

**A STUDY ON
INDUSTRIAL SUB-SECTOR
DEVELOPMENT
IN THE REPUBLIC OF INDONESIA**

Comprehensive Review Report

DECEMBER 1991

JAPAN INTERNATIONAL COOPERATION AGENCY

**A STUDY ON
INDUSTRIAL SUB-SECTOR
DEVELOPMENT
IN THE REPUBLIC OF INDONESIA**

Comprehensive Review Report

JICA LIBRARY



1094604(4)

23093

DECEMBER 1991

JAPAN INTERNATIONAL COOPERATION AGENCY

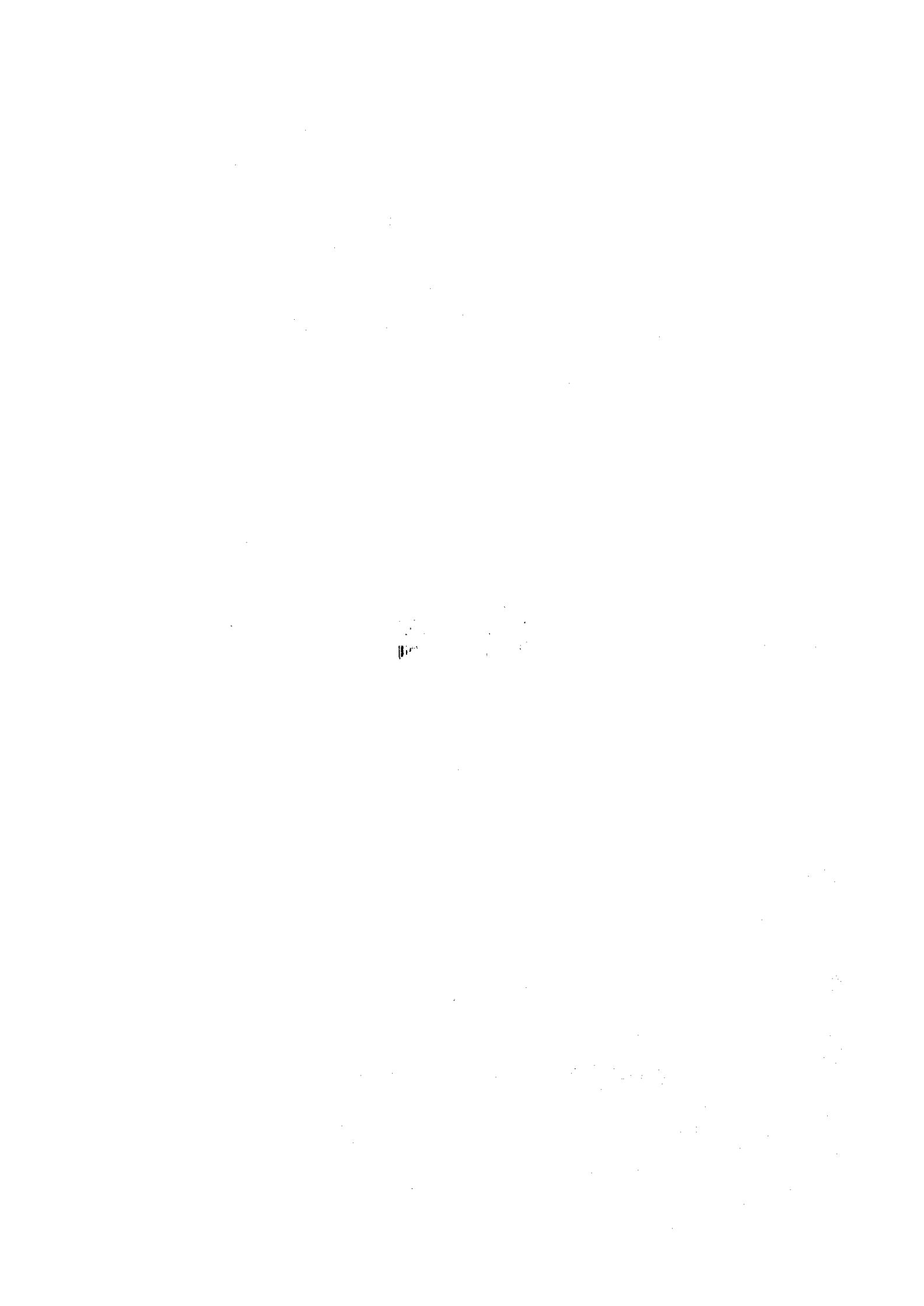


Table of Contents

Abbreviations	i
1. Introduction	1
2. Basic Perspectives for Industrial Sub-sector Development.....	5
2-1 Basic Objectives of Repelita V and Role of Industrial Sub-sectors.....	5
2-2 Position of Industrial Sub-sectors in Industry as a Whole.....	6
2-3 Position of Industrial Sub-sectoral Products Among Total Exports.....	9
2-4 Basic Perspectives for Industrial Sub-sector Development.....	10
3. Issues and Promotion Programs of Six Industrial Sub-sectors . .	14
3-1 Handicraft Industry.....	14
3-2 Rubber-based Products Industry	18
3-3 Electrical Machinery Industry	22
3-4 Ceramic Products Industry	25
3-5 Aluminium Downstream Products Industry.....	28
3-6 Plastic Products Industry	31
4. Derivation of Priority Programs and Their Relations with Promotion Programs.....	35
4-1 Derivation of Priority Programs	35
4-2 Relationships between Priority Programs and Sub-sectoral Promotion Programs	37
5. Outline of Priority Programs.....	44
5-1 Program for Development of Metalworking Technology	44
5-2 Program for Promotion of Industrial Standardization and Quality Control.....	52
5-3 Program for Vitalization of Industrial Associations	60
5-4 Program for Development of Mid-level Engineers and Technicians.....	67
5-5 Program for Implementation of Export Promotion Projects.....	72
5-6 Program for Promotion of Foreign Investment and Technical Tieups	81
5-7 Program for Strengthening of Research and Development Institutes under Ministry of Industry	88
5-8 Program for Survey of Resources of Ceramics Raw Materials	105
5-9 Program for Handicraft Development and Promotion Center (HDPC)	110
5-10 Program for High Polymer Center	119
5-11 Program for Prevention of Industrial Pollution and Promotion of Energy Saving	125
6. Initiatives and Major Policy Issues on the Indonesian Side.....	131
6-1 Initiatives on the Indonesian Side.....	131
6-2 Government and Private Sector Cooperation	131
6-3 Major Policy Issues	131

Contents for Tables and Figures

Contents for Tables

Table 1-1:	The Industrial Sub-sectors and Products Covered in the Study	3
Table 2-1:	Targets for Industrial Sub-sectors in Repelita V.....	5
Table 2-2:	Basic Indicators of Industrial Sub-sectors (1986).....	7
Table 2-3:	No. of Business Establishments and Size of Businesses (1986).....	8
Table 2-4:	Indonesian Total Export and Export of Industrial Sub-sectoral Products.....	9
Table 2-5:	Evaluation of Possibilities for Increased Exports in Six Sub-sector Industries.....	11
Table 2-6:	Development Targets and Role of Industrial Sub-sectors	13
Table 3-1:	Issues and Promotion Programs of Handicraft Industry	17
Table 3-2:	Issues and Promotion Programs of Rubber-based Products Industry....	21
Table 3-3:	Issues and Promotion Programs of Electrical Machinery Industry.....	24
Table 3-4:	Issues and Promotion Programs of Ceramic Products Industry.....	27
Table 3-5:	Issues and Promotion Programs of Aluminium Downstream Products Industry	30
Table 3-6:	Issues and Promotion Programs of Plastic Products Industry.....	34
Table 5-1-1:	Comparison of three Candidate Sites for Metalworking Technology Program	47
Table 5-1-2:	List of Major Machines and Equipment to be considered Necessary for Forging, Heat Treatment and Machining Facilities	49
Table 5-3-1:	Implementation Schedule (Plan) of Program for Vitalization of Industrial Associations	65
Table 5-5-1:	Difference Between Exports and Domestic Sales (in the case of Indonesian manufacturers).....	74
Table 5-5-2:	Examples of Indonesian Exportable Products Identified by Six Sub-sector Study	77
Table 5-6-1:	Foreign Investment in Indonesia	81
Table 5-6-2:	Destination of Sales of Japanese Manufacturing Affiliates in Asia.....	82
Table 5-7-1:	Location of Institutes of Ministry of Industry and Provincial Government by Region.....	92
Table 5-7-2:	Outline of Central R&D Institutes under Ministry of Industry Related to the Sub-sectors.....	93
Table 5-7-3:	Related Research Institutes under Other Ministries	94
Table 5-7-4:	List of Testing and Inspection Equipment for Rubber-based Products to be Considered Necessary in the IRDLAI	100
Table 5-7-5:	List of Testing and Inspection Equipment etc. for Ceramic Products to be Considered Necessary in the IRDCRI	102
Table 5-9-1:	Major Public Institutes Related to Handicraft Industry	112
Table 5-10-1:	Present High Polymer Related Institutes and Projects and Requirement for Reinforcement and Improvement in the Future.....	121
Table 5-10-2:	List of Testing and Inspection Equipment for Plastic Products to be Considered Necessary in the IRDLAI.....	123

Contents for Figures

Fig. 1-1:	Basic Flow of the Study.....	4
Fig. 4-1:	Basic Concept of Priority Programs	36
Fig. 4-2:	Relationship between Promotion Programs and Priority Programs by Sub-sectors.....	38
Fig. 5-1-1:	Basic Concept of the Program of Metalworking Technology.....	46
Fig. 5-2-1:	Procedures for Establishment of SNI Standards.....	54

Fig. 5-2-2:	Procedures for Establishment of SII Standards	55
Fig. 5-3-1:	Flow Chart (Draft) for Vitalizing Activities of Industrial Associations and Strengthening Ties with Foreign Organizations	61
Fig. 5-4-1:	Concept of Human Resources Development in Company Personnel Structure.....	68
Fig. 5-4-2:	Education System of Indonesia.....	69
Fig. 5-5-1:	Typical Pattern of Domestic Sales by Medium and Small Scale Firms... ..	73
Fig. 5-5-2:	Basic Concept for Upgrading Products for Export	75
Fig. 5-5-3:	Basic Concept of Export Marketing in Broad Sense	76
Fig. 5-6-1:	Organization Chart of BKPM.....	84
Fig. 5-6-2:	Organization Chart for the Promotion of Foreign Investment to Industrial Sub-sectors	85
Fig. 5-7-1:	Issues for Industrial Development and Functions of Public R&D Institutes.....	89
Fig. 5-7-2:	Organizational Chart of the Ministry of Industry.....	91
Fig. 5-7-3:	Relation between HDPC and Existing Institutes	96
Fig. 5-8-1:	Flow Chart (Draft) for Survey of Resources and Development Projects.....	108
Fig. 5-9-1:	Scenario for Promotion of Exports from Small and Medium-scale Handicraft Firms.....	115
Fig. 5-9-2:	Outline of Morioka Handicraft Square and Denparmanent.....	118
Fig. 5-10-1:	An Example of a System Covering a Wide Area of the High Polymer Center.....	122
Fig. 5-11-1:	Basic Concept of Environmental Pollution Control.....	126
Fig. 5-11-2:	Basic Concept of Energy Saving Policy.....	128

ABBREVIATIONS

I. ORGANIZATIONS

ADB	: Asian Development Bank
BAPPENAS	: National Planning Agency
BKPM	: Investment Coordinating Board
BPPI	: Agency for Industrial Research and Development
BPPT	: Agency for the Assessment and Application of Technology
BPS	: Central Bureau of Statistics
DSN	: National Standardization Council
DMR	: Directorate of Mineral Resources
IETC	: Indonesia Export Training Center
IRDABI	: Institute for Research and Development of Agro-Based Industries
IRDCI	: Institute for Research and Development of Chemical Industries
IRDCLI	: Institute for Research and Development of Cellulose Industries
IRDCRI	: Institute for Research and Development of Ceramic Industries
IRDHBI	: Institute for Research and Development of Handicraft and Batik Industries
IRDLAI	: Institute for Research and Development of Leather and Allied Industries
IRDMMI	: Institute for Research and Development of Metal and Machinery Industries
IRDMTP	: Institute for Research and Development of Material and Technical Product Industries
IRDTI	: Institute for Research and Development of Textile Industries
ITB	: Bandung Institute of Technology
ITS	: Surabaya Institute of Technology
JETRO	: Japan External Trade Organization

JICA	: Japan International Cooperation Agency
KADIN	: Indonesia Chamber of Commerce and Industry
KIM-LIPI	: Research and Development Center for Calibration Instrumentation
LEMIGAS	: Oil and Gas Research and Technology Development Center
LIPI	: Indonesian Institute of Science
LUK	: Laboratory for Strength and Material Component and Structure
MOI	: Ministry of Industry in the Republic of Indonesia
MTDC	: Mineral Technology Development Center
NAFED	: National Agency for Export Development
PKTI	: Industrial Chemistry Technology Education Center
PPDJ	: Jakarta Design Development Center (Jakarta Handicraft Center)
PPMB	: Testing and Quality Control Center
PUSBINLAT	: Industrial Skill and Vocational Training Development Center
AESIEAP	: Association of Electricity Supply Industry of Southeast and Western Pacific
AFPI	: ASEAN Federation of Plastics Processing Industry
AIKI	: Association of Indonesia Rubber Goods Industries
APINDO	: Indonesian Plastic Manufacturers Association
APPI	: Association of Indonesian Electrical Industries
APVICI	: Plastic Resin Manufacturers Association
AP3	: The Plastic Pipe Manufacturers Association
ASAKI	: Indonesian Ceramic Association
ASTA	: Indonesian Gloves Manufacturers Association
CICA	: Ceramic Industry Club of ASEAN
FIKI	: Federation of Indonesian Rubber Industries
FIPLASIN	: Federation of Indonesian Plastics Industries
GAMMA	: Federation of Indonesian Metal Works and Machinery Industries
GAPAKISI	: Indonesian Synthetic Leather Manufacturers Association

GAPKINDO	: Association of Indonesian Rubber Producers
GAPPI	: The Storage Battery Manufacturers Association
GIAMM	: Association of Automotive Component Parts Manufacturers
GIATPI	: Indonesian Plastic Woven Polyolefine Manufacturers Association

II. ECONOMIC TERMS AND OTHERS

AMDAL	: Environment Impact Assessment
GDP	: Gross Domestic Product
GNP	: Gross National Product
KOPINKRA	: Small Scale and Handicraft Industry Cooperative
NIEs	: Newly Industrializing Economies
Asian NIEs	: The Republic of Korea, Taiwan, Hong Kong and Singapore
OECD	: Organization for Economic Cooperation and Development
PMA	: Foreign Investment
PMDN	: Domestic Investment
REPELITA	: Five Year Development Plan
Rp	: Indonesian Rupiah
RPMU	: Regional Project Management Unit
R & D	: Research and Development
SEDP	: Small Enterprise Development Project
SII	: Indonesia Industrial Standard
SMIEP	: Small and Medium Industrial Enterprise Project
SNI	: Indonesian National Standard
TPL	: Technical Instructor
TQC	: Total Quality Control
UPT	: Technical Service Unit

1. Introduction

1) Objective of Comprehensive Review Report

(1) The study for the industrial sub-sector promotion and development plans of the Republic of Indonesia included surveys of six sub-sector industries in two years starting from August 1989, based on the Scope of Work for the Study on Industrial Sub-Sector Development in the Republic of Indonesia, signed between the Ministry of Industry of the Republic of Indonesia and the Japan International Cooperation Agency (JICA) on March 23, 1989.

Six sub-sector industries covered in the study are shown in the Table 1-1.

(2) The comprehensive review report is compiled to give an overall review of the reports on the six sub-sector industries for the first and second years as part of the second year report, summarize the promotion programs recommended in the sub-sector reports and derive programs spanning industries, and give priority programs.

(3) The priority programs in this comprehensive review report are composed of programs for solving major common issues to each industrial sub-sector, ones with which greater benefits may be gained amid restrictions in applicable resources and ones based on interests shown from the Indonesian side. The availability and the utilization of existing resources in Indonesia and assistances from abroad are taken into account for proposing each priority program.

(4) It is recommendable, therefore, that the priority programs in the comprehensive review report be given priority over the promotion programs in each sub-sector report, for the development of six industrial sub-sectors.

In requesting for foreign assistances when implementing priority programs, it is necessary for the Indonesian side to consult with foreign economic cooperation agencies on the scope and details of proposed programs beforehand.

2) Background and Method of Study

(1) Indonesia has been suffering from a deterioration of its international balance of payments due to the fall in oil prices which began in the mid 1980s and therefore is trying to escape from its economic dependence on oil revenues. Toward this end, it has designated the promotion of non-migas (non-oil and gas) products as one of its most important economic targets. Giving priority to the development of export-oriented industries, an average annual growth of 15 percent in the value of industrial product exports is aimed for and this should reach more than \$18 billion in the final year of the Fifth Five Year Development Plan (Repelita V).

(2) To help in this endeavor, the Indonesian government requested the Japanese government to study industrial fields and products which could be expected to be promising in terms of future exports and to formulate comprehensive programs for the promotion of exports.

In response to this, the Japan International Cooperation Agency began a two-year study on industrial sub-sector promotion and development plans for Indonesia starting in August 1989.

(3) The objective of the study was to formulate comprehensive promotional measures and then to recommend practical promotion programs, bearing in mind the questions of how

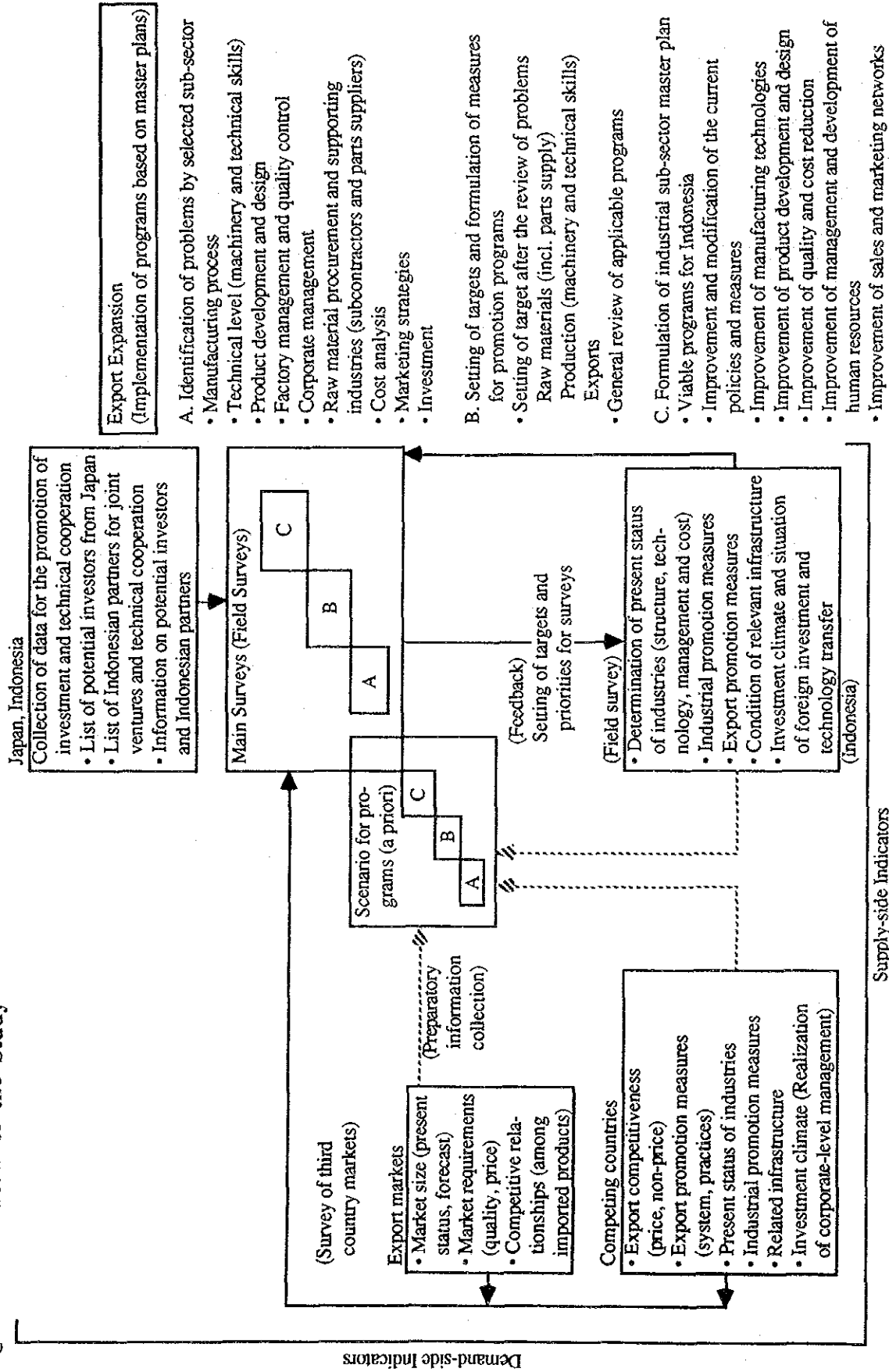
to increase exports of the products of each selected industrial sub-sector and how to foster internationally competitive industries. The study was composed of a field survey in Indonesia, third country surveys, and a questionnaire survey in Japan and worked to obtain a grasp of the problems in the selected industries and products from both the supply side and the demand side. Analyses of the study results and the formulation of the promotion programs and the priority programs were done in consultation with Indonesian counterparts.

The basic flow-chart of the survey is show in Fig.1-1.

Table 1-1: The Industrial Sub-sectors and Products Covered in the Study

Year	Sub-sector	Product
First Year	a. Handicraft	Fashion accessories (precious stones and metals, peals, etc.)
		Traditional handicraft (wooden craft, textile, etc.)
	b. Rubber-based industry	Industrial rubber goods (belts, hoses, tubes excl. automobile tyres)
		Latex-based goods (gloves, condoms, medical and hygienic)
c. Electrical machinery	Transformers	
	Generators & motors	
Second Year	d. Ceramic products industry	Table ware Construction materials (tiles and sanitary ware)
	e. Aluminium down-stream products industry	Die cast products Sheets, sheet formed products and foils
	f. Plastic products industry	Injection products (camera body, electric components, cassettes, automobile components and household utensils)
		Sheets, films and woven bags

Fig.1-1: Basic Flow of the Study



2. Basic Perspectives for Industrial Sub-sector Development

2-1 Basic Objectives of Repelita V and Role of Industrial Sub-sectors

The Indonesian government considers Repelita V to be a preparatory period for its economic takeoff in Repelita VI and therefore set the following targets for the industrial sector in the period of the plan:

a. It set a target for average annual growth of the industrial sector as a whole of 8.5 percent and a target for growth in the non-migas industrial sector of over 10 percent. It has set the ratio of the industrial sector in the GDP as of the end of Repelita V at 16.9 percent.

It is further scheduling for 2.3 million new jobs to be created during this period. It plans to raise the average annual rate of growth of exports of industrial products to 15 percent and the ratio of industrial products in all exports as of the end of Repelita V to 59.7 percent. In value, the exports will reach about US\$18.0 billion.

b. The targets for exports and creation of jobs in each industrial sub-sector are as follows:

Table 2-1: Targets for Industrial Sub-sectors in Repelita V

	Exports in final year (US\$ billion)	No. of new jobs created (5 years)
Multifarious industry sector	12.69	730,000 (146,000/year)
Basic chemical sector	1.43	35,000 (7,000/year)
Basic metal, machinery, and electrical sector	1.08	35,000 (7,000/year)
Small industry sector	2.10	1,500,000 (300,000/year)
Total	17.30	2,300,000 (460,000/year)

Source: Repelita V

In the above way, the roles of the small industries and the multifarious industry sector is extremely large in quantitative terms. When judged from the two points of the increase of jobs and the increase of exports, the two major objectives of the development policies, for the time being the ability to achieve the targets in these two sectors will have a major bearing on the success of the policies.

On the other hand, in Repelita V, targets have been set not only for quantitative matters, but also qualitative measures in preparation for the economic takeoff in Repelita VI. In particular, the improvement of the industrial structure, the augmentation of research and development facilities, the acquisition of advanced manufacturing technologies, the improvement of design capabilities, the establishment of industrial standards, the improvement of overall management capabilities, and the like are set as key goals as steps in achieving a more sophisticated industrial structure. Seen in the medium and long term, it is expected that the basic metal, machinery, and electric sector and the basic chemical sector will become of increasing importance.

2-2 Position of Industrial Sub-sectors in Industry as a Whole

Let us look at the features of Indonesian industry using *Statistik Indonesia* and industrial statistics of the Biro Pusat Statistik (BPS).

In the industrial statistic tables, industry is divided into the following nine classes:

- 31: Food, beverage, and tobacco manufacturing industries
- 32: Textile, garment, and leather product manufacturing industries
- 33: Lumber and wood product manufacturing industries
- 34: Paper, paper products, printing, and publishing industries
- 35: Chemical, chemical product, oil, coal, rubber, and plastic product manufacturing industries
- 36: Nonmetallic mineral product manufacturing industries
- 37: Basic metal industries
- 38: Metal product, machinery, and equipment manufacturing industries
- 39: Other manufacturing industries

The latest statistics covering the large, medium, small, and cottage sized industries of Indonesia as a whole are those of 1986 given in *Statistik Indonesia*. Based on this, the features of Indonesian industry are as follows:

- a. There were about 5.2 million people employed in Indonesian industry. Among these, about 70 percent were employed in industries using as raw materials the abundant agricultural and forestry products of Indonesia, i.e., the sectors of industrial classes 31, 32, and 33. These three sectors account for about 55 percent of the overall added value in industry.

b. Table 2-2 shows the indicators of the features of the different industrial sub-sectors:

Table 2-2: Basic Indicators of Industrial Sub-sectors (1986)

Industrial classification number	No. of business establishments	Employees/business establishments	Wages per employee (1000 Rp)	Added value per employee (1000 Rp)	Input-output ratio	Added value rate (%)
31	486,595	4	302.4	1,925.2	0.66	34
32	167,044	5	485.4	2,067.3	0.63	37
33	482,624	2	272.0	1,187.4	0.59	41
34	10,080	10	1,158.4	3,672.3	0.64	36
35	11,717	24	1,379.9	5,032.7	0.70	30
36	120,576	7	322.9	1,561.9	0.57	43
37	30	563	2,896.0	46,580.5	0.45	55
38	40,693	7	1,132.9	4,647.3	0.67	33
39	204,573	2	138.4	1,034.5	0.57	43
Overall (average)	1,523,935	(3)	(444.3)	(2,198.3)	(0.64)	(36)

Source: Prepared from *Statistik Indonesia 1989*.

According to Table 2-2, the average size of the business establishments in the industrial sector is of the cottage industry level. This is due to the overwhelmingly large number of business establishments belonging to the sectors 31, 32, and 33. The size of sector 37 is remarkably large, however, the number of establishments is small.

Among the industrial sub-sectors covered by this study, the rubber products industry and the plastic products industry fall under sector 35, the ceramic products industry under sector 36, and the electrical machinery industry and aluminium products industry under sector 38. The handicraft industry falls under sectors 32, 33, 36, and 39. Sector 35 has only a few business establishments and stands second after sector 37 in the added value per employee, followed by sector 38. Sector 36 under which the ceramic products industry falls and the sector under which the handicraft industry falls remained at a low level of per capita added value as of 1986. Industries with under the average per capita added value accounted for the majority of the number of business establishments and employees.

In the following, comparison of the industrial sectors which development targets are given in Repelita V and industrial classification number is made:

Multifarious industrial sectors: 31, 32, 33, 34, part of 35, 36, part of 38
 Basic chemical sector: part of 35
 Machinery, basic metal, electrical sector: 37, 38
 Small sized industry sector: Almost all fields except 37

As mentioned in the above 2-1, great hopes were placed on export promotion in the multifarious industry sector in Repelita V. Further, high targets were set for increasing employment in the small sized industry sector and multifarious industry sector. Most of the companies belonging to the multifarious industry sector are small sized industries or cottage sized industries. Table 2-3 shows the size of businesses for each industrial sub-sector.

Table 2-3: No. of Business Establishments and Size of Businesses (1986)

Industrial classification number	No. of business establishments	Large and medium sized industries (%)	Small sized industries (%)	Cottage sized industries (%)
31	486,595	3,875 (0.8)	38,925 (8.0)	443,795 (91.2)
32	167,044	2,852 (1.7)	15,068 (9.0)	149,124 (89.3)
33	482,624	1,160 (0.2)	14,493 (3.0)	467,071 (96.8)
34	10,080	602 (6.0)	2,348 (23.3)	7,130 (70.7)
35	11,717	1,591 (13.6)	2,596 (22.2)	7,530 (64.2)
36	120,576	1,208 (1.0)	13,582 (11.2)	105,789 (87.8)
37	30	30 (100)	—	—
38	40,693	1,272 (3.0)	5,018 (12.3)	34,403 (84.7)
39	204,573	175 (0.1)	2,604 (1.3)	201,794 (98.6)
Overall	1,523,935	12,765 (0.8)	94,534 (6.2)	1,416,636 (93.0)

Source: Same as Table 2-2.

The multifarious industry sector includes industries which make active use of agricultural, forestry, marine, and mineral resources abundant in Indonesia. For development of the multifarious industry sector, strong consideration must be given to the effective utilization of resources in addition to the promotion of the small sized industries.

2-3 Position of Industrial Sub-sectoral Products Among Total Exports

The Table 2-4 summarized the position of the six industrial sub-sectoral products surveyed in this report.

Table 2-4: Indonesian Total Export and Export of Industrial Sub-sectoral Products

(Unit: millions of US\$)

	1987 (%)		1988 (%)		1989 (%)		1990 (%)	
Total Export	17,136	(100)	19,219	(100)	22,159	(100)	25,675	(100)
Non-oil gas	8,580	(50)	11,537	(60)	13,480	(61)	14,604	(61)
Handicraft	493.8	(2.9)	613.3	(3.2)	859.3	(3.9)	—	
Rubber-based products	0.9	(0.005)	3.7	(0.02)	7.7	(0.04)	9.2	(0.04)
Electrical machinery	0.2	(0.001)	1.4	(0.01)	5.2	(0.02)	9.0	(0.04)
Ceramic products	4.3	(0.025)	13.8	(0.07)	27.2	(0.12)	28.5	(0.11)
Aluminium downstream products	0.8	(0.004)	11.2	(0.06)	31.3	(0.14)	35.7	(0.14)
Plastic products	9.1	(0.05)	16.1	(0.08)	28.3	(0.13)	41.4	(0.16)

Note: The export amounts of industrial subsectoral products cover those of the products surveyed under this study. For example, amount of rubber-based products does not contain that of tire, and the amount of electrical machinery contains only the amount of transformer, generator and motor.

Source: Indonesia Foreign Trade Statistics (BPS), Indonesian Export '89 (NAFED)

According to the Table 2-4, the export amount of handicraft is by far the largest among six sub-sectors, and also shows steady growth. While the export amounts of the other five products are relatively small in value in comparison to that of handicraft, the growth rates are very high. In particular, export of aluminium downstream products and electrical machinery increased remarkably. The export amounts of rubber-based products, ceramic products and plastic products increased greater than that of non-oil and gas products, however, the export growth rates of those products were less than those of aluminium downstream products and electrical machinery.

2-4 Basic Perspectives for Industrial Sub-sector Development

A common feature in all of the six industries surveyed except for the handicraft industry was the fact that exports were being performed by only a small number of large companies. Almost all of these companies were tied up with foreign capital (through capital itself or technology) in some form or another. In so far as these large companies are concerned, the export marketing is in generally being suitably handled. The majority of the businesses, however, not including these companies, suffer from problems in manufacturing technology or export marketing due to lack of experience. Table 2-5 summarizes the current problems faced as seen from the actual states of the six industries surveyed, based on the results of the current field survey, and the evaluation of the possibilities for increased exports:

Table 2-5: Evaluation of Possibilities for Increased Exports in Six Sub-sector Industries

Evaluated item	Handicraft	Rubber-based products	Electrical machinery	Ceramic products	Aluminium products	Plastic products
Supply side issue						
Possibility of securing good quality raw materials	OOO	OOO	O	OO	OO	OO
Possibility of securing suitable parts, secondary materials, dies, etc.	O	O	O	O	O	O
Level of sufficiency of production technology	OO	O	OO	OO	O	O
Managerial capabilities	O	O	O	OO	O	OO
Possibility of securing suitable manpower (Skilled workers and R&D personnel)	OO	O	O	O	O	O
Position in international market						
Ability to collect information on international markets	O	O	O	O	O	O
Price competitiveness	OOO	OOO	O	OOO	OO	OO
Nonprice competitiveness	OO	O	O	O	O	O
Brand awareness	OO	O	O	O	O	O
Possibility of increasing export markets	OOO	OOO	OO	OOO	OO	OO

Note: OOO denotes large
OO denotes medium
O denotes small

Looking at just Table 2-5, there is a large possibility for increasing exports in Indonesian industries using domestic natural resources, such as the handicraft industry, the rubber-based products industry, and the ceramic products industry. These industries all fall under the category of the multifarious industry sector and the small sized industry sector in Repelita V. As opposed to this, one may point to the low marks given to the electrical machinery industry, the plastic products industry, and the aluminium products industry, all relatively young industries in Indonesia. The above assessments, however, are for establishing priorities for development based on the current state of Repelita V and it is well possible that industries like electrical machinery which have growth potential may become more important in the future along with future policies, investment, and technical advances.

Furthermore, problems which were common to each of the six sub-sectors were difficulty in securing things such as suitable parts, secondary materials and metal dies on the supply side, low levels of managerial capabilities, difficulty in securing personnel and inadequate production technology. Poor capabilities in the gathering of information on the global market also considerably restricts international marketing. In order to succeed in expanding exports in the future, the improvements of these points are highly desirable.

Furthermore, the important points in the economic development of Indonesia are clearly 1) the increase of employment and 2) the increase of exports. Other major policy issues are 3) regional development, 4) promotion of small sized industries, 5) increasing the added value of industry, and 6) raising the level of technology. In the foregoing section, we tried to assess the situation based on the state of the industrial sub-sectors as they now stand. In Table 2-6, we have summarized the targets of economic development and the role of each industrial sub-sector. According to this, the groups which would be expected to gain the most benefit in the short term are the handicraft, ceramic and rubber-based products industries. For the increase in value added and the spread of technology the electrical machinery, aluminium downstream products and plastic products industries are expected to play a major role.

It follows that as a basic direction for promotion of the industrial sub-sectors, development of the handicraft, ceramic and rubber-based products industries should be developed and strengthened under the short term perspectives. Under the mid and long-term perspectives then, in order to improve technology and increase value added, it would be highly desirable to develop and strengthen the electrical machinery, aluminium and plastic products industries.

Accordingly, the basic perspectives for industrial sub-sector development should be so formulated as to reflect fully the characteristics of Indonesian industrial sub-sectors. Specifically, for the increase in employment and export, resource oriented industrial sub-sectors such as handicraft products, ceramic products, and rubber-based products should be promoted under a short-term perspective, and for the enhancement and dispersion of technology as well as the increase of the added value of the industry, the assembling and processing industries utilizing sophisticated technology such as electrical machinery, aluminium downstream products and plastic products industries should be promoted under mid and long-term perspectives.

Table 2-6: Development Targets and Role of Industrial Sub-Sectors

Targets in economic development	Handicraft	Rubber-based products	Electrical machinery	Ceramic products	Aluminium products	Plastic products
Effect of increasing employment	OOO	OO	O	OO	OO	OO
Effect of increasing exports	OOO	OO	OO	OO	OO	OO
Effect of regional development	OOO	OOO	O	OOO	O	O
Effect of promotion of small-sized industries	OOO	OO	OO	OO	OO	O
Effect of increasing added value	OO	OO	OO	OO	OO	OO
Technology dispersion effect	O	OO	OOO	OO	OO	OOO

Note: OOO denotes large effect
OO denotes medium effect
O denotes small effect

3. Issues and Promotion Programs of Six Industrial Sub-sectors

Major issues reviewed from the aspects of business management, production management, manufacturing technologies, marketing, etc., and main promotion programs proposed in each sub-sector report are summarized in this chapter.

3-1 Handicraft Industry

(1) Issues and Measures

Numerous types of products are included in the scope of handicrafts. Also, the areas producing them are scattered throughout Indonesia. Seen at the level of the individual businesses, there are many problems in the individual businesses faced. Looking at the handicraft industry as a whole, however, the problems pending in promoting the industry may be summarized as follows:

[1] Business management

Most of the businesses in the handicraft industry are cottage sized operations and lack even such basic business sense as the observance of delivery commitments and the need for products to be the same as samples initially presented in sample transactions. Further, they lack knowledge concerning the system and procedures of export transactions, which hinders the expansion of their sales channels and increase of their exports. Therefore, in the medium and long term measures should be taken to develop staff who can manage export business. For the time being, however, it is necessary to instill greater business knowhow in managers. Furthermore, function of transaction agency should be established for cottage sized operation in the region.

[2] Production management

Businesses in the handicraft industry do not engage in production control or quality control in most cases, so there are often complaints from the buyers about delivery, the stability of the quality (in particular with relatively large sized businesses), and the packing (in particular with small sized businesses). If aiming at greater sales channels, in particular exports to overseas markets, thorough production control and quality control are important and therefore it is necessary to promote the spread of production control and quality control.

[3] Manufacturing technology

Indonesian handicrafts are highly esteemed in beauty of art and value in themselves, but suffer from problems of unstable quality such as color fading of hand woven textile, it has been pointed out. The reasons for this are the unstable quality of the materials, and the decline in quality along with an increase in the volume of production. Therefore, from the standpoint of production technology, the tasks to be taken up are the stabilization of quality of the raw materials, etc. The introduction of machinery and equipment which has the possibility of detracting from the excellence of handwork should be carefully treated.

[4] Marketing

There are few cases of businesses in the handicraft industry developing products, collecting marketing information, making approaches to overseas buyers, or engaging in other marketing activities. Further, due to the small size of operations, engaging in such marketing activities would be difficult on their own. Therefore, an issue will be to what

extent public organizations can assist in marketing, such as in strengthening product development capabilities, collecting market information, strengthening design capabilities, and providing information to buyers.

(2) Promotion Programs

[1] Establishment of a Handicraft Development and Promotion Center (HDPC) and Fostering of MA Firms

In promoting the handicraft industry and exports, it is recommended that a Handicraft Development and Promotion Center (HDPC) be established which would provide assistance in the resolution of problems which individual businesses cannot deal with on their own, such as marketing problems, and which would engage in activities to educate and guide businesses and programs to develop human resources in tandem so as to comprehensively promote the industry.

The Center would desirably have the following functions:

- Provision of marketing information to businesses
- Agent services for exports
- Education and guidance to businesses
- Development of human resources
- Research and development
- Exhibitions
- Provision of information to overseas markets and buyers

MA (Marketing Access) firms are organization which assume marketing functions in local producing regions where cottage industry level firms are the majority. MA firms will be established based on wholesalers in production regions and koperasi.

[2] Application of Assistance from Foreign Economic Cooperation Agencies to Handicraft Industry

Cooperation programs of foreign economic cooperation agencies such as monitoring of products, guidance to individual companies, provision of design, holding seminar, dispatch of export missions, holding of exhibitions should be applied to handicraft industry. In addition to diffusion of business knowledge, guidance on quality control, provision of market information and guidance on design, realization of export can be expected.

[3] Vitalization of existing public sector facilities

Existing public sector facilities related to handicraft industry are to be used to improve production technology in the handicraft industry. The purposes are study and improvement of raw materials, study and improvement of the production process, design development, exchanges with the overseas similar organizations, dissemination of R&D results and short-term training of craftsman.

[4] Implementation of promotion measures by product and region

By product, silk products (South Sulawesi) are the most promising followed by hand woven products (North Sumatra, etc.) and these two products should be selected targets for development. Other handicrafts such as ceramics, fashion accessories, bamboo

and anyaman, wooden handicrafts and wood carving should be developed by individual product based programs.

Table 3-1: Issues and Promotion Programs of Handicraft Industry

	Establishment of HDPC and strengthening and fostering of MA firms	Application of assistance from foreign economic cooperation agencies to handicraft	Vitalization of existing public sector facilities	Implementation of promotion measures by product and region
Business Management				
Development of manpower	○		○	
Dissemination of basic business information		○		
Production Management				
Introduction of production control & quality control		○		
Delivery	○	○	○	○
Quality	○	○		
Packaging	○	○		
Manufacturing Technology				
Stabilization of raw materials in quality		○	○	○
Guidance on production technology	○		○	○
Guidance on introduction of machine	○			○
Marketing				
Enhancement of product development capabilities	○		○	○
Gathering market information	○	○		
Enhancement of design capability	○		○	
Dissemination of information to buyers	○	○		
Agent services for export business	○			

3-2 Rubber-based Products Industry

(1) Issues and measures

It is not possible for rubber-based products industry to stably manufacture high quality products, unless all the processes are well controlled and organically linked each others from upstream raw materials production sector to down stream products manufacturing sector.

The businesses in the rubber-based products industry include various type of businesses from those of large sizes and high levels of technology established through joint ventures with foreign capital to cottage sized businesses with undeveloped technology. In numbers, the majority of the businesses are cottage sized, undeveloped operations. This industry face the following problems:

[1] Business management

Most of the businesses in the rubber-based products industry do not have sufficient staff with technical development capabilities or quality control capabilities. This is one factor behind the low quality, high defect rate, and low productivity causing Indonesian rubber-based products industry to lose international competitiveness. Therefore, it is desired to secure the necessary manpower and thus to establish a system of education and training for such manpower.

[2] Production management

In the rubber-based products industry, work is performed under inferior conditions in many businesses.

Work in an inferior environment not only results in low quality of products and productivity, but also has a detrimental effect on the health of the workers and has the danger of causing fire as well. Also, since the majority of the businesses produce products for the domestic market, which is not that tough on quality, there are only few businesses which can manufacture products of a quality competitiveness in the international markets. Therefore, an urgent issues are to introduce safety and sanitation control and quality control.

Another problem is that the Ministry of Agriculture, the Ministry of Industry, and the Ministry of Trade have each established their own product standards depending on the degree of processing of the products or for export oriented products. There is some overlap and confusion among those standards. It would be desirable to quickly complete national standards (NSI) as is currently being worked on.

[3] Manufacturing technology

The majority of businesses rely on outdated facilities and have low levels of production technology as well. To create products with international competitiveness, it is necessary to modernize the facilities and to introduced advanced technology. Further, securing good quality materials and managing of it and improvement of the knowhow for mixing the same should be sought.

In addition, the public research and development institutes engaged in research in production technology, guidance, testing, and inspection are not satisfactory in any of their locations (meaning they are not located in areas of concentration of the rubber-based

products industry), facilities, or personnel. Improvement of the public research and development organizations is required too.

[4] Marketing

Businesses in the rubber-based products industry are generally underdeveloped in marketing capabilities. To drum up a "marketing mind" and to provide information on overseas markets so as to promote exports will be necessary.

[5] Others

Indonesian rubber-based products are said to be poor in international competitiveness in terms of quality. One of the reasons for this is that the quality of the natural rubber material is lower and less stable than in Malaysia and other competing countries. Therefore, it is necessary to improve harvesting and processing technology in the raw material production sector so as to stabilize the quality of the raw materials. It is also necessary to tackle issues shared with other industries such as raising the level of the metal die industry, establishing standards for secondary materials and chemicals and stabilizing their quality, etc. Further, the majority of businesses do not take sufficient measures to prevent air pollution, water pollution, and other forms of pollution, so that it is necessary to spread the idea of pollution prevention.

(2) Promotion Programs

[1] Augmentation of public research and development institutes and strengthening of ties among them

In order to strengthen the international competitiveness of Indonesian rubber-based products, it is necessary to strengthen research and development capability of each business so as to improve technology. The Indonesian rubber-based products industry, however, is composed of many small and medium sized businesses which have little capabilities of self reliance, thus require assistance from public research and development institutes. At the present, however, the research and development institutes are not satisfactory in any of their locations, facilities, or personnel and, further, there is only weak ties among related research and development institutes. Therefore, it is necessary to augment the public research and development institutes, modernize their facilities, and strengthen ties among them.

[2] Strengthening of technical and managerial guidance

To raise the level of business management and production technology, it is necessary to have the public research and development institutes increase their guidance so as to support the efforts of individual businesses. Further, it would be effective to invite experts from overseas so as to transfer advanced technology.

[3] Vitalization of activities of industrial associations

Marketing activities in overseas markets, introduction of capital and technology from other countries, engagement of foreign experts, and the like are matters difficult for individual businesses to do on their own, but these can be realized in many cases if promoted by industry as a whole lead by industrial associations. Therefore, the vitalization of activities of industrial associations and the positive promotion of exchanges with overseas industrial associations so as to [1] strengthen marketing and [2] promote the

introduction of foreign capital and technology could be expected to be effective in the promotion of the rubber-based products industry as a whole.

[4] Establishment of policy coordinating functions

It would be necessary to coordinate policies and activities among ministries and public research and development institutes related to raw materials production, products manufacturing, introduction of foreign capital and technology so as to comprehensively promote rubber industry as a whole. Therefore, it is recommended to urgently establish committee or council for that task, studying cases in the neighboring competing countries. In that forum, it is desirable to call participation of private sector so as to make promotion measures practical.

Table 3-2: Issues and Promotion Programs of Rubber-based Products Industry

	Augmentation of public research & development	Strengthening of technical and managerial guidance	Establishment of policy coordination function	Utilization of activities of industrial associations
Business Management				
Securing manpower	○		○	○
Augmentation of manpower training system	○	○	○	○
Production Management				
Improvement of safety & sanitation control	○	○	○	○
Promotion of industrial standardization & Quality Control	○	○	○	○
Manufacturing Technology				
Development of control & application technology of raw materials	○	○	○	
Modernization of facilities			○	
Introduction of advanced technology	○	○	○	○
Strengthening of Research and Development capability	○	○	○	
Marketing				
Enlightenment of marketing mind			○	○
Dissemination of overseas market information	○	○	○	○
Others				
Improvement of raw materials in quality	○	○	○	
Development of metal die industry	○		○	
Industrial standardization & quality stabilization of auxiliary material	○		○	
Promotion of anti-pollution mind	○		○	○

3-3 Electrical Machinery Industry

(1) Issues and Measures

The businesses in the electrical machinery industry are considerably large in size compared with other industrial sectors of Indonesia and have positively introduced technology from other countries, but is still a young industry. To promote development of the industry in the future and help it grow into an export industry, the following problems have to be resolved:

[1] Business management

Along with the high economic growth rate of recent years, the domestic market for electrical machinery has been growing steadily in Indonesia. The majority of the electrical machinery produced is therefore for the domestic market. To enable the electrical machinery industrial sector to develop into an export industry, it is necessary to create an "export mind" in businesses.

Further, businesses in the electrical machinery sector generally employ more highly educated people than with the other industrial sectors of Indonesia, but a large number of these work as managers or unskilled labor and few of them serve as engineers or technicians of the foreman class on the production floor. Therefore, it is necessary to train engineers and technicians to raise productivity and improve quality.

[2] Production management

Indonesian users tend to prefer imported electrical machinery over domestically produced ones. To eliminate this tendency, it is necessary for individual businesses to introduce testing and inspection facilities and production and safety control so as to raise the reliability of their products.

Further, the businesses in the electrical machinery industry are currently using standards of various different countries, making it difficult to raise productivity. National unification of the standards used is sought.

[3] Manufacturing technology

The businesses in the electrical machinery industry include state owned corporations and further are generally large in size and often are joint ventures with foreign capital, so almost all of them are using technology introduced from other countries in some way or another. Tasks which remain for the future are the establishment of research and development institutes for development of independent Indonesian technology and the augmentation of R&D sectors in the individual businesses and, further, the collection of technical information.

[4] Marketing

The electrical machinery manufacturers of Indonesia are not very positive when it comes to marketing, in particular marketing activities in overseas markets. In the future, to enable the electrical machinery industry to grow into an export industry, it will be necessary to collect product development information and overseas marketing information, all of which are currently difficult for businesses to get their hands on.

[5] Others

The reason why Indonesian electrical machinery has not yet won the confidence of users is, in addition to production control matters, the low and unstable quality of the materials and parts. Therefore, a major task to be taken up will be the promotion of subcontracting and parts industries.

(2) Promotion Programs

[1] Strengthening of technical assistance activities at public sector R&D institutes

It is necessary to augment the public research and development institutes so as to provide the businesses in the electrical machinery industry with R&D functions which they lack and also to have the public institutes perform testing and inspection so as to increase the confidence of the users in the products. The low level of technology in the parts, die, and other metalworking industries is having a large detrimental effect on the quality and reliability of electrical machinery. Augmentation of the public research and development institutes relating to the metalworking industry will also be necessary for promoting the electrical machinery industry. The current public research and development institutes cannot be said to be sufficient at the present in size, manpower, or facilities. By promoting use of unified standards for products and parts and the use of quality control nationwide, it would be possible to improve the quality and reliability of products and raise production efficiency.

[2] Technical and management guidance to individual companies by experts

Roving guidance by overseas experts including company diagnosis to individual companies is to be intensified to upgrade production technology of the private companies including supporting industries such as parts manufacturers. Emphasis will be put on in house standardization and TQC activity.

[3] Strengthening of programs to foster technicians

There is both a qualitative and quantitative shortage of engineers and technicians on the production floor. The staff of the Ministry of Industry should take the lead and provide roving guidance to domestic medium sized businesses in cooperation with the technical staff of the IRDMMI and IRDMTP so as to try to further train site engineers and technicians and improve their capabilities. In accordance with necessity, experts will be engaged from the advanced countries using aid from foreign organizations.

[4] Vitalization of activities of industrial associations

The APPI, the industrial association covering the electrical machinery industry, engages in publication, exhibitions, symposiums, and other activities to promote the industry and also participates in efforts for industrial standardization. It is hoped that this industrial association will be even more active in the future.

[5] Strengthening of activities to attract foreign investors and promote exports

At the time of the survey, seven of the 21 companies manufacturing the products covered were joint ventures with foreign capital. To increase exports, however, it is necessary to continue and positively introduce foreign investment and promote technical tieups, and to strengthen export promotion activities.

Table 3-3: Issues and Promotion Programs of Electrical Machinery Industry

	Strengthening of technical assistance activities in public sector R&D institutes	Technical and management guidance to individual companies by experts	Strengthening of activities to attract foreign investors and promote export	Vitalization of activities of industrial associations
Business Management				
Enlightenment of export mind	○	○	○	○
Development of engineers and technicians				
Production Management				
Introduction of testing & inspection equipment	○		○	○
Introduction of production management & safety management at workplace	○	○	○	○
Promotion of industrial standardization	○			○
Manufacturing Technology				
Enhancement of Research & Development institutions & inhouse R&D	○	○	○	○
Gathering technical information	○	○	○	
Marketing				
Gathering product development information	○		○	○
Gathering overseas markets information			○	○
Others				
Development of supporting & parts industries	○	○	○	○

3-4 Ceramic Products Industry

(1) Issues and Measures

The Indonesian ceramic products industry has been experiencing rapid growth in recent years along with the surge in domestic demand and, while still small in scale, has begun exporting as well. The majority of the businesses, however, suffer from problems in quality and design of products, and productivity. To promote this industry as export industry, it is necessary to tackle the following issues.

[1] Business management

With the exception of a few business such as foreign capital joint ventures, ceramic products of Indonesian manufacturers have not yet reached a level of quality and design where they can be exported. Some of the reasons are the insufficiency of research and development capabilities, due to the shortage of engineers and middle management, the slow start in TQC, and the shortage of skilled workers due to the instability of employees. Issues to be tackled therefore will be the improvement of job loyalty of employees and the education and training system for employees and, also, the fostering of engineers and middle management.

[2] Production management

The main reasons why the quality of the ceramic products of many Indonesian businesses has not yet reached an export level are the improper receipt and management of raw materials and auxiliary materials, the insufficiency of work control relating to the mixing of materials and the finishing of materials, insufficient factory control and the lack of thorough inspection of quality. Issues to be tackled will be the strengthening of production control and quality control. Further, there is little interest in the work environment and safety and sanitation, so it is desirable to fundamentally improve safety and sanitation control and pollution prevention.

[3] Manufacturing technology

With the exception of some superior companies such as sanitaryware manufacturers etc., businesses lag behind in their production technologies and research and development capabilities. It is necessary to train middle management and engineers and also to introduce advanced technology, modernize facilities, and strengthen maintenance and inspection skills for the same.

[4] Marketing

With the exception of a few firms, companies do not engage in almost any marketing activities at all. In order to enable the ceramic products industry to grow into an export industry, it is necessary to strength marketing activities, in particular to strengthen overseas marketing and to strengthen development of product, in particular, development of designs.

[5] Others

To manufacture good quality ceramic products, it is necessary that sufficient process control be applied at all stages from the mining of the raw materials to the final finishing steps. In particular, the establishment of a system for the stable production and supply of raw materials and auxiliary materials of a high quality will be essential. Therefore,

government and industry are requested to join together and proceed with comprehensive activities to promote the industry. At the present, however, the Institute for Research and Development of Ceramic Industries (IRDCRI), the Indonesian Ceramic Association (ASAKI), and other organizations are not sufficiently active, so strengthening of the support system and establishment of a policy coordinating function would be desirable.

(2) Promotion Programs

[1] Strengthening of development of ceramic raw materials and promotion of raw material and auxiliary materials industries, [2] Construction of raw materials and auxiliary materials estate

There have been little comprehensive, systematic surveys made of resources of ceramic raw materials in Indonesia and therefore development has been delayed. Also, the country has been slow to set up the infrastructure required for distribution, such as the transport roads and joint storage facilities. Auxiliary material industry lag behind in development. Therefore, it is necessary to develop this sector comprehensively by running full-scale surveys of resources, promoting raw material and auxiliary material industries and establishing distribution and processing centers for raw and auxiliary materials.

[3] Vitalization of activities of industrial associations

It is necessary to strengthen industrial association, in particular ASAKI, so as to make them the promoting bodies for strengthening overseas marketing, the introduction and spread of the latest technology, the establishment of industrial standards, and the promotion of safety and sanitation control and quality control. As for the introduction of latest technology, effective measures would be introduction of foreign capital, promotion of technological tie-ups and engagement of foreign experts.

[4] Augmentation of public research and development institutes and strengthening of ties among institutes and ties with industrial world

The Institute for Research and Development of Ceramic Industries (IRDCRI) is a specialized central institute engaged in research and development of ceramics. At the present time, however, it is not having its desired effects due to shortages of funding and manpower. It is necessary to augment the IRDCRI so as to strengthen its quality inspection services, promote technology, and train engineers and middle management.

Also, stronger linkage among the IRDCRI and the Ministry of Mining and Energy and its Mineral Technology Development Center (MTDC) could be expected to assist the establishment of standards for raw and auxiliary materials and the improvement of quality of the same. Strengthening ties with industrial circles is also indispensable to make activities for promotion of technology more practical.

[5] Establishment of policy coordination function

It is recommended that a consultative body comprised of the related ministries and agencies, public institutes, and industrial associations be organized and coordinate policies and activities for promotion of the ceramic industry so that they match with each other. It is recommended that a "ceramic conference" be held about once every half year and that a taskforce be created to consider the feasibility of the plan of "construction of raw material and auxiliary material estate."

Table 3-4: Issues and Promotion Programs of Ceramic Products Industry

	Augmentation of public research & development institutes and strengthening of ties among institutes and tie with industrial circles	Strengthening of ceramic raw materials & promotion of raw materials & auxiliary industries	Construction of raw materials and auxiliary materials estate	Vitalization of activities of industrial associations	Establishment of policy coordination function
Business Management					
Securing skilled labor	○			○	○
Development of engineer and middle stuff	○			○	○
Production Management					
Improvement of raw material control, manufacturing process control & quality control	○	○	○	○	○
Improvement of safety & sanitation control & pollution prevention	○	○	○	○	○
Manufacturing Technology					
Strengthening of Research & Development	○	○			○
Introduction of advanced technology	○	○		○	○
Modernization of facilities & development of maintenance technique	○				○
Marketing					
Strengthening of overseas marketing				○	○
Development of products & design	○			○	○
Others					
Improvement & stabilization of raw materials in quality	○	○	○	○	○
Enhancement of production & distribution of raw materials & auxiliary materials	○	○	○	○	○

3-5 Aluminium Downstream Products Industry

(1) Issues and Measures

Except for a few foreign capital joint ventures, the Indonesian aluminium products industry has not yet reached the international level in either of quality or of productivity. The following problems must be resolved to promote the industry:

[1] Business management

Not only is there a shortage of skilled workers in the domestic industry, but also workers are not being educated further. This is causing defective products to be made and impurities to be included. Therefore, tasks to be taken up in the future include the education and training of workers and the training of skilled workers.

[2] Production management

The layout of the factories in the domestic industry is poor and the factories are not kept clean or orderly. Foreign matter tends to enter the products and process control and quality control are not performed. Due to these reasons, both the quality and productivity are low. Therefore, the tasks for the future are the promotion of production control and quality controls and the establishment of industrial standards.

[3] Manufacturing technology

The domestic industry is generally using old-fashioned antiquated machinery and equipment and relies on human labor for much of its work. Further, the Institute for Development of Metal and Machinery Industries (IDMMI), the Institute for Research and Development of Material and Technical Product Industries (IRDMTP), and other public research and development institutes lack sufficient testing and research facilities and personnel in aluminium products. Therefore, the tasks to be taken up here are the replacement of machinery and equipment and the augmentation of public technical assistance, testing and inspection organizations.

[4] Marketing

There was only one company, a foreign affiliate, among the companies surveyed with the ability to develop products. Interest in product and marketing information is generally low at the present time. The topic for the future therefore is public assistance in the improvement of marketing capabilities and marketing activities.

[5] Others

Aluminium products (in particular die castings) include numerous defects attributable to the die technology and the quality of the alloy materials, so it is necessary to strength the die industry, alloys, and other sectors of the metalworking industry.

(2) Promotion Programs

[1] Strengthening and augmentation of research and development institutes of Ministry of Industry

To improve the quality of aluminium products, it is necessary to raise the level of various types of technology relating to metalworking from the slab, billet and dies to the processing of the aluminium.

To improve the quality and productivity of aluminium products, it is desirable to set up a comprehensive research and development institute to deal with metalworking and to give it the functions of testing and inspection, research and development, technical exchanges, dissemination of technology, and development of human resources. Consideration should be taken for the prevention of industrial pollution.

[2] Technical assistance by experts

The participation of foreign experts in joint technical teams comprised of the technical staffs of the Ministry of Industry, the IRDMMI, and the IRDMTP and roving guidance to companies by the same would raise the level of technology of the industry as a whole and improve production control by placing emphasis on standard and quality control. Further, promising businesses could be given intensive guidance and promotion so as to create successful models for use in promoting industry leaders and stimulating interest in modernization among domestic businesses.

[3] Implementation of export promotion projects

Provision of information, trade inquiry service, overseas market survey, encouragement to participation in missions and trade fairs will be promoted by the initiative of Ministry of Industry with the cooperation of NAFED.

[4] Implementation of project for promotion of foreign investment and technical tieups

Transfers of technology would be promoted by promotion of foreign investment and technical tieups.

[5] Development of new products

With the coordination of above mentioned programs, development of new products is to be promoted.

Table 3-5: Issues and Promotion Programs of Aluminium Downstream Industry

	Strengthening and augmentation of research and development institutes of Ministr of Industry	Technical assistance by experts	Implementation of export promotion projects	Implementation of project for promotion of foreign investment and technical tie-ups
Business Management				
Training of worker	○	○		○
Development of skillful labor	○	○		
Production Management				
Introduction of Production management & quality control	○	○		○
Industrial standardization	○			
Manufacturing Technology				
Replacement of old equipment				○
Enhancement of public organization for technical assistance, testing & inspection	○			○
Marketing				
Development of marketing capability			○	○
Assistance for marketing activities by public organization			○	
Assistance for marketing activities by public organization				
Development of metal processing industries such as metal die, alloy	○	○		○
Development of new products	○	○	○	○

3-6 Plastic Products Industry

(1) Issues and Measures

With the exception of the OPP film manufacturers, foreign capital affiliates, and a few other firms, the Indonesian plastic products industry is weak in business management, production management, production technology, and marketing. The following problems are to be solved in promoting the industry:

[1] Business management

Like with other sub-sectors, the plastic products industry suffers from a shortage of middle management, engineers, and skilled workers and this is causing unstable quality and low productivity. On the other hand, there are still few businesses engaged in planned, systematic in-house education of their employees. Therefore, the tasks to be taken up in the future will be the establishment of educational systems and the securing and training of expert engineers.

[2] Production management

The productivity of plastic products in manufacturing industry is generally low and the quality of the products has not reached the international level. Reasons for this include the unstable supplies of raw materials - both in quality, quantity, and costs, the delays in in-house standardization, poor quality inspection systems (almost all inspections being performed visually), and poor work environments and safety and sanitation control. Therefore, the tasks to be taken up will be the use of quality control techniques, the introduction of receipt inspections and inventory control for raw materials, industrial standardization (establishment of industrial standards and setting of work standards), and the introduction of safety and sanitation control.

[3] Manufacturing technology

With the exception of the foreign capital affiliates and some other firms, the plastic products manufacturers use antiquated facilities and engage in poor maintenance. The production technology itself has to be improved, but there are shortages in both engineers and technical information and so the technical development capabilities are generally low. Therefore, the tasks to be taken up will be the modernization of manufacturing facilities, the improvement of measurement and control technology, mixing technology, molding technology, etc., the improvement of die design, fabrication, and maintenance technology, the training of technical development staff, and the collection of technical information.

[4] Marketing

Marketing is necessary not only when aiming to penetrate overseas markets, but also when targeting mainly the domestic market. At the present, however, almost no marketing activities are being performed. It is necessary to introduce and entrench the concept of marketing, collect overseas market information, and strengthen product design activities.

Further, for products which have reached the international level of price and quality, it will be important to have individual companies promote sales in overseas markets and to have public organizations sponsor exhibitions, arrange business meetings, etc.

[5] Others

Plastic products are characterized by a high ratio of the costs of materials in the prime cost of manufacture. The Indonesian plastic products industry relies on imports for a considerable portion of its raw materials, including sub materials. From the perspective of costs as well, it is necessary to stabilize the supply of raw materials.

Further, the majority of companies obtain the dies they use, even for injection molding, from overseas, except for simple ones. There are problems in the maintenance of the dies, however, so the products tend to be inferior in precision. Further, the majority of the manufacturing facilities are imported ones, so when trouble occurs, there is considerable time and effort required for their repair. Therefore, tasks to be taken up are the improvement of die-making and maintenance technology and the promotion of the repair parts supplying industry.

(2) Promotion Programs

[1] Strengthening and vitalization of government support systems

Public research and development institutes related to the plastic products industry and engaging in management and technical guidance to the plastics industry, dissemination of technical information, testing and inspection of products, etc. include the Institute for Research and Development of Leather and Allied Industries (IRDLAI) in Yogyakarta and the Institute for Research and Development of Chemical Industries (IRDCI) in Jakarta. Neither of these, however, can be said to be sufficient in terms of facilities and equipment owned and even in personnel and only a limited number of companies use them. Further, there is the problem that the IRDLAI is not located in the area of concentration of the plastic products industry.

Therefore, it is necessary to reinforce and improve the testing, inspection, and research and development equipment in the public research and development institutes and to augment and strengthen facilities and personnel for gathering and storing technical information and transferring technology to private businesses. Methods for this could be to make active use of existing public institutes and also to set up a comprehensive research and development institute covering rubber and other polymer materials.

[2] Technical and management guidance for individual companies

One-to-one guidance for individual companies is effective in improving technical standards in the plastic products industry. Local experts of public institutes should be hired as instructors and experienced foreign experts invited to Indonesia. Their cooperation would be a short cut to progress.

a. Short-term corporate guidance

Technical teams and experts belonging to public institutes would be invited to visit middle leveled companies in order to provide advice on making improvements to product standards, design, mold technology, quality control, etc.

b. Medium and long-term corporate guidance

Advice would be given on production technology and TQC in addition to management and marketing for superior leveled companies over the medium and long term. Assistance on fostering of staffs in companies would be done as well.

[3] Vitalization of industrial associations

The promotion of Federation of Indonesian Plastics Industries, FIPIASIN and her plastic manufacturers associations will be essential. Stronger ties with the academic community, providing a forum for talks with user industries, implementation of local and foreign PR activities and industrial promotion campaigns, development of export marketing strategies, staff training efforts, publications should be promoted as well. If a system of assistance by public organizations is set up properly, the industry would be able to proceed with the above on its own.

[4] Promotion of foreign investment and technical tie-ups

The introduction of foreign capital and technology will be indispensable in bringing Indonesian plastics manufacturers to a level at which they are capable of competing in the international market. Measures requiring urgent implementation would include preparation of information concerning the Indonesian plastic products industry, collection and supply of information concerning foreign investment and investors and holding of seminars and study groups concerning joint venture investment and technical tie-ups. In addition, either FIPLASIN or the industry association should supervise such as dispatch of foreign investment and technology missions abroad and acceptance of investment and technical exchange missions under the guidance of the Ministry of Industry or the BKPM.

Table 3-6: Issues and Promotion Programs of Plastic Products Industry

	Strengthening and vitalization of public support systems	Technical and management guidance for individual companies	Promotion of foreign investments and technical tie-ups	Vitalization of industrial associations
Business Management				
Establishment of training system	○	○		○
Development of technical expert	○	○	○	○
Production Management				
Application of quality control techniques	○	○		
Examination of raw material & stock management	○			
Industrial standardization & in-house standardization	○	○		○
Introduction of health & safety management	○			○
Manufacturing Technology				
Replacement of old equipment	○	○	○	
Development of manufacturing techniques	○	○	○	○
Development of metal die maintenance techniques	○	○		
Development of R&D staff	○	○		○
Gathering technical information	○		○	○
Marketing				
Enlightening of marketing mind				○
Gathering overseas market information			○	○
Promotion in overseas market				○
Product & design development	○	○	○	○
Others				
Stabilization of raw material supply				
Development of metal die techniques	○	○	○	
Development of parts industries for repair		○		○

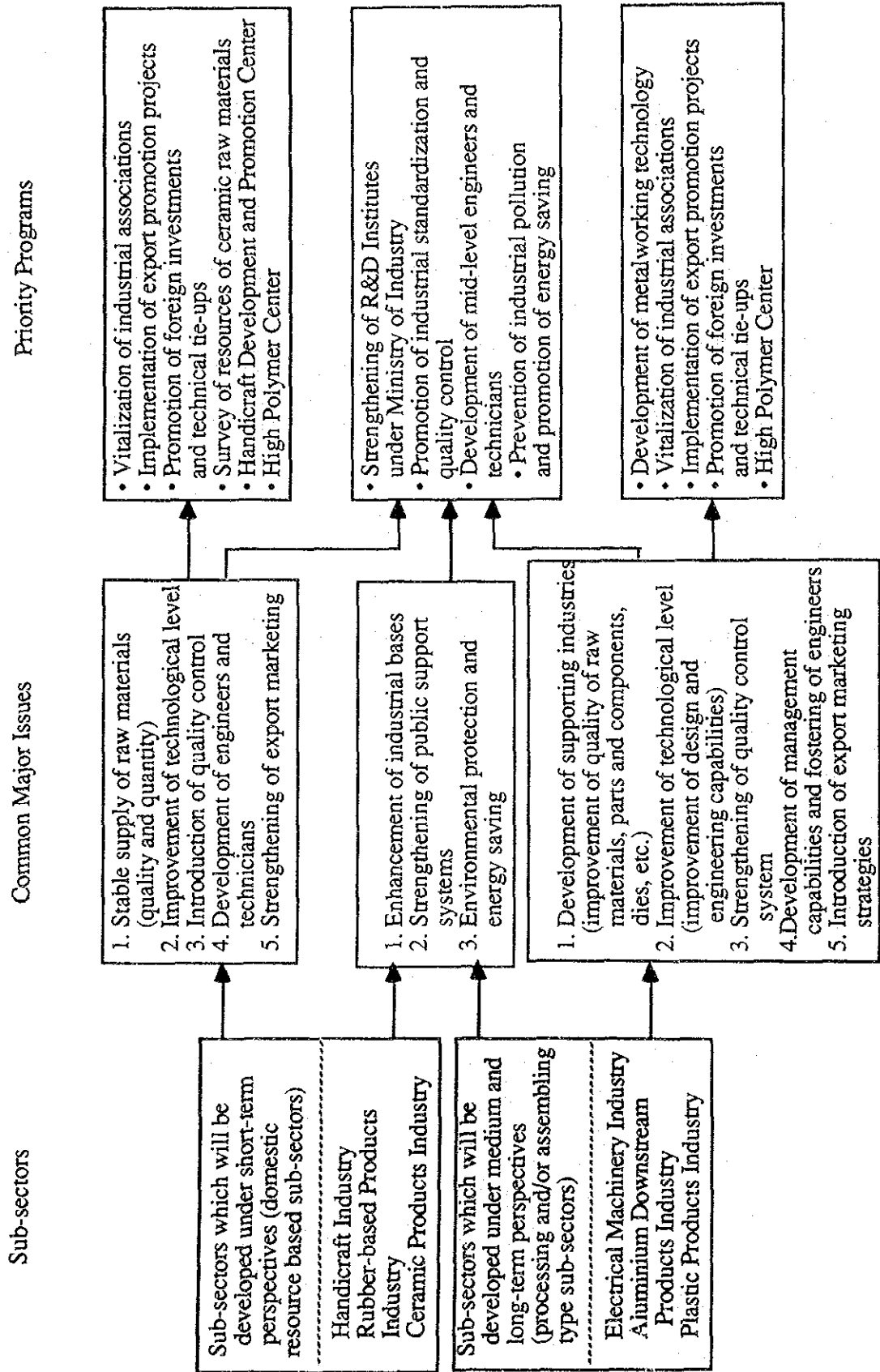
4. Derivation of Priority Programs and Their Relations with Promotion Programs

4-1 Derivation of Priority Programs

A total of 27 programs have been recommended as main promotional programs for the six sub-sector industries, as reviewed in chapter 2. In each of these programs, the implementation of countermeasures for the various issues has been made a keynote in aiming for the industrial development of each sub-sector, and considerable benefits can be expected from these programs. It is also believed that concrete implementation of these programs is possible.

In proposing promotion programs for the six sub-sectors, the formulation of programs applicable to each sub-sector, addressing problems common to them without dwelling on approaches to each industry separately is required. In this way, greater benefits may be gained amid restrictions in resources able to be invested. In broad terms industries are categorized into those industries where development from short-term perspectives is desirable (handicraft, rubber-based products, and ceramic products industries: industries which can be said to be those which utilize Indonesia's natural resources), and those industries for which the development from mid and long-term perspectives is thought desirable (electrical machinery, aluminium downstream products, and plastic products industries: similarly processing of raw materials and assembly type industries). The major issues for each of them were then coordinated. A total 11 priority programs to solve these issues were introduced, taking into consideration concerns from the Indonesian side, points of view common to all industries and the availability of resources in Indonesia and assistances from abroad (Fig. 4-1).

Fig. 4-1: Basic Concept of Priority Programs

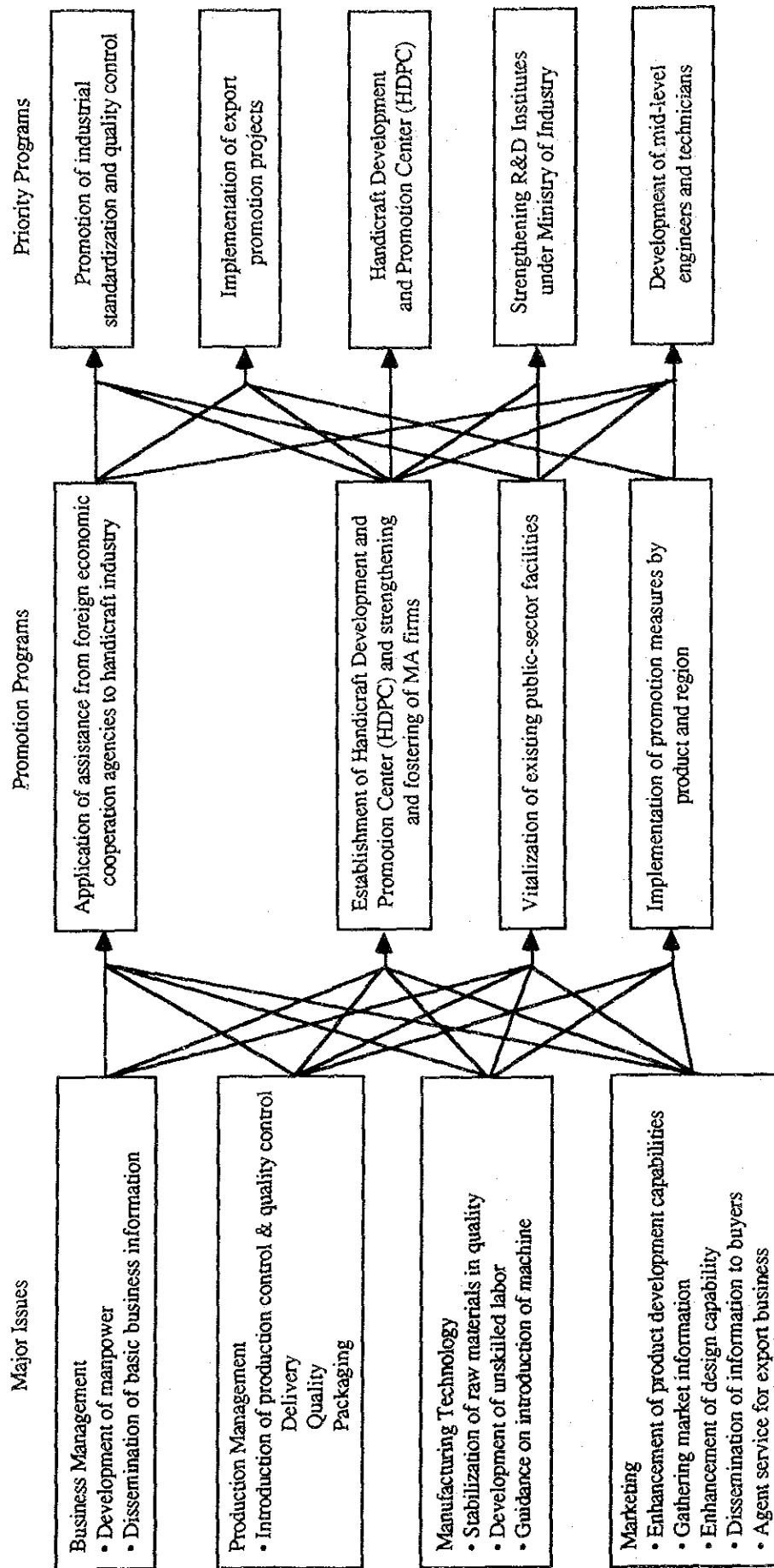


4-2 Relationships between Priority Programs and Sub-sectoral Promotion Programs

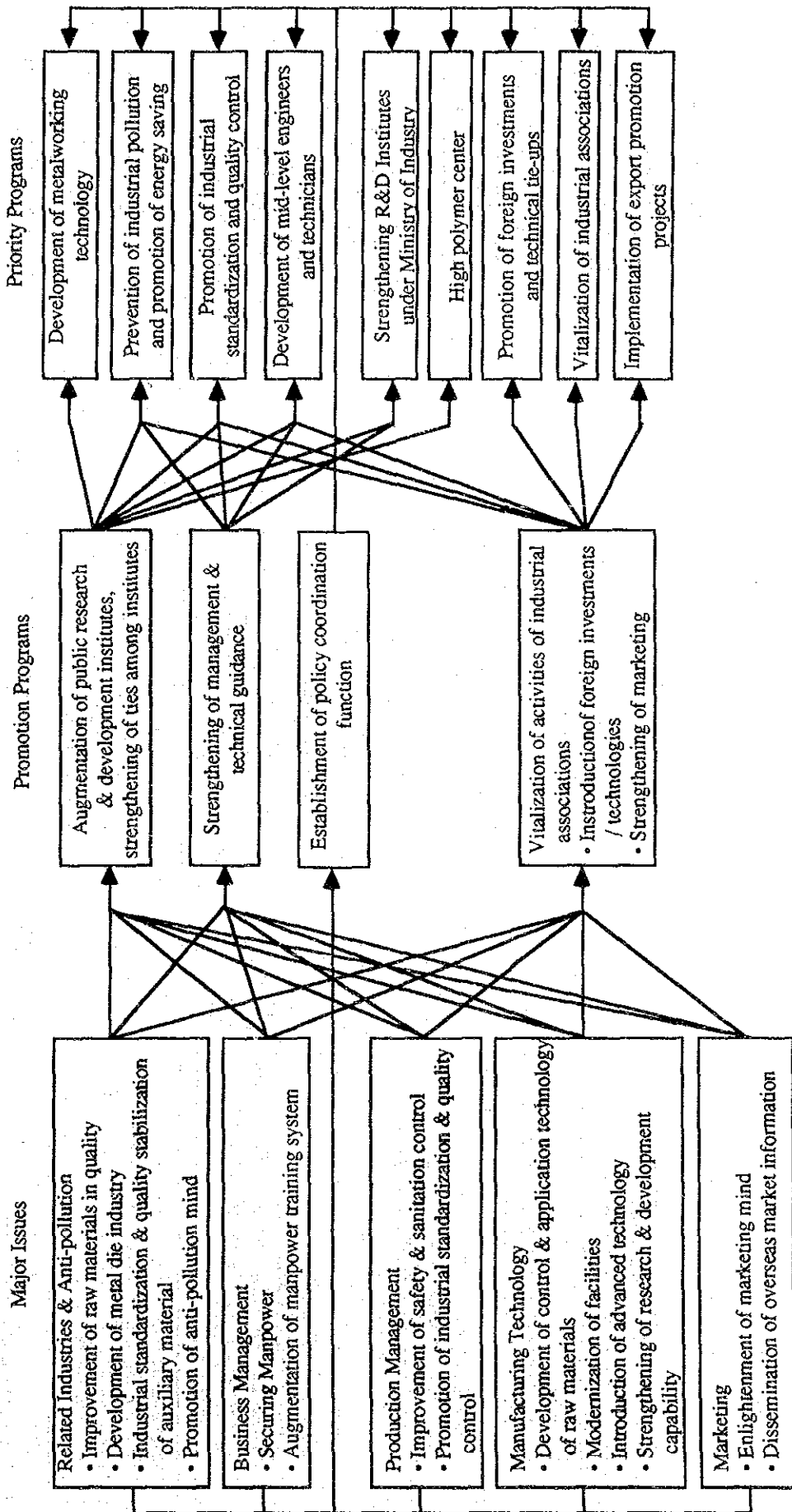
Most of the priority programs are applicable to each or some of the six industrial sub-sectors. The programs address major issues common to the sub-sectors, and greater benefits can be expected in light of the limited resources able to be invested. In addition to these, the programs for surveys of resources of ceramic raw materials and for the Handicraft Development and Promotion Center (HDPC) are included in the priority programs, based on suggestions from the Indonesian side. It is recommended, therefore, that the priority programs in this comprehensive review report be given priority in implementation over the promotional programs in each sub-sector report, for the development of the six industrial sub-sectors.

The relationships between priority programs and sub-sector promotion programs are shown in Fig. 4-2 for each industrial sub-sector. Outlines of the priority programs are given in the next chapter.

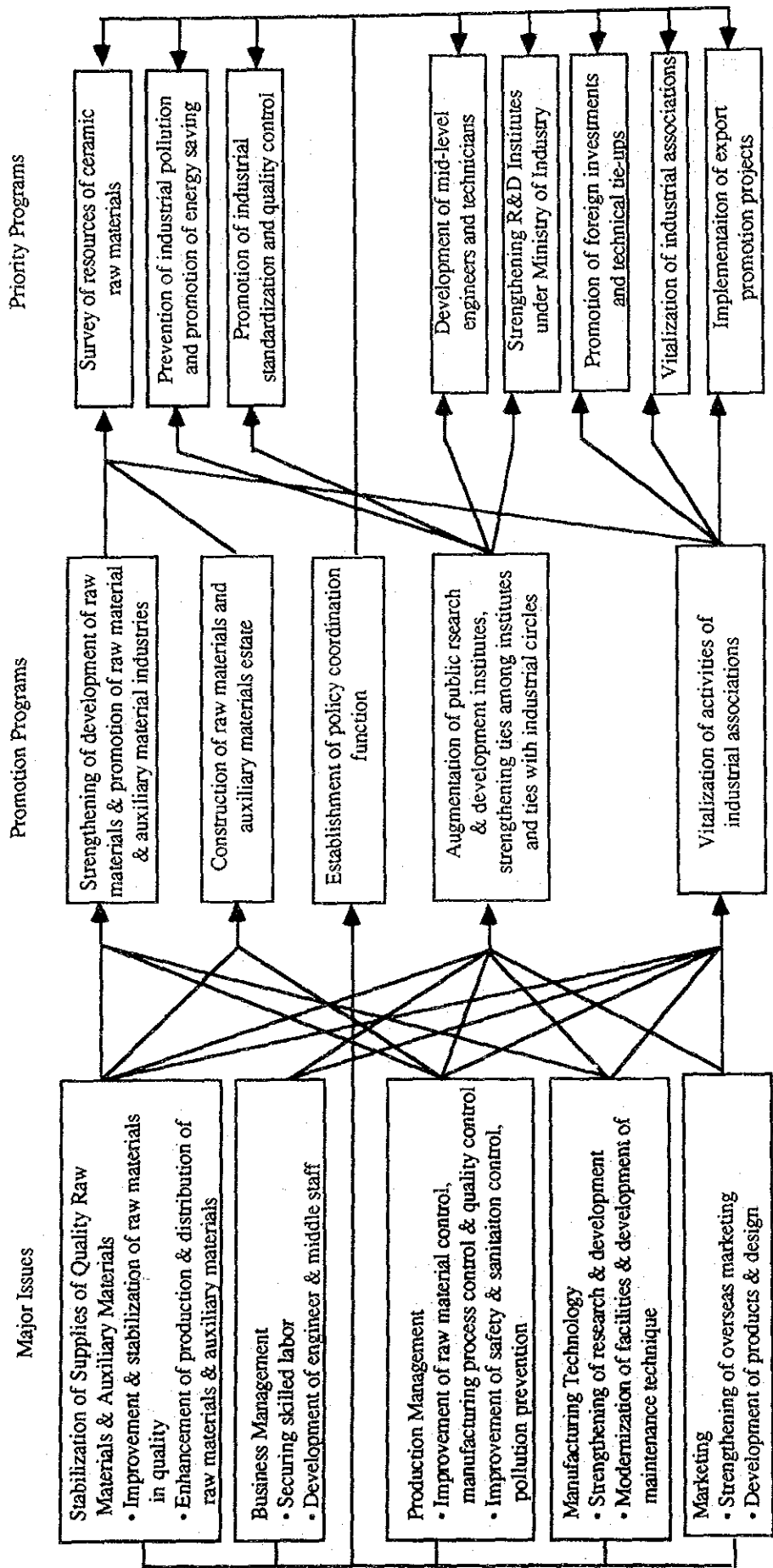
Fig. 4-2 : Relationship between Promotion Programs and Priority Programs by Sub-sectors
Handicraft Industry



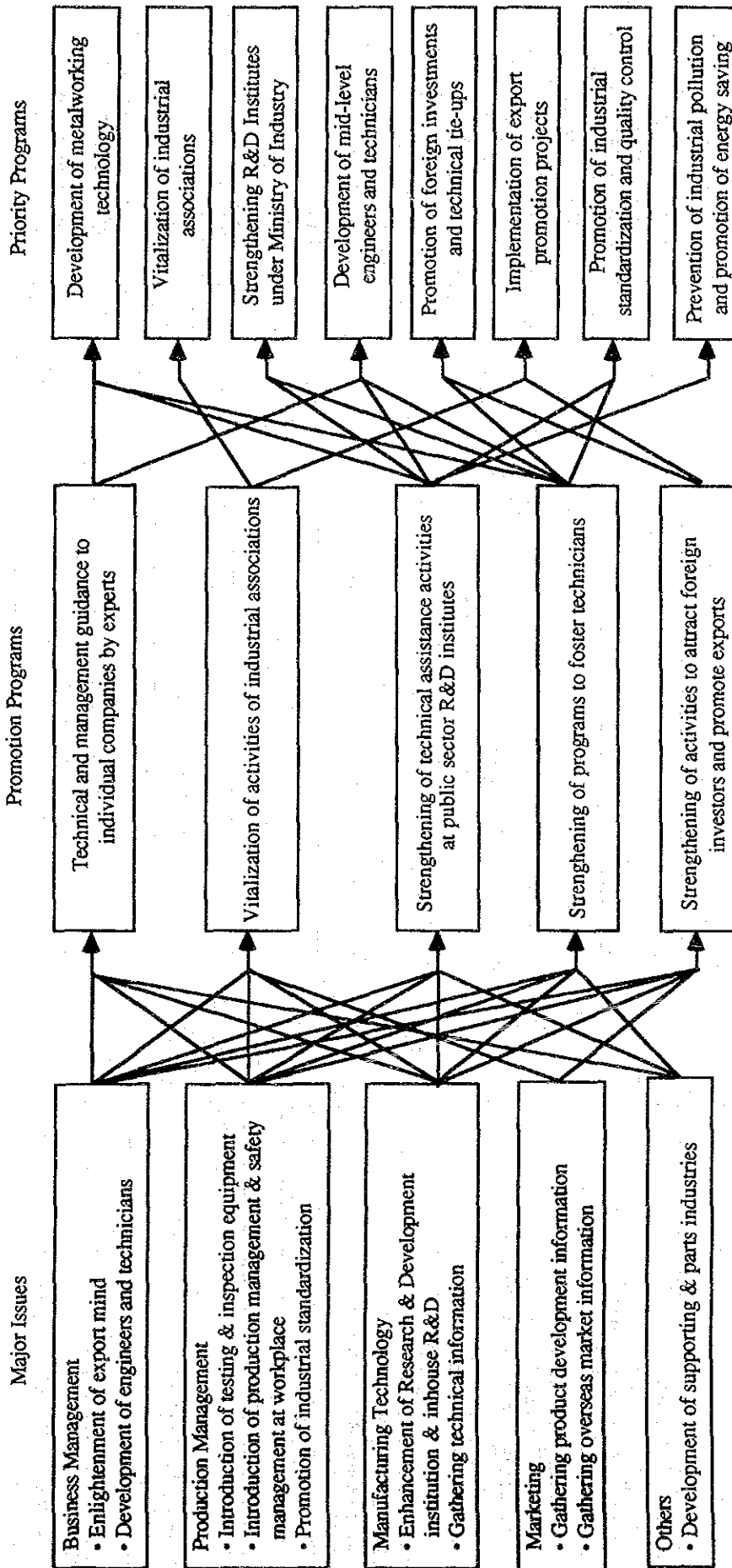
Rubber-based Products Industry



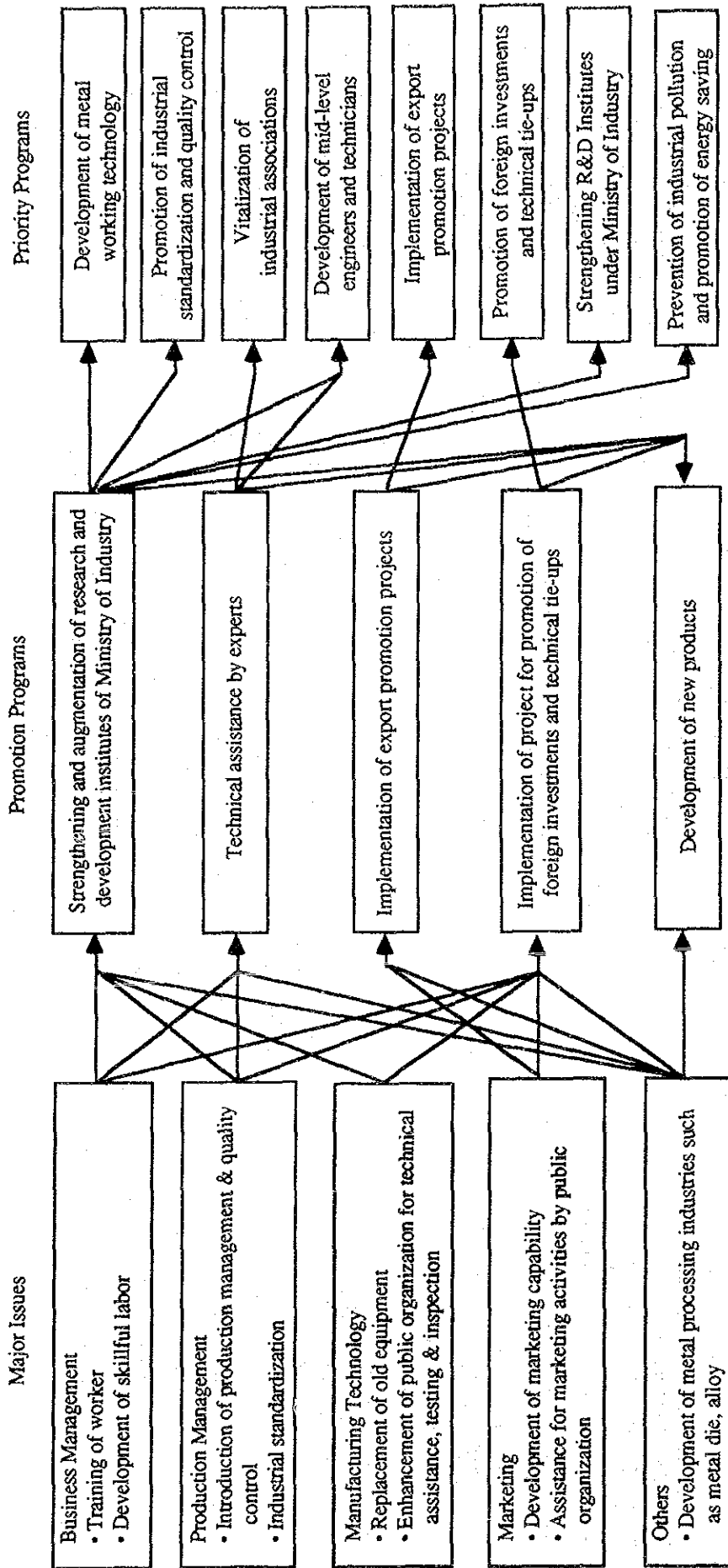
Ceramic Products Industry



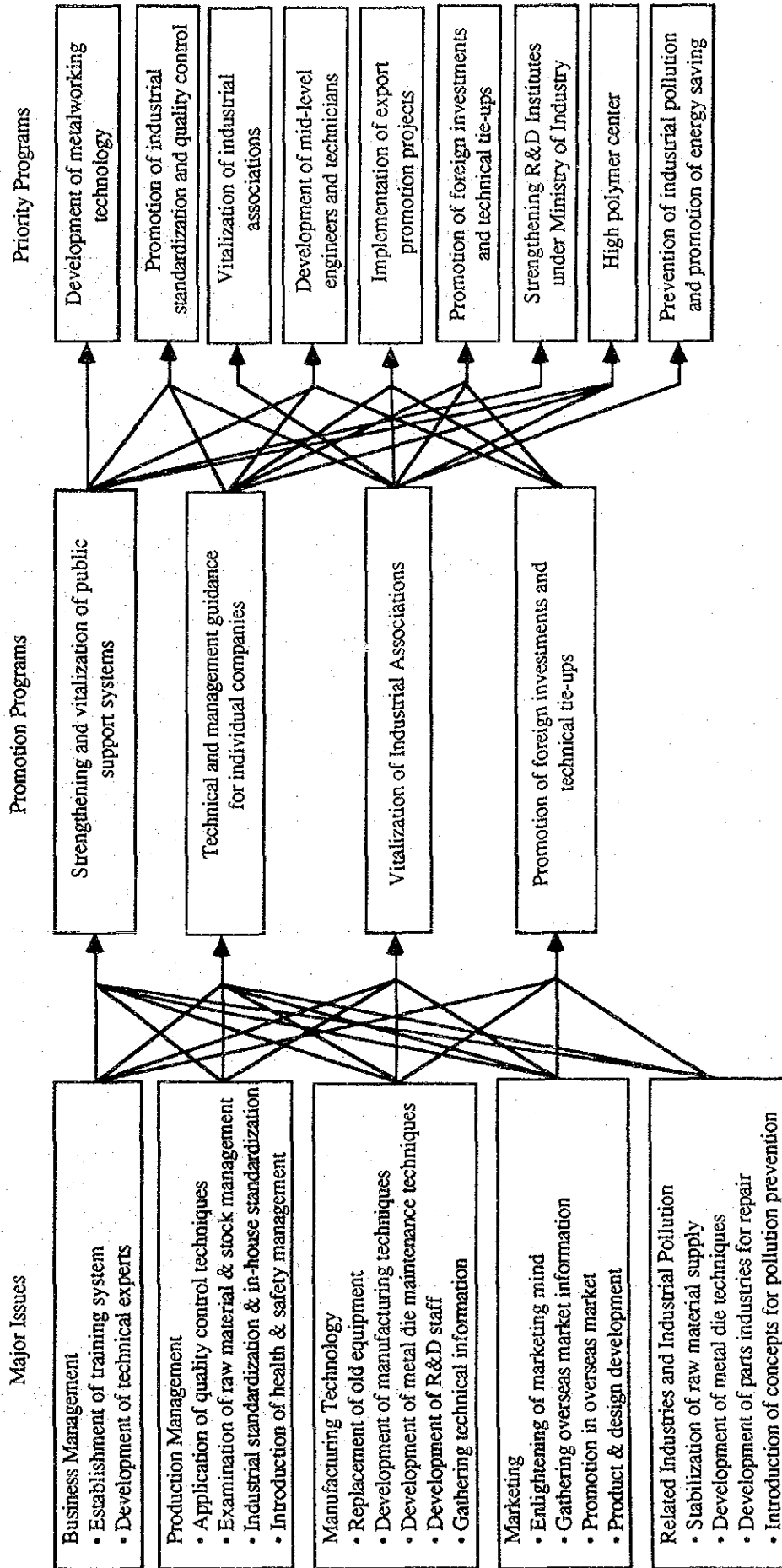
Electrical Machinery Industry



Aluminium Downstream Products Industry



Plastic Products Industry



5. Outline of Priority Programs

5-1 Program for Development of Metalworking Technology

1 Background and Objectives of Recommendation

The improvement of metalworking technology is essential for the development of the manufacturing industries of Indonesia. As found in the sub-sector studies, the level of metalworking technology in Indonesia is relatively low, except in a few large corporations and foreign capital companies, particularly in the small and medium sized enterprises, which make up the majority of Indonesian industry. As a result, the products produced are low in quality, high in cost, and thus insufficient in international competitiveness. Most businesses are suffering from shortages in the absolute numbers of skilled workers and design engineers employed. Further, they find it difficult to improve their technical level on their own due to their current facilities and budgetary restrictions. Strong assistance from public organizations is required.

Indonesia has two central Research and Development Institutes dealing in metalworking technology under the Agency for Industrial Research and Development (BPPI): the Institute for Research and Development of Metal and Machinery Industries (IRDMMI, MIDC) and the Institute for Research and Development of Material and Technical Product Industries (IRDMTP, B4T). The IRDMMI engages in technical development for metals and machinery, while the IRDMTP deals in testing and inspection of general industrial materials. Calibration Centers have been set up in Jakarta, Bandung, Medan, and Surabaya for these two institutes under assistance of the World Bank. Further, the Belgian government provided assistance to the IRDMMI from 1970 to 1987, but as of the moment no Belgian engineers remain in Indonesia. Therefore, a problem is arising in that Indonesia is several years behind in the rapidly advancing technology. This program has as its final objective the strengthening of the competitiveness of private companies by bolstering the above-mentioned Institutes in testing and inspection, research and development, quality control, and human resources development.

Among these, a current project aims at the acquisition of basic technology through development of human resources in the field of private sector metalworking. Specifically, it aims at the development of human resources and improvement of technical expertise in private companies through strengthening of the central research and development institutes, strives to train skilled workers and designers from a long term perspective, and therefore raise the level of technology. By implementation of this program, the quality of metalworked products and parts will be enhanced and productivity will be improved.

2 Detailed Content of Program

The Program for Development of Metalworking Technology aims at the improvement of over-all metalworking technology, the improvement of quality control, the development of human resources, and the promotion of research and development in private companies through strengthening and augmentation of the Research and Development Institutes under the BPPI of the Ministry of Industry. The public Research and Development Institutes have the following five main functions:

[1] Testing and Inspection

Provision of testing and inspection services to small and medium sized enterprises etc., primarily inspection for certification of compliance with national standards or industrial standards.

[2] Education and Training (Human Resources Development)

Provision of technical training to engineers, technicians, skilled workers, general workers, etc. in the form of on-the-job training, seminars, symposiums, training courses, etc. and assistance to private companies in development of human resources.

[3] Technical Assistance

Provision of technical assistance of problem-solving type or trouble shoot type in areas of production technology and testing and inspection technology through factory diagnoses and guidance, primarily for small and medium sized enterprises.

[4] Research and Development

Tackling of research and development activities which seems difficult for private companies to handle on their own and research and development on commission from private companies, in cooperation with the private sector, or through the support of overseas technical cooperation organizations.

[5] Acquisition and Provision of Technical Information

Collection of the latest domestic and foreign technical information and provision of the same to private companies so as to contribute to technical development.

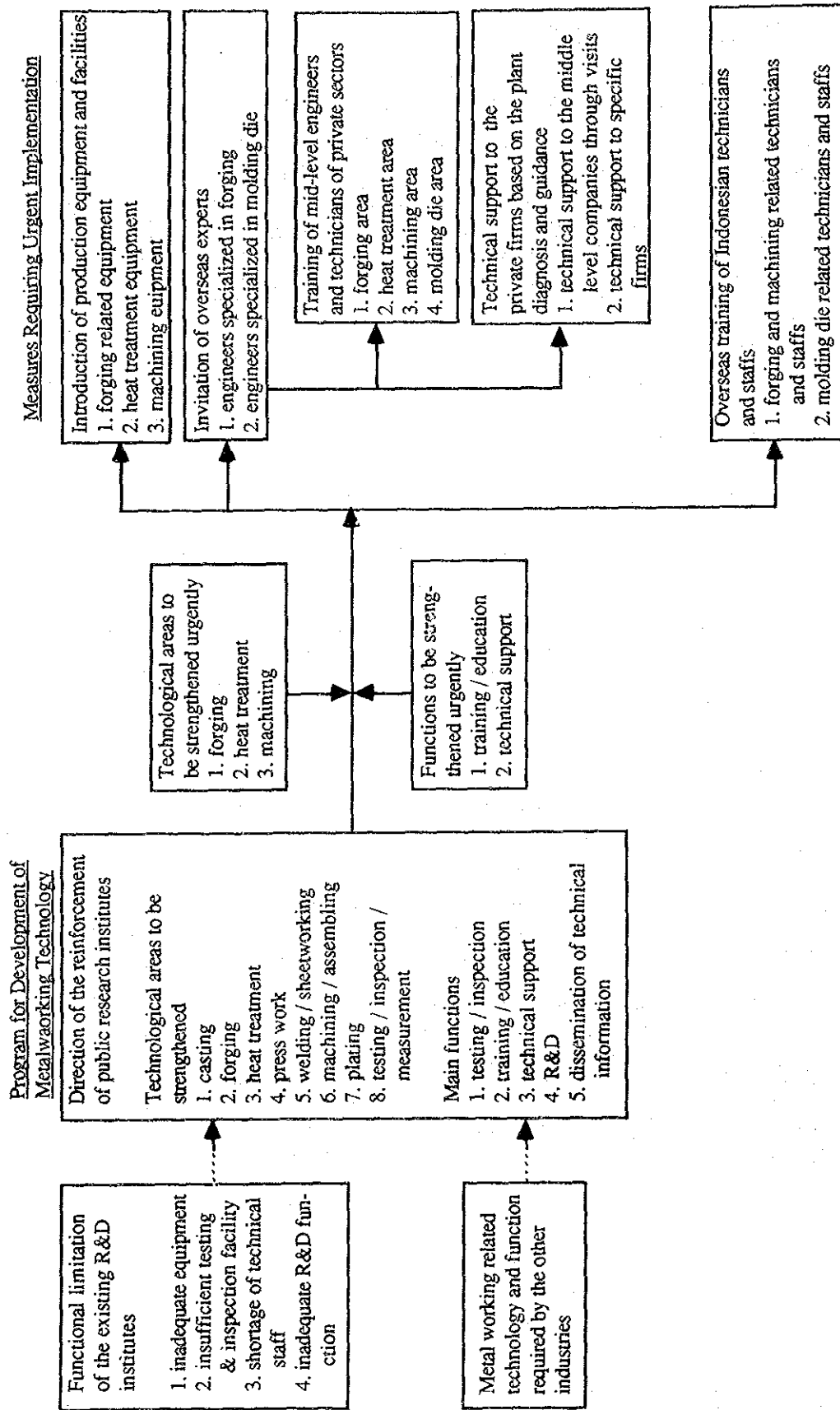
This program will strengthen and augment these five functions in primarily the Institute for Research and Development of Metal and Machinery Industries (IRDMMI) and the Institute for Research and Development of Material and Technical Product Industries (IRDMTP), located in Bandung, and also the institutes and laboratories in Jakarta and Surabaya.

In this case, the areas of technology to be covered will be [1] casting, [2] forging, [3] heat treatment, [4] presswork, [5] sheetwork and welding, [6] machining and assembling, [7] plating, and [8] inspection, testing, and measurement. This is illustrated in Fig. 5-1-1.

It is recommended to select from among these product areas the fields and functions of extreme urgency and move forward with the program by making up for deficiencies in existing Research and Development Institutes.

Please note that in running this program, it is essential to ensure that the opinions of the private sector be widely reflected and that the activities meet the needs of industry. It is crucial to implement the program with positive private participation, mainly from industrial associations. Toward this end, it is recommended that the Indonesian side, primarily the Ministry of Industry, assemble experienced persons from industry, government, and academia and organize a working committee (provisional) to serve as an organization for promoting the program on the Indonesian side.

Fig. 5-1-1: Basic Concept of the Program for Development of Metalworking Technology



3 Measures Urgently Requiring Implementation

Measures requiring urgent implementation will be the introduction of production facilities and equipment, invitation of overseas experts, and overseas training of Indonesian engineers with the aim of development of the human resources in the fields of forging, heat treatment and machining.

In consideration of the limited resources and engineers and technicians available, it is recommended to avoid the construction of new buildings and establishment of new organizations and to strengthen and augment the existing institutes.

As the Institutes to be covered, consideration will be given to the Bandung IRDMMI, the Jakarta Metal Center (Metal Calibration Center and metal workshop), and the Surabaya Institute (laboratory). Table 5-1-1 shows a comparison of the site conditions of the three institutes:

Table 5-1-1: Comparison of three Candidate Sites for Metalworking Technology Program

Criteria	Bandung	Jakarta	Surabaya
Utilization of existing facility	best suited as IRDMMI exists	Metal Center is narrow	possible to utilize existing laboratory
Availability of space	500m ² of IRDMMI is available	necessary to secure new space	space is available
Availability of engineers and professionals	about 70 engineers and technical staffs are working at IRDMMI and IRDMTP. ITB would also provide engineers	although readily available engineers are limited at the existing institute, the supply of engineers could be expected.	almost no eligible metalworking engineers at the existing laboratory, engineers could be supplied by ITS, etc.
Degree of the Regional Distribution of metalworking industries	relatively small number of metal working industries in comparison with the other two sites 180km from Jakarta	almost 80% of metal working industries are located	degree of the distribution of metalworking firms is next to Jakarta area

It is recommended that the stress be placed on the IRDMMI of Bandung because it is best suited in terms of space and technical staff availability and that the program proceed through the introduction of major machinery and equipment to the Bandung area and the conducting of major training in Bandung. It is recommended that a part of basic equipment and materials be placed in Jakarta and Surabaya which are major metalworking centers in the west and east, and that short term training and technical symposiums on basic technology be held and travelling technical guidances arranged in these two cities.

Next, looking at the linkage between the program and the six sub-sectors, this Program for Development of Metalworking Technology would contribute particularly,

among the six sub-sectors, to promotion of electrical machinery, aluminium products, and plastic products. In these fields, there is a very urgent need for the machining technology required for aluminium diecasting and for fabrication of molding die for plastic injection molding and for the forging technology essential for the manufacture of gears, shafts, and other key components of electrical machinery.

On the other hand, the technical areas covered by the IRDMMI, which reportedly is the Institute under the Ministry of Industry most well equipped in research facilities in the metal related field, are limited to casting, machining, welding, heat treatment, electrical plating, and sheetwork and do not include forging. Further, in machining, while the Institute has the basic facilities, it is not equipped with electrodischarge machines, electrolytic grinding machines, diesinking machines, or other equipment essential for die fabrication etc. In view of this, it is urgent that the machining related facilities required for forging and dies be augmented. Also, there is a lack of engineers and technicians familiar with these technologies, in particular die-related engineers, so it is necessary to train the staff of the Research and Development Institutes and at the same time promote transfer of technology to the private companies.

The detailed contents of measures requiring urgent implementation are as follows:

(1) Introduction of Production Facilities and Equipment

The main facilities to be introduced, in addition to existing facilities, are as follows: However, in the event that these facilities and equipment are procured through foreign aid, the detail of the facilities and equipment to be procured should be fully discussed between the parties concerned.

Table 5-1-2: List of Major Machines and Equipment to be considered Necessary for Forging, Heat Treatment and Machining Facilities

1) Forging Facilities	
- Batch type heating furnace	1 unit
- Billet shear	1 unit
- Shot blast	1 unit
- Drop hammer	1 unit
- Trimming press	1 unit
- Hoist	1 unit
- Conveying system	1 unit
- Thermometer	1 unit
- Tools and Jigs	1 set
2) Heat Treatment Facilities	
- Heating furnace	1 unit
- Quenching oil bath	1 unit
- Quenching water tank	1 unit
- Gas atmosphere furnace	1 unit
- Tempering furnace	1 unit
- Cleaning bath	1 unit
- Soft nitriding furnace	1 unit
- Tools and jigs	1 set
- Carbo-nitriding furnace	1 unit
3) Machining Facilities	
- Engine lathe*	1 unit
- Precision high speed lathe	1 unit
- Universal milling machine*	1 unit
- CNC machining center*	1 unit
- CNC wire cut EDM*	1 unit
- CNC EDM*	1 unit
- CNC forming grinder*	1 unit
- Copy milling machine*	1 unit
- Radial drilling machine	1 unit
- Hack sawing machine	1 unit
- Band sawing machine	1 unit
- Abrasive cutoff machine	1 unit
- Bench drilling machine	1 unit
- Universal machine	1 unit
- Accurate surface grinding machine*	1 unit
- Surface grinding machine*	1 unit
- Electrolytic grinding machine	1 unit
- Diesinking machine	1 unit
- Jig boring machine	1 unit
- Universal tool and cutter grinding machine*	1 unit
- Carbide tool grinder*	1 unit
- Gear hobbing machine	1 unit
- Straight bevel gear generator	1 unit
- Table grinder with dust collector	1 unit
- Air compressor	1 unit
- Tool set	1 set
- Diecasting machine	1 unit

Note: *: Machines and equipment particularly necessary for die manufacture.

(2) Invitation of Overseas Experts and Technical Guidance to Counterparts and Private Companies

Regarding the invitation of technical experts necessary for technical development and technical guidance and development of human resources, it is recommended that assistance be requested from overseas technical cooperation organizations in the following fields and on the following scales. It is necessary, however, to consult with the overseas cooperation organizations on details of the availability of engineers.

[1] Engineers in field of forging

Number: 1
Period: 1 to 2 years

[2] Engineers in field of precision machining

Number: 1
Period: 1 to 2 years

[3] Engineers in field of molds and dies

Number: 1
Period: 1 to 2 years

These overseas experts would provide technical guidance to their Indonesian counterparts in the public and private sectors mainly in Bandung and, along with their counterparts, would provide technical guidance to private companies by travelling. Also in Jakarta and Surabaya small scale training for one to two days will be arranged with overseas experts invited as instructors. Note that the costs required for private sector trainees would be borne by the companies involved themselves. Also, the dormitory facilities for the trainees would be arranged by the Indonesian side.

The training courses would cover the following content:

[1] Training course for field of forging

Content: Free forging technology, stamp forging technology, etc.
Period: 7 days per course (3 days of lectures/4 days of practice)
Participants: 5 to 25 students per course
Frequency: 4 times a year

[2] Training course for field of heat treatment

Content: Heat treatment technology for dies, heat treatment technology for carbon steel, etc.
Period: 7 days per course (3 days of lectures/3 days of practice and 1 day of measuring hardness and microscopic tests)
Participants: 5 to 25 students per course
Frequency: 4 times a year

[3] Training course for field of machining

Content: Learning technology of NC machines, learning technology of grinding machines, etc.

Period: 1 to 3 months per course
Participants: 3 to 5 students per course
Frequency: 4 times a year

[4] Training course for field of mold and dies

Content: Molds and die technology
Period: 10 days (4 days of design, 4 days of processing, 2 days of assembly and test striking)
Participants: 5 to 25 students per course
Frequency: 4 times a year

Next, in the travelling technical guidance given to private companies, guidance will be provided in production technology, both hardware and software, through on-the-job training. Specifically, the guidance will primarily be for raising the level of production technology, but will stress not only the acquisition of technology, but also more software oriented areas such as product planning, design, quality control, and the promotion of TQC activities. Products able to be made competitive in a relatively short or medium term will be selected and guidance will be provided aimed at bringing them to a level enabling sufficient competitiveness in the overseas markets. Note that the expenses required for the travelling guidance shall be born by the Indonesian side.

For those private companies with relatively superior technical expertise, the Institutes would engage in joint research on production technology at the request of those companies. In this case, experts invited from abroad will provide suitable technical guidance and advice with the aim of increasing the sophistication of production technology and training engineers.

(3) Dispatch of Engineers and Technical Staffs of Public and Private Sectors of Indonesia to Other Countries for Overseas Training

In the overseas training, as much as possible, participants will study the production technology of private companies and their quality control and testing and inspections.

[1] Forging and precision machining

Number of participants: 1 each, for total of 2
Period: 3 months each

[2] Molds and dies engineers

Number of participants: 1
Period: 3 months

5-2 Program for Promotion of Industrial Standardization and Quality Control

1 Background and Objectives of Recommendation

Over 200 industrial standards (SII) have been established each year in the past five years. As of June 1991, the number of standards reached 2,733, so rapid progress is being made in the system. Of the 2,733 SII's, the SII approval system (labeling of SII mark) has been applied to 46 compulsory standards and 278 voluntary ones. As of June 1991, 1,311 licences have been approved. Industrial standards (SII) will be consolidated into national standards (SNI) by 1994, under which 1,770 SII's have been certified as SNI's.

However, use of these standards among private companies is delayed. In-house standardization by private companies has not been effectively implemented so far. Further, there is insufficient understanding of quality control, with many places equating product inspections with quality control in their minds. These problems may be seen in all of the five industrial sub-sectors with the exception of handicrafts. Further, inspections for SII approval are being performed by related R&D institutes under the BPPI, but much of the equipment and facilities there are antiquated. The Industrial Standardization Center has only seven instructors and nine assessors. That means it suffers from a remarkable shortage of manpower.

To strengthen the international competitiveness of the industrial products, it is essential that use of industrial standards and quality control in the private companies be promoted. To assist in this, it is necessary to raise the level of the industrial standards to that of international standards, train the personnel of the Industrial Standardization Center, and strengthen and augment the testing and inspection capabilities.

The National Standardization Council (Dewan Standardisasi Nasional (DSN)), established in 1984, is working to consolidate the SII and other standards established independently by various ministries into the SNI.

The DSN was established with the following two objectives:

- Coordination and adjustment of standardization activities
- Recommendations on national plans for standardization

The DSN has the following functions:

- Planning of standardization policies
- Coordination of standardization plans
- Documentary surveys on the state of standardization enforced
- Cooperation in inter-ministerial activities
- Coordination of standardization activities
- Cooperation in international standards
- Approval of national standard SNI
- Provision of standardization information
- Preparation and approval of procedures for establishing standards
- Activities required in enforcing national standards

The DSN is chaired by the State Minister for Research and Technology, sub-chaired by the Minister of Industry and the Minister of Trade, has the LIPI as its secretariat, and is participated in by 10 ministries and agencies. The administrative work of the DSN is handled by the LIPI Standardization Center. Six specialized committees have been established for the following purposes:

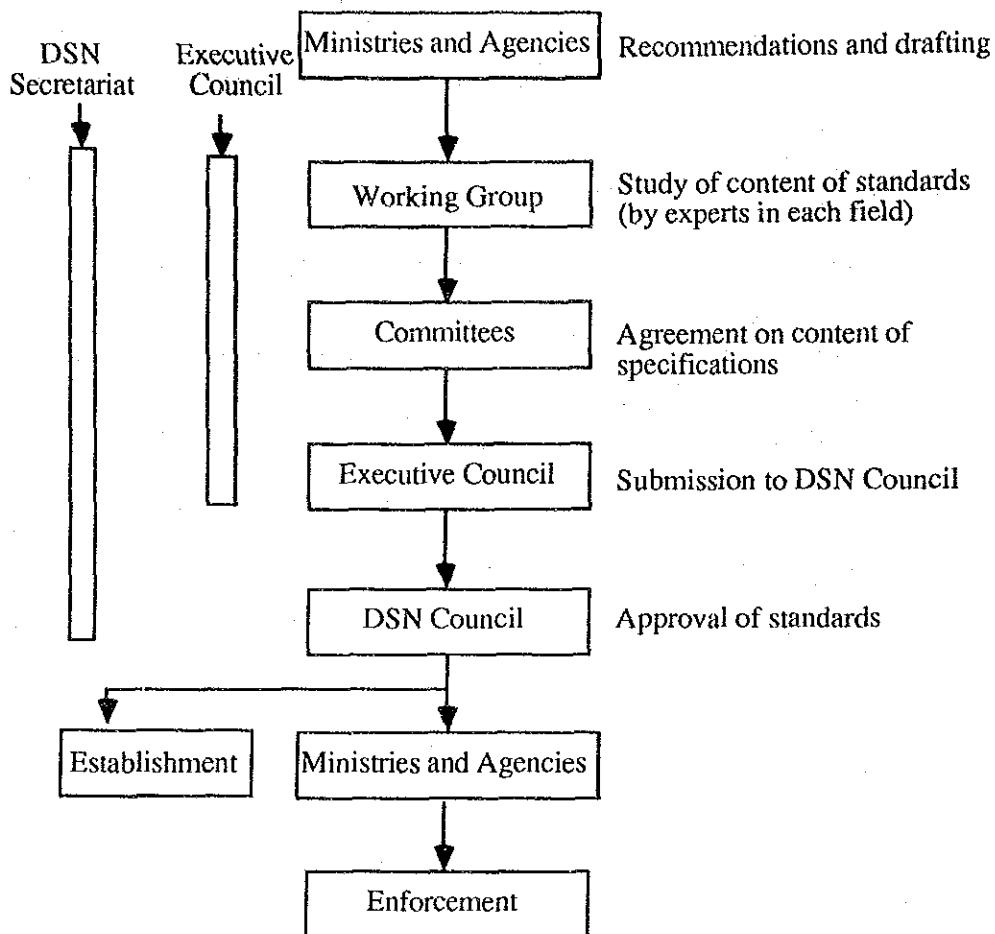
- Preparation of standardization policies and programs
- Preparation of standards
- Enforcement of standards, testing, and certification
- Cooperation with international standards and information on standards
- Calibration
- Evaluation of safety standards

The DSN has the following objectives in its activities:

- Establishment of the foundation for a national system of standardization
- Establishment of procedures, formats, and approval system for SNI
- Enforcement of standards (testing organizations, verification, and certification system)
- Participation in international standardization activities
- Establishment of system of measurement
- Approval of SNI standards: 1995 standards (1994 deadline)
- Coordination of areas of responsibility in standardization activities of various ministries and agencies

The procedure for establishment of SNI standards currently in use is as follows:

Fig. 5-2-1: Procedures for Establishment of SNI Standards



In the Ministry of Industry, the Industrial Standardization Center of the Industrial Research and Development Agency (BPPI) is in charge of work relating to standardization. Drafts of SII are studied by technical teams for industrial standardization (TTSI) made up of representatives of related bureaus of the Ministry of Industry, producers, consumers, the LIPI, laboratory related personnel, and industrial associations and are approved by the Minister of Industry through the Coordinating Committee for Industrial Standardization (TKSI).

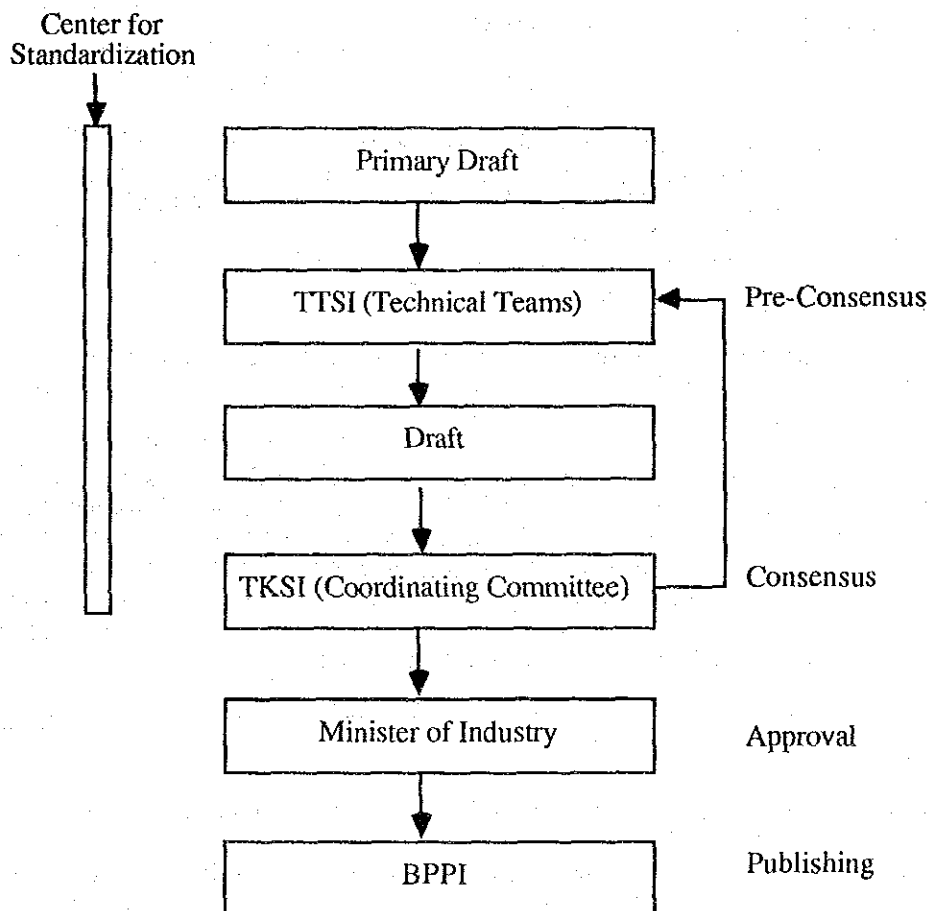
There are 16 TTSI established:

Technical Teams for Industrial Standardization (TTSI)

1. Agriculture, machinery, and equipment
2. Shipping and related building construction
3. Motor vehicles
4. Textiles
5. Electrical machinery and equipment
6. Electronic products
7. Chemical products
8. Ferrous and nonferrous metals

9. Food and beverages
10. Rubber, plastic, and leather
11. Sports, office, and education equipment
12. Pulp and paper
13. Basic chemical and gas industry
14. Nonferrous building materials
15. Packaging
16. Engineering industry

Fig. 5-2-2: Procedures for Establishment of SII Standards



2 Detailed Content of Program

In order to achieve industrial standardization and the widespread implementation of quality control, it is necessary to formulate standards, strengthen capabilities for their enforcement, and promote standardization and quality control in private enterprise.

Industrial standardization and quality control may be promoted by public organizations, private companies, and the two in cooperation. Therefore, this program includes strengthening of the functions of public organizations, assistance to private enterprise, and improvement of the environment for cooperation.

Issues in the strengthening of the functions of public organizations include [1] the strengthening of the capabilities of the staff of the ministries and agencies concerned and the development of human resources, [2] the augmentation of the ability to collect and disseminate information, and [3] the augmentation of testing and inspection capabilities. Toward this end, the following program is envisioned.

[1] Strengthening of capabilities of staff and development of human resources

The staff of the ministries and agencies in charge will undergo training in Indonesia, overseas training, and on-the-job training concerning technical guidance by experts to individual companies, through which a grasp will be obtained of the process capabilities and state of standardization of private companies, and guidance will be provided in standardization and quality control.

[2] Augmentation of information collection and dissemination capabilities

Concerned ministries and agencies will obtain a grasp of and collect data on the state of standardization and quality control in private companies, standards of the advanced nations will be collected and disseminated to private companies, and English versions of standards will be prepared.

[3] Augmentation of testing and inspection capabilities

Antiquated testing and inspection equipment in the R&D institutes will be replaced so that measurement and calibration capabilities will be intensified. Roving guidance to small scale companies by experts will be given.

Promotion of use of industrial standards and widespread implementation of quality control is a prerequisite for sustained increase of exports of industrial products. Meeting the requirements of JIS standards is a minimum requirement for industrial products to enter Japanese market. It is needless to say that use of industrial standards and quality control in the private sectors should be promoted on the private sector's initiative. The responsibility of public organizations is to give necessary support and prepare an environment conducive to such promotion by the private sector.

Measures able to support the private sector through public organizations can be organized as follows

[1] Provision of information on international and overseas standards.

Information on ISO9000, JIS etc., will be provided at seminars and/or by leaflets.

[2] Technical guidance to individual companies

On the spot guidance on in-house standardization and quality control at private companies will be given by experts. Guidance will be implemented based on strategy targeting appropriate subsectors and regions.

[3] Development of manpower in the private sector

Training will be provided for the staff of private companies in charge of standardization and quality control.

[4] Encouragement of assistance to small and medium sized companies by large corporations

Large corporations using small and medium sized enterprises as subcontractors will be encouraged to provide assistance to those enterprises in quality control. The large corporations, on the other hand, will be aided through provision of information, dispatch of experts, and training of staff.

[5] Encouragement of purchases of SII certified products in the procurement of products by the central government, state governments, and public corporations

[6] Selection of and provision of awards to superior factories using SII

[7] PR for industrial standardization during "standardization promotion month" through seminars, exhibits, films, newspaper advertisements, etc.

Industrial standardization and quality control should be promoted through the cooperation of public organizations and private enterprise. Therefore, the measures for strengthening the functions of public organizations and for assisting private enterprises and improving the environment for cooperation must be formulated and implemented so that they are not separate, but are comprehensive and integrally linked.

From this viewpoint, the afore-mentioned issues and programs may be summarized as follows:

[1] Improvement, strengthening, and augmentation of public organizations, systems, and policies for promotion of industrial standardization and quality control

- Study of the experiences of advanced nations in standardization and quality control and the application of the same to Indonesia
- Acceptance of overseas experts in policies relating to standardization and quality control
- Implementation of national campaign for promotion of standardization and quality control, including seminars and exhibitions
- Selection and awarding of superior SII factories
- Priority purchasing of SII certified products in public procurement
- Acquisition of overseas standards and provision of same to private companies
- Encouragement of and aid in assistance by large corporations to quality control in small and medium sized enterprises

[2] Fostering and training of manpower dealing with quality control in public organizations engaged in formulation of policies, enforcement of policies, testing and inspection, and guidance to private enterprise and in private companies

- Training of staff of public organizations in Indonesia and overseas
- Guidance to private enterprise by staff of public organizations and overseas experts
- Training of staff in private companies engaged in standardization and quality control

[3] Augmentation of testing and inspection capabilities

- Replacement of old testing and inspection facilities in public institutes
- Roving guidance by experts to small and medium sized enterprises using testing and inspection equipment

Industrial sector in Indonesia has been growing in size, particularly since 1987, and has been changing in structure due to foreign investment and the rapid growth of companies tied up with foreign firms. To achieve sustained growth in exports, it is essential to increase exports by domestic large and medium sized companies in addition to foreign affiliates and large corporations tied up with foreign firms and to strengthen the linkage with small business. It is necessary to promote standardization and quality control in all private companies - small and medium sized enterprises in addition to large corporations.

Therefore, the program must act most efficiently for the realization of the objective of promotion of the export industries based on the development of and changes in industrial sector, the need for standardization and quality control in private enterprises, including small and medium sized enterprises, and the limits of policy-implementing organizations in manpower and facilities.

Considering this, at the present time a comprehensive survey should be run to obtain a grasp of the state of activities by public organizations and private enterprise in the promotion of industrial standardization and quality control and of the problems in the same and to draw up a master plan.

3 Measures Urgently Requiring Implementation

The following survey will be conducted and a master plan will be prepared for the promotion of standardization and quality control:

(1) Comprehensive Survey for Promotion of Industrial Standardization and Quality Control

i) Objective of survey

The objective will be to improve the quality of Indonesian industrial products and contribute to the development of industry and promotion of exports by the preparation of a master plan for establishment and dissemination of industrial standards and the promotion of quality control.

ii) Main items of survey

[1] Trends in and current state of industrial standardization policies

- National standards (SNI)
- Industrial standards (SII)
- Other standards
- Differences with international standards

[2] Current state of and problems in policy-implementing organizations relating to industrial standardization and quality control

- National Standardization Council (DSN)
- Industrial Standardization Center of Ministry of Industry
- State of coordination among organizations and consolidation to SNI

[3] Current state of and problems in standardization and quality control in private enterprises

- Obtaining grasp by a corporate survey of the current state and problems and the capabilities of producing quality goods in the main industries (metals, machinery, electrical machinery, etc.) and main regions (Jabotabek, Surabaya, Semarang, Bandung, Medan). The survey will be run covering foreign capital affiliates, state corporations, and domestic private companies separately.
- Possibilities of promotion of and guidance in quality control using linkage between large corporations and small and medium sized enterprises
- State of quality control and use of standards in export companies and response by export markets

[4] Current state of and problems in use of standards

- Certification
- Export inspection
- Evaluation of capabilities and equipment of testing and inspection organizations
- System of measurement
- Promotion of standards

[5] Current state of and problems in education in quality control and activities to promote same

- Education and promotional activities by public organizations
- Education and promotional activities by private enterprises

[6] Current state of international cooperation in industrial standardization and quality control

iii) Expertise required for survey team

Expertise required for and fields to be handled by the survey team are envisioned as being as follows:

- Standards system
- Standard certification system
- Education for promoting systems
- Quality control
- Inspection system and strengthening of facilities

iv) Period of survey

9 to 12 months

(2) Dispatch of Staff of Industrial Standardization Center of Ministry of Industry Overseas for Training

i) Staff in charge of quality assurance, testing and inspection, and promotion

ii) Period of dispatch: 2 to 3 months each

5-3 Program for Vitalization of Industrial Associations

1 Background and Objectives of Recommendation

(1) Background

The source of the energy for industrial development lies in the independent efforts of businesses to improve their management and technical expertise. There are limits, however, to the abilities of individual businesses to develop on their own. Therefore, promotional activities of industries as a whole, channeled through industrial associations, and government promotional measures for supporting the private sector are sought in all countries. Businesses, industrial associations, and government would create a three party system for industrial promotion. One of the basics in industrial promotion is to make this system work effectively.

The activities of industrial associations are particularly effective in the process of developing an emerging industry into an export-oriented industry. This is clearly shown in the history of the export-oriented industrialization in Japan and the Asian NIE's. In Japan, the broad range of activities of the industrial associations, such as participation in establishment of industrial standards, the preparation of industrial information and materials, organizing industrial promotion campaigns, collection of overseas market and technical information, preparation of catalogs, participation in and sponsoring of trade fairs, and other PR activities, improvement of technology and quality of products through exchanges of information with research and development institutes and academies, and further development of human resources has contributed tremendously to business development. Industrial associations function also as window for the aid, such as institutional financing, offered by the government with the aim of promoting small and medium sized businesses and therefore serve as important pipelines connecting the government and the industrial circles.

Looking at the system of industrial promotion of Indonesia from this perspective, there are still many areas which could be improved. The government has been strongly eager in establishing industrial policies in the past few years based on the themes of deregulation and debureaucratization and has been successful in promoting industrial development and export-oriented industrialization. These policies have been highly appreciated both in the country and abroad. However, it has yet to set up systems of promotion tailored to the characteristics of individual industries and therefore there is still room for improvement. Part of the reason for this lies in the problems on the industry side. In all of the industries, the coordination organizations are weak and do not function satisfactorily as they should to reflect the overall opinions and needs of their members. Therefore, there are no grand designs of the industries themselves and promotional activities consequently end up low in profile. As a result, it is difficult to find out what the measures for promotion of individual industries should be.

(2) Objectives

To change this situation, it is considered extremely important that the industrial associations would take initiative and the public and private sectors could act as one so as to rebuild the system of industrial promotion. This is therefore taken up as a priority program.

The industrial associations first of all should strengthen their own organizations and vitalize their activities. It is essential to create an outside environment conducive to this. It is desirable that more active approaches be made to the government, liaison councils be established, and other specific steps be taken so as to strengthen ties. Judging from the general characteristics of Indonesian entrepreneurs, the associations preferably

will be loose organizations. It will be necessary, however, that their activities be made more attractive ones tailored to the needs of the members so as to raise the awareness of members of the need to participate in. One effective method for this would be to deepen exchanges with foreign industrial associations so as to introduce their knowhow and to implant the same in a form suitable to the situation in Indonesia.

The Ministry of Industry and other related government organizations are requested to provide maximum backup to these industrial activities in areas of technology, information, institutions, and facilities, even if it finds difficult to provide funding assistance such as subsidies.

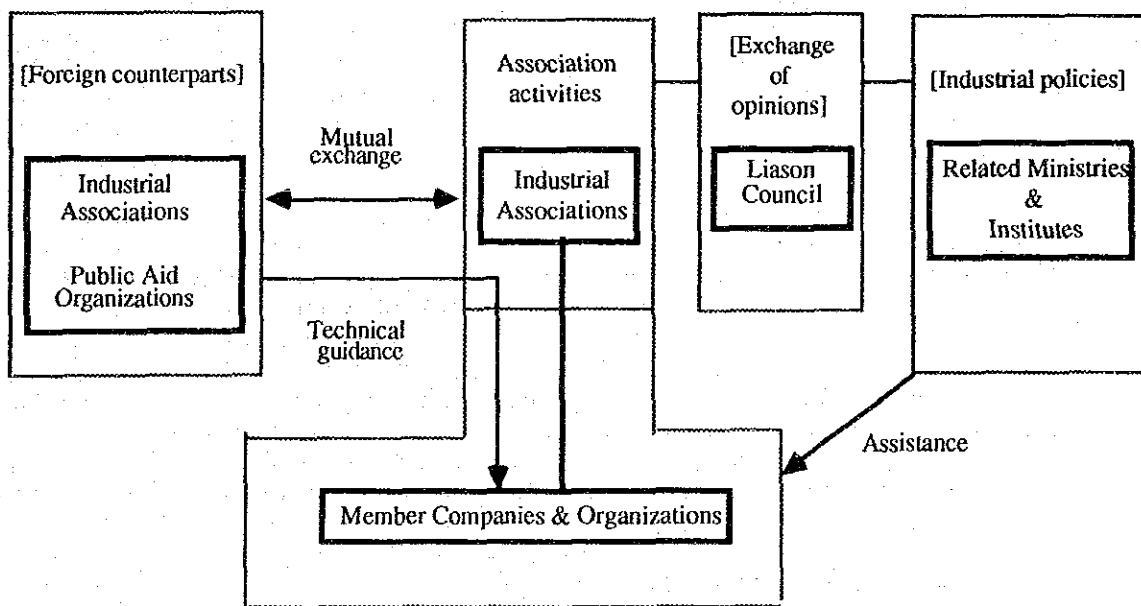
(3) Anticipated Effects

In the Indonesian industries, there are a considerable number of medium sized businesses with the potential of growing into export firms. It may be said that sufficient possibility is there for export industrialization. A support system based on the industrial associations and combining the public and private sectors, if set up, would be considerably effective.

The following can be mentioned as the major effects anticipated;

- [1] Raising of the level of management knowhow, technology as well as improvement of quality and design of products
- [2] Development of human resources
- [3] Strengthening of overseas marketing
- [4] Stimulation of technical exchanges with overseas industries

Fig. 5-3-1: Flow Chart (Draft) for Vitalizing Activities of Industrial Associations and Strengthening Ties with Foreign Organizations



2 Current State and Problems

1) Summary of Organizations and Activities of Industrial Associations

In almost all of the industries in Indonesia, industrial associations are organized. All of the associations have their objective such as the promotion of their respective industries and engage in a wide range of activities such as representation before and reporting to the government, participation in the formulation of industrial standards, and participation in and sponsoring of exhibitions, trade fairs, seminars, etc. These associations have been successful to a certain extent.

(1) Ceramic products manufacturing industry

The Indonesian Ceramic Association (ASAKI) is the only industrial association which covers the ceramic products industry as a whole (the Industrial Mineral Association covers the raw materials sector). ASAKI was established in 1972 under the initiative of the Ministry of Industry and the Institute for Research and Development of Ceramic Industry (IRDCRI) and other public organizations. Early activities were limited to reporting to the government on protection of domestic production etc. and participation in the establishment of industrial standards, but along with the development of the industry, it has been expanded to broad range of area including promotion of technology, strengthening of marketing, and assistance to village handicraft industries. ASAKI participates in trade fairs, seminars, and missions sponsored by the Ceramic Industry Club of ASEAN (CICA) as a member of CICA and, further, sponsors an Indonesian ceramic trade fairs and technical seminars etc. in an endeavor to develop new products, promote technology, and promote sales in cooperation with government organizations. Current membership includes 53 major products manufacturers and traders of products and materials and the IRDCRI.

(2) Plastic products manufacturing industry

There are seven industrial associations organized for different products: [1] the Indonesian Plastic Manufacturers Association (APINDO), [2] the Indonesian Woven Polyolefine Manufacturers Association (GIATPI), [3] the Flexible Packaging Association, [4] the Indonesian Synthetic Leather Manufacturers Association (GAPAKISI), [5] the Plastic Pipe Manufacturers Association (AP3), [6] the Plastic Resin Manufacturers Association (APVICI), and [7] the Storage Battery Manufacturers Association (GAPPI).

These associations form an upper organization known as the Federation of Indonesian Plastics Industries (FIPLASIN). FIPLASIN was established in 1971 and has been working to promote the industry through activities such as joint reporting to the government, sponsorship and participation in trade fairs and seminars, PR and other enlightening activities, and exchanges and cooperation with academic and research organizations. As for the future activities, it stresses the development of human resources such as middle management and engineers, technical and managerial guidance to companies, and the introduction of foreign investment and foreign technology.

FIPLASIN is a member of the ASEAN Federation of Plastics Processing Industry (AFPI).

(3) Electrical machinery manufacturing industry

The Association of Indonesian Electrical Industries (APPI) is the only association covering the industrial electrical machinery and electronic component industry as a whole. It was established in 1976 and has a membership of 63 companies (as of May 1989). The

APPI has as its objectives dealing with users, recommendations to the government, and promotion of foreign investment and engages in activities such as PR and promotional activities using publications, trade fairs, and symposiums, reports to the government on import policies, participation in the establishment of industrial standards, and campaigns for the improvement of quality control. Further, it participates in the Association of Electricity Supply Industry of Southeast Asia and the Western Pacific (AESIEAP) and through that organization endeavors to secure opportunities for promoting foreign investment.

(4) Rubber-based products manufacturing industry

There are six associations, established for individual products. Among these, those currently active in the fields covered by the survey include the [1] Indonesian Gloves Manufacturers Association (ASTA) and [2] the Association of Indonesian Rubber Goods Industries (AIKI). As an upper organization, there is the Federation of Indonesian Rubber Industries (FIKI). The associations have their main objectives such as the exchange of information concerning management for top executives, marketing, etc. and liaison and consultations with related Ministries and Agencies. FIKI is showing interest in sponsoring seminars on technology, management, and marketing and in coordinating with other ASEAN countries.

In the material sector, there is the Association of Indonesian Rubber Producers (GAPKINDO). This association has a long history and strong organization and is engaged in progressive activities.

In addition to the above, there are the [1] Aluminium Goods Manufacturers Association and [2] Federation of Indonesian Aluminium Industry in the aluminum product industry and the Association of Indonesian Exporters and Handicraft Producers in the handicraft industry.

2) Issues

However, these associations cannot really be said to be organized well and sufficiently active overall. There are different reasons for each association, but in general these organizations all face the following problems:

- [1] Low in organizational coverage and small amount of membership fee, resulting in insufficient funding
- [2] Executives are busy with work in their own companies and therefore little leeway for them to exert much effort in activities of associations. Weak functions of secretariats.
- [3] Shortage of experience and insufficient knowhow in association activities
- [4] Strong tendency of member companies toward individual activities, weak awareness as members, resulting in low degree of cooperativeness
- [5] Short histories of industries and small number of large companies, resulting in lack of merit in exchanges and division of labor among companies

Due to the above, members find association activities insufficiently attractive and this in turn reduces their desire to participate much as members. It is hoped that the administrative offices of the associations will perk up and that the top companies will wake up to their duties as industrial leaders and show initiatives.

3 Detailed Content of Program

1) Framework of Program

The program envisions a process of steering the activities of industrial associations onto the path of self-reliant development and raising them to the level where they can contribute to government activities for promoting industry. The mainstays of the program would be, for the time being, [1] the strengthening of the industrial associations, [2] the strengthening of activities of them, and [3] exchanges with overseas industries.

(1) Strengthening of organization of associations

Inside the industrial associations, the main goals would be the strengthening of the human network in the organizations, the improvement of the rate of membership, the strengthening of the fiscal standing, and the improvement of management knowhow. The government, it is hoped, would provide boost assistance to activities of them and improve the related policies. Therefore, it is desirable that, first, actual state of the industries, the structure and activities of the industrial associations, the related policies, etc. be rechecked and areas for improvement be pinpointed and that PR and promotional activities aimed at companies be made brisker and outside knowhow be introduced.

(2) Strengthening of activities

The basic issue in strengthening the associations would be stimulating the desire of companies to participate in them. The only way to do this would be to stimulate association activities and improve their content. From this viewpoint, in consideration of the current state of the industries and needs of member companies, the stress in the future industrial activities would be in the following areas:

- [1] Promotion of campaigns for industrial development focusing on improvement of the quality and design of products
- [2] Promotion of managerial knowhow and technology with the aim of strengthening business standing
- [3] Development of human resources in areas of particularly short supply, such as middle management, skilled workers, designers, and engineers
- [4] Strengthening of overseas marketing with the aim of sales promotion and collection of market information
- [5] Participation in establishment of national standards with the aim of establishment of standards of quality
- [6] Promotion of joint ventures and technical tieups with foreign companies and invitation of experts to provide guidance with the aim of introducing foreign capital and technology and of increasing export capabilities

It is recommended that the needs of the member companies be studied once more in each of the industries and that plans for activities be formulated from a medium to long term perspective.

(3) Strengthening exchanges with overseas industries

In proceeding with these activities, it would be effective to research successful overseas cases and positively make use of the knowhow in a manner suited to the domestic situation. As a method for this, it is recommended to deepen exchanges with the industrial associations of the advanced nations, invite experts on the association activities and industrial policy of other countries to obtain their advice, and dispatch industry leaders overseas to study the actual situations there and secure opportunities for exchanges of opinion. It would be effective, it is considered, to invite overseas experts in

merchandizing and technology using such exchanges and to have them provide roving guidance to member companies so as to strengthen the organizations of associations and stimulate their activities.

Further, for projects requiring considerable manpower, fund, and time, such as fostering of engineers, it would be necessary to study possibility of cooperation with neighboring countries as international cooperative projects based on the industrial federations of ASEAN etc. and to seek technical cooperation from the advanced countries for the same.

2) Methods of Implementation

(1) Fields covered

Regarding the coverage of the program, judging from the degree of organization of the industrial associations and the state of their activities, it is considered that the four sub-sectors of ceramic products, plastic products, rubber-based products, and electrical machinery would be suitable. In particular, the possibilities for realization of the goals will be high in the two fields of ceramic products (covering ASAKI) and plastic products (primarily covering FIPLASIN) in view of the eagerness shown by these industries.

(2) Schedule of implementation

The program cannot be expected to be sufficiently effective unless the above-mentioned three mainstays of the program are implemented as a comprehensive package. Therefore, the program has to be proceeded with step by step divided into about three stages as mentioned below. General completion will probably require three or more years.

Depending on the industry, it would also be effective to lay stress on the immediate efficiency of the activities and to target first the invitation of foreign technical experts through contacts with foreign industries.

Table 5-3-1: Implementation Schedule (Plan) of Program for Vitalization of Industrial Associations

	Industrial circles	Ministries and Institutes
First stage (Preparation for implementation)	Exchange of opinions [Establishing liaison conference]	Permeation of understandings
	Formation of concrete programs	Formulating assistance measures
Second stage (Full-scale Implementation)	Strengthening organization/ implementation of industrial promotion activities	Comprehensive assistance by related Ministries and Institutes
Third stage (Self reliant development)	<ul style="list-style-type: none"> • Drawing long-term grand design for self reliance • Participation in and contribution to government policy 	<ul style="list-style-type: none"> • Improvement of systems/ augmentation of guiding Institutes • Inviting private sector to industrial promotion measures

4 Measures Urgently Requiring Implementation

(1) Establishment of System for Promotion

The program is diverse in content and would require a long time to complete, so full preparations should be sought. First, it would be necessary to exchange opinions on the program in the respective industries and to promote understanding in related government organizations to foster recognition of the need for the program. On top of this, it is recommended to establish a liaison council between the industrial associations and related government organizations and exchange opinions on the medium term targets of the activities (key objectives and targets for achievement). At that time, it would be desirable for the Directorates General in charge in the Ministry of Industry to serve as the secretariat and deal with liaison and coordination among government organizations.

(2) Introduction of Foreign Technology and Knowhow

It is recommended that exchanges with foreign industrial associations be started from the first stage and experts from them be invited to provide advice along with each stage. As the experts, it is envisioned that use should be made of human resources in the industrial associations or government industrial promotion authorities and of experts in merchandizing and technology. The fields of activity of the experts will, it is considered, be diverse and include running surveys for obtaining a grasp of actual conditions and evaluating the same, PR activities, advice for formulation of programs, factory diagnosis, and technical guidance.

Preferably, industrial leaders would be suitably dispatched overseas along with the schedule of implementation of the program, making their objectives clear.

5-4 Program for Development of Mid-level Engineers and Technicians

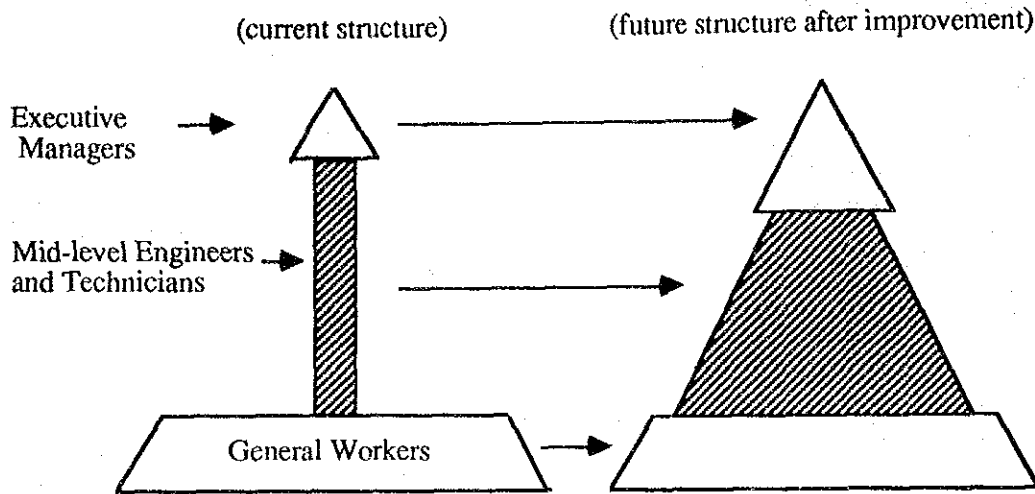
According to the surveys of the six industrial sub-sectors, the keys to industrial development are human resources, technology, and information. In particular, development of human resources useful for industrial development will be most important. To achieve the goal of export-oriented industrialization in Indonesia in the future, the most important task will be to train and secure mid-level engineers and technicians (in factories, the engineers and technicians fulfilling the roles of supervisors and foremen) who handle the key jobs of production technology, quality control, and inspection and testing in private companies. In many private businesses, use is made of relatively low-cost labor to produce and sell low price, low quality products, making creative product development and production of high quality goods difficult. The biggest reason for this is seen as being the low awareness of management, but another key factor is the shortage of all levels of engineers. Due to the shortage of engineers, various problems on the production floor are not brought to light and even if problems are understood, solutions cannot be found.

In Indonesia's case, there is still a large shortage of university graduate level engineers. On top of this, generally these engineers enter the ranks of management as elite employees and seldom participate in the daily work on the production floor. University education, further, is primarily more theory oriented with little practical experience. Therefore, the work on the production floor is considered the job of skilled laborers and technicians and not jobs which elite employees such as engineers would take part in. This separation of engineers having knowledge of technical theory from the production floor requiring for practical skills is a defect hindering the production of superior, internationally competitive products. Therefore, it is judged essential to train mid-level engineers and technicians to bridge the gap between management and engineers and workers.

It is expected that these mid-level engineers and technicians will [1] not only have deep knowledge and experience in the fields they themselves manage and are in charge of, but also have broad knowledge and experience in both theory and practice in all fields of the production processes of the company, [2] serve as pivotal staff in a company-wide quality control system, [3] fall in the middle of management/engineers and workers and contribute to the improvement of productivity through promotion of smooth communication between the two groups, [4] be able to apply the advanced technology of foreign countries to the production floor, and [5] collect suggestions for improvement from the production floor and make use of them in factory management. That is, they will serve as pivotal staff in smoothly applying new production technologies and quality control techniques to the production floor and collect suggestions from the production floor to enable better production control.

On the other hand, in the public sector too, technical trainers skilled in the production technology of private companies will be trained in the Research and Development Institutes under the BPPI. This would require that the Ministry of Industry prepare a master plan for the development of human resources in both the public and private sectors and invite experts from other countries so as to proceed with the program for training engineers and technicians. The Ministry of Industry is also requested to implement the program in a planned fashion so that the mid-level engineers and technicians development program will be accomplished in the future even without cooperation from overseas countries.

Fig. 5-4-1: Concept of Human Resources Development in Company Personnel Structure

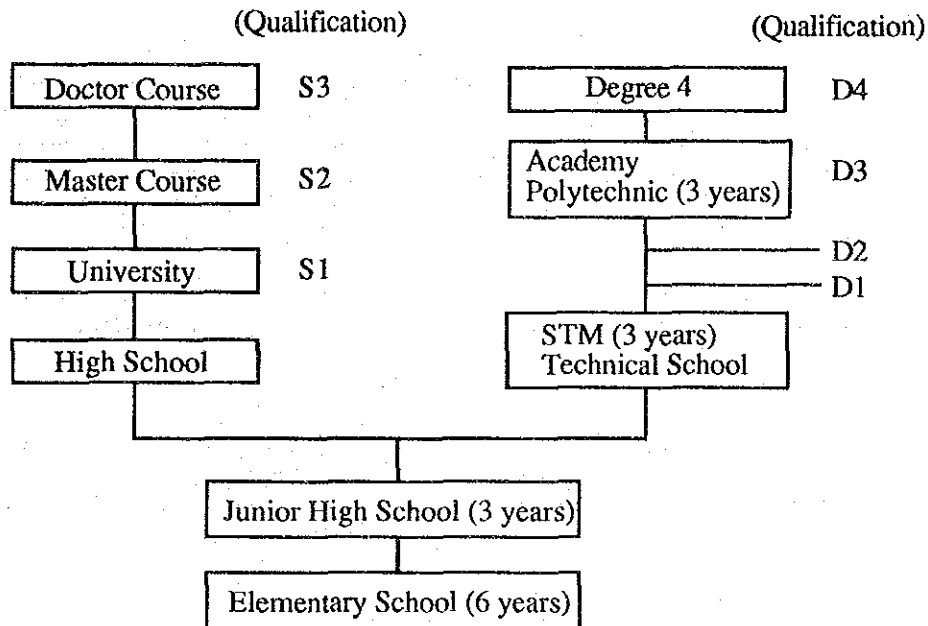


2 Detailed Content of Program

1) Augmentation of Education of Engineers and Technicians by Educational Organizations etc.

Figure 5-4-2 illustrates the educational system in Indonesia upon which the training of mid-level engineers and technicians is assumed to be based. In addition to general education where students advance through elementary school, junior high school, high school, and university, there is a system of vocational education, or what may be said to be upper level industrial schools such as the technical schools and polytechnics. University education lays stress on teaching theory, while these specialized schools stress practical skills in their teaching and turn out would-be mid-level engineers and technicians sought for industrial development. There are only 19 polytechnics in all of Indonesia, however, so these have to be augmented both in quality and quantity.

Fig. 5-4-2: Education System of Indonesia



2) Education and Training of Mid-level Engineers and Technicians by Ministry of Industry

There are seven specialized industrial schools under the Center for Promotion of Industrial Skilled and Vocational Training (Pusbinlat) of the Ministry of Industry: in Jakarta, Medan, Padang, Bogor, Yogyakarta, Bandung, and Surabaya. These industrial schools usually have three-year training and education, but give education and training on industrial technology to graduates from high school and those having higher educational background as well as trainees from private companies through the three-year course or one to three month training or night training courses. A degree 3 qualification is given to graduates enabling them to take on mid-level engineer and technician posts, such as supervisors and foremen, in private companies after their graduation. These seven schools would be requested to provide education and training of immediate use in the production technology of private companies. Consideration would be given to inviting experts well versed in private sector production technology from overseas countries to serve as provisional instructors.

On the other hand, the Research and Development Institutes under the BPPI offer technical training for private sector engineers and technicians. They would be requested to strengthen and augment their training systems targeting the training of mid-level engineers and technicians in private business.

3) Invitation of Experts and Overseas Training on the Private Company Basis

Industrial development is the result of activities of individual private companies, so of course it would be most desirable for private enterprise to secure the transfer of technology from the technically advanced countries on their own initiatives. The following methods may be used to train mid-level engineers and technicians:

[1] Use of technical tieups with companies of technically advanced nations so as to secure experts (engineers), acquire production and inspection facilities etc., introduce quality control systems and, further, use of on-the-job training to train mid-level engineers and technicians.

[2] Experts will be invited by methods other than technical tieups and, companies will be also provided with overseas training. In this case, if individual companies cannot support such assistance, groups of companies, or industrial associations may invite experts to provide technical guidance for the members. Further, on-the-job training, factory diagnosis, and other methods will be used to train mid-level engineers and technicians in the private sector.

The Government is requested to provide positive support institutionally and through various methods so that private sector activities may be carried out smoothly.

4) Invitation of Experts and Overseas Training on the G-G Basis

When such private sector-based activities are not possible due to funding and other reasons in small and medium sized enterprises, it is hoped that the Government would provide positive assistance, possibly, utilizing foreign assistance from technically advanced countries.

When promoting transfers of technology on a government to government (G-G) basis, full consideration is essential as to whether the technology could be efficiently made use of for training private sector engineers and technicians. Further, it is necessary to proceed with projects in a planned fashion so that independent human resource development programs without any help from overseas will be established in the future. The technology covered would include control of manufacturing processes, quality control, worker training, product development, product inspection and testing, etc.

[1] Development of Mid-level Engineers and Technicians in Small and Medium Scale Companies

In the case of small and medium businesses which would find it difficult financially to employ experts on a private basis, the Ministry of Industry would invite overseas product and technical experts, station them in the Ministry, and have them perform travelling technical guidance to private companies and hold technical symposiums. The Ministry would desirably invite two experts for each sub-sector industry (for example, tile and tableware experts), with each expert serving two years and the service continued for four to six years (two to three terms).

In this case the Ministry will see to it that such experts will transfer technology by O.J.T. to the Indonesian experts who will accompany them to the factories so that Indonesia's own independent human resources development will become possible.

[2] Establishment of a System of Technological Guidance by Indonesian Experts

When transferring technology by the two-step method of an overseas expert -> Indonesian expert/counterpart -> private company, consideration would be given to the following three points and matters will be handled flexibly. It is necessary that the Ministry of Industry aims at the establishment of a human resource development system without the help of overseas experts in the future.

- a) It is essential that the ratio of instructors will be 7 from private sector training centers and industry experts and 3 from engineers in public Research and Development Institutes and other public sectors. The reason may be that there is

only an insufficient degree of technical exchanges between the public and private sectors in Indonesia at the present time and it may be difficult for public engineers to provide technical guidance and fostering of human resources to private companies.

- b) The instructors from the private sector training centers and the industrial experts would be obligated to provide technical guidance to small businesses in the Bapak Angkat philosophy. Experts in large companies in particular should be made adequately aware of the fact that development of allied and supporting industries is linked with strengthening of their own firm's production and management bases. With future orders in mind, appropriate guidance will be carried out.
- c) Overseas experts would, in addition to technical guidance by the two step method, provide on-the-job guidance to private companies and hold broad-based, repeated technical symposiums, along with the Indonesian experts/counterparts.

[3] Promotion of Overseas Training of Private Sector Personnel

As it is ultimately private sector personnel who will uphold industrial development, it is desirable that even in overseas training on a G-G basis the utmost effort be directed to training of private sector personnel on production technology.

3 Measures Urgently Requiring Implementation

[1] A middle and long-term master plan will be formulated for the training of personnel on the Ministry of Industry's initiative. Greatest emphasis will be placed on the training of mid-level engineers and technicians playing roles as supervisors and foremen in factories in addition to managerial guidance for private sector managers, increase of expertise and number of high level engineers, and general workers participation in planning regarding process and quality control.

[2] The Ministry of Industry will take an initiative of implementing the above-mentioned programs regarded feasible in order to develop middle level engineers and technicians.