industry.

These situations imply that, in order to develop horizontal and vertical linkages between the assembly-type industry and the linkage-type industry, it is essential to expand modernized medium- and small-scale metalworking industries which are capable to produce the industrial components and parts satisfying the level of quality as demanded by the assembly-type industry.

The following table shows a tabulation of the answers provided by 210 firms in the questionnaire survey, which relate to their total sales and sales to the assembly-type industry.

SALES AMOUNT FOR ASSEMBLY-TYPE INDUSTRIES, 1984

Size of Company	Answered	Sales Amount (Rp. mill.)		
		Total	Assemblers	%
Large	41	128,875	40,911	31.7
Medium	96	36,964	15,682	42.4
Small	73	2,953	483	16.4
Total	210 ^{1/}	168,792	57,076	33.8

Note: ^{1/} The number of valid answers out of 219 answers

The table indicates that the small-scale industries sell their products to assembly-type industries by 16.4%, while selling the rest, 83.6% to the general market. For medium-scale, the "rate of linkage" is the highest of 42.4%, while the large-scale is the in-between.

The results of the questionnaire survey and several facts found by the Study Team during the field survey imply that:

- 1) There may be difficulties for small-scale metalworking industries to play a central role to have linkage with assembly-type industries due to their obsolete and small production units, as well as their inferiority in technical level and skill of workers.

- 2) The manufacturer's sizes of medium-scale and just smaller than large-scale can play the main role of linkage-type industries and their growth potential is high.

In order to promote the development of the linkage-type industry, priority should have to be given to expanding modernized medium-scale "grower" type metalworking industries by means of modernizing the existing medium-scale metalworking factories, modernization and expansion of the small-scale factories, and the establishment of new metalworking factories while continuing technical assistances should also be provided to all the medium- and small-scale metalworking industries, especially to the small-scale industries, to improve and upgrade their technical skills and management capability.

At present, the metalworking industry, which supplies components to the machine assembly industry, cannot compete with imported products due to the inferior product quality and high cost. The cost disadvantage may be improved by considering the import duties and also by cost-down which can be achieved by the advancement of mass-production. However, as the improvement of product quality can only be brought about by the improvement of the manufacturing technology, priority should be given to quality improvement in promoting the linkage-type industry.

3. Measures Required for Developing the Linkage-Type Industry

(1) Manufacturing technology

As has been discussed earlier, technological gap of the existing medium- and small-scale metalworking industries is one of the vital factors constraining the development of the linkage-type industry. They lack the manufacturing technology to be practically applied at works, including techniques for design, strength calculation, drafting of shop-drawings and for manufacturing according to drawings. There is no place for workers to learn such technological skills as blade sharpening or how to use tools, which can be immediately utilized in their work. In addition, there are shortcomings of published text books on these techniques. In order to improve and upgrade their technical gap, it is important to consider the establishment of technical service centers which provide them with those vocational trainings and technical services including extension services and technical guidances for quality improvement.

(2) Industrial standards and product inspection

Lack of a common-use technical language - industrial standards and drawings - is one of the technical problems which obstruct the development of linkages between the assembly-type industry and the linkage-type industry. The government authority has launched on the work to define standards of the metalworking products, but they will not include design standards, drawing methods, manufacturing methods and inspection methods.

Another problem is a shortage of the institutions which provide the industries with inspection services for metalworking products.

In order to foster the linkage-type industry and thereby promote the localization of components and parts to be used by the assembly-type industry, it is important to induce applicable standards and establish inspection institutions for the metalworking products.

(3) Education of entrepreneur

Most of entrepreneur engaged in the metalworking industries do not realize on the benefits of improving product quality, performing planned production based on long-term constant supply arrangements, and operating mass-production systems with modernization of manufacturing facilities. It is important to educate them to induce advanced management concepts and improve their conventional business customs.

(4) Provision of information

There is a lack of communication between the machinery assembly companies and the metalworking companies. The medium- and small-scale metalworking companies are virtually weak in gathering market information and establishing business channels with the machinery assembly companies. It is important for the Government to establish appropriate means for providing them with market information and introducing them to machinery assembly companies, as well as providing assistance to enhance their marketing capability.

(5) Encouragement of joint efforts among metalworking companies

There are successful cases of the joint purchase of raw materials and of the joint marketing of products performed on a cooperative basis in Central Java. It would be effective to encourage the manufacturers to organize their joint activities.

(6) Role of large-scale machinery assembly companies

Large-scale machinery assembly companies can play an important role to foster the linkage-type industry by means of increasing their sub-contracting purchases of components and parts and also providing technical assistances and technology transfer to subcontractors. It is important for the Government to take appropriate practices for encouraging the large-scale machinery assembly companies to positively undertake such activities.

(7) Preventing labor turnover

One of the problems which the metalworking industries have been encountering is frequent turnover of skilled labor. It is important for the Government to educate and guide entrepreneur engaged in the metalworking industries to take measures for preventing the frequent turnover of skilled labor by means of increasing wage and salary to a reasonable level, improving working conditions and welfare, and adopting a payroll system which provides incentives to workers staying longer, while standardizing work procedure and also conducting vocational trainings for new workers.

III. PROMISING SUB-SECTOR IN METALWORKING INDUSTRY AND INVESTMENT OPPORTUNITY STUDY

1. Promising Subsectors in the Metalworking Industries

As a basis for developing the linkage-type industry, the Study attempts to identify promising subsectors to be developed in the metalworking industries. The identification is made in view of marketability of products and technical level to be possibly attained by manufacturers.

(1) Marketability

1) Market size

In Indonesia, since the metalworking industries can be regarded as import substitution industries for some time to come, the size of the domestic market is a crucial element. The increase in the size of the domestic market is projected as the sum of the natural increase in demand and the prospect of localization replacing imports.

As long as a natural demand increase is deemed very little because of the depression which is anticipated to persist, the progress of localization has more importance. In this context, the industries which directly supply parts and components to the industries under government's strong localization policy are considered promising. Those priority industries are automobile, machine tools and construction equipment.

2) Prospective client

The market can be broadly classified into the following four: sub-contract for assembly-type industries, government purchase such as for public works, after-market for repair and maintenance parts, and sales to the general market. Government purchases for public works and supply for assembly-type enterprises are more stable market than others.

The government purchase will be electrical parts related to power development and electrification of rural villages and irrigation pumps for modernization of rural areas. The sub-contract will be automotive parts, electric home appliance parts, and parts for heavy equipment and agricultural machinery.

3) Price competitiveness

Products being competitive with imported products in terms of price are deemed promising. Products for which the raw materials are available at low price and the manufacturing process is labor intensive are generally considered as being competitive in price. Labor intensive products, however, are inferior in terms of quality and precision to the imported products which are produced in mass-production based on modern facilities.

Another possibility is the products the manufacturing of which are anticipated to be shifted from advanced countries to developing countries due to manpower shortage on account of soaring wages and hard work. Casting products fall into this category.

(2) Technical level

1) Manufacturing technology

Products which involve many manufacturing steps or many control factors (such as temperature, time for processing, etc.) tend to be poor in quality because errors in each step or factor are accumulated in the final products.

Products which can be self designed by manufacturers or products specified with simple and clear standardization are considered to be particularly promising for medium and small firms. In this context, pressworking and casting products are promising types of industry. On the contrary, welding of special alloy steel or cutting, welding and heat treatment of products with large plate thickness and others which require advanced manufacturing and inspection technologies are unlikely to be promising, because a fairly long period is required for acquiring the necessary technology.

2) Manufacturing facilities and product quality

Manufacturing of metal dies and molds for presswork and bearings, gears, etc. for high speed rotary machines and other products that require high precision are the fields in which Indonesia greatly lags behind in facilities, skilled manpower and technical level for plant management. It would be difficult to fill this technical gap in a short period.

Also, domestic raw materials are unsuitable for use in high precision products because of their uneven quality. Highly automated manufac-

turing facilities pose problems in terms of repair and maintenance because machine parts are not obtainable in Indonesia. Furthermore, the production using such facilities may also result in high costs, unless there is an adequate market for the product, because they are expensive and also have rather large production capacities. Accordingly, parts manufacturing that requires highly automated manufacturing facilities is unlikely to become promising in the immediate future.

Parts and components deemed promising from the aforesaid viewpoint are listed by the sub-sector and by the process in Table 1.

2. Investment Opportunity Study

In order to promote the domestic production of promising components and parts as listed in Table 1, it is essential to develop a number of modern factories which are capable to produce some of those products having required quality. Since such projects should be implemented mainly by private entities, a detailed feasibility study of the projects shall be individually made by them for their investment decision.

Nevertheless, an investment opportunity study is made on possible projects to be developed for the foregoing goal. The objective of this study is to demonstrate typical examples of the possible projects and their investment sizes which can serve to examine the direction of investment promotion.

The investment opportunity study is made on 13 identified projects which consist of the following three types.

- | | |
|--|------------|
| 1) Projects to produce a complete set of components and parts by building up modern facilities | 6 projects |
| 2) Projects of new plants with relatively small-scale investment | 4 projects |
| 3) Expansion projects of existing plants | 3 projects |

The outline of these projects are summarized in Table 2. The outcome of this study indicates that the projects to be implemented for the development of the linkage-type industry, which comprise the establishment of new facilities and the modernization and expansion of existing facilities, would require investments in a scale over that defined as a small scale, and there-

fore it implies that the investment promotion program for the development of the linkage-type industry shall be focussed on the expansion of modernized medium-scale metalworking factories. In this connection the program should be designed to promote investments by "grower" type medium- and small-scale enterprises. For small-scale enterprises who are financially unable to undertake projects respectively, it may be effective to promote joint investment by a few enterprises as stated earlier.

3. Cost Competitiveness of Local Production

The Study attempts to analyze the cost structure of the existing metalworking factories which are producing some components of the machinery assembly. Their present costs are higher by about 40% as compared to the costs in Japan. The higher production costs in Indonesia are attributed to (a) higher raw material costs, (b) higher defect rates of the products, and (c) higher financial costs. The defect rates can be reduced to a substantial extent by establishing modern factories or modernizing existing factories, as well as providing technical assistances to improve and upgrade manufacturing technologies and skills. In addition, if appropriate measures are taken to reduce the raw material costs and financial costs, there is a great possibility for the local production costs to be reduced to a level nearly comparable to the Japanese costs.

Table 1 PARTS AND COMPONENTS AS PROMISING PRODUCTS FOR METALWORKING
INDUSTRY

(1/2)

Industrial Field as Market	Parts and Components
Machine tool (Lathe, Miller, etc.)	Apron component, bed, casing, pulley, frame, column components, base, table, leg, cover, gear, shaft, bearing, bolt & nuts, spring, screwshaft, coolant tank, pan, panel box, cooling system, gear, spindle, handle, hinge
Agricultural machine (Mini tractor, etc.)	Transmission, rear drive axle, brake drum and cover, front weight, shaft, final drive axle, front axle, gear, support frame, bonnet, muffler, hydraulic tank, side cover bracket, seat, step, hitch attachment, fender, brake rod, rotary frame, wiring harness, hinge, bolt and nut
Construction Equipment (Crawler bulldozer, etc.)	Counter weight, cutting edge, end bit, teeth, front idler, pin and bushing, roller, transmission, gear, shaft, torque flow convertor, track shoe, bonnet & side cover, fender, yoke, muffler, support, hydraulic tank, radiator and guard, cable wiring, filter, fan and pulley, trunion, front idler, piston, handle, hinge, screw, bolt and nut, wiring harness
Automotive & motorcycle	Engine block, brocket, pump body, pulley, casing, cover, brake drum, bearing, connection rod, shaft, gear, yoke, valve, transmission, lever, arm, lifter, pedal, clutch, brake shoe, lever, steering column, cylinder head, filter, pan support, frame, body, door lock, window sash, bumper, wheel cap, seat
Electrical machine (Diesel engine, etc.)	Base, piston, wheel, casing, valve, handle, pump, cover, bush, shaft, pin bolt, connection rod, washer, snapring, magnet, shaft key, fan, fuel tank, condensor, muffler, panel box, bracket, stator core, pan, wheel, valve, bolt and nuts, screw
Plant equipment (with Simple technology)	Tanks, heat exchanger, cooler, pump, valve, cyclon, belt conveyor, dust collector, pipe fittings, control panel, lighting fixture, overhead crane, hoist, pipe support, steel structure, filter, screen, blower, fans, boiler
Ship buildings (with Simple technology)	Propeller, motors, generator sets, transformer, pumps, switch board, heat exchanger, purifier, ladder, anchor and chain, tanks, mast, derrick post, rader post, antenna pole, boom, davit, mooring fittings, bollard, fair leader, mooring hole, deck roller, hatch cover, vent truck, dust, ventilator, deck stand, pipe support, strainer, steel furniture & fixture

Table 1 (Continued)

(2/2)

Industrial Field as Market	Parts and Components
Others (Pump, valve, hand tool, household appliances, etc.)	Casing, impeller, valve body, yoke, disk, cover, shaft, gear, spinde, ponch, driver, wrench, panel box, meter box, caster, tool box, window sash, steel furniture & fixtures, bolt and nut, screw, hinge

Table 2 SUMMARY OF INVESTMENT OPPOTUNITY STUDY

Products	Production Capacity	Employees	Total Project Cost (US\$1,000)	Equipment and Machinery (f.o.b.) (US\$1,000)
A. Modernized factories with small and medium size investment				
(1) Small size foundry products	420 t/y	19	1,500	420
(2) Forging of screw and rivets	68 t/y	7	200	60
(3) Presswork of locker, kitchen ware, etc.	240 t/y	17	350	110
(4) Electroplating of bolts, nuts, screw, etc.	144 t/y	7	310	100
B. Expansion or re-location of existing factory ^{L/}				
(5) Oil and air filter for automotive	500/2,000 pcs/d	15/50	130	24
(6) Foundry and machining of pumps	Pump 200/2,000 t/y Foundry 0/3,000 t/y	44/110	6,900	1,900
(7) Sheetwork of switch gear	1,200/6,000 sets/y	202/250	3,000	170
C. Factories fully equipped as sub-contractors directly to assembly-type industry				
(8) Casted products for machine industry	12,000 t/y	272	17,440	5,450
(9) Forging of shafts, gears, rods, etc.	4,600 t/y	102	8,150	3,140
(10) Precise machining of driving components	639 t/y	163	8,100	3,590
(11) Sheetwork case and cover for transmission, etc.	1,500 t/y	90	1,710	420
(12) Presswork for kWh meter box, etc.	1,380 t/y	25	1,710	480
(13) Steel fabrication of out-fittings for ship, etc.	1,500 t/y	97	4,790	680

Note: ^{L/} (a)/(b): (a) is before-expansion while (b) represents after expansion, and investments cost are additional requirements for expansion.

IV. INSTITUTIONAL FINANCING SYSTEM FOR INDUSTRIAL SECTOR

In June, 1983, a financial sector reform was conducted in Indonesia. This reform abolished the short-term general credit previously made and Category II to IV of KIB which were credit for medium-scale enterprises, while setting new programs such as (a) short-term working capital credit up to Rp.75 million which is equivalent to the former KIB-Category I, (b) Keppres 29/1984 which is short-term credit of working capital required for procurement by government organizations, and (c) export credit.

OUTLINE OF KIB SYSTEM (ABOLISHED IN JUNE, 1983)

Kinds	Category-I	Category-II	Category-III	Category-IV
Maximum loan amount (Rp.million)	up to 75	75 - 200	200 - 500	500 - 1,500 (BAPINDO; 2,500)
Purpose	Equipment	Equipment	Equipment	Equipment
Handling banks	6 state banks			
Interest rate	10.5%	12.0%	13.5%	13.5%
BI refinance interest rate	3%	3%	4%	4%
Min. self finance by Borrower	20%	25%	30%	35%
Security requirement	Completed facilities with this loan plus collateral at 50% of loan amount			
P.T. Askrindo's insurance	Handling banks may request for insurance/guarantee, but subject to Askrindo's acceptance			

The reorganization also adopted a simplified on-lend rate structure. A 12% point was applied to 17 programs; except for the short-term working capital credit up to Rp.75 millions and Keppres 29/1984 set at a 15% point, export credit set at a 9% point, and housing and education credit set at a 5 to 9% point. The outline of each program is given in Table 3.

In the long-term view, it is likely that the financial sector reform enacted in June, 1983 will stimulate the effective operation of the banking system from viewpoint of national economy. However, the abolishment of BI's refinance for

KIB-Category II to IV and short-term general credits provided by the state banks increased the funding cost of the state banks, and further, because of deregulation of the interest rates, the interest rates charged to non-priority borrowers rised swiftly.

Creditable large-scale enterprises would be possible to borrow low cost loans from external sources, while small-scale enterprises can still borrow the low interest rate loans under the special credit program. The medium-scale enterprises, however, should be rather difficult to borrow low interest rate loans because of the deleted KIB-Category II to IV which provided low interest loan with loan size ranged from Rp.75 million upto Rp.1,500 million.

Table 3 CHARACTERISTICS OF CREDIT SCHEMES IN INDONESIA

(1/3)

Name of Schemes	Date of Commencement	Category of Use	BI's Credit for High Priority Sector	Handling Bank (HB)	Maximum Loan Amount (Rp.)	Source of Funds	Minimum Self Financing	Maximum Lending Term	Interest Rate p.a.	BI's Fund Interest Rate p.a.	Collateral Requirement	Insurance Coverage
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
1. Kredit candak kulak (KCK)	Apr. '76	Working Capital (WC)	-	Village Co-operatives (KUD)	2,000 15,000	Government Budget	0%	5days-7months	12%	-	-	Government
2. General rural credit (KUPEDES)	Feb. '84	Investment (I)		BRI	1MM	BI 100%	-do.-	3years	-do.-	3%	Assets created	BI/BRI
		W.C.		-do.-	1MM	-do.-	-do.-	2years	18%	15%	-do.-	-do.-
Of which mini credit	Apr. '74	I	-	-do.-	200M	Government	-do.-	3years	12%	-	-do.-	Gov't/BRI
		I		-do.-	500M	BI 100%	-do.-	5years	-do.-	3%	-do.-	BRI
3. BIMAS/INMAS credit	'64	W.C.		-do.-	Package	-do.-	-do.-	7months	-do.-	-do.-	Land certi- ficate/Other assets	Gov't 50% BI 25% BRI 25%
4. Small investment credit (KIK)	Jan. '74	I		National banks	15MM	BI 55% WB 20% HB 25%	-do.-	8years	-do.-	BI 3% WB 10.1%	Assets created+ max 50% of loan	Askrindo 75% HB 25%
5. Permanent working capital credit (KMKP)	Jan. '74	W.C.		-do.-	15MM	-do.-	-do.-	5years	-do.-	BI 3% WB 10.1%	-do.-	-do.-
6. Investment credit up to Rp.75MM	Jun. '83	I		-do.-	75MM	BI 80% HB 10%	10%	10years	-do.-	3%	Assets created+ additional collateral	-
7. Working capital credit up to Rp.75MM	May '84	W.C.		-do.-	75MM	BI 70% HB 20%	-do.-	1year	15%	-do.-	Assets created	Askrindo 70% HB 30%
8. Working capital credit for gov't project (Keppres 29/'84)	May '84	W.C.		-do.-	200MM	-do.-	-do.-	-do.-	-do.-	-do.-	Assets created/ project concerned	-do.-

Table 3 (Continued)

(2/3)

Name of Schemes	Date of Commencement	Category of Use	BI's Credit for High Priority Sector	Handling Bank (HB)	Maximum Loan Amount (Rp.)	Source of Funds	Minimum Self Financing	Maximum Lending Term	Interest Rate p.a.	BI's Fund Interest Rate p.a.	Collateral Require-ment	Insurance Coverage
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
9. Credits for agricultural specific sector for binas program	Nov. '69	W.C.		State commercial banks	unlimited	BI 75%	25%	--do.--	12%	--do.--	Commodities concerned	-
10. Export credit	Jan. '82	W.C.		National banks	--do.--	BI 60% HB 40%	0%	--do.--	9%	--do.--	--do.--	Askindo85% BI 7.5% HB 7.5%
11. Cooperatives credits												
a. For the members & for supply of high priority goods	Sept. '81	I		--do.--	15MM	BI 90% HB 10%	--do.--	10years	12%	--do.--	Assets created	PerumPKK90% BI 5% BI 5%
		W.C.		--do.--		--do.--	--do.--	3years	--do.--	--do.--	--do.--	--do.--
b. For the farmers under intensification program of paddy & crops	Apr. '85	W.C.		BRI/KUD	Package	BI 100%	--do.--	1year	--do.--	--do.--	Assets created/ other assets	PerumPKK95% BI 5%
12. Paddy field formation	Sept. '79	I		Channelled thru. Dept. of agriculture	unlimited	--do.--	--do.--	1-2years	--do.--	--do.--	Gov't guarantee	Government
13. Plantation credits												
a. Estate smallholder		I		National banks	--do.--	BI 80%	un-identified	20years	--do.--	--do.--	un-identified	un-identified

Table 3 (Continued)

Name of Schemes	Date of Commence-ment	Category of Use	Br's Credit for High Priority Sector	Handling Bank (HB)	Maximum Loan Amount (Rp.)	Source of Funds	Minimum Self Financing	Maximum Lending Term	Interest Rate p.a.	Br's Fund Interest Rate p.a.	Collateral Requirement	Insurance Coverage
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
b. Replanting rehabilitation & development of export commodity plants	I			-do.-	-do.-	-do.-	-do.-	-do.-	-do.-	-do.-	-do.-	-do.-
c. Private national plantation (PSN)	I			-do.-	-do.-	BI 85%	-do.-	10 years	-do.-	-do.-	-do.-	-do.-
14. Credits for house ownership (KPR)	W.C.			-do.-	-do.-	BI 75%	30%	un-identified	-do.-	-do.-	-do.-	-do.-
a. Public housing	Nov. '78	I	-	BTN	3.5MM	Gov't Budget	10-20%	20 years	5-9%	-	House	Gov't/BTN
b. Non-public housing	I			-do.-	7.5MM	BI 90%	-do.-	-do.-	9%	3%	-do.-	BTN
15. Student loan												
a. For Indonesian students (KMI)	May '82	W.C.		BNI '46	75MM	BI 100%	0%	10 years	6%	-do.-	Diploma	Askrindo 75% BIL 8.75% BN 15.25%
b. For student dormitories for 5 universities	I			un-identified	5.5 billion	BI 80% HB 20%	-do.-	20 years	5%	un-identified	un-identified	un-identified

Notes:

- 1/ Investment credits; 9 categories, of which 2 schemes for industrial sector; KIK and investment credit up to Rp. 75MM.
- 2/ Working capital credits; 11 categories, of which 3 schemes for industrial sector; KMKP, working capital credit up to Rp. 75MM, and working capital credit for government project (keppers 29/1984).
- 3/ Other credits; 4 categories
- 4/ No. 12; excluding the credit channelled through the government.

Source: Bank Indonesia

V. PROPOSED DEVELOPMENT PROGRAM FOR THE LINKAGE-TYPE METALWORKING INDUSTRY

1. Basic Concept of the Program

Technical and financial facilities exist to a certain extent in Indonesia, for the purpose of fostering small-scale industries. It can be said that the Government's continuous efforts are now showing positive results.

In the field of the metalworking industries, however, there is a critical lack of modernized factories which are capable to undertake a constant supply of components and parts with high and uniform quality to the assembly-type machine industry. The overwhelming majority of existing factories are classified into cottage industry in virtue, and they are equipped with obsolete facilities, using the traditional technologies. The existing machinery and metalworking industries are characterized with a structure which is bipolarised into a group of large-scale machine assembly industry with many of them being joint ventures or state owned companies and a group of small-scale industry which is dependent on the traditional technologies. Medium standing companies to fill up the gap between these two groups have not been sufficiently fostered up until now. This is the biggest reason why the expansion of the domestic supply of machine parts replacing imports has been hampered in Indonesia.

Based on this understanding of the current state of the Indonesian metalworking industry, it is proposed here that efforts should be focussed on expanding the growing type of modernized metalworking industries consisting of those companies with a sizable operation which is called as the "Grower", rather than those companies which are dependent on the traditional technologies and which are collectively called as the "Stayer", although continuous efforts should also be made for the Stayer to upgrade their technical skills and management capability.

To a group of small-scale industry, KIK/KMKP upto 15 million Rupiah and the investment credit up to 75 million Rupiah are provided as special credit facilities and vocational training centres, common service facilities, mini-industrial estates and extension services through local offices of the Ministry of Industry (KANWIL), are available in the aspect of technical assistance.

As a result of the 1983 reform of the financing sector, there is no institutional finance available for the companies which were eligible for the previous KIB Category II or above. Hence, medium-scale and growing small-scale companies which have a most vigorous demand for financing are

obliged to borrow high interest loans, resulting in discouraging their investment. It would be necessary to establish an investment credit system for providing low-interest, long-term finance for the medium- and small-scale metalworking companies in order to develop the modern metalworking industry.

The proposed program is a development finance program designed to provide a soft-term credit to a selected number of companies who intend to modernize their technology and facilities, aiming at intensively fostering a certain number of model factories, so that success of their investments can be demonstrated for stimulating the investments to be made by other manufacturers for the modernization of their facilities.

In this context it is proposed to implement the first phase program with a certain amount of funds prepared for financing to a limited number of projects, focussing on stemming effective impacts on the target subsectors to be expanded through subsequent phases of the program.

It is well known that technical assistance is a must for modernization of medium- and small-scale industry in addition to the provision of credit facilities. The proposed program shall include such services as Technical Assistance Services (TA) and the establishment of Common Service Facilities (CSF). It is recommended that these services and facilities will directly relate to those companies subject to the fostering efforts.

The basic concept of the comprehensive development program being proposed in this Report is summarized as follows.

- 1) The objective of the program shall be to expand modernized medium- and small-scale metalworking industry, particularly the linkage-type industry.
- 2) To meet the above objective, a program loan is to be newly enacted to provide soft-term investment credit for those projects.
- 3) As a first step, the program shall provide a limited number of projects, as model cases, with comprehensive services so as to ensure their success. With their success, the size of the credit facility, the number of companies and target subsectors shall be expanded on step-by-step.
- 4) The development program is to be a package program combining the provision of a special program loan, and the provision of TA and CSF.

2. Eligibility of Borrowers for the Proposed Program Loan

One of the most important requisite for success of the program is to identify pipeline projects which are financially viable and eligible to the proposed program loan. The followings are suggestion of the Study Team for reference, although the criteria of the eligibility to the loan shall be mutually discussed between Indonesian Government and a prospected financier(s).

2.1 Eligible Subsector

Eligible subsector is to be the linkage-type metalworking industry. Those companies, however, which have potentiality to become or grow up to one of the linkage-type industries even though no link is presently made to the assembly-type industries shall also be considered as being eligible, since the objective of the program is not only to "foster" the linkage-type industry for the immediate needs but also "foster" the candidates to be grown for the future expansion.

2.2 Ownership of Company and Usage of the Loan

Companies owned by Indonesian citizen shall be the main target of the program loan. It is recommended to consider joint ventures with foreign companies also as eligible companies as long as they satisfy the conditions set in terms of company scale and other requirements, because the introduction of technology, technical assistance and the transfer of technology given through the joint ventures will all play important roles in the modernization of the subsector concerned. As for Common Service Facilities (CSF), public sector companies or organizations should be regarded as eligible due to its public nature.

The investment for the establishment of new facilities but also for the expansion of existing facilities should be considered as eligible projects, provided that those projects be based on modern technology and facilities. Application of modernized technology and facilities for the subject projects should be assessed and guided in the process of loan appraisal.

The main subject of financing should be investment to production facilities in view of the basic concept of the program. Loan applications for working capital which do not involve investment to production facilities should not be eligible.

2.3 Company Size and Credit Ceiling

- (1) If the subject of the present program loan is restricted to small-scale industries, most of the growing type industries would be excluded, contradicting the program's basic objective.
- (2) It is undesirable for the eligible size of companies to be determined only in terms of the number of employees. In general, the size of the asset and the number of employees should be simultaneously used to determine the company size eligible for the loan.
- (3) Although KIK/KMKP is available as institutional financing for small-scale industries, it is undesirable for small-scale industries to be excluded from the program loan as they would not be able to enjoy such benefits as technical assistance, etc. which are an integral part of the package program.
- (4) Another way to determine the size of companies which are eligible for the loan is to control simply by means of a maximum ceiling of the credit. In general, however, both the size of assets of the company before investment and the credit ceiling are used to define the size of companies eligible for loans.

Modernization usually requires a fairly large investment amount and, therefore, a minimum lending limit may be introduced with a view to leaving those requirements needing a small amount of credit to the other existing credit facilities.

- (5) It is recommended to carefully examine an eligible company size and a credit ceiling in view of the above-described guidelines.

The following is one of the possible criteria, which have been examined in due consideration of the eligibility conditions applied to similar program loans and also of the requirements in Indonesia.

Existing Asset Size	(Maximum):	Rp.1,000 to 2,000 million
Credit Limit	(Maximum):	Rp. 500 to 1,000 million
	(Minimum):	Rp. 15 million

2.4 Profitability of Firm Level Project

In the process of loan appraisal, it is necessary to assess the project's profitability in addition to security and creditability for the loan. The Internal Rate of Return (IRR) is generally used as a tool for assessing profitability. The minimum IRR value (the cut-off rate) will, therefore, be set up so that finance is only available to those projects which are anticipated to generate the returns over cut-off rate.

The IRR cut-off rate is determined by reference to the lending rate of interest, the inflation and the average rate of return for the manufacturing industry in Indonesia. The cut-off rate is commonly given at 10 to 15% in a constant price term.

3. Source of Funds, and Terms and Conditions of the Loan

3.1 Source of Funds and Two-Step Loan

In general, a so-called two-step loan arrangement is based on aid finance provided by bilateral aid financing institutes or international financing institutes, combining local currency funds prepared by the central bank, as well as the handling banks in the recipient country. These funds are blended and managed in a special account. These original funds may be provided on concessional terms and conditions or commercial ones. The overseas funds found in hard currency(-ies) are mainly used for the import of machinery and equipment while the local funds are basically used for local procurements and the construction of buildings, etc. In the case of two-step loan for medium- and small-scale industries, however, the demarcation between the foreign and local currency portion is not rigorously applied for the smooth and flexible fund management.

3.2 Interest Rates of Sub-Loans

The following three factors determine the interest rates of sub-loans.

- 1) The cost of the original funds and the spread, that is the cost and charges for the management of the program loan.
- 2) The interest rate appropriate for the effective fostering of the target industries.
- 3) The interest rates of existing finance systems or similar program loans in the country.

In this Report, as item (1) above is not yet known, based on (2) and (3), it would appear preferable that the interest rate for sub-loans be between 9% upto a maximum rate of 12%. The final interest rate, however, should be decided when the cost of the original funds is defined. It may be unnecessary to set up different interest rates for investment to fixed assets and for working capital.

3.3 Terms of Repayment

As the loan will be made for the long-term investment for production facilities, the provision of preferential repayment conditions should be offered to end-users, namely the borrowers of the sub-loan.

One possibility is a maximum repayment period of 15 years with a maximum grace period of 5 years. Even if it becomes necessary to shorten these periods, the term of repayment should not be shorter than a maximum period of 8 years with a maximum grace period of 2 years in order to prevent a cash shortage in the cash flow of the financed projects.

With regard to the repayment conditions, it is suggested that a maximum period for repayment and grace be set up as a program-level guideline. In the course of loan approval for individual projects, an appropriate repayment condition for each project will be decided on the basis of the financial evaluation of the project. It will be unnecessary for the repayment period to set up different terms on working capital and on investment for fixed assets.

3.4 Debt/Equity Ratio

It should be reasonable to set up a debt/equity ratio in a range between 80/20 and 70/30.

4. Establishment of Testing Laboratory for Metalworking Industry as Common Service Facility (CSF)

Production of parts and components which meet the requirements of buyers in terms of quality should be essential for the modernization of metalworking industry in Indonesia. A large gap between the requirements on quality demanded by the assembly-type industry and production capability of sub-contractors is often observed at present. From such point of view, establishment of authorized and well-equipped testing laboratories which are eagerly desired by private companies is indispensable. It is also advisable that the laboratory shall play a role of technical consultancy center.

4.1 Activities of Metalworking Products Testing Laboratory

- (1) Testing and inspection
- (2) Technical consultancy and guidance
- (3) Technical and marketing information service

4.2 Institutional Set Up of Metalworking Product Testing Laboratory

In Indonesia, it is urgently needed to have the laboratories in Jakarta and Surabaya area, and will be needed in Semarang and Medan in the near future. It must be carefully studied on what the suitable institutional set-up is for these laboratories in order to have them effectively function. The followings are some possibilities to be considered.

- (1) To establish as branches of MIDC
- (2) To strengthen and supplement the Regional Industrial Institute (BPI)
- (3) To establish as an organization under semi-governmental operation

4.3 Toward Realization of Establishment of the Metalworking Products Testing Laboratory

There are several issues, particularly financial and institutional ones, yet to be examined and determined between government, industries and other relevant parties in Indonesia.

It is recommended to make a detailed feasibility study concerning the required testing equipment line-up, personnel requirement, institutional and financial arrangement including utilization of foreign aid fund.

5. Technical Assistance (TA) Related to the Implementation of the Program

5.1 Necessity and Role of TA

The objective of the proposed program is to lead all enterprises which will be financed by the program loan to successful operation by means of modernization of their technology and facility, providing them with institutional finance, TA and CSF.

The activities of the Implementing Agency in executing the program will involve the following major aspects:

- 1) Program promotion
- 2) Project identification and development
- 3) Project evaluation
- 4) Project implementation and supervision

The Implementing Agency has to render appropriate assistance and advice to proponents in due course from planning stage until operational stage of their projects. Thus, TA services separated from the institutional finance in terms of activities cannot easily reach to the goal of the program.

5.2 Employment of Outside Consultants

The wide range of technical assistance envisaged for the implementation of the program will require technical expertise in various fields, which may not be within the Agency's capability to provide. This will have to be sourced from both local and foreign experts outside the Agency.

It will be effective in performance of the consultancy services that the outside consultants will be organized as a group and attached to the Agency as a part of total framework of the execution system in the Agency.

The general role of the outside consultants will be to assist the Agency, as its extended staff, in the provision of technical assistance during the various phases of program implementation. This will include assistance in the collection and analysis of market information, organisation of project promotion seminars, analysis of production technology needs and sources of technology, and extension services to proponent firms.

6. Implementing Agency

6.1 Selection of Implementing Agency (Executing Body)

In order to achieve the aims of the proposed development program, it has been discussed that it is imperative to implement the program by packaging both institutional finance component and technical assistant component. In implementing this comprehensive program, the direct and indirect cooperation of relevant government authorities, industrial organizations and financial institutions are necessary, but among others, what is essentially needed is an implementing agency to assume initiative and responsibility in

executing this program. From technical and financial assistance viewpoints, either a technical ministry such as the Ministry of Industry or some other governmental agencies concerned mostly with technical assistance or a financial institution such as state banks can be the candidates for the implementing agency.

The study team has carefully conducted the field survey from these two viewpoints, and upon conferring time after time with the various parties concerned, has reached the conclusion that it is reasonable to select one or more of state-owned banks as the implementing agency. The reasons for it are as follows.

- 1) The major pillar upon which this development program rests is the institutional finance called "two step loan" or "program loan" provided for the medium and small industries.
- 2) According to the laws of Indonesia, general financing operation shall be made by financing institutions.
- 3) Considering that the main source of the fund for institutional finance will be met from a foreign fund(s), the necessary procedures and steps would be more smoothly carried out if a state-owned bank(s) is assigned as the implementing agency.

(1) State banks to be examined

- a) Bank Negara Indonesia 1946 (BNI'46)
- b) Bank Rakyat Indonesia (BRI)
- c) Bank Ekspor Impor Indonesia (BEII)
- d) Bank Bumi Daya (BBD)
- e) Bank Dagang Negara (BDN)
- f) Bank Pembangunan Indonesia (BAPINDO)

(2) Requirements for implementing agency (handling bank)

In view of the general characteristics of medium and small firm financing, the handling financial institutions must have the following functions.

- 1) It must have experience in industrial (manufacturing) finance and be familiar with conditions of industrial society.
- 2) It must be accustomed to handle long term development financing and be capable of directly or indirectly (by mutually cooperating

with other financial institutions) implementing short term commercial lending (follow-up financing after lending development funds).

- 3) It must be located close to the clients (the target medium and small-firms) so as to be able to maintain contact with their day to day operating activities and to offer face-to-face guidance and information. In other words, it must have an extensive branch network.
- 4) It must be able of allocating manpower to conduct firm's credibility investigation and project analysis for the proposed new program within the institution.
- 5) It must be able to provide technical assistance, particularly in project identification, implmentation and monitoring after lending with proponent firms.

(3) Overall evaluation

The above various indicies for evaluation are summarized as the following table. Prior to this evaluation, BRI was excluded from the list, since its major clients are quite different from the clients currently being studied.

OVERALL EVALUATION OF STATE BANKS AS AN IMPLEMENTING AGENCY
OF THIS PROGRAM

	BAPINDO	BNI'46	BDN	BBD	BEH
Long term loans to industry	1	2	3		
Experience with medium and small industries		1	2	2	
Branch network in major areas		1	2	2	
Bank managerial performance indices			2	2	1
After care finance		1	1	1	1
Manpower and administration of loan	1	2	3	3	

Note: The number indicates ranking in each item.

(4) Consideration to be taken in selection of implementing agency

There are advantages and disadvantages in appointing only one institution or a plurality of financial institutions as implementing agency. The advantage in having plural implementing agencies is that the principle of competition will work to the credit of the program by accelerating the promotion of lending to promising industries and thus speed up development. The advantage in having only one bank is that technical assistance which ought to be integrated with finance can be integrally implemented under centralized control under one bank. In case of plural agencies are assigned, it tends to hinder smooth promotion of this program because their assistance given under institutional finance would be separated from technical assistance.

This matter requires further review, but since the proposed promotion program, if materialized, would become Indonesia's new system, it is considered that the program would be more smoothly operated if only one bank is to be appointed as implementing agency to adopt a centralized control and assistance system at least during the initial program loan.

Involvement of a technical agency(-ies), however, in the part of the technical assistance is still worth for examination in the case that an

assigned bank(s) could not provide sufficient technical services to proponents inside of his organization. The Institute for Industrial Entrepreneurship newly established by MOI in participation of other agencies could function technical and managerial assistance services to be extended to individual projects under the program, as well as the promotion and monitoring of the program, provided that close coordinations are maintained with the appointed bank(s).

6.2 Overall Institutional Framework and Role of Ministry of Industry for the Proposed Program

Figure 1 illustrates an overall framework including relevant organizations and institutions for implementation of the proposed program. As shown in the figure, collaboration of relevant agencies such as MOI, MOF, BAPENAS, BKPM, industry associations, technical agencies and banks is indispensable. In such sense, although it is suggested in the preceeding paragraph that a state bank(s) which has TA division inside of the bank will be most workable as the implementation agency for the program, the role to be played by the Ministry of Industry as the governmental ministry responsible to development of industry in the country is important for the success of the program specifically by participation in the area of TA. In such case that MOI will be directly or indirectly involved in the program, the function, organization and workflow of the overall execution system shall be carefully examined in coming stage. Some of major functions of MOI in the program can be described as below:

(1) Project identification and feasibility study

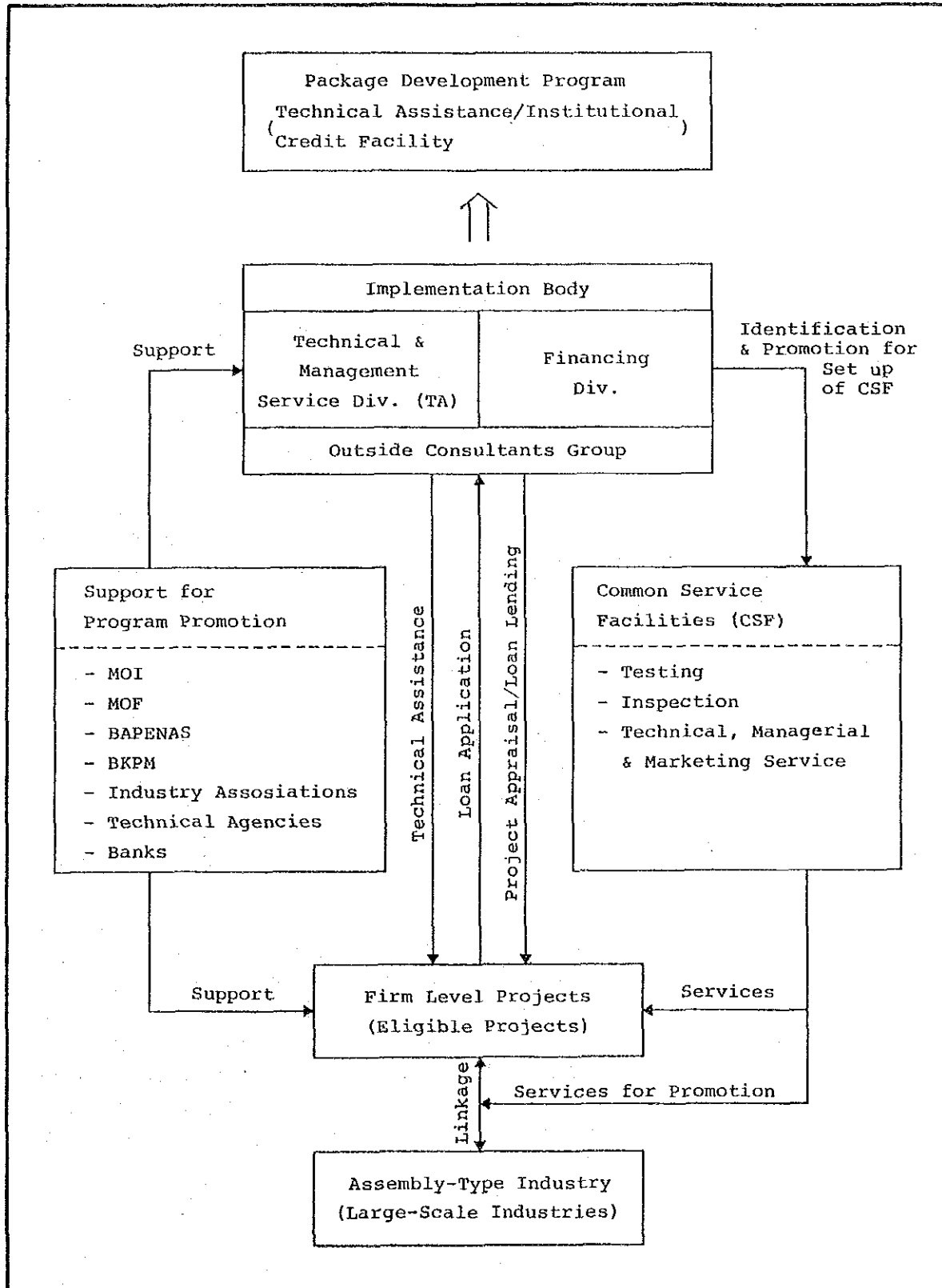
MOI has been in close contact with medium and small industries through its regional offices (KANWIL) and implementing various assistance programs. Identification of projects and conduct of feasibility studies (F/S) of sub-projects (expansion or new construction of factories) are important supporting functions of this program, which is a possible area to be covered by functions of MOI or its agency.

(2) Testing laboratory for metalworking industry

Establishment of Metalworking Product Testing Laboratory is necessary as Common Service Facilities (CSF) for development of the subsector. As institutional setup for this CSF, there will be possibilities in establishing directly under MOI, under private industrial association or in collaboration between government (MOI) and private (so called "third sector" approach). At any rate, there has to be a participation

by MOI directly or indirectly. There are still various factors to be carefully studied, in regard to facilities, manpower, budgeting of operational expenses, technology and sourcing of fund from government budget or private sector or foreign aid, which are proposed to be clarified in the further study.

Figure 1. OVERALL FRAMEWORK OF EXECUTION OF THE PROGRAM



VI. MEASUREMENT OF FUND REQUIREMENT

This section reviews the capital investment which may be needed for the linkage-type metalworking industries in the near future. The fund requirement is measured from the following two viewpoints.

- a) The amount of fund actually needed by the private firms.
- b) The potential fund requirement for the metalworking industries in Indonesia as a whole.

a) is the realistic amount of fund requirement obtained by questionnaire survey of 219 firms, and it represents the total requirement of existing firms who replied that they needed the fund for expansion and/or modernization of their facilities. Although it is hard to determine what proportion of this fund requirement will actually be realized as real demand for two step-loans, it means that at least this much fund requirement does actually exist.

Meanwhile, b) represents the potential total demand for fund obtained from the viewpoint of capital investment required for the metalworking industries if it is to achieve industrial development as targeted in REPELITA IV and other programs. Accordingly, a) may be regarded as being a part of b).

1. Tabulation of Fund Requirement Obtained by Means of Questionnaire Survey

The figures obtained from the questionnaires are listed in Table 4.

(1) Classification of the scale of firms and distribution of replies

According to the Ministry of Industry's classification, "the small-scale enterprises" are defined as those which satisfy the two conditions of (1) having the mechanical production facilities worth 70 million Rupiahs or less, and (2) capital per employee of 650 thousand Rupiahs. MOI does not have any precise definition with respect to "medium-scale" and "large-scale" firms so that it is not possible to classify the statistical data into small, medium and large industries. BI's definition is also only for the small-scale industry. For expedience, the questionnaires were tabulated here according to the classification by number of employees. The distribution of the number of replies to the questionnaire by the scale of firm is as follows.

DISTRIBUTION OF REPLIES TO QUESTIONNAIRES
BY FIRMS OF THE METALWORKING INDUSTRIES BY SIZE

Group of Company	No. of Answers (%)		Average employee per-company
I (19 employee or less)	75	(34.2)	10
II (20 to 99)	99	(45.2)	46
III (100 to 199)	24	(11.0)	137
IV (200 employees or more)	19	(8.7)	354
Employment size unknown	2	(0.9)	-
Total	219	100.0	71

(2) Total investment

As summarized below, investment required for 121 companies in a total amounts to Rp.84 billion, or Rp.695 million per company.

The size of investment per company increases accordingly to the size of company.

The total capital investment above is deemed as the sum of funds for capital investment and working capital because the question was not made separately on the two capitals. Almost all firms scheduled to complete their investment by 1990, which on average, centers on May 1987. The figures below can be considered as the total required fund for five years.

INVESTMENT REQUIRED BY GROUP OF COMPANY SIZE

Group		I	II	III	IV	Total
No. of answer		55	53	6	7	121
Total investment	(Rp. billion)	2.4	22.2	22.0	37.5	84.0
	(US\$ million)	2.1	20.0	19.8	33.8	75.7
Per company	(Rp. million)	43	403	3,667	5,357	695
	(US\$ thousand)	39	363	3,303	4,826	626

(3) Required loan amount

Assuming the Debt/Equity Ratio of 70/30, the required loan amount for coming 5 years is calculated as 70% of the above total requirement, as listed below:

LOAN REQUIREMENTS BY GROUP OF COMPANY SIZE

Group	I	II	III	IV	Total
Total investment (Rp. million)	2,376	22,163	22,000	37,500	84,039
Loan requirement (Rp. million) ^{1/}	1,663	15,514	15,400	26,250	58,827
No. of company	55	53	6	7	121
Loan per company (Rp. million)	30	293	2,560	3,750	486

Note: ^{1/} Debt/Equity is assumed as 70/30 for all groups.

2. Potential Capital Demand Estimate

The potential capital demand in the near future for the linkage-type industry in whole Indonesia has been estimated in three different methods.

a) Estimate by work volume increase

Work volume for the linkage-type metalworking industry in Indonesia is firstly estimated on the assumption that the requirements for domestic production stemmed from localization and natural economic growth in the assembly-type industry sector will create an additional market for the linkage-type industry sector.

Secondly, the capital investment required for the linkage-type industry is computed on the assumption that such additional market shall be fulfilled by investment for installation of new or additional capacity.

b) Estimate by the questionnaire survey data

The questionnaire survey shows a capital requirement as much as Rp.84 billion for 219 companies including ones which do not have expansion plan in the near future. An average capital requirement per company has been computed as Rp.380 million, by which an estimated total number of companies in Indonesia is multiplied to obtain a total capital requirements for the whole country.

c) Estimate by the national macro-economic data

It is known that there is a correlation between the value-added and the fixed assets formation (investment) in the industry. Using the correlation, an estimation of the capital requirements for the metalworking industry sector is made.

The results of these three method of estimation are as follows:

a) Estimate by work volume increase

(US\$ million)

	1986	1987	1988	1989	1990	Total
1985 constant price	103.7	103.7	103.7	103.7	103.7	518.6
With 8% inflation	112.0	121.0	130.6	141.1	152.3	657.0

b) Estimate by the questionnaire survey data

(US\$ million)

	1986	1987	1988	1989	1990	Total
1985 constant price	179.6	179.6	179.6	179.6	179.6	898.0
With 8% inflation	194.0	209.5	226.3	244.4	264.0	1,138.2

c) Estimate by the national macro-economic data

(US\$ million)

	1986	1987	1988	1989	1990	Total
1985 constant price	159.0	159.0	159.0	159.0	159.0	795.0
With 8% inflation	171.7	185.5	200.3	216.3	233.6	1,007.4

Table 4 CAPITAL INVESTMENT REQUIRED BY 219 COMPANIES IN QUESTIONNAIRE SURVEY

Category Employees	I 19 and below	II 20-99	III 100-199	IV 200-299	Total
<u>Expansion plan</u>					
(1) Nos. of answers	75	99	24	19	217 ^{1/}
(2) Expansion plan (yes)	66	70	13	10	159
(3) (2)/(1) (%)	(88.0)	(70.7)	(54.2)	(52.6)	(73.3)
<u>Total investment</u>					
(4) Total capital required (MMRp.)	2,376	22,163	22,000	37,500	84,039
(5) Validity of answers (Companies)	55	53	6	7	121
(6) (4)/(5) (MMRp./Company)	(43)	(403)	(3,667)	(5,357)	(695)
<u>Self finance</u>					
(7) Self finance (MMRp.)	615	5,313	400	2,300	8,628
(8) Validity of answers	50	49	4	5	108
(9) (7)/(8) (MMRp./Company)	(12)	(108)	(100)	(460)	(80)
<u>Loan required</u>					
(10) Loan required (MMRp.)	1,111	14,675	1,600	3,200	20,586
(11) Validity of answers	51	50	5	5	111
(12) (10)/(11) (MMRp./Company)	(22)	(294)	(320)	(640)	(186)
<u>Equity/Debt Ratio</u>					
(13) (7)/(10)	36/64	27/73	20/80	42/58	30/70

Note: ^{1/} Of 219 answers (companies), two answers don't show number of employees.

Source: Questionnaire Survey Carried Out by JICA Team

VII. ESTIMATED BUDGET OF THE PROGRAM LOAN

- (1) The total amount of sub-loans to firm level projects and number of borrowing companies

The metalworking industry in Indonesia is expected to require investment in a range between 500 and 900 million U.S. dollars in the coming five years. This investment requirement will be met by government investment, private investment, investment from overseas in the form of joint-ventures, borrowing from various institutional loans, borrowing from state and private banks and the acceptance of foreign loans and aids.

Therefore, the portion to be shared by the program loan proposed in this Report cannot be exactly stated at this moment that no financing source is defined. The program loan aims at stimulating the Indonesian metalworking industry in the direction of modernization by means of selectively fostering grower-type companies as development models. The initial total amount of sub-loans should, therefore, be assumed based on the actual capital demand in a pipeline.

Loan requirement answered by 219 companies in the questionnaire survey is summarized as follows.

Group (No. of Employees)	Required Borrowing Amounts	
	(Rp. Million)	(US\$1,000)
I (upto 19)	1,663	1,498
II (20 - 99)	15,514	13,977
III (100 - 199)	15,400	13,874
IV (200 or more)	26,250	23,649
Total	58,827	52,997

Suppose Group IV is removed from the target group because of its large size, and also suppose that Rp.350 million (70% of the investment amount of Rp.500 million per sub-project) is required for each sub-project as an average owing to the need for fair large investment for modernization, the lending schedule for the coming five years can be calculated as shown in the table below. These finance requirements would be met by foreign funds, as well as domestic counterfunds.

LENDING SCHEDULE (SUBJECTS: CATEGORIES I, II AND III ONLY)

	No. of Borrowing Companies	Rp. Million	US\$1,000
1st Year	18	6,300	5,681
2nd Year	20	7,000	6,312
3rd Year	20	7,000	6,312
4th Year	19	6,650	5,996
5th Year	16	5,627	5,047
Total	93	32,577	29,348

Note: Assumed as sub-loans for Group I, II and III with an average lending amount per company of Rp.350 million, or US\$315.6 thousand.

(2) CFS and TA

The cost of Common Service Facilities is preliminarily estimated to be between US\$5.3 million and US\$7.6 million. Whether this cost will be financed from the frame of the program loan or met by other sources shall be determined only after the program's implementation has been decided.

Supposing that TA would be provided, the cost for outside consultants except costs for the implementing agency might be around US\$3.0 million.

3) Total budget for the development program

While many items of the total program budget are subject to future examination, a preliminary estimation is shown as below based on the above-described assumptions.

	US\$ Million
Sub-loans	29.4
Outside consultants	3.0
Common service facilities	7.6
Sub-total	40.0
Contingency (10%)	4.0
Total	44.0

VIII. ECONOMIC BENEFITS EXPECTED BY THE IMPLEMENTATION OF THE PROGRAM

The possible benefits of the development program for the linkage-type metalworking industry in Indonesia as a whole are evaluated in this Report in terms of employment opportunities, the saving of foreign currency and the indirect benefits.

(1) Increment of employment opportunities

The employment structure in Indonesia is: 58% in the agricultural sector, 12% in the industrial sector and 30% in the service sector (World Bank, 1981). As the Fourth Five-Year Development Plan (REPELITA IV) requires new employment of 1,864,000 people each year, it is anticipated that the industrial sector, with the highest growth rate of 9.5%, will provide most of these new employment opportunities. As REPELITA IV clearly states "the metalworking industry and the machine industry are the important industries for the expansion of productive employment in the industrial sector", the linkage-type metalworking industry should play an important role as its employment opportunities creation in accordance with the modernization, as well as the expansion, of its production facilities.

(2) Saving of foreign currency

Since the present program is a promotion program for the import substitution industry with the aim of introducing the domestic purchase of intermediate products (metal parts, etc.) which have so far been imported, it will have a direct effect on the saving of foreign currency. With the purchase of machinery from abroad as part of the investment in plant and equipment and the import of capital goods, however, some raw materials and quasi-materials will obviously increase. As a result, the saving of foreign currency under this program may be low in the short-term but will definitely be beneficial in the long-term viewpoint.

(3) Indirect benefits generated by the program

REPELITA VI emphasises the expansion of the linkages between large, medium and small industries. As a result, it gives priority to those measures converting weak, small size companies into modern, medium size companies. In this regard, REPELITA IV tries to enforce an economic policy whereby private companies are fostered, together with the general expansion of the industrial base, instead of a social policy simply aiming at "protecting the weak".

The present Survey has already confirmed the existence of medium-and small-size machine/metal processing companies with good prospects to become modern, medium standing companies. Therefore, it can be expected that the implementation of the present program will stimulate the fostering of private industrial capital and that economic development in Indonesia can be achieved by means of actively utilising the vigorousness of the private sector in the national efforts for industrial development.

RECOMMENDATIONS

[RECOMMENDATIONS]

I. GENERAL ASPECTS FOR METALWORKING INDUSTRY IN INDONESIA

- (1) Establishment of new facilities for strengthen linkage between machine assembly industry mainly comprising large-scale enterprises and suppliers of components and parts consisting of small- and medium-scale enterprises is recommendable. For this end it is recommended to set up a definition of medium-scale enterprises.
- (2) The recommended facilities shall provide both a testing laboratory for metalworking products and a function of filling up technical and information gaps between the two groups.
- (3) It is advisable to provide industries which are obliged to utilize domestic components in line with the deletion program with some incentives in order to promote attainment of the deletion program.

Reduction of and exemption from the income tax and the value-added tax are considerable as an incentive. Besides, exemption from import tax and duties for importable components to those enterprises which have attained the target of the deletion program is also advisable.

- (4) The above means of exemption from import tax and duties aim at a compensation of cost penalty caused by the utilization of domestically manufactured components.
- (5) The deletion program stipulates no obligation to suppliers of components. This means that buyers are obliged to use such components even if they are below the industrial standards in terms of quality. It is recommendable that submission of an authorized report on testing results is to be obligation for the suppliers when the buyers would request it.
- (6) The reasons why the domestic metalworking products tend to be high in cost when compared with imported ones are a) high raw material cost, b) high import tax and duties on imported machine and materials, c) high interest rate and d) low production efficiency caused by superannuated facilities and insufficient management skill.

These facts indicate that purchase of materials at economical costs, provision of special credit program and modernization of facilities and technology will be able to reduce such cost penalty to a great extent.

- (7) Special credit facility for the investors which were categorized in KIB II to IV (loan amount: Rp.75 million to Rp.1,500 million) was abolished by the financial sector reform in June, 1983. In order to stimulate the investment made by the small- and medium-scale industry, introduction of a special financing program having the loan size larger than Rp.75 million is vital for modernization of production facility.
- (8) First step to be taken for the development of the linkage-type metalworking industry is to be production of components which are marketable to the public sectors and the assembly-type industries in view of stable market, and which can be produced with less automated machinery in view of present technology level as well as job opportunity creation.

II. DEVELOPMENT PROGRAM FOR METALWORKING INDUSTRY

- (1) A package development program is recommended for the modernization of the linkage-type metalworking industry in Indonesia. The proposed program has tools and functions of a special credit facility (program loan), Technical Assistance (TA) and Common Service Facilities (CSF) in a package.

The basic concept of the comprehensive development program proposed above can be summarized as follows:

- a) The objective of the program shall be to expand modernized small- and medium-scale metalworking industry, particularly the linkage-type industry.
 - b) To meet the above objective, a program loan will be newly enacted to provide soft-term investment credit for those projects.
 - c) In the beginning, the number of companies to be subject to fostering efforts should be limited in order that the success of the model companies can be secured with intensive assistance for their development. With their success, the total loan amount and the number of companies as well as sub-sectors shall be expanded.
 - d) The development program is to be a package program combining the provision of a special loan program and the provision of TA and CSF.
- (2) The following recommendations shall be taken into account for justification of eligible borrowers for the proposed program loan in the course of the program formulation.
 - a) Eligible subsector is to be the linkage-type metalworking industry. Those companies which have potentiality to become or grow up to one of the linkage-type industries, even though no link is presently made to the assembly-type industries, shall be also eligible, since the objective of the program is not only to foster the linkage-type industry for the immediate needs but also foster the candidates to be grown for the future expansion.
 - b) As for eligibility of ownership, companies owned by Indonesian citizen shall be the main target of the program loan. Nevertheless, it is recommended to consider joint ventures with

foreign companies also as eligible companies, as long as they satisfy the conditions set in terms of size of company and other requirements because such joint ventures will play a great role in modernization of the technology.

- c) The investment for the establishment of new facilities but also for the expansion of existing facilities should be eligible, provided that those projects be based on modern technology and facilities. Loan applications for only working capital which do not involve investment to production facilities should not be eligible.
- d) Eligibility for company size and credit ceiling will be carefully examined in the course of final formulation of the program.

The following is one of the possible criteria examined in due consideration of the conditions applied to similar program loans as well as the objective of the proposed program.

Existing assets:	max. Rp.1,000 to 2,000 million
Credit limits:	max. Rp. 500 to 1,000 million
	min. Rp. 15 million

- (3) In assessment of individual projects for loan approval, profitability of each project shall be evaluated on the basis of a financial projection. Those projects which do not satisfy a pre-determined Internal Rate of Return (IRR) should be rejected from the loan in the case that the projects will not be able to be improved by any re-planning or adjustment.
- (4) For the purpose of grading up metalworking products in terms of quality, construction of Common Service Facilities (CSF) which have a testing laboratory is recommended for success of the proposed program and for the long-term development of the said industry.
- (5) It is advisable for the CSF to have promotion activities on the close linkage between the assembly-type and the linkage-type industries. Participation of private industry associations in operation of CSF shall be examined because the associations will be able to activate the performance of CSF from users' side.
- (6) First the all, an execution body shall be selected or formulated for realization of the proposed package program. Assignment of a state bank(s) as the execution body is preferable because the fund management becomes one of the most important function for the program.

- (7) Function of Technical Assistance (TA) shall be attached under the execution body. TA division will assist proponent projects over preparation, implementation and operation from technical, marketing and managerial points of view. If the appointed banks have no function or capability to undertake TA, another agency shall be appointed for the implementation of TA program, provided that it has close coordinations with the appointed bank(s). The Institute for Industrial Entrepreneurship should be the candidate for the implementation agency of the TA program.
- (8) It is recommendable for TA to employ outside consultants comprising local and foreign consultants. The outside consultants work as a group under the management of the execution body.
- (9) The Ministry of Industry (MOI) shall support the implementation of the package development program especially in the area of the TA. Concrete measure for participation of MOI is one of the subjects to be discussed in Indonesian Government.
- (10) Understandings and cooperation of relevant organizations such as MOI, MOF, BAPPENAS, BKPM, BI, Banks, Industry Associations are indispensable for the success of the proposed program.
- (11) For the implementation of the proposed program, it is recommended to take the following steps.
- 1) Appointment of the implementation agency(ies) and the preparation of an implementation program based on the proposed concept.
 - 2) Conducting a detailed feasibility study for the establishment of the proposed Common Service Facilities (i.e., Metalworking Product Testing Laboratory and Technical Service Center).

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Chapter 1 INTRODUCTION

Chapter 1 INTRODUCTION

1.1 Background of the Study

The development of the industrial sector is one of its basic policies the Government of Indonesia has adopted for economic development in the Fourth Five-year Development Plan (REPELITA IV) started in April 1984.

The industrial development policy set for achieving the goal of REPELITA IV, aimed at the development in balance between large-scale industries and small- and medium-scale industries, between export industries and domestic-market-oriented industries, and between capital intensive industries and labour intensive industries in the manufacturing sector. Specifically, priority was given to the development of engineering industries including offshore engineering, aircraft, heavy machinery, electric machinery, agriculture machinery, and for this end it was decided to pursue the measures for establishing the supply of raw materials and intermediate materials, and the transfer of required technologies. As the goals of such industrial development, the following four points are stated in REPELITA IV.

- 1) By succeeding the previously adopted industry promotion policy, promote to produce essential commodities at the costs which can meet the consumer's purchasing capacity.
- 2) Give priority to the promotion of the industries which are related to engineering industries and basic metal industries.
- 3) Promote the industries related to the efficient utilization of indigenous resources and energy, including basic chemical industries.
- 4) Develop modern industrial society and promote small-scale industries and handicraft industry for the increase of employment.

The following policy measures for attaining the above goal were cited.

- a) Establishment of industrial development centers in the regions and the development of financing institutions required for promoting the industrial development.
- b) With the rational measures for protecting the domestic industries, improve the competitiveness of domestic products against imports in terms of costs and quality.

- c) Modernization of small-scale industries.
- d) Foster the local consultants, and enhance development planning capability.
- e) Supporting measures in transportation and finance to improve the competitiveness of manufactured products.
- f) Education and vocational trainings in respect of management and technology for linkage-type industries.

In order to mainly attain the goal 2) above, in August, 1984, the Government of Indonesia has requested the Government of Japan to conduct a study necessary for formulating measures for the promotion of the linkage-type metalworking industries particularly for subcontracting system for the machine industry. In response to this request, the Government of Japan has dispatched a preliminary survey team in November, 1984 through Japan International Cooperation Agency (JICA). In March 1985, JICA sent the second preliminary survey team and signed the Scope of Work for the Study on the Development of Linkage-Type Industries in the Republic of Indonesia. This report summarizes, on the basis of the Scope of Work, the results of this study which has been commenced in June 1985.

1.2 Objective and Scope of the Study

Objective of the Study is defined in the said Scope of work as below:

"The objective of the Study is to examine the development program of the linkage-type industries, from technical, economic and financial points of view and prepare reports for the Government of Indonesia.

The linkage-type industry can be further identified as metalworking industries which presently have or will possibly have linkage to large-scale machine assembly industry. The target industrial group to be developed is defined as the following subsectors:

- 1) Casting
- 2) Forging/heat treatment
- 3) Sheetworking/welding
- 4) Plating
- 5) Machining
- 6) Presswork
- 7) Repairing

The above metalworking industries are in a position to supply components and parts as subcontractors to the large- and medium-scale machine assembly industry (hereinafter referred to as "assembly-type industry" in an opposite meaning of "linkage-type industry").

The assembly-type industry is also identified as follows:

- 1) Machine tools
- 2) Agricultural machinery & equipment
- 3) Heavy equipment and construction machinery
- 4) Process equipment
- 5) Electrical machine
- 6) Shipbuilding
- 7) Automotive
- 8) Motorcycle

The objective of the Study is first to clarify underlying problems in and between the linkage-type industry and the assembly-type industry and finally to recommend a development program, which will promote vertical and/or horizontal business linkages between these two types of industries.

The development program to be recommended for the linkage-type industries is a package of overall promotion measures including the selection of types

of industries to be developed, a review of the supporting systems for the modernization of technologies and the development financing systems and implementing agencies, common service facilities necessary for development and policy recommendations for promoting their development.

1.3 Methodology of the Study

The field survey was commenced at the beginning of June 1985. The total number of 12 experts were mobilized for the main field survey which ended in the early August. The field survey includes a questionnaire survey and an interview survey of firms selected from both the assembly-type industry and the linkage-type industry to clarify their current situation and future prospects.

In the questionnaire survey, 55 assembly-type companies responded to the questionnaires mailed to 160 companies. As for the linkage-type industry, extension service workers of the regional offices of the Ministry of Industry contributed in visit interviews to the owners and to fill-in the questionnaire sheets in the number of 219 companies. In the main field survey, financial institutions, relevant government organizations and industrial associations were visited for fact-finding survey and identification of problems.

In November 1985, the study team leader and the five members visited Indonesia to give an explanation of the interim report to the concerned authorities for discussion. Following these meetings, three of the team members conducted the supplementary field survey by early December which covered additional firms and visits to research institutes and training centers related to the metalworking industries. This final report was compiled on the basis of the findings from these surveys and the assessment of the relevant issues.

1.4 Constitution of the Report

This report consists of the following four parts.

Part I: Summary, Conclusion and Recommendations

This part summarizes the main contents of the findings mentioned in the main report. The overall development program for the linkage-type metalworking industries is explained as the conclusions and recommendations of the Study.

Part II: Main Report

This part outlines the various issues which constitute the bases for formulating the overall development program and relevant issues given in the scope of work. Part II is the major part of this report.

Part III: Section Report

This part provides a detailed study of the major issues contained in the main report. In other words the main report was compiled on the basis of the conclusions reached from each section in the Section Report.

Part IV: ANNEX

This part is a file of basic data supporting analyses and description made in Part II and Part III. For instance, it offers an outline of the field survey, the questionnaire and its analytical results and the economic data.

Chapter 2 PREVALENT CONDITIONS AND PROBLEMS OF THE METALWORKING INDUSTRIES IN INDONESIA

Chapter 2 PREVALENT CONDITIONS AND PROBLEMS OF THE METALWORKING INDUSTRIES IN INDONESIA

The prevalent conditions and problems of the assembly-type machine industries and the linkage-type metalworking industries in Indonesia are outlined below. The detailed discussion can be referred in Section 2 of the Section Report.

2.1 Outline of the Assembly-Type Machine Industries

The objective of this study is to study how to develop the linkage-type metalworking industry, which is linked vertically or horizontally with the assembly-type industry. The production trends in the assembly-type industry govern the demand for the metalworking industry as subcontracting business. In this section, the present status of the assembly-type industry is reviewed for each subsector.

2.1.1 Structural Characteristics of Machine Industries in Indonesia

Referring to the industrial statistics of BPS, Table 2.1 is a summary of the basic data of the assembly-type industry. (Small-scale industry of 20 employees or below are excluded.)

The industry is outlined as follows according to the 1982 statistics.

No. of establishments	: 392
Total No. of employees	: 80,000
Total amount of value-added	: Rp.450 bill.
Average No. of employees per establishment	: 204
Value-added per employee	: Rp.5.6 mill.
Domestic procurement ratio of material, component and labor	: 24.6%

The industry categories of Table 2.1 are divided into 2 groups. One is a group in which products are sold directly to household consumers and end users in other industries (in the table, (2), (3), (5) and (6)), and the other is a group for other categories ((1), (4) and (7)). The former and the latter are called consumer's goods manufacturer and capital goods manufacturer, respectively.

In terms of the total amount of value-added for the consumer's goods manufacturer, the automotive assembly industry shares 20.4%, the motor-

cycle assembly industry 20.2%, the household electrical appliances e.g., refrigerators, electric fans, air conditioners, 20.4%, and TV, radio, recorder etc., 16.4%. The total for this group amounts to 77.4% of the total value-added. The number of establishments is 149 or 41.3% of the total.

In contrast, the capital goods manufacturer alone shares the remaining 22.6% in value-added, although the share in number of companies is 58.7% including machinery manufacture and repair, shipbuilding and repair, and automotive body and equipment manufacturer. Regarding the per-capita value-added, these sectors are in the lowest ranks of 3.2 million Rupiahs, 3.3 million Rupiahs and 4.2 million Rupiahs respectively. These are about 1/2 to 1/3 of those of the automotive assembly or motorcycle assembly industry.

The average numbers of employees per company for the capital goods manufacturer are also ranked in the lower groups, namely machinery, 99 persons, automotive components, 108 persons and shipbuilding, 150 persons. On the other hand, the largest 3 industries are motor-cycle assembly, 576 persons, radio and T.V., 426 persons and automobile assembly, 342 persons.

Another interesting figure is the ratio of local content involved in the finished goods, in which the capital goods group uses more domestic components and parts, namely shipbuilding, 60.3%, automotive components, 53.8% and machinery, 32.8%. The three lowest industries in terms of local content comprise electric appliances, 12.8%, radio and T.V., 14.3% and automobile assembly, 20.2%, which belong to the consumer's goods group.

Based on the above facts, the following general trend can be observed.

- 1) Enterprises manufacturing capital goods employ less employees on average, but its production style is labor-intensive, so that production facilities are not yet modernized. They are manufacturing a variety of goods in small quantity, while large quantities of domestic materials and parts are used. Their costs are considered to be high with small amount of value-added.

The manufacturers in this group are those in the machine tool, agricultural machinery, construction machinery, plant equipment, industrial electrical machines and shipbuilding industries.

- 2) Enterprises that produce consumer's goods employ the mass production system and mainly belong to large-scale assembly industry.

These companies directly import components and parts for assembly, while using a smaller amount of domestic material and parts. The manufacturers in this group are those for household electrical appliances, automotives and motorcycles.

2.1.2 Present Conditions of Assembly-Type Industries

(1) Machine tool industry

The demand for machine tools in 1984/85 is 19,100 units and the domestic supply capacity is 2,275 units according to MOI estimate. The additional production capacity of 15,295 units is newly given to 11 manufacturers who obtained license by Industry Ministerial Decree, proclaimed on January 4, 1985.

At present more than 90% of the demand is supplied by imports mainly from Korea, Japan and European countries.

The majority of machine tool industries in Indonesia is medium and small-scale, manufacturing conventional machine tool, while not manufacturing NC machine and electric spark machine for mass-production and precision processing.

They can be regarded as in the early stage of development since the main portion of the components are imported as CKD and their facilities, technology and production system which are not fully developed.

(2) Agricultural machinery industry

The total production capacity of agricultural machinery except for irrigation pumps and atomizers in 1984/85 is 21,270 units which is able to cover only 20% of the total demand, 104,500 units. However, the actual production amount in 1984/85 is only 7% of the total demand, 7,135 units.

The production capacity is considerably lower than the demand, while the gap is supplied by the imports in CKD and CBU conditions at present.

In 1980, the number of manufacturers for agricultural machinery is less than 30, of which 8 companies are producing tractors and hand-tractors, 4 companies for threshers, 10 companies for hullers and driers, 3 companies for sprayers and 7 companies for irrigation pumps.

Except for large tractor and combine, manufacturing of agro-machineries do not require highly sophisticated technology, so that the domestic production is being proceeded following the deletion program.

On the other hand, since the government also allows import of built-up agricultural machinery, rice hullers and rice millers are imported from Taiwan and China at low prices, resulting in closures of domestic production of certain items. Although domestic manufacturers can produce some machines, they are not able to supply those machines at competitive price to the domestic market. It is necessary for them to take the measures to reduce the production cost through modernization of facilities, mass-production of standardized products and stable supply of low-priced raw material.

(3) Construction equipment industry

In the whole construction machinery industry, 3,141 units are estimated to be produced by the capacity of 6,385 units, 49% of utilization rate, while it fills 79% of the total demand in 1984/85. However, these figures seem to include over-estimated capacities in licensing and the optimistic estimation of production amount. In fact, production figures in 1983/84 show 22 units for the bulldozer, 10 units for the excavator, 1 unit for the wheel loader and no unit for the motor grader.

The import of construction machinery is declining these years. Because of the continuing recession induced by oil price fall in 1981, there has been termination and postponement of large industrial projects and infrastructure construction projects, resulting in a decrease of the demand for construction machinery. However, it is not clear whether the import of used machinery is included in the above figure or not.

The construction machinery industry is still in its initial stage of development. Manufacturers of construction machinery are dominated by several large-scale companies which should lead the future development of this subsector. Licensed manufacturing system seems to have established a sound production and supply system, however, actual manufacturing has not yet reached to its efficient and practical operation.

(4) Automotive industry

Passenger vehicles are imported in CKD condition and assembled, while commercial vehicles are assembled from imported CKD-minus components and domestically produced components. In the CKD-minus, the CKD components are imported with the exception of locally produced components specified by the deletion program.

The import of a completed car is restricted and no car is exported, which makes the domestic market "closed". Domestic production capacity is larger than the present demand, which will be described later, so that the production record can be regarded as the domestic demand.

There are 17 automotive assembling companies each of which associated with Japanese, US and European auto-makers, producing 25 types of model in the comparatively small market. The capacity of production facilities are 55,000 units of passenger cars and 313,000 units of commercial cars, total of 368,000 cars. Most of the factories are located near Jakarta. (The Japanese joint venture companies include Daihatsu, Mitsubishi, Toyota, Suzuki, Honda, Isuzu, Mazda, Hino and Nissan.) About 85% of the total demand is commercial vehicle and 15% is passenger vehicle. About 75% of the commercial cars belong to the light loading cars. About 92% of the total demand is supplied by the Japanese subsidiary joint ventures.

After the oil boom in 1980, the demand rapidly increased to record a production level of 210,000 cars in 1981. However, after 1981, demand gradually fell because of the stagnated world economies and the influence of oil depression, resulting in the demand in 1984 being about 27% less than that of 1981. The capacity utilization rate also recorded a peak of 57% in 1981 and decreased to 42% in 1983 and 1984. Demand forecast of the industry in general indicates that it will maintain the same level in 1984 and 1985, and will then recover.

However, the auto-manufacturers are facing serious difficulties because of low capacity utilization caused by falling demand over recent years, while personnel dismissal is difficult. In order to expand market size, increase of income level and the lowering of costs are required.

The automotive industry retains a wide range of supporting industries. As the local production schedule is advanced, the supporting industries must be developed together. At present, the supporting industries are not yet sufficiently developed, and very few subcontractors can supply parts which satisfy the quality required, delivery deadline and the price level.

(5) Motorcycle industry

The term "motorcycle" here includes motorcycle, scooter and motor-driven tri-cycle.

Import of motorcycle is also prohibited in complete built-up form (CBU) like as the automobile, CKD-minus components are imported, and then assembled together with locally manufactured components.

Regarding the production capacity, the 5 companies including the 4 Japanese joint companies (Yamaha, Honda, Suzuki and Kawasaki) have the total capacity of 1.11 million units, among which the 4 Japanese joint companies share more than 85%.

Demand for motorcycles has the same tendency as the automobiles, after a peak of 560,000 cycles recorded in 1982, the demand dropped to 250,000 cycles in 1984 and perhaps 210,000 cycles in 1985, the same level as 5 years ago.

The motorcycle is a very convenient means of transportation for ordinary citizens and its price is in a range of affordable level by common people, so that there is a large latent demand.

One of the most difficult problems for the motorcycle industry is, as same as the automotive industry, how to achieve to follow the deletion program. However, for motorcycles, the situation would be slightly easier, because the Program does not specify detailed parts individually but only the ratios in standard price base, and further the scale of motorcycle production is very large so as to gear a large quantity of each part and component.

(6) Electrical machinery and household appliance industry

The number of probable assembly-type manufacturers for each item of electrical machinery and household appliances are listed below.

The list includes manufacturers having no production experience of the item, and also some manufacturers who have been counted in more than one item of the products.

a) Electrical machinery related products

Generator set (including welding generator)	: 24 companies
Panel	: 31 companies
Transformer	: 17 companies
Electric motor	: 5 companies
KWH meter	: 7 companies
Storage battery	: 7 companies

b) Household appliances related products

T.V. black & white	: 12 companies
Radio/radio cassette	: 24 companies
Room air-conditioner	: 19 companies
Room fan	: 3 companies
Dry battery	: 5 companies
Refrigerator	: 15 companies
Filament lamp	: 10 companies
Fluorescent lamp	: 7 companies

Among electrical machinery, the production of electric motors falls short of demand by about 300,000 sets. KWH meters for home use are being produced at full capacity, but they still fall short of demand by 430,000 sets. On the other hand, there is a surplus of production for electric home appliances, which is being adjusted to meet the demand. The following general tendency is observed.

- 1) Local production capacities for the electrical machinery industry, such as motor, generator and transformer are rather insufficient and, when the economic environment recovers, large latent demands will reveal larger capacity shortage.
- 2) The production capacities for household electrical appliances are rather excessive so that, even when demand recovers, the present facilities can cope with the demand for the time being.

The electrical industry in Indonesia has been developed for import substitution. The production of household electrical appliances which are the consumers good, has reached to the target level.

On the other hand, the production of electrical machinery and apparatus, which are capital goods, has not grown to a satisfactory level, and imports have ranged between 250 to 350 million U.S. dollars

annually during the last three years. Since the shift to domestic production of industrial products is one of the basic policies of the government, the capital investment in these areas should have to be promoted, along with development in public investment and electrification of rural villages.

(7) Shipbuilding and ship repair industry

There are 113 shipbuilding companies (steel ships only) including 10 state-owned companies. Out of a total of 104 berths, the majority of 65% has adequate capacity for 100 GT or smaller, while none can accommodate anything above 5,000 GT. Domestic navigation ships of 5,000 DWT or less, are built domestically, while ocean-going navigation ships are imported. A tanker of 3,500 DWT was first built in 1985. The annual capacity for building new ships is 45,000 GT, but actual production is only 20,000 GT at the capacity utilization rate of 44%, which supplies 18% of the total demand of 110,000 GT. Low capacity utilization is largely due to low efficiency in shipbuilding and long construction period, which will be explained in more detail.

Annual repair capabilities are estimated between 90,000 GT and 120,000 GT. Out of a total of 136 docks, 63% handle 100 GT class or smaller. According to the government policy, ships smaller than 30,000 BRT have to be repaired domestically and the existing docks are enjoying sufficient repair orders corresponding to their repair capacities. However, facilities for repairing 10,000 to 30,000 BRT class ocean-going navigation ships are obviously insufficient, resulting in most contracts being awarded to foreign firms.

Although there are many shipyards, as has been already reviewed, most of them still employ the traditional shipbuilding and repair methods. Even for the some leading yards, their technical level has not yet reached to the international level, rather, they have numerous problems in production system, building process, subcontracting system and price competitiveness.

(8) Process equipment

The process equipment industries in Indonesia are mainly engaged in the supply and repair of equipment for food processing factories of copra, sugar, coffee and tea. There are many other types of processing, such as petroleum refineries, petrochemical plants, natural gas processing, fertilizer, paper and pulp, cement, ironworks and steel mills, textile and food processing. Process equipment include columns and

tanks, furnaces and rotary machines, each of which are further subdivided.

At present, Indonesia is said to have some 40 process equipment manufacturing firms. The major ones are the three state-run enterprises, P.T. Barata Indonesia, P.T. Boma Bisma Indra and P.T. Boma Stork. All the three originally started as repair and maintenance shops of sugar mills. At present, they are engaged in manufacturing, machining and casting of ferro-concrete structures, sheet-working products, tanks, boilers for plants in general as well as equipment and machinery for sugar mills. Since the Wahana Plant of P.T. Boma Bisma Indra is mainly engaged in the assembly of freight cars, the total plant equipment manufacturing capacity of these plants is about 35,000 t/y, by excluding the Wahana. On the other hand, about 200,000 tons of plant equipment were demanded in 1982, of which about 60,000 tons, 30%, were produced domestically.

The plant equipment industry is not yet developed to such a level that designing of plant processes can be done by their own staffs. Therefore, an equipment is manufactured according to the given manufacturing drawings.

Some types of processing plants involve operations with high-pressure, high or low temperatures, toxic or corrosive gases or fluids. Although the steel wall of special thickness must be used for these processing equipment, the domestic steel manufacturer is not yet capable of producing the thick steel plate. These plants include oil refineries, petrochemicals, natural gas processing, fertilizers, steel making and pulp & paper.

Therefore, the main markets for the industry for the time being, may be limited to the equipment to be used in processing plants for sugar, cement, palm oil, food, particularly for replacing or repairing works for the existing plants.

2.2 Outline of the Linkage-Type Industries

In this section, the current status of each sub-sector of metal working industry is reviewed and its problems are pointed out. These industries under the study are called as "linkage-type industry", by corresponding with the "assembly-type industry" studied in the foregoing sections. The linkage-type industry is the supplier of components as a subcontractor to an assembly-type machinery manufacturer.

2.2.1 Present Status of Raw Material Supply

In general, the metalworking industry is highly dependent on the quality and supply of raw materials. The supply and demand for steel, as a basic material, are very important factors for the manufacturing industries such as general machinery, transportation equipment and electrical equipment. Therefore, the following description outlines the supply conditions of the steel.

(1) Domestic materials

Crude steel (a total of slab and ingot/billet) production stood at 990,000 tons and 1,350,000 tons in 1983/84 and 1984/85, respectively. At present, about 1.81 million tons of major steel-based materials are domestically produced, including hot coil (about 130,000 tons in 1983/84), bar and shape (about 720,000 tons), wire rod (about 300,000 tons), galvanized steel sheet (about 420,000 tons), welded steel pipe (about 230,000 tons, including spiral steel pipe) and wire metal (9,000 tons). In addition, plates are also produced (amount of production is included in the hot coil above). In addition to the steel materials, domestically produced metal materials include copper bar (33,000 tons), aluminum plate (8,000 tons) and aluminum bar (about 35,000 tons).

Products which are not produced currently are cold rolled steel plates, tin plates and seamless pipes, but all these are planned for production in or after 1986/87. The aforementioned steel materials currently being produced domestically are mostly of so-called "common sizes" and confined to the ordinary types of steel. There is no domestic production of special alloyed steels, high tension steels or stainless steels.

(2) Local production capacity

P.T. Krakatau Steel is the leading domestic producer of steel, equipped with the direct reduction furnaces from pellet using natural gas, with capacity of 2 million tons of sponge iron per annum.

There are 11 domestic manufacturers equipped with electric furnaces (including 1 open-hearth furnace) which are mainly producing bars, shapes, wire rods, etc. There are about 22 rolling mills manufacturers including the rerolling mills which are producing bars and shapes. There is only one thick plate manufacturer and, in addition, 14 companies manufacturing galvanized steel sheets, and 21 welded steel pipe manufacturers.

The annual domestic production capacities can be summarized 2.37 million tons for crude steel; 1.37 million tons for bar and shape steel; 370,000 tons for wire rods and others; 400,000 tons for galvanized sheets; and 580,000 tons for welded steel pipe. A total production capacity is 3.79 million tons per year for all steel products (the steel production amount in 1983/84 recorded about 1.81 million tons, which suggests the capacity utilization rate of 48%.)

(3) Export/import of steel

In 1983, 1.66 million tons of steel products were imported, sharing 48% of the total domestic consumption of 3.48 million tons, while the domestic production standing at 1.81 million tons in 1983/84. However, this rate is an approximate estimate because of the discrepancy in statistical periods.

According to recent newspaper reports, Indonesia achieved steel exports in 1985/86, which is estimated to have been 120 thousand tons valued at US\$35 million.

(4) Present status of distribution and sales

In Indonesia, the import of steel products and other metal-based materials is regulated in order to protect domestic steel manufacturers and encourage the use of domestic products. The two kinds of system are applied for import restriction, namely, the concentrated purchasing system, and the quota license system. The former aims to protect the state-owned steel manufacturer and the latter protects the domestic private steel industry.

According to the concentrated purchasing system, specified articles must be imported through the three central purchasing organizations, established by the government, which mainly deal with the following items.

- PPBB (a department of P.T. Krakatau Steel)
Wire rod, billet, scrap, hot coil, plate & slab
- P.T. Giwang Selogam
Cold rolled strip, GI Sheet & stainless steel
- P.T. Kemasinti Nuabakti
Tin plate & aluminum

These regulations are intended to protect the domestic (especially state-owned) steel industry by controlling the quantity and price of specified items.

According to the quota license system, special items other than the above centrally purchased items (for example, shape steel, pipe & wire rod product) should be imported after obtaining permission within the limited amount licensed to the two national trading companies, P.T. Dharma Niaga & P.T. Kerta Niaga. This aims at controlling domestic supply and demand in terms of quantities, thereby protecting the domestic steel industry.

The domestic price of steel products is set higher than the international market price with a view to protecting high-cost domestic products. Compared with the C & F prices of imported steel, domestic selling prices are higher by 40% to 45% for hot coil and plate and 30% to 35% for galvanized steel and colored steel plate. The difference in domestic and international prices for the cold coil, which is not produced domestically, is smaller, only 2% to 4% higher. (exchange rate of Rp.1,110/US\$ is used.)

The above could be a cause for the high production cost of Indonesian metalworking products and machinery products.

(5) Future plan

The nominal steel consumption in Indonesia (local production + import - export) is estimated at 3.12 million tons in 1983, after converting to crude steel. This corresponds to 19.6 Kg per capita. The local consumption of steel products can be broken down into each demand sec-

tor, standing at about 65% for the construction industry and about 24% for manufacturing industry. These two sectors share almost 90% in 1983.

In the future, the development of the Indonesian economy and industry is expected to be accompanied with increasing demand for steel products, and there are already some projects which are under planning to cope with the expected future demand increase.

- Cold strip mill, planned by the P.T. Krakatau Steel Group
(Capacity : 850 thousand tons/y, to be completed in 1986)
- Tin plate plant, planned by the P.T. Krakatau Steel Group
(Capacity : 120 thousand tons/y, to be completed in 1986)
- Steel complex plan in the yard of P.T. Krakatau Steel
(Pressure vessel works, maintenance and repair works, plateworking and galvanizing works, machine tool works and training school and welded "H" shape steel works)
- Expansion plans of electric furnace equipment.
(Steel bar mill in P.T. Tosan Prima and shape steel mill in P.T. Ispat Indo)

There is also a plan for the second steel mill, as part of the second steel generation plan.

The steel consumption of Indonesia is currently 20 kg/per capita, while that in Korea, is ten times higher (GNP is about 2.85 times). When the GNP in Indonesia reaches the level of the present Korea, Indonesia will become a steel consuming country by an amount of at least 30 million tons per annum.

2.2.2 Overview of Each Sub-Sector

(1) Casting

In 1983/84, the demand for casting products amounted to approximately 110,000 tons, of which 70,000 tons, or 64%, were produced locally and the rest, 40,000 tons, were imported, according to the estimation. According to the REPELITA IV, a 17% growth rate for basic metal industries is planned, while several authorities predict the growth at 15% to 18%. On the other hand, according to the planning of MOI,

the cast iron production will be doubled in 1986/87 and tripled in 1987/88, while that for cast steel might increase gradually. Such an abrupt increase in the production, however, will require the expansion of the facilities. The production capacity in 1985/86 is estimated to be about 100,000 tons although the MOI figure gives 71,000 tons during 1982/83 to 1985/86.

There are several large-scale and specialized casting manufactures and many other medium- and small-scale manufacturers including cottage industries. Particularly in Tegal and Cepur areas of Central Java, there are many casting factories, and in outer islands, a large casting manufacturer is located in Medan.

Although the traditional production system is still dominant, one possible development of the future casting industry will be a joint business operation such as the Batur Jaya Association located in Klaten Area in Central Java, where the machining process, the receiving of orders, and the purchase of coke, are all carried out on a joint basis by small and medium casting firms.

The defect rate of casting products in Indonesia is estimated to be 10% to 20% or higher, which is the one of causes of the high production cost. The inferiority of casting products may be attributed mainly to the low quality of the main- and sub-materials used in the melting process, the low pouring temperature, and the lack of composition analysis.

In the molding process, analysis and measurement of molding sand and mechanical mixing have not been commonly employed. Floor molding is still found in many manufacturers which tends to be a cause of defects such as gas flaws and inclusions.

In the fettling process, blasting by means of shot blast should be performed, and the workshop should be equipped with various types of grinders. The lack of understanding on quality control and inspection seems to be hindering the development of the casting industry.

(2) Forging

The manufacturing methods of forging can generally be divided into two groups. One is a method in which large forgings or alloy steel forgings are manufactured by the free forging system. This method can provide an integrated production system from steel making to forging, which is most suitable for large companies.

The other is a system in which small forgings are produced by the die forging and free forging, which is better suited to medium- or small-sized manufacturers where the steel materials is obtained from general market.

In Indonesia, however, only few of these modern systems are actually observed in the survey (2 or 3 companies), while traditional blacksmith work is dominant. The technology employed in this sector is the least modernized one in the Indonesian metalworking industry.

Materials used for forgings should be not only mild steel, but also medium carbon steel and low alloy steel, for providing strength and hardness. If such materials are not easily obtained, the forging industry will not be easily expanded.

Many of the automotive parts are small in size and mass-produced. These parts are manufactured by die forging, which seems to have problems in the supply of the raw material and its machining technology.

In particular, material for hot forging die consists of medium alloy steel or high alloy steel, which both require a complicated manufacturing method including heat treatment.

(3) Sheetworking/welding

The sheetworking and welding industries in Indonesia employ comparatively more advanced technology than other metalworking industries. This is due to several reasons, for example, the steel raw material, including welding electrodes, alloy steel plates and other imported products can be easily obtained, the processing technology and skill can be easily learnt and the demand is comparatively stable.

Sheetworking and welding works consist mainly of medium or large manufacturers, in which plant equipment is typically repaired.

Since the current sheetworking and welding products do not require very high accuracy or strength, manufacturing facilities are not yet modernized. The welding is done manually, without testing facilities of detailed pre-test, such as X-ray inspection, supersonic inspection or other flaw detection equipments, which may cause defects.

The sheetworking and welding industries should adopt modern equipment and technology in order to develop and build their role as a linkage

industry for plant equipment, shipbuilding and other metalworking/machinery industries.

(4) Plating

No specialized plating factory was found during the survey. The plating work is a part of the finishing process of various metal working and machining industries. At present, since products sold directly to the general market are plated, the plating work at each factory is many in variety but small in quantity. The size of plate works is not yet sufficiently large to justify the buildup of specialized plating factory.

Many plated parts are used as automotive parts and electrical parts. The plating industry should therefore be developed as rapidly as possible, as long as the localization plan proceeds with its aim to facilitate genuine domestic production of all parts. Products are usually plated after completion of machining. Therefore, the plating industry will be able to develop along with precise metalworking which includes high accuracy machining of components. Improvements in metal machining technology will be one of conditions for increasing demand for the plating industry, as its process follows after various machining process.

In the plating process the plated film should be uniformly adhered with specified thickness to the given surface, without any impure metal to be included. For this purpose, important control items include the setting of current and voltage of electricity, and the adjustment of plating liquid concentration and temperature. At that time, plating liquid should be infiltrated and stirred. In addition, waste liquid and sludge should be treated to prevent water pollution.

It is expected that various items of technical management should be improved, including plating film measurement which is not completely done.

For the equipped facilities, the pre-treatment equipment such as surface finishing, degreasing, acid cleaning and water rinse seems to be insufficient. The necessity of enhancing safety precautions is particularly important since strong acids and alkalis are used in the process.

(5) Machining and machine assembly

In most cases, machining process is accompanied with other metal-working process, rather than machining alone is employed in one manufacturer. According to the questionnaire survey, 163 companies out of 219 have machining shops, while these companies also have repair shops or assembly shops.

In terms of equipment and technology, there is still a wide gap between joint venture companies and medium and small companies. A considerable effort is required to promote them as linkage-type industries linked with assembly-type industries.

More than half of medium and small machine firms retain only conventional lathes and bench drilling machines, but very few companies own grinding machines and milling machines. In addition, many of the present machinery is quite obsolete, and machining accuracy is not so high because of poor maintenance and machining techniques. In fact, the range and type of machinable products are rather restricted. Hence these firms cannot easily enter into the market of genuine and new products, but are doing business mainly in the fields of repairing, machining of spare parts, disassembly of faulty machines, inspections and assembly.

Regarding high precision machining, related equipment is seen only in very few companies. Only a small fraction of these companies retain the complete set-ups of the equipment and technology.

In considering these conditions, there are very few existing companies which could possibly produce machine parts requiring high levels of accuracy and technology, such as the transmissions for agricultural machinery. Such manufacturers should therefore be developed as a completely new factory by providing integrated technical and financial assistance to potentially capable companies.

(6) Pressworking

The joint venture companies are equipped with large press machine for large press work with imported dies. Most medium and small companies are producing mainly punched and bent products by using small press machine. However, the die manufacturing capabilities of these companies are still poor. The medium and small companies prepare the dies by themselves, of which the working life is short because of inadequate heat treatment and faulty finishing accuracies, resulting also in

low product accuracy. As die is the vital component in pressworking, design and manufacturing technology should be immediately improved.

Main pressworking jobs for local medium and small companies consist primarily of punching and bending processes of small parts. Major working machines comprise the traditional lever-type manual press machines. Dies are manufactured in-house without high level of accuracy. In spite of such a status, pressworking companies are strongly demanding orders and technical instructions from assembly-type industries. However, the pressworking companies should first become aware of general information about advanced industrial machinery in order to recognize the level of state-of-the-art technology. According to our general survey, work facilities seem to be out of date. Therefore, for future improvement and development of the present status, it is important to introduce new technologies and equipment and thereby innovate the working environment. For this end it is required to establish a technical assistance institution for medium- and small-scale metalworking industries.

(7) Repair and maintenance

Indonesian metalworking industries have started from repairing jobs. The curricula of vocational training schools include automotive repair, various industrial machinery repair and other repair works, which all widely contributes to practical jobs because of the excellent craftsmanship and manual skills of the Indonesian people. In case of automotives, simple equipment repairs are done by the owners themselves, while the specialized and technically demanding repairs on passenger cars can perhaps be carried out in automotive repair shops located in urban areas. However, the repair or overhaul of the engine requires the facilities and technology of a certain level, which are exclusively carried out by the specialized engine repair shops. These specialized shops possess high-precision machinery, equipment and technology, and some companies also carry out manufacturing work on dies, subcontracted machining jobs of mechanical parts by using their own technology and equipment.

In addition to these repair shops, there are a few companies which deal with large mechanical parts such as plant machinery, equipment and industrial machinery, which employ large machinery, welding equipment and press machines. However, even in these factories, the reproduction of the original shape is appeared to be the most important task, while the accuracy is of the second importance.

2.3 Industrial Linkage between Assembly- and Linkage-Type Industry

2.3.1 Overview of Present Status

(1) Industrial structure

The machine assembly industry are mostly large companies with 100 or more employees which include many joint ventures mostly with Japan, which produce automobiles, motor cycles, home electrical appliances and agricultural machinery. In this report, this group of companies is categorised as the "assembly-type industry".

On the other hand, medium and small-size companies (medium: from 20 to 99 employees, small: 5 to 19 employees) in the metalworking industry are mostly those with domestic capital. This group is categorized as the "linkage-type industry" in this report. While the number of cottage industries is said to be innumerable, the number of medium-size industries is relatively small.

The assembly-type industry imports a large part of components and parts, assembles them into complete products and then sell them to the market, while most of the linkage-type industry mainly uses domestic raw materials to produce building materials and piping materials, etc., then selling them in the general market too. A survey carried out by means of a questionnaire showed that 66.2% of all companies sell their products to the general market while the remaining 33.8% are direct supply to other companies as parts. Both the assembly-type and the linkage-type industries manufacture their products to the general market and have their own direct links with consumers. Their industrial structures lack intermediate companies to supply components to the assembly-type industry, so that both large and medium/small companies have direct connections with consumers and form their own worlds without linkage with one another. Therefore, it is important to increase the medium and small-scale companies which can manufacture the products substituting for imported products, as the steps to develop the horizontal and vertical linkage between the assembly-type and the linkage-type industry.

The deletion programs would stem the fostering of the above-mentioned linkage-industry, since they stimulate the utilization of domestically manufactured components thereby promoting localization in the machine assembly industry. Despite of such actions, however, effective demands for the medium- and small-scale metalworking companies with

domestic capital are not yet generated to a substantial extent, since the assembly-type industry tends to manufacture their parts in-house, and also for some items which the programs promote out-house procurement, they tend to set up new joint ventures with foreign capital belonging to its group in order to make them produce those products. The automotive industry, for which deletion programs were first introduced 8 years ago, is the most instance. These practices result from the facts that the quality of those parts manufactured by the local medium and small-scale industry is unreliable and, further, there is a lack of mutual understanding between the assembly-type industry and the linkage-type industry in regard to contract customs.

(2) Results of questionnaire survey and medium-scale industries

The questionnaire survey for linkage-type industries were conducted in this Study. The questionnaire sheets were distributed to 219 manufacturers which comprise large, medium and small industries. The present condition of linkages with the assembly-type industry is one of the questions made in the questionnaires, in order to assess on how many metalworking industries are selling their products directly to the assembly-type industry. The table below tabulates the results of answers made from 210 companies.

NUMBER OF COMPANIES IN DIRECT LINKAGE TO
ASSEMBLY-TYPE INDUSTRIES, 1984

(Number of establishment)

Size of Company ^{1/}	Answered	Direct Linkage	%
Large	41	10	24.4
Medium	96	41	42.7
Small	73	22	30.1
Total	210	73	34.8

Note: ^{1/} Size of companies is categorized by number of employees: Large; 100 or more, medium; from 20 to 99, Small; from 5 to 19.

The linkage is mostly found in the medium-scale industries, 42.7%, indicating its whole or partial products are sold directly to assembly-type industries. Then followed by small-scale, 30.1%, while the large-scale tend to sell to the general market.

The above table lists the number of companies in direct linkage, even though the company might be selling only the portion of its products to the assembly-type industries. The following table gives the figure in terms of sales amount.

SALES AMOUNT FOR ASSEMBLY-TYPE INDUSTRIES, 1984

Size of Company ^{1/}	Answered	Sales Amount (Rp. mill)		
		Total	Assemblers	%
Large	41	128,875	40,911	31.7
Medium	96	36,964	15,682	42.4
Small	73	2,953	483	16.4
Total	210	168,792	57,076	33.8

Note: ^{1/} Same as the preceeding table.

The table indicates the small-scale industries sell their product to assembly-type industries by 16.4%, while the rest, 83.6% are sold to the general market. For medium-scale, the "rate of linkage" is the highest of 42.4%, while the large-scale is the in-between.

The results of the questionnaire survey and several facts found by the Study Team during the field survey imply that:

- 1) There may be difficulties for small-scale metalworking industries to play a central role to have linkage with assembly-type industries due to their obsolete and small production units, as well as their inferiority in technical level and skill of workers.
- 2) The manufacturer's sizes of medium-scale and just smaller than large-scale can play the main role of linkage-type industries and their growth potential is high.

In order to promote the development of the linkage-type industry, priority should have to be given to expanding modernized medium-scale "grower" type metalworking industries by means of modernizing the existing medium-scale metalworking factories, modernization and expansion of the small-scale factories, and the establishment of new

metalworking factories while continuing technical assistances should also be provided to all the medium- and small-scale metalworking industries, especially to the small-scale industries, to improve and upgrade their technical skills and management capability.

(3) Types of linkage

Two types of linkage exist between the assembly-type industry and the linkage-type industry. The first type is where a parent company holds part, or majority of the shares, sends management staff and provides technical assistance to the subsidiary in order that they can meet the specifications of the products to be manufactured for the parent company. In this case, all the products of the subsidiary are purchased by the parent company which supplies the raw materials in some cases. The second type is that an independent subcontractor supplies its products to more than one assembly-type companies. Generally speaking, the first type of linkage is often seen in the case of Japanese companies, while the second is more often seen in Western companies. In Indonesia, joint ventures with Japanese companies tend to follow the first type of linkage, although local industries are basically classified as the second type.

According to the questionnaire survey on subcontractors which have linkage with the assembly-type companies, 3% have capital investment from the parent companies, while 15% receive either credit lending or loans from the parent companies, and 24% receive supplies of raw materials and 40% receive constant orders under the planned order system, while the others manufacture on a job order basis.

(4) Production style

The style of production employed by the medium and small scale metalworking industry is characterized with a sell-reliant production a variety of finished products rather than concentrating in the production of specialized items. In addition, as the market size of each item is relatively small, they are engaged in the production of a large variety of products in small volumes. As a result, the management, as well as the production technologies, are dispersed, resulting in the production of low quality products, but at high costs, which could be easily manufactured by other competitors. It is, therefore, essential that this linkage-type industry is directed towards the manufactures of high quality, low cost products through the accumulation of technology and the rationalization of production, which in turn can be achieved by selecting product items and introducing specialized production system.

Nevertheless, if the production is made on specific parts to supply them to a certain large-size company, it may not be economical because of a relatively small volume. Further, if the demand for the products has seasonal fluctuation, it may lead to a low capacity utilization due to smallness and fluctuation of the markets. The measures for improving such problems would be to undertake specialized production of similar components to be used for several final products, for example, the production of transmissions for agricultural machines, machine tools, construction machines and automobiles, by one manufacturer.

If the specialization and concentration in specific products succeeds in achieving a supply of high quality, and low cost products, the possibility of exporting metalworking products will then arise as the next step. In fact as to cast iron products, the plants have been transferred from advanced countries to developing countries in ASEAN and East Asian Countries and some of them have started the export.

2.3.2 Factors Obstructing the Development of the Linkage-Type Industry and Countermeasures for Them

(1) Manufacturing technology

The reason why the metalworking industry, which supplies components to the machine assembly industry, cannot compete with imported products lies in the inferior product quality and in high cost. The cost disadvantage may be improved by the adjustment of import duties and also by cost-down which can be achieved by the advancement of mass-production. However, as the improvement of product quality can only be brought about by the improvement of the manufacturing technology, in order to promote the linkage-type industry, priority should be given to quality improvement.

The Indonesian metalworking industry originates from the repair industry for various machines (e.g., locomotive, and carriage cars) and plants (e.g., sugar plants) which were brought in by the Dutch. As a result, the transferred metalworking technology was biased towards repairs thus delaying Indonesians from learning about production technology. They are able to manufacture products similar to originals but remain at a stage of product imitation due to lack of techniques in regard to design, strength calculation, drafting and manufacturing according to drawings.

With regard to the actual manufacturing technology at plants, there is no place for workers to learn technological skills which can be imme-

diately utilized in their work such as blade sharpening or how to use tools. In addition, there are shortcomings of text books available for learning those aspects in Indonesian. Since the only way to improve the manufacturing technology is to train administrators, plant managers and workers, serious consideration should be given to the consolidation of educational/training centres and/or educational facilities which will be described later.

(2) Industrial standards and product inspection

One of the technical problems which hamper the expansion of linkages between the assembly-type industry and the linkage-type industry is the lack of a common-use technical language industrial standards and drawings.

The preparation of industrial standards, known as SII (Standard Industri Indonesia), has in fact already begun with REPELITA II. According to the explanation given by BPPI of the Ministry of Industry, 1,300 standards have so far been introduced in 9 sectors and by the end of REPELITA IV, 1,605 standards are planned to be made. The work has started to define the standards of product specifications, but they will not include design standards, drawing methods, manufacturing methods and inspection methods.

Industrial standards can only be expected to play their roles to the full extent when they are prepared as a package. While it generally requires a long period of time to set up reasonably systematic standards, both the assembly-type industry and the linkage-type industry hope for their provision at the earliest possible time. There is, however, one persistent opinion which favours the introduction of already established industrial standards, such as the International Industrial Standards, as the intermediate measures to be taken until the time when Indonesia's own standards are completed.

The users might wish to use reliable components with the standard guarantees by SII mark, while manufacturers might also wish to produce components under the standard in order to reduce the rates of defect and expand the markets. There is, however, a shortage of product inspection institutions, and the authority and reliability of inspection results have not yet been established in the industrial society. Due to the insufficient number of these institutions, some companies send their domestically manufactured sample components to Japan for product inspection.

The establishment of applicable standards and adequate inspection institutions is assential requisite for the fostering of linkage-type industry and, therefore, their provision is an important task for the Government of Indonesia in the industrialization of the country.

(3) Business climate and business customs

Summarized below are the management concepts and business customs prevalent in the existing medium- and small-scale manufacturers which are required to be reformed if they are fostered to grow for reliable subcontractors to the assembly-type industry.

- 1) There is one prevailing concept that the improvement of product quality will not directly lead to the improvement of profitability. This concept presupposes that the cost of quality improvement cannot be paid off because there would be little difference in the actual sales prices, regardless of the quality.
- 2) Most of the manufacturers do not realize on the benefits of sustaining a stable product supply with stable prices which could enable them to undertake planned production based on a long-term contract made with an assembly-type company. When a subcontractor is fostered to such a level that it can manufacture products having acceptable quality even if such a level-up is attributed to the technical guidance of an assembly-type company, it easily resorts to price increases and ultimately the stoppage of the product supply in the case that the price increase would fail under the situation where no competitors exist. As a result, the assembly-type industry, which must constantly supply its assembly lines with parts to maintain the mass-production system, will be forced to stop its own operation. This often discourages assembly-type industries to foster subcontractors.
- 3) Most of them do not realize on the benefit of expanding sales with marginal margin so that they can achieve cost-down by mass-production. The prevailing concept is that the same products can value the same prices regardless of differences in the costs which may vary depending on production style. This is because the traditional production method with a large share of labour and raw materials does not have any scale economy by volume of production. However, it must be understood that the cost-down based on high efficiency, which is realised by the shift to modern facilities, and the resulting reduction of sales prices will ultimately contribute to the profitability. It is important to educate them so as to change

their management concept from traders' concept to industrialists' concept.

A series of regular seminars would be useful means for educating entrepreneur and managers to improve their conventional business customs. It is participants' opinions that the seminars and training courses which have been held until today pertain to general and superficial aspects. In the seminars and training, emphasis should be made to demonstrate that quality control, rationalization of production management, and improvement of safety aids and working conditions will lower the production cost and also that the expansion of sales which small margin will eventually contribute to better profitability. Moreover, it will be effective to appoint model plants, providing them with thorough guidance, in order to prove that modern plant management based on the idea of industrial management actually generates more profits than the traditional concept.

(4) Provision of information to strengthen linkage

The field survey carried out by the Study Team found several local capital companies which are engaged in metalworking at relatively high technological levels. This shows the possibility for medium-scale companies in Indonesia to develop themselves without assistance from foreign companies or joint ventures. These companies, however, have few dealings with large joint ventures while large companies do not know of their existence. There is an absence of effort communication and by these linkage-type companies to open new markets, as shown by the fact that there is no staff in charge of market promotion except for the owners themselves. Another reason is that large companies, which are the users, do not make any effort to find and further foster reliable companies in Indonesia by continuously placing their orders.

As the ability of individual companies to gather market information is limited, the government assistance should also be provided on such activities, including introduction of assembly-type companies and linkage-type companies, by establishing information centres for entrepreneurs. Moreover, the dissemination of the information must be continuously carried out by visiting companies in turn. Furthermore, it is recommended to promote the publication of text books in Indonesia.

(5) Industrial organizations and cooperation

There are successful cases of the joint purchase of raw materials and of the joint marketing of products on a cooperative basis in Central Java. With a lot of fluctuation in the supply of raw materials, the cost burden for each company becomes rather heavy if each company tries to have its own adequate inventory level. The cost for company will be reduced if a joint inventory system is introduced. The following methods may also reduce the cost burden of each company on the basis of a joint cost sharing system. These should be seriously examined by the respective industrial organizations.

- 1) Joint purchases of expensive machinery, such as inspection machines.
- 2) Commencement of commissioned processing service by setting up processing centers.
- 3) Roving technical guidance system.
- 4) Provision of vocational trainings and seminars.

GAMMA^{1/}, which is an organization for the machinery and metalworking industries, strongly hopes for the establishment of this type of service center and, therefore, has positive opinion for the personnel and financial cooperation, management participation and the sharing of reasonable service charges.

Note: ^{1/} GAMBUNGAN INDUSTRI PENGARJAAAN LOGAM DAN MESIN INDONESIA (Federation of Indonesian Metal Works & Machinery Industries). The Federation consists of the following 9 Associations with 224 member companies in total.

ABI	(Engine Association: 6)
ALSINTANI	(Agricultural Machinery Association: 40)
APKOBI	(Steel Structure Association: 3)
ASPEP	(Machine Industry Association: 43)
APLINDO	(Basic Metal Association: 22)
AIMKI	(Construction Machinery Association: 10)
ASIMPI	(Machine Tool Association: 11)
AIPSI	(Pump Manufacturers' Association: 13)
AIPPI	(Plant Equipment Association: 46)

(6) Role of large companies

Assembly-type companies can play an important role in the fostering of the linkage-type industry and their technical assistance is particularly indispensable. At present, however, most of the large assembly companies are situated in difficult position to promote localization and foster subcontractors, although the government has been promoting out-house procurement of certain components under the deletion programs.

However, as the localization of components has been given national priority, large companies are obliged to bear certain responsibilities. Conversely, the linkage-type companies have their own problems in such fields as trade customs, etc. The Government, therefore, is expected to play the role described in this section in order to bring about mutual linkages between these two types of industries.

(7) Preventing labor turnover

One of the problems which the metalworking industries have been encountering is frequent turnover of skilled labor. It is important for the Government to educate and guide entrepreneur engaged in the metalworking industries to take measures for preventing the frequent turnover of skilled labor by means of increasing wage and salary to a reasonable level, improving working conditions and welfare, and adopting a payroll system which provide incentives to workers staying longer, while standardizing work procedure and also conducting vocational trainings for new worker.

Table 2.1 SUMMARY OF BASIC DATA FOR ASSEMBLY - TYPE INDUSTRY

	Establishment (No.)		Employees ¹ / (M)		Value added ² / (BRP.)		Employees/ Est.		Value added per employee ³ / (MMRp.)		Local content (%)	
	1980	1982	1980	1982	1980	1982	1980	1982	1980	1982	1980	1982
(1) Machinery & Repair (38200)	132	131	12.1	13.0	34.9	54.6	91	99	2.9	4.2	17.4	32.8
(2) Radio, T.V., and others (38320)	34	36	14.5	15.3	53.9	73.6	427	426	3.7	4.8	12.1	14.3
(3) Electrical apparatus etc. (38330, 38340)	56	58	15.9	15.3	59.8	91.6	297	264	3.8	6.0	25.1	12.8
(4) Ship building & repairing (38411)	42	54	7.0	8.1	20.3	27.0	65	150	2.9	3.3	54.6	60.3
(5) Motor vehicles assembling & mfg. (38430)	32	42	11.4	14.4	78.5	91.5	167	342	6.9	6.4	18.8	20.2
(6) Motor cycle assembling & mfg. (38440)	15	13	5.6	7.5	35.8	90.5	357	576	6.4	12.1	35.3	31.0
(7) Motor vehicle body & equipment	50	58	4.3	6.3	6.9	20.2	371	108	1.6	3.2	42.5	53.8
Total/Average	361	392	70.8	79.9	290.1	449.0	196	204	4.1	5.6	23.0	24.6

Notes: ¹/ M = Thousand persons
²/ BRP = Billion Rp.
³/ MMRp = Million Rp.

Sources: ANNEX III, Tables ANX III-1 and ANX III-3

