9. METALWORKING INDUSTRY PROMOTION PROGRAM IN THAILAND

9. Metalworking Industry Promotion Program in Thailand

All possible measures should be motivated for development and promotion of one whole sector. Viewing the promotion policies in Thailand from such a viewpoint, all kinds of development program menus are almost ready and some of them are already embodied. However, they will have to be activated as early as possible.

In addition, independence of function and role will make the program more efficient with expansion and completeness of the duties.

Accordingly, the following programs were drafted with such a point in mind.

1) Development Program by the Government Level

As the promotion program by the governmental agency, a master development plan is drafted under the title of "Development Policies Implementation Program" by classifying the businesses (enterprises) by the categories of business subjected to license and approval, business restricted for new establishment, business for strengthening and supporting the existing enterprises, etc. and linking the embodied policies to those.

And this master program shall include the following conceptions and programs.

- Idea of the Independent Core Institution for Implementation of Promotion Measures
- Scheme for Promotion and Guidance of the Modernization of the Industrial Structure
- Scheme of Preferential Treatment for Start-up Industries
- Scheme for Promotion and Rearing of export industries
- Scheme for Industrial Relocation

- Scheme of the Technical Promotion Project
- Scheme for Promotion of the Establishment of Industrial Organizations by Type of Processes and Products

Various legal program, school education program, etc.

(1) Idea of the Independent Core Institution for Implementation of Promotion Measures

The Engineering Industry Development Office (EIDO) was created this year in the Department of Industrial Promotion, with the purpose of functioning as a kernel institution regarding the implementation and coordination of policies and systems of the government aimed at promoting the development of the metalworking industry.

This is an organization for planning and preparation for implementation of the various measures aimed at promoting the engineering industry. On the other hand, the institution related to the promotion of the metalworking industry was established in 1966 within the ISD (Industrial Service Division) with aid of the UNDP, but it did not succeed at keeping pace with the rapid technological progress.

It is urgent to implement in an efficient way the functional coordination and the complementary relationship between the various government and private institutions engaged in activities related to the promotion of the metalworking industry, in order to realize an effective progress of this sector. In this connection, it is advisable to reorganize the ISD in the form of an independent institution with the function of promoting the metalworking industry and to give it new power and

responsibilities such as a) organization and collectivization of the industrial sector in question, b) modernization of the management, c) strengthening of the industrial structure by means of public financing, d) industrial relocation etc., related to the promotion and coordination of a series of systems and policies aimed at realizing an consistent and effective implementation of the industrial promotion measures.

Furthermore, in establishing a new institution of this kind it is advisable to make it function in the form of a semi-governmental institution in order to facilitate the global accomplishment of its functions, but on the other hand the benefit principle should be introduced in order to promote as much as possible its autonomy although it is a government institution. The introduction of the said system, where the beneficiary bears with the actual expenses required to supply specific services to outside (common fund plus commission to entrusted jobs) is expected to contribute directly and indirectly to invigorate the activities of this institution. Furthermore, this type of organization will make it possible a relatively frequent job rotation of the staff, which is a general tendency of government institutions.

Even under the circumstances it is very important to consider effective measures to carry out the recording of the accumulated experience, know-how and other kinds of software for the successors to inherit them in the form of audio-visual materials and written manuals. It is necessary to take a positive attitude toward the actualization of software, by bearing in mind that the said accumulation of experience and its utilization contribute to accelerate the technology transfer speed, upgrades its effects and the productivity and strengthen the foundation for industrial development.

This institution should pay attention to its function regarding support to the implementation of schemes for promotion of the provinces, and should work in perfect teamwork with the public institutions in charge of the provincial promotion in order to realize positive results in this connection.

(2) Scheme for Promotion and Guidance of the Modernization of the Industrial Structure

The metalworking industry befalls under the classification of the so-called engineering industry, and therefore the upgrading of the engineering capacity is indispensable for its promotion.

The capacity of the manpower, i.e., the quality of the human resources, is a factor exerting decisive influence on most of aspects of the engineering capability.

On the other hand, in industrialized countries there are many fields that present the tendency of sophistication of the engineering sector through mechanization typically represented by the rebotization, in view of the difficulties regarding hiring of qualified manpower and soaring cost of the personnel expenditures. Under the circumstances, an extremely important development policy issue related to the definition of the strategy for promotion of the metalworking industry of Thailand is to define the optimum combination of manpower and machine, i.e., the optimum distribution of investments for development of human resources and the investments for acquisition of capital goods such as facilities, equipments, etc., in order to realize the upgrading of the industrial structure in the most efficient way.

Various kinds of policies are susceptible of consideration when the course for modernization of the industrial structure of the

metalworking sector of Thailand is examined from the said standpoint.

a. Overall upgrading of the quality of the human resources based on the improvement of the school education system, supplemented by programs for re-education of workers engaged in the various types of industries.

b. Promotion of modernization of facilities and equipments through their gradual renovation.

c. Promotion of the specialization.

It is necessary to implement measures of various kinds using public funds as pacemakers, in order to realize and guide the aforementioned alternatives in such a way to cope appropriately with the needs of the times.

(3) Scheme of Preferential Treatment for Start-up Industries

It is necessary to strengthen the casting and forging industry, sheet works and welding industry, machining industry, etc., by keeping a satisfactory balance between them, in order to realized the satisfactory strengthening of the metalworking industry as a whole of Thailand. The survey carried out this time indicate that the industries related to forging and heat treatment are very important in connection with the quality improvement of the metalworking industry, but in reality the demand creation mechanism is not working satisfactory and as a consequence even the few existing establishments are facing the risk of bankruptcy.

It must be borne in mind that these kinds of industries must operate in relatively technology-intensive and capital-intensive form in order to maintain their relative advantage, and the

effective utilization of the existing establishments is an important issue also in connection with the effective use of the social capital.

Many of the existing firms have relatively short histories since their foundation. Therefore, it is necessary to consider effective measures to dig up latent demands for the existing firms to operate with appropriate scale, and furthermore it is necessary to consider measures for their sound development by providing technical aid in addition to tax preference and financial support.

On the other hand, some forged and heat-treated parts and components included in such products as hand tools, motorcycles, automotive parts, agricultural equipment, etc., that have stable demand in view of the economic structure of Thailand, depend considerably on forging and heat-treatment, and in this connection it is necessary to consider incentive measures to encourage investments in start-up firms as well as to consider preferential treatment measures to development them on a long term basis, in order to realize the gradual localization of these industries aiming at coping with the said demands.

In connection with the parts industry, it is necessary to consolidate the domestic production of gears, because they can be used in common by all industries. Therefore, the application of preferential measures referring to start-up industries to this industry should be considered as well.

(4) Scheme for Promotion and Rearing of Export Industries

Part of the products of the metalworking industry of Thailand is exported, mainly to neighbouring countries, although very rarely and in very small quantities. Such being the case, it is necessary to pick up exportable priority industries from among the metalworking industries of Thailand and to apply

them intensive promotion and fostering measures in order to cope with the export promotion policy of the country.

As a matter of fact, technology referring to the manufacturing of hacksaw has been transferred from Japan to Taiwan, and subsequently from Taiwan to Thailand, accompanied with improvements and adaptation at each transfer step and nowadays it has been localized with peculiarities suiting the local needs, and there are cases of small- and medium-scale firms of Thailand exporting their products of Malaysia and Indonesia.

On the other hand, there is a Thai foundry exporting machine tool (grinder) heads to a Japanese-capital machine tool manufacturer of Singapore which assembles the finished product and exports it to such industrialized countries as the U.S.A., Europe and Japan. FUrthermore, there is a Japan-Thailand joint-venture piston ring manufacturer which is exporting approximately 30% of its products to Japan. As can be seen, a pattern of mutual dependence is progressing as a consequence of the gradual establishment of the scheme of international division of work in this field. Such being the case, it is desirable to consider comprehensive measures such as public financing support for plant and equipment investment, technical and marketing aid, etc., not to mention exemption and reduction of business tax, corporation tax, custom duty on imported materials, etc., in order to encourage further the said tendency.

The types of industries that have the most promising export prospect for the time being are the existing ones referring to the casting industry and related products as well as press machinery, because they have a high potential in the long range in view of the variety and depth of their products and techniques compared with other ASEAN countries. On the other hand the toy industry has the possibility of growing as a respectable export industry within five or ten years if

industrial production structure are appropriate hereafter from the standpoint of start-up industry, accompanied with the upgrading of the quality and maintenance of the price competitiveness.

(5) Scheme for Industrial Relocation

The survey carried out this time evidenced that the pollution problem is becoming actual also in connection with the metalworking industries located in the metropolitan area of Bangkok.

Therefore, the definition of the ways to solve the impasse is an urgent and important issue.

The IEAT (Industrial Estate Authority of Thailand) has industrial estate projects comprising industrial rearrangement schemes seen from the said standpoint, but they are relatively large-scale ones. In reality there is no project focusing specifically on the metalworking industry which consists of small-scale firms in most of the cases.

Such being the case, it is necessary to implement factory location projects focusing principally on small- and medium-scale metalworking industries.

Fortunately, the Department of Industrial Works is setting forth an industrial estate project comprising small- and medium-scale industries that tend to be omitted from projects of the IEAT. The concretization of projects specialized in metalworking industries is indispensable in order to define an appropriate course of development for this field.

Particularly in connection with the process of specialization in specific products such as agricultural machinery, etc. and promotion of heavy and chemical industries such as those

ones of the Eastern Sea Board, etc., the machining industry, sheet work and welding industry, plating industry, etc. are required to account for part of the supporting industries, and the planning and implementation of their collectivization and other applicable measures should be given priority.

(6) Scheme of the Technical Promotion Project

The central issues referring to roles and functions are defined in the form of the following four technical promotion measures.

a. Development of human resources (re-education of the manpower in connection with practical techniques).

b. Propagation and diffusion of information (extension service system consisting principally of extension consultation and business diagnosis activities).

c. Introduction and improvement of techniques (practical service system consisting principally of test and inspection, commission work and trial production).

d. Planning and coordination (execution of planning and coordination of various kinds).

The technical promotion projects will be concretely systematized by defining the order of priority for each type of industry and product.

In the first instance the priority industries are the following ones.

1. Casting
2. Sheet work and welding

3. Machining and machine assembly (including precision machines)
4. Heat treatment
5. Low cost automation

In the second instance the priority industries are the following ones.

1. Forging
2. Plating
3. Presswork

It must be borne in mind that the term "second instance" does not mean that the industries in question are not important. It means that the absolute number of firms in the forging industries is small instead, and that there are relatively few technical issues requiring urgent solution in the plating and press industries.

In terms of order of priority the various industries are classified as follows.

- First priority
    1. Agricultural machinery
    2. Mold and dies
    3. Grears

- Second priority
    1. Pumps and valves
    2. Hand tools
    3. Machine tools
    4. Automotive parts, etc.

On the other hand, the order of priority of the various activities is as follows.

a. Development of human resources
The redevelopment of the capacity of entrepreneurs, executives, middle-class management personnel and extension officers is given priority, and the problems regarding floor management personnel such as foreman is regarded as secondary ones.

b. Propagation and diffusion of information
Extension service, business diagnosis, technical information (issue of circulars), etc., are given priority, and problems referring to technology transfer and exchange, statistics and publishing are regarded as secondary ones.

c. Introduction and improvement of technology
Production control referring principally to process, quality and cost, design engineering, test and inspection, trial production and entrusted jobs are given importance, and projects related to management technique, market survey, F/S, development, etc., will be handled in the next stage.

d. Planning and coordination
Planning and coordination referring to the aforesaid projects will be executed with priority.

Furthermore, a system for official recognition of the technical skill of supervisors and workers (e.g. casting, welding) will be introduced and diffused in order to popularize the social recognition system of the technical skill.

Audio-visual equipment should be used in connection with the aforementioned technical promotion, and efforts should be made for actualization and universalization of the software. As a result of the implementation of the said measures, it will be possible to accumulate experience and know-how in spite of their tendency of getting scattered and lost, and furthermore

it will be possible to make substantial contributions to the acceleration of the technology transfer speed and to the overall promotion of the typically technology-intensive industry like the metalworking sector through its pervasiveness.

(7) Scheme for Promotion of the Establishment of Industrial Organizations by Type of Processes and Products

To realize the promotion of the totality of a sector, such as the metalworking industry, covering a wide scope, it is necessary to promote its organization by type of industry and by product in order to make it possible to identify its internal problems and to enhance the mutual exchange within the trade itself, which will result into the construction of the foundation for fostering of new sprouts for development. In Thailand there are already various industrial organizations, but it is necessary to develop them further in order to create chances for promotion of collectivization.

In particular, the relation of mutual trust between the firms is indispensable in order to promote and consolidate the sophistication of the subcontracting system, and the government institutions must play the role of leaders in order to promote further the said tendency.

(8) Legislation Scheme

The legislation constitutes the institutional framework for promotion of the schemes described in the foregoings, and as a consequence its concretization is required urgently. In particular, the promotion of the metalworking industry should be mentioned specifically in connection with the enactment of the following legislation.

a. Law for promotion of modernization of small- and medium scale businesses aimed at promoting the structural conversion and sophistication of industries, as well as the respective enforcement order.

b. Export inspection law aimed at promoting the exports, and export inspection item order.

c. Industrial standardization law aimed at promoting the industrial standardization, and the respective enforcement order.

d. Industrial location law and industrial rearrangement promotion law aimed at promoting the industrial relocation.

e. Law of measures for promotion of specific industries, aimed at fostering specific types of industries.

There are many examples of legislation systems for industrial promotion in Japan and other industrialized countries, and they are working successfully.

(9) Scheme of School Education/ Vocational Training Programs

In Thailand there are six national universities and one college with courses related to metalworking industry, and the number of students graduated form the said courses in the 1978 - 1982 period is under 2000 per annum. The number of holders of the Master degree is under 100 (1983). The said figures expressed in terms of population ratio correspond to less than 1/10 of the corresponding figures of industrialized and newly-industrialized nations.

The said fact indicates that an urgent expansion of the school education system is required in order to realize the promotion of the metalworking industry which is a technology-intensive sector.

On the other hand, the formation of an appropriate teaching body is indispensable in order to support the said state of things, and after the realization of the schemes proposed in (1) to (6) above, it is desirable to add futurely contents able to provide subsidiary support to the said social needs.

Furthermore, it must be borne in mind that there are cases such as the Faculty of Engineering of the Churalonkong University, which was left behind in terms of modernization of research and training facilities, and is being outstripped by the newcomer King Monkut Institute of Technology. Such being the case, modernization is a particularly urgent issue in such institutions too.

On the other hand, the number of diploma technicians and certificate technicians related to the metalworking industry is also under 1/10 of the corresponding ones of industrialized nations and NICS.

It is indispensable to bear in mind that the scale and quality of school education is the fundamental conditions for promotion of specific industries, and particular attention should be paid in connection with the expansion and improvement of this sector.

Reference: Number of schools with curricula related to the metalworking industry

- Technical Institutes (national)	76
- Vocational Institutes (national)	68
- Private schools	260
- Colleges of Technology and Vocational Education (national)	20
- Universities (6) Colleges (1) (national)	7

2) Private Level Programs

Programs for promotion of the metalworking industry reflecting the selfreliance of the private sector are proposed in the form of program of activities to be developed after the establishment of specialized industrial organizations. (e.g. exchange of information, definition and commissioning of collective R & D themes, etc.).

(1) Scheme for Promotion of the Establishment of Industrial Organizations (Industrial Associations) by Type of Processes and Products in Specific Way

The outline of this scheme is described in the item (7) of the scheme referring to government level policies. Public institutions should play a leading part until the establishment of organizations of this kind, but in connection with the operation it is recommendable to establish urgently a system making it possible to run the organization in an autonomous way by collecting membership fees and financial sources. The principal activities will be the collection of information, coordination of the opinion of the members regarding promotion projects, cooperative test and inspection system, instruction and arrangement for entrusted jobs, discussion and decision and implementation of commonly interested R & D theme, preparation of statistical data, procurement of materials, collectivization of the acceptance of orders, etc. Furthermore, from the standpoint of promotion of the subcontracting activities, it is recommendable to make efforts regarding the assurance of quality of the sector as a whole, upgrading of the after service system and to make it customary to use written documents related to specifications and instructions (specification sheet, drawings, etc.).

3) Government-Private Cooperation Level

Irrespective of the leadership of either private or government sector in connection with the promotion at either of the aforementioned levels 1) or 2), an incessant teamwork between the two sectors in question will be required in order to make it possible to realize each one of the said schemes.

In particular, the government level schemes (1) and (6) should aim at a semi-autonomous form of operation in the medium- and long-range, by creating conditions propicious for establishment of the beneficiary principle in order to realize a continuous invigoration of its activities in the long-range.

The cooperation between the public and private sector will be particularly desirable in connection with such aspects as definition of standards and tolerances, utilization of public institutions for inspection and diffusion of education and or training regarding production control (quality, process and cost).

4) Programs at the Level of Individual Firms

Steps regarding improvement measures, productivity campaigns, etc., to be considered at the level of each individual companies are described here, with the purpose of providing the milestone of the promotion measures at microscopic level.

(1) Scheme for Promotion of Cooperatives

These cooperatives should play the functions described in the followings in connection with metalworking firms located in specific areas, with the purpose of rationalizing the business management and improving the productivity. The support of public institutions regarding the financing of funds for establishment of these cooperatives is particularly desirable, in order to help promoting this scheme.

a. Coordination of the interests of the member companies of the cooperative and diffusion and collection of information.

b. Joint purchase of raw materials and mutual supplementation among member companies.

c. Mutual cooperative use of inspection, test and measuring equipment.

d. Joint activities regarding market survey, market development, advertisement and propaganda.

e. Planning and joint implementation of education and training.

f. Negotiation of financing and joint surety (Referring to collective use facilities such as material storage yard, welfare facilities, pollution control facilities, weighing and measuring facilities, etc. The collective use of manufacturing facilities is not recommendable, because there is direct shock of interests between the member companies and problems occur very frequently).

(2) Upgrading of the Technical and Control Level

a. Establishment of the quality assurance system (documentation of specification and drawings, recording, sorting, analysis and feedback of data, strengthening of after-sale service, in-house education).

b. Preparation of work standards and work manuals.

c. Strengthening of management control capacity (education, participation in seminar and other events, etc.).

d. Schedule, materials, facilities and equipments, cost, labour, safety, design.

5) ASEANs Level

The attitude of the various countries of the ASEAN region regarding the promotion of the metalworking industry is practically at the same pace, with exception of Singapore and Brunei.

It is necessary to create a Metalworking Industry Sub-committee within the ASEAN Committee of Industry, Mines and Energy (ASEAN COIME) in charge of the creation of buds for implementation of metalworking industry promotion projects within the ASEANs, such as the system of division of work within and outside the region, cooperative promotion projects, technology transfer and technology sharing projects in multinational scale, etc., in order to set forth the substantial cooperation within the region, and to improve the efficiency of such activities as exchange of information between promotion institutions of the various ASEAN countries, training seminars, technology transfer, technology sharing etc. In the particular case of Thailand it is necessary to make efforts to cultivate real technical power in order to become a strategic base for international cooperation and technology transfer to such neighbouring LLDCs as Bangladesh, Nepal, Burma, etc., and other similar countries such as Laos, Cambodia, Viet-Nam, etc., in the future.

Particularly in connection with the development and education of human resources related to technical and management aspects, it is necessary to cultivate real technical capability and accumulate software assets through the production of audio-visual materials and documents such as manuals, leaflets, etc., in order to expand the range of mutual exchange.

10. PROMOTIONAL PRIORITY PROJECT PROPOSALS

10. Promotional Priority Project Proposals

In order to encourage the growth of an industry, it is desirable to implement well balanced, governmental promotional policies.

The following four project proposals are introduced in this chapter, aiming at a superior overall effect of promotional measures for the Thai metalworking industry by making a package of the four factors of technology, finance, location and market.

Namely,

(1) Establishment of a technology oriented independent organization to make the nucleus in promoting the metalworking industry in Thailand.

The organization is expected to be instrumental mainly in

1) developing human resources
2) disseminating necessary information
3) introducing, improving and implanting technology, and
4) coordinating programs for the above purposes.

(2) Financial support for promotion of industrial modernization restructure.

(3) Promotion of rationalization through relocation of production operation.

(4) Market support for export promotion.

These make the four pillars to promote the Thai metalworking industry.

A flow chart rendition of these projects in the overall flow of promotional programming is shown on next page.

10.1 Project Proposal 1.

Establishment of Metalworking Industry Promotion Center

10.1.1 Background

In Article 4.4 and 4.5 the actual situation of the metalworking industry in Thailand was detailed and analyzed by process and product. Conspicuous and latent issues thereof have also been extracted and some recommendations to resolve them have been proposed. Some issues are specific to respective products, processes and firms, but others are difficult to be resolved by themselves, especially small and medium scale firms in the country. These issues are observed in technology, managerial control, market, finance and personnel affairs. These issues and problems seem not to be independent, but related each other.

Therefore, resolutions should be made on the integral standpoint of view. Among from these issues, technical problems are summarized as follows:

(1) Lack of engineering and managerial technology,

(2) Low productivity and low quality of products due to time-worn facilities,

(3) Lack of skilled workers,

(4) Feeble subcontract structure due to the technology gaps between small/medium scale industry and large scale firms, especially foreign capitalized firms.

On the other hand, the Thai government has been undertaking the industrial re-construction program with emphasis on the promotion of exports, small and medium scale industries, regional industries and increase of employment opportunity in the fifth five year social economic development plan and the succeding sixth five year plan, and emphasizing the promotion and development of the engineering industries like metalworking and electric/electronics industries.

Thus, it is an urgent subject to upgrade the technologies and to modernize the facilities of small and medium scale industries coping with industrialization in the country, which are more than 90% in number of the whole metalworking industry. However, judging from their actual potential, they could not attain it individually due to the lack of technology and finance.

Therefore it is recommended as the first priority of project proposals that a strong and effective governmental supporting organization like 'metalworking industry promotion center' be established.

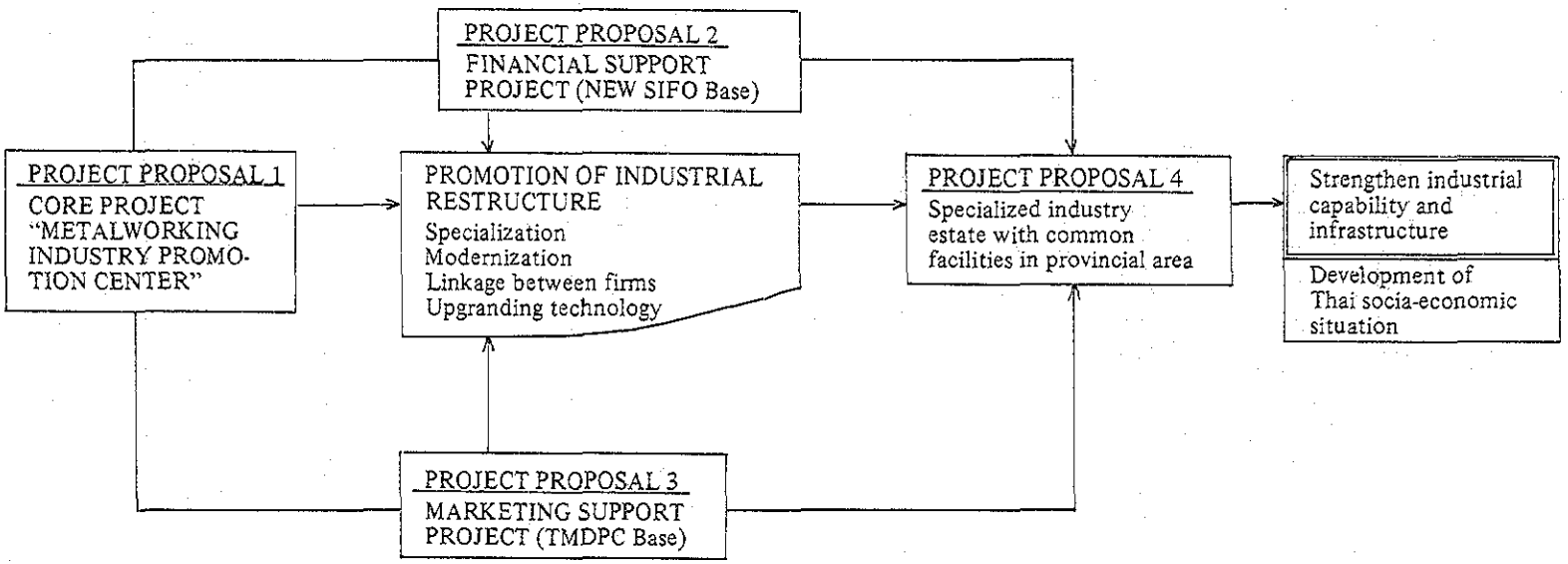


Fig. 10-1 Promotional Priority Project Proposal Master Plan

10.1.2 Functions and Activities of the Center

(1) Functions and activities

The metalwork industry promotion center will be situated on the position between high leveled academic educational and research organizations like universities and research institutes and primary technical training organizations like vocational training schools and technical schools. Refer to Figure 10.1.2-1.

The center, as mentioned before, will play a role as an assistant and promoter for upgrading and improving the technology level of engineers, skilled technicians and managerial persons of the private sectors, above all, of small and medium scale firms. And also instructors and teachers of vocational training schools and technical schools will be educated and trained here.

Furthermore, the center will carry out not only service to the private sectors, but proper jobs, research, development and technological information study, etc, for the engineering industries of the country.

Main functions and activities of the Center will be expected as follows,

1) Development of human resources

   Activities;

   - Seminars and Training courses

     Metalworking technologies by process; casting, forging welding, heat treatment, plating, machining, machinery design, drawing and basic material engineering will be lectured and trained in the Center.

   - Roving Extension Service

     Periodical and optional extension services will be made mainly to small and medium scaled enterprises.

2) Support and Assistance for Managerial Technology Improvement.

   Activities;

   - Seminars and Training Courses:

     Managerial technologies such as production control, quality control, cost control and pollution prevention technology will be lectured and trained in the Center.

   - Extension Service.

     Roving extension service and business diagnosis will be conducted to small and medium scale industries.

3) Support of firm's production activities.

Activities;

- Entrusting service of Manufacturing, Testing and Measuring.

  The center will be equipped with precise and specialized production equipment and inspection and testing facilities, and will serve small and medium scale firms with fee or without fee, because almost all of them have not such facilities. Furthermore, operational training on these equipment will be conducted to the firms who are planning to introduce such an equipment in future.
- Consultation of Factory establishment and Layout

4) Applied Research and Development

The center will carry out applied research development and testing, which will be appropriate for the actual situations of the country, for instance, low cost automation system, jigs and fixture development, methods of inspection and testing, trial production of machinery components etc. The fruits of development will be disseminated to the private sectors.

5) Information Service and Publishment

- Library and Audio-visual education system will be opened to the public.
- Collection and interpretation of technical reports and papers
- Publishment of bulletin
- Advertisement and promotion of utilization of the Center
- Preparation of industrial standards and regulations and proposal to the governmental organizations concerned.
- Technical information interchange and personnel interchange with other organizations concerned.

The above mentioned activities are detailed in Table 10.1.2-2(a)(b)(c)

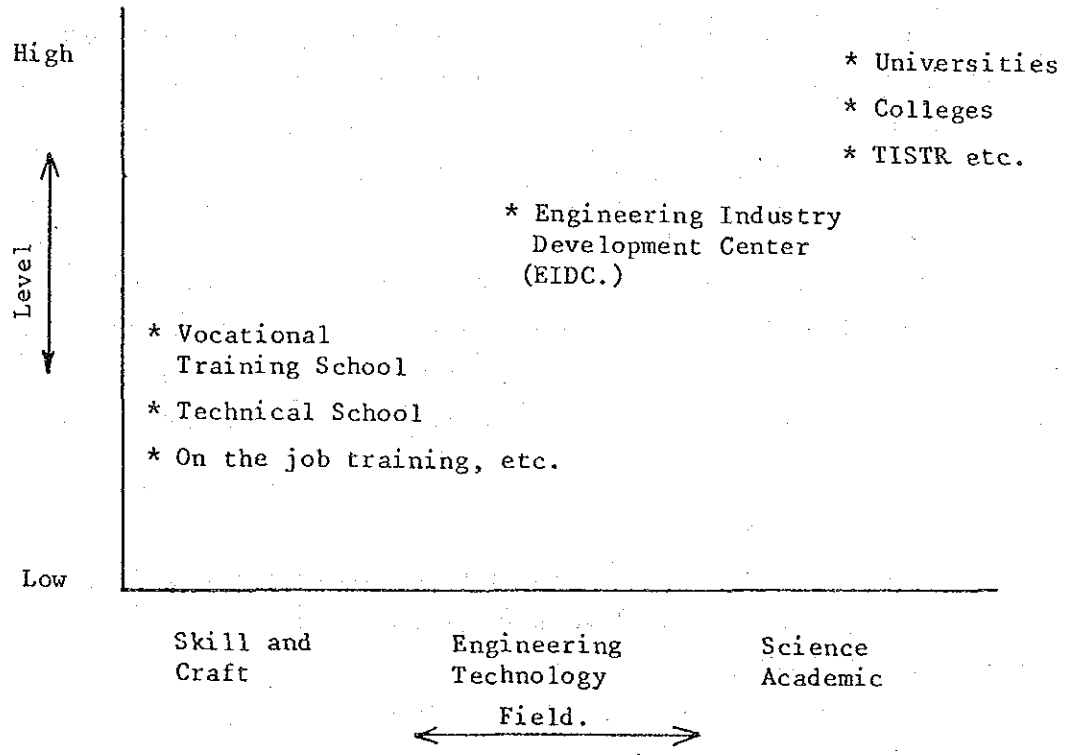


Fig. 10.1.2-1 Position of the Center

Table 10.1.2-1 Function and Roles by Time Elapse

Purpose	Function and Roles by Time Elapse		
	PHASE-1 (Founding ∿ 4th Year)	PHASE-2 (5th Year ∿ 7th Year)	PHASE-3 (8th Year ∿)
(1) Training and Education of Personnel	Sympodium (for enterpriser, top-managements) Seminar (for middle managements) Workshop, training course (for patrol instructors, middle managements)	Symposium (for middle managements) Seminar (for patrol instructors, middle managements) Workshop, training course (for field foremen, etc.)	Symposium (for patrol instructors, middle managements) Seminar (for field foremen) Workshop, training course (for skilled workers)
(2) Transmission and Spread of Information	Patrol guidance (short period), Issue of circular (at three months interval)	Patrol guidance (short/middle period), Diagnosis of enterprises (short period), Issue of circular (at one month interval), Transfer and interchange of engineering (within Thailand)	Patrol guidance (short/long period), Diagnosis of enterprises (short/middle period), Statistic/publishing, Transfer and interchange of engineering (within ASEAN territory)
(3) Introduction and Improvement of Engineering	Production control (process, quality, cost, etc.) Design engineering Test and Inspection Working under consignment and trial manufacture Market research, feasibility study	same as left, and management engineering	same as left, plus development
(4) Planning and Adjustment	Organizing fields, etc.	Promotion of high precision metal-working, specializing of enterprises, and promotion of special metal working	Standardizaion, approval of type, development of qualification and certification system

Metalworking Industry Promotion Center (MIPC)

Table 10.1.2-2(a)

Function, Role and Activity Program Phase-1 (Start up - 4th year)

Kind of processes/products \ Function/duty		(1) Training/education of personnel				(2) Transmission and defusion of information				(3) Introduction and improvement of engineering capability											(4) Planning and coordination			
		Enterpreneurs, Executives	Middle managements	Foremen, etc.	Extension officers	Technical information (circular)	Transfer and interchange of technology	Statistic, publishing	Extension service and diagnosis of enterprises,	Production control (process, quality, cost)	Design engineering	Management technology	Test & Inspection: Material	Test & Inspection: Nondestructive testing	Test & Inspection: Plasticity	Test & Inspection: Accuracy	Test & Inspection: Chemical	Research and survey: Market research, F/S	Research and survey: Trial product, R & D	Entrusted jobs	Organizing firms, etc.	Specializing of firms, and promotion of special metalworking sector	Modernization of industries	Standardization, authorization approval of proto type products Qualification and certification
Kind of Processes	Casting	○	○		○	○			○	○	○		○				○	○		○	○			
	Forging																		○		○			
	Sheetwork and welding	○	○		○	○			○	○	○		○	○	○					○	○			
	Plating				○	○			○	○	○						○			○	○			
	Machining and machine assembling	○	○		○	○			○	○	○		○			○		○		○	○			
	Presswork				○	○			○	○	○								○		○			
	Precision machinery	○	○		○	○			○	○	○		○			○			○	○	○			
	Heat treatment	○	○		○	○			○	○	○		○							○	○			
	Low cost automation	○	○		○																○			
Kind of Products	Agricultural machinery	○	○		○	○			○	○	○		○					○	○		○			
	Pump, valve												○								○			
	Mold/dies	○	○		○	○			○	○	○		○					○		○	○			
	Hand tool																				○			
	Machine tools								○	○	○								○		○			
	Automotive parts					○			○	○	○		○								○			
	Gears	○	○		○	○							○					○		○	○			

Metalworking Industry ..omotion Center (MIPC)

Table 10.1.2-..)

Function, Role and Activity Program Phase-2 (5th - ..th year)

Function/duty / Kind of processes/products		(1) Training/education of personnel				(2) Transmission and defusion of information				(3) Introduction and improvement of engineering capability											(4) Planning and coordination			
		Enterpreneurs, Executives	Middle managements	Foremen, etc.	Extension officers	Technical information (circular)	Transfer and interchange of technology	Statistic, publishing	Extension service and diagnosis of enterprises,	Production control (process, quality, cost)	Design engineering	Management technology	Test & Inspection: Material	Test & Inspection: Nondestructive testing	Test & Inspection: Plasticity	Test & Inspection: Accuracy	Test & Inspection: Chemical	Research and survey: Market research, F/S	Research and survey: Trial product, R & D	Entrusted jobs	Organizing firms, etc.	Specializing of firms, and promotion of special metalworking sector	Modernization of industries	Standardization, authorization approval of proto type products Qualification and certification
Kind of Processes	Casting	○	○	○	○	○	○		○	○	○		○				○			○	○	○	○	
	Forging	○	○	○	○	○			○										○		○			
	Sheetwork and welding	○	○	○	○	○	○		○	○	○		○	○	○					○	○		○	
	Plating	○	○	○	○	○			○	○	○						○			○	○	○		
	Machining and machine assembling	○	○	○	○	○	○		○	○	○		○			○				○	○	○		
	Presswork	○	○	○	○	○			○	○	○							○	○		○			
	Precision machinery	○	○	○	○	○			○	○	○		○			○				○	○	○	○	
	Heat treatment	○	○	○	○	○			○	○	○		○							○	○	○		
	Low cost automation	○	○	○	○																○			
Kind of Products	Agricultural machinery	○	○	○	○	○	○		○	○	○		○						○		○	○	○	
	Pump, valve	○	○	○	○				○				○					○			○	○		
	Mold/dies	○	○	○	○	○	○		○	○	○		○							○	○	○	○	
	Hand tool	○	○	○	○													○			○			
	Machine tools	○	○	○	○				○	○	○							○	○		○	○	○	
	Automotive parts	○	○	○	○	○	○		○	○	○	○	○								○	○	○	
	Gears	○	○	○	○	○							○							○	○			

Metalworking Industry Promotion Center (MIPC)

Table 10.1.2-2(c)

Function, Role and Activity Program Phase-3 (8th year -)

Function/duty / Kind of processes/products	(1) Training/education of personnel				(2) Transmission and defusion of information				(3) Introduction and improvement of engineering capability											(4) Planning and coordination			
												Test & Inspection					Research and survey						
	Enterpreneurs, Executives	Middle managements	Foremen, etc.	Extension officers	Technical information (circular)	Transfer and interchange of technology	Statistic, publishing	Extension service and diagnosis of enterprises,	Production control (process, quality, cost)	Design engineering	Management technology	Material	Nondestructive testing	Plasticity	Accuracy	Chemical	Market research, P/S	Trial product, R & D	Entrusted jobs	Organizing firms, etc.	Specializing of firms, and promotion of special metalworking sector	Modernization of industries	Standardization, authorization approval of proto type products Qualification and certification
Kind of Processes																							
Casting	○	○	○	○	○	○	○	○	○	○	○	○				○		○	○	○	○	○	○
Forging	○	○	○	○	○			○	○	○								○		○			
Sheetwork and welding	○	○	○	○	○	○	○	○	○	○	○	○	○	○					○	○		○	○
Plating	○	○	○	○	○	○	○	○			○					○			○	○	○		
Machining and machine assembling	○	○	○	○	○	○	○	○	○	○	○	○			○				○	○	○		
Presswork	○	○	○	○	○			○			○							○		○			
Precision machinery	○	○	○	○	○			○	○	○	○	○			○			○	○	○	○	○	
Heat treatment	○	○	○	○	○			○				○							○	○	○		
Low cost automation	○	○	○	○																○			
Kind of Products																							
Agricultural machinery	○	○	○	○	○	○	○	○	○	○	○	○						○		○	○	○	○
Pump, valve	○	○	○	○								○								○	○		○
Mold/dies	○	○	○	○	○	○	○	○	○	○	○	○						○	○	○	○	○	
Hand tool	○	○	○	○														○		○			
Machine tools	○	○	○	○				○	○	○								○		○	○	○	
Automotive parts	○	○	○	○	○	○	○		○	○	○	○					○	○		○	○	○	○
Gears	○	○	○	○	○			○				○						○	○	○			

(2) Methodology of Education

Curricula of Seminars and Training courses.

The curricula of the education in the center will aim at upgrading of practical technologies not only through 'on the desk" study, but through sufficient practices with emphasis on metalworking process technology and engineering such as casting, forging, welding, heat treatment, electroplating and machining. These technologies are substantial for improvement and stabilization of quality and cost of production. Furthermore, the curricula and the facilities of the center will aim at engineering design and production of the target products which have been characterized by the government of Thailand in the information for the discussion with JICA team in 1983 "On the Study on the Promotion of Metalworking Industries in the Kingdom of Thailand".

The targets are:

- Agricultural machinery
- Pumps and Valves
- Simple machine tools
- Hand tools and tool and dies
  Electrical parts and equipment
- Automobile spare parts
- Industrial machineries

Some examples of the curriculum are shown hereinafter.

A. Technical Course (Process oriented)

1) Casting process.

A consistent casting technology from pattern making to finishing will be taught, and at the same time systematic inspection method in each process will be emphasized so as to produce high quality sophisticated products. And more molten metal treatment technologies like spheroidal treatment will be taught coping with diversification and sophistication of the engineering industries in the country.

As molding process, green sand mold, Furan binder mold, Co2 gas mold and shell mold technologies will be taught. From the view points of materials, cast iron, cast steel, copper alloy and light metal alloy will be treated. Furthermore, the center will be equipped for the future with facilities and capability which enable to produce actual products in semi-production scale and to serve SMIs in the fields.

2) Forging and Heat-treatment Process.

Die forging and stamp forging technology as well as free forging will be taught and importance of heat treatment on machinery components and tools will be recognized in this course. At the same time, various metallurgical inspection techniques will be trained.

3) Welding process.

A stress will be placed on welding process, welding design and various control technologies as well as general welding technologies. And also, inspection of welding defects will be particularly emphasized through basic quality control conception. Furthermore, special welding technologies such as frictional welding and electro beam welding will be adopted here in future.

4) Machining process and measuring technique.

A stress will be placed on precise machining such as tool, die and gear coping with sophisticated industrialization of the country. The curricula of machining course will be consist of engineering, design and drawing as well as machining techniques. Precise measuring technology and facilities are mostly behind the times in the small and medium scale metalworking industries in Thailand, so it will be much emphasized together with quality control by means of actual production.

5) Plating process.

In the early period, electroplating technologies will be trained using the existing facilities in ISI. However, in future, surface treatment technologies as well as electroplating will be adopted in the curriculum and facilities. In this project, a model plant of waste water treatment system will be equipped with, and its performance and running cost will be studied. The objective of this plant aims at "Industrial Estates" of plating industries in the country, where such a waste water plant will be substantial.

6) Metallurgical Laboratory.

It is needless to say that the strength and property inspection and testing of raw materials are important to metalwork products. It seems, however, difficult for private firms in particular, for small and medium scale ones to own inspection and testing facilities. Therefore, the center will be equipped with these facilities and serve those jobs' for firms. Furthermore, the center will conduct research and test on basic raw materials which are used in the country, and the data of the research will be disseminated to the

public and private sectors. To complete these research and test, enormous times and budget will be taken, so it will be desirable to co-research with universities and research institutes concerned.

B. Engineering and Design Course (Product oriented)
- Basic and applied machine design
- Tools and die
- Gears
- Simple machine tool
- Pump and valves
- Agricultural machinery, etc.

C. Managerial Course.
- Production control
- Quality control
- Market research
- Personnel management
- Pollution prevention
- Subcontractor control
- Factory construction and shop layout, etc.

Some examples of curricula are shown in Table 10.1.2-3 and 10.1.2-4.

Methods of Lecture and Training

1) "In the room" lectures and seminars.

The objects of education and training in the center are entrepreneurs, skilled technicians and engineers in private firms and public organizations who are always busy with their daily jobs. Therefore, effective methods should be adopted as teaching and training media, so as for them to master the practical technologies in short period. For this purpose, an audio-visual education system will be used together with printed matters. In this system, the education materials (soft-ware) is more important than the facilities (hard-ware) Therefore, some specialized engineers will be nurtured for this system and they will develope and produce educational material successively.

2) Training

Not only in the technical course, but in the engineering and managerial courses, practical trainings will be emphasized so that trainees can serve daily practical jobs.

3) Study tours to other public or private firms.

Study tours will adopted in the curricula as occasion demands.

Lecturers and Instructors

Lecturers and instructors of the said courses will be consist of permanents and non-permanents.

Permanents: MIPC officers

Non Permanents:
- from universities and institutes of the country
- veteran engineers and managerial persons from private firms
- experts and fellowships from foreign countries.

Table 10.1.2-3 Curricula of Technical Course

Course	Contents	Remarks
Casting Technology Course	Molding process	1 week
	• General	
	Characters of molds,	
	Properties of molding materials	
	Selection of molding	
	Mold reactions	
	• Green sand mold	1 week
	Characters on G.S. mold	
	Molding mach. of G.S. mold	
	Sand Treatment of G.S.	
	Training of sand testing	
	• Special mold	1 week
	Co2 gas mold	
	Skill molding process	
	Furan binder mold	
	Training of each molding method	
	• Gating system	1 week
	Metal flow in Mold	
	Principle and application of gating	
	principle and application of risering	
	Control of solidity in mold	
	Metallurgy of Cast metal	1 week
	• Gray cast iron	
	• Spheroidal graphite cast iron	
	• Cast steel	
	• Copper alloys	
	• Aluminium alloys	
	• Inspection of micro structure	
	Melting	1 week
	• Training of melting tech.	
	Cupola Operation	
	Inspection of molten iron	

Table 10.1.2-3 Curricula of Technical Course (continued)

Course	Contents	Remarks
	Induction furnace operation Crucible furnace operation for aluminium alloy	
Casting Technology Course (continued)	Technology of Molten Metal Treatment · Inoculation · Spheroidal treatment · Degassing treatment on Al-alloy · Heat treatment on cast steel	1 week
	Application on Quality Control · System of molding sand · Quality of cast metal · Application to casting process	1 week
	Pattern making	1 week
	Special course · Situation of castings in metalworking · Recent development on casting technology · Mechanization of foundry	1 to 2 days
Welding Technology Course	Application Technology · Material and welding · Management and control of electrods · Selection and management of welding machines · Welding preparation works · Welding process and its management · Trouble shooting procedure · Welding engineering, basic · Planning method.	

Table 10.1.2-3 Curricula of Technical Course (continued)

Course	Contents	Remarks
Welding Technology Course (continued)	Individual Technology · Gas welding · Arc welding (1) and (2) · Semi-automatic CO2 arc welding (1) and (2) · Tig welding · Low temperature welding-brazing · How to interpenetrate drawing of welding structure · Welding process technology (1) and (2) · Displacement measuring method · Penetration and magnetic flow detector · Ultrasonic detector · X-ray test	
Machining Technology Course	General · Calculation method of metal weight, cutting speed and cutting power, etc. · Properties of metals steel, iron and non-ferrous metals	1 day
	Cutting · Kind of machine tools · Machinability · Cutting tools · Cutting conditions	2 days
	Setting · Setting jigs and fixture · Setting methods	1 day

Table 10.1.2-3 Curricula of Technical Course (continued)

Course	Contents	Remarks
Machining Technology Course (continued)	NC programming • Program for lathe • Program for machining center	1 week
	Measuring • Accuracy and error • Measuring instruments and method	1 day
	Control • Quality control in machining • Working time control • Working schedule	3 to 4 days

Table 10.1.2-4 Curricula of Machinery Design Course

Course	Contents	Remarks
Basic Machinery Design Course	Fundamental course · Outline of machinery design · Material strength · Permissible strength and safety factors · Stress concentration · Fatigue strength · Tolerance and accuracy · Surface finishing and roughness · Standards and regulation · Unit and symbol · Fundamental mathematics · Machinery dynamics · Mechanics	1 week
	Applied machinery design (I) · Casting design · Welding design · Basic machinery component thread, bolt and nut shafts, spring, valve link mechanism, cam, vessels, piping, gears, coupling, brake, sealing, bearing, chain and belt. etc.	1 week
	Applied machinery design (II) · Agricultural machinery · Pump and valves · Hand tool and farm tool · Simple machine tool · Automation etc.	1 week

Table 10.1.2-4 Curricula of Machinery Design Course (continued)

Course	Contents	Remarks
Practical Gear Design and Engineering	General · Power transmission system · Types and application · Kinds and feature of gears · Kinds of tooth form · Bearings · Coupling, brake and clutch	1 day
	Fundamental Gear Design · Design process, flow chart · Design conditions · Decision of gear specification · Shafting, bearing, key, seal and coupling, etc. · Gear housing · Lubrication system · Drawings	3 to 4 days
	Advanced Gear Design · Forced lubrication system system design, loss power, supply oil quantity, etc. · Vibration; torsional, lateral and axial · Oil film on tooth surface · Tooth form modification · Profile shifted gear · Shaft alignment · Differential gears	2 to 3 days
	Applied Gear Design · Marine use gears · Industrial use gears . Gears for farm machinery, construction , Machinery and machine tools, etc.	2 to 3 days

machinery and machine tools, etc

Table 10.1.2-4 Curricula of Machinery Design Course (continued)

Course	Contents	Remarks
Practical Gear Design and Engineering (continued)	Seminar for Users · Selection of gears, couplings and clutches · Maintenance · Gear troubles · Purchase order sheet	1 day
	Special Seminars · Standardization of gears · Planning of gear shop construction · Development and Lab. test · Tooth profile theory, etc.	2 to 3 days
	Production · Process and procedure · Production facilities · Production technology · Assembly and check items · Tool regrinding and maintenance · Machine maintenance and repair	1 weeks
	Inspection · Gear inspection by process · Inspection instruments and technique · Inspection record and application to quality control	3 to 4 days

10.1.3 Operation of the Center

(1) Organization

The center will be established under the Department of Industrial Promotion of the Ministry of Industry.

Three divisions will be organized under the Director of the Center, of which functions are as follows;

1) Administrative and Information Division
   - Adjustment and management of general schedules and budget of the center
   - Future planning and adjustment
   - Personnel planning and control
   - General planning and scheduling of seminars, trainings and (roving) extension services
   - Managing of library and Audio visual education system
   - Interchanging contact to other organizations concerned
   - Publication of bulletines, technical information etc.
   - Advertisement and dissemination of the activities of the center.
   - Acceptance of seminars, training and entrusted services.
   - Other general affairs, etc.

2) Engineering Division
   - Curricula planning and execution of seminars and training courses
   - Control and procurement of lecturers and instructors
   - Research and development
   - Instruction to extension services
   - Drafting and proposal of industrial standards
   - Drafting future plan
   - Planning and editing of educational materials
   - Study and translation of technical papers and reports etc.

3) Production Training Division
   - Training and instructing of trainees
   - Production of entrusted jobs
   - Development and trial production of jigs and fixtures
   - Trial production and testing of developed products

- Maintenance of facilities and equipment
- Instruction of extension services
- Introduction plans of facilities and equipment
- Scheduling of facilities and control, etc.

The organization chart is shown in Fig. 10.1.3-1.

(2) Personnel Plan

1) Number of persons for operating the center

In the first 3 year period, the center will be operated by approximately 70 government officers and skilled instructors and more than 10 external experts. And, non-permanent lecturers and fellowships will be temporarily provided on demand for seminars and lectures.

In the second 3 year period, a few external experts will be reduced, and some officers will be increased in compensation for them.

After the second period, the center will be operated mostly by proper persons, excluding temporary external experts. The personnel plan is shown in Table 10.1.3-1.

2) Training of the staff of the center

The success or failure of this project is greatly dependent on the quality of the staff of the center. Qualified engineers, technicians and administrators are insufficient at present for operating the center.

Before and after the completion of the center, two or three trainees will be sent to abroad for three to six months twice every year. The training will be periodically succeeded for the future.

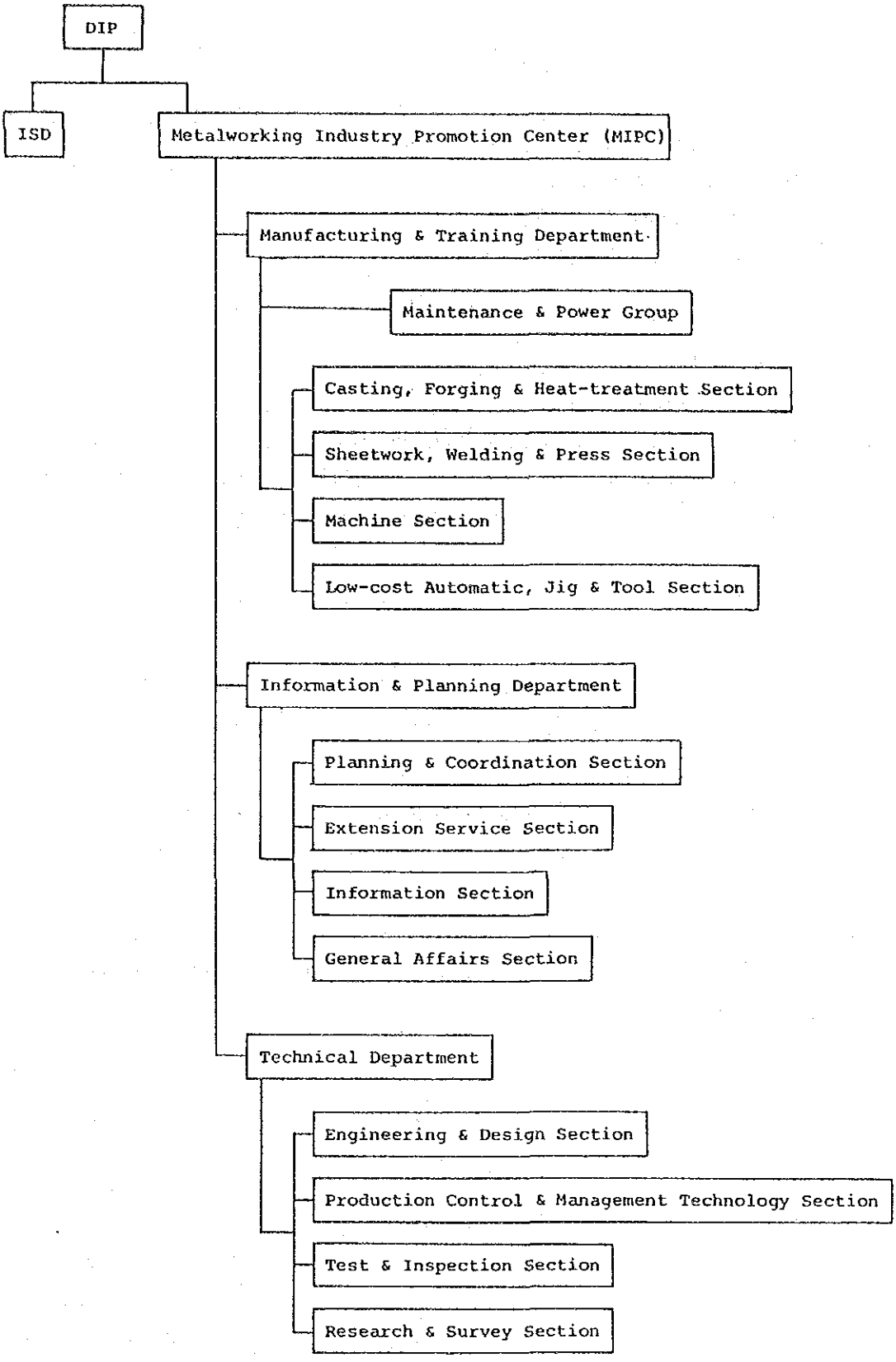

DIP
ISD
Metalworking Industry Promotion Center (MIPC)
Manufacturing & Training Department
Maintenance & Power Group
Casting, Forging & Heat-treatment Section
Sheetwork, Welding & Press Section
Machine Section
Low-cost Automatic, Jig & Tool Section
Information & Planning Department
Planning & Coordination Section
Extension Service Section
Information Section
General Affairs Section
Technical Department
Engineering & Design Section
Production Control & Management Technology Section
Test & Inspection Section
Research & Survey Section

Fig. 10.1.3-1

Table 10.1.3-1 Number of Staff Required by Phase

		Phase I (4 years)				Phase II (3 years)				Phase III (3 years)			
		Civil Serv.	Permanent Staff	External Exp. long	temp.	Civil Serv.	Permanent Staff	External Exp. long	temp.	Civil Serv.	Permanent Staff	External Exp. long	temp.
Administration & Information Div.	Administrative Section	3	6			3	7			5	7		
	Information Serv. Sec.	2				2				2			
	Roving Extention Service Sec.	2				4			2	4			4
	Planning Sec.	5		1		5		1		5		1	
Engineering Division	Engineering Sec.	18	1	8		20	1	6		20	1	3	5
	Managerial Control Sec.	2		1		3	1		3	4			3
	Experiment and Inspection Sec.	3	1	1	2	3	1	1	3	3	1	1	3
	Research and Investigation Sec.	3		1		3	1	1	3	3			3
Product Tech. Training Division	Maintenance Gr.	1	2		2	1	2		2	1	2		2
	Casting, Forging & Heat Treatment Shop	3	7		8	4	7		10	4	7		10
	Sheetmetal Working Shop	3	4		6	3	4		6	3	4		6
	Machining Shop	2	3		6	3	3		6	4	4		6
	Semi-automation and Tool Shop	1	1			1	1		3	2	1		3
Total		48	25	12	24	55	28	10	38	60	27	5	45

Table 10.1.3-2 Training Program of Center's Staff

		Before Operation (1985 - 1986)			Phase I (1987 - 1990)			Phase II (1991 - 1993)			After Phase III		
		Abroad	In Country	In Center	Abroad	In Country	In Center	Abroad	In Country	In Center	Abroad	In Country	In Center
Function	Engineer	4	4	4	5	2	2	2	2	2	As shown below		
	Technician	3	10	12	5	8	4	3	3	3			
	Managerial Eng'r	1	2	4	2	2	2	1	1	1			
	Total	8	16	20	12	12	8	6	6	6			
Technology Field	Casting	2	4	3	1	2	-	1	1	-	One or two as occasion demands	One or two as occasion demands	One or two as occasion demands
	Forging	-	1	1	1	1	-	-	1	-			
	Heat Treatment	1	1	2	1	1	-	-	-	-			
	Welding	-	1	1	1	1	2	1	1	1			
	Presswork	-	1	1	-	2	-	1	-	1			
	Plating	-	2	1	1	-	1	1	-	-			
	Machining & Measuring	2	3	4	1	1	1	1	1	1			
	Inspection & Testing	1	-	2	1	1	1	-	-	1			
	Automation	-	-	1	1	1	1	1	-	-			
	Audio Visual System	1	1	2	1	-	-	-	-	1			
	Quality Control	1	1	1	1	1	1	-	1	1			
	Production Control		1	1	1	1	1	-	1	-			
	Others	-	-	-	1	-	-	-	-	-			
	Total	8	16	20	12	12	8	6	6	6			

10.1.4 Construction plan

(1) Site

The Metalwork Industry Promotion Center will be located at the south of the Industrial Service Institute (ISI), addressed RAMA VI ROAD, BANGKOK. At present, some ISI's facilities like ceramic industry shop are in existence, which will be removed and the land will be prepared.

The required area of the site is approximately estimated at 20000 m^2.

(2) Facilities and Equipment

The main facilities and equipment of the center are as follows;

1) Administrative Building

Total floor area: 4000 m^2, four stories

- Director's and Officers' rooms
- Lecture rooms
- Guest and Meeting rooms
- Library
- Metallurgical Laboratory
- Audio-visual education rooms
- Others.

2) No. 1 Factory

Total area: Approx. 2500 m^2

- Casting shop
- Forging shop
- Heat Treatment Shop

3) No. 2 Factory

Total area: Approx. 2000 m^2

- Machining shop
- Welding shop
- Plating shop

The machining shop will be partially air-conditioned where precision machinery and measuring instruments are installed.

4) Canteen

Total area: Approx. 200 m^2

5) Dormitory

Total area: Approx. 600 m^2

with 28 single rooms, administrative room and shower rooms, etc.

6) Others

- Electricity Transformers: 500 KW x 2 sets
- Water Storage Tank: Approx. 10 m^3
- Waste Water Treatment System: 20 m^3/day
- Waste Water Treatment System for Plating: Approx. 30 m^3/day
- Parking Places: Approx. 20 cars

The main equipment and machinery are shown in Table 10.1.4-1.

Table 10.1.4-1 Main Facilities and Equipment

Shop	Items	Q'ty	Remarks
Foundry Shop	C-1. Melting Process		
Approx. 1200 m2	• H.F Induction Furnace	1	
	• Cupola	1	
	• Crusible furnace	1	
	• Laddle	1	
	• CE meter	1	
	• Pyrometer	3	
	• Others		
	C-2. Molding Process		
	• Molding machine	2	
	• Sand mill	1	
	• Sand aerator	1	
	• Belt conveyor	1	
	• Bucket elevator	1	
	• Others		
	C-3. CO2 Process		
	• Sand mixer	1	
	• CO2 gas economizer	1	
	• Others		
	C-4. Chemical Binder No bake system		
	• Sand mixer	1	
	• Sand crusher	1	
	• Sand crusher	1	
	• Vibra screen	1	
	• Reclaimer	1	
	• Bucket elevator	2	
	• Sand cooler	1	
	• Others		

Table 10.1.4-1 Main Facilities and Equipment (continued)

Shop	Items	Q'ty	Remarks
Foundry Shop (continued)	C-5. Shell Molding Process		
	• Shell machine (molding)	2	
	• Shell machine (core)	1	
	• Coated sand mixer	1	
	• Setting machine	2	
	• Others		
	C-6. Sand Testing Machine	1	
	• Sand rammer	1	
	• Permeability tester	1	
	• Ro tap sieving shaker	1	
	• Moisture teller	1	
	• Univ'l strength tender	1	
	C-7. Cleaning		
	• 4-station hanger blast	1	
	• Dust collector	1	
	• Operation panel	1	
	• Others		
	C-8. Pattern making shop		
	• Wood lathe	1	
	• Planer	1	
	• Band saw	1	
	• Router machine	1	
	• Others		

Table 10.1.4-1 Main Facilities and Equipment (continued)

Shop	Items	Q'ty	Remarks
Forging Shop	• Cut off machine	2	
W/3t O.H. Crane	• Gas cutting	1	
Approx. 350 m2	• Air hammer	1	
	• Manipulator	1	
	• Heating furnace	3	
	• Annealing furnace	1	
	• Drop hammer	1	
	• Trimming press	1	
	• Fork lifter	1	
	• Shot blast	1	
	• Compressor	1	
	• Others		
Heat Treatment	• Heating furnace	2	
Shop	• Oil bath	1	
Approx. 600 m2	• Water bath	1	
W/O.H Crane	• Carburizing furnace	2	
	• Gas atmosphere furnace	2	
	• Wash Cleaning bath	2	
	• Vacuum heating furnace	1	
	• H.F heating furnace	1	
	• Control panel	1	
	• Shot blaster	1	
	• Fork lifter	1	
	• Others		

Table 10.1.4-1 Main Facilities and Equipment (continued)

Shop	Items	Q'ty	Remarks
Welding Shop	• A.C arc welder	10	
Approx. 600 m2	• D.C. CO2 welder	4	
	• TIG Welder	2	
	• MIG welder	1	
	• Argon welder	1	
	• Submerged arc welder	1	
	• Spot welder	2	
	• High frequency welder	1	
	• Spot welder	2	
	• High frequency welder	1	
	• Ultra sonic welder	1	
	• Semi-auto gas cutter	2	
	• Manual gas cutter	4	
	• Grinder	1	
	• Boring	1	
	• Others		
Machining Shop	• Gear hobbing machine	2	
Approx. 900 m2	• Gear shaper	1	
W/O.H crane	• Gear grinder	1	
and Hoist crane	• NC profile die milling m/c	1	
	• JIG milling machine	1	
	• Vertical milling machine	1	
	• Horizontal milling machine	1	
	• Electric discharge machine	1	
	• Wire-cut E.D.M	1	
	• Planomiller	1	
	• Horizontal boring machine	1	
	• NC lathe	1	
	• Vertical lathe	1	
	• Hob sharpner	1	
	• Universal grinder	1	
	• Tool, drill, carbide tool grinder	3	
	• Floor grinder	2	

Table 10.1.4-1 Main Facilities and Equipment (continued)

Shop	Items	Q'ty	Remarks
Machining Shop (continued)	• Surface grinder	1	
	• Profile grinder	1	
	• Slotter and shaper	2	
	• Radial/bench drilling m/c	3	
	• Others		
Precise Inspection Facilities	• Involute and helix tester	1	
	• Pitch meter	2	
	• Tooth micrometer	1	
	• Hob tester	1	
	• Grinding wheel balancer	1	
	• 3-dimension coordinate gauge	1	
	• Roundness tester	1	
	• Screen projector	1	
	• Surface roughness tester	1	
	• Measuring microscope	1	
	• Black gauge	1	
	• Granite surface plate	1	
	• Digital count height gauge	1	
	• Optical parallel, flat gauge	2	
	• Cylinder gauge	1	
	• Inside/outside micrometer	8	
	• Dial gauge w/magnet base	30	
	• Others		

Table 10.1.4-1 Main Facilities and Equipment (continued)

Shop	Items	Q'ty	Remarks
Metallurgical Inspection and Testing	• Vacuum emission spectrometer	1	
	◦ C-meter	1	
	◦ Universal testing machine	2	
	◦ Fatigue testing machine	1	
	◦ Micro hardness tester	1	
	◦ Brinnell hardness tester	1	
	◦ Rockwell hardness tester	1	
	◦ Shore hardness tester	1	
	◦ Charpy impact tester	1	
	◦ Magnetic Particle inspection	1	
	◦ Ultra sonic inspection	1	
	◦ X-ray inspection	1	
	◦ Micro scope	8	
	◦ Others		
Electroplating shop	• Waste water treatment system Pumps and blowers Agitators, controller, towers, tanks, filter press control panel, etc.	1 set	Capacity 4 m3/hrs. Approx.100m2
	* Hard chrome plating unit	1	Approx.300m2
	* Cr plating unit	1	
	* Bright Ni plating unit	1	
	* Cu cyanide plating unit	1	
	* Zinc plating unit	1	

Remark : The items marked * will be transfered from the existing plating shop of ISI

Table 10.1.4-1. Main Facilities and Equipment (continued)

Shop	Items	Q'ty	Remarks
Education and Roving service facilities	. Video studio system	1 set	
	. Video editing system	1	
	. Film chain system	1	
	. Seminar room system	1	
	. Individual study system	1	
	. Video display system	4	
	. Field production system	1	
	. Field production system	1	
	. Portable recording system	2	
	. Video mobile system	1	
	. Micro-computer	2	
	. Minibus for roving service	3	
	. Photo copy m/c	1	
	. Word processor	2	
	. Jeep	1	
Low cost automation system	. Portable pneumatic training kit	1 set	
	. Hydraulic & pneumatic devices cross-section	1 set	
	. Pneumatic & pneumatic electric control training unit	6 sets	
	. Pneumatic sequence programmer	2 sets	
	. Hydraulic & hydraulic electric control training unit	3 sets	
	. Pneumatic electronic sensor devices	1 set	
	. Air compressor 5 HP 380 V. 3 phases	2 sets	

(3) Master Schedule of Construction

The target point of completion of the center is placed on March in 1987, and on the basis of the target, the master schedule is coordinated as shown Table 10.1.4-2.

Basic Design	Dec. 1984 to Feb. 1985	3 months
Detailed Design	July, 1985 to Feb. 1986	8 months
Land Preparation	July 1985 to Oct. 1985	6 months
Building Construction	Nov. 1985 to June 1986	8 months
Installation of facilities	July 1986 to Feb. 1987	8 months
Adjustment and Test running of Equip't	July 1987 to Mar. 1987	3 months
Operation start	April 1987	
	Total	36 months

(4) Cost Estimation

1) Construction cost

Construction cost of the center is estimated as follows,

Land	Approx. 180 million Baht
Land preparation	4
Building construction	90
Equipment & facilities	230
Utilities	1
sub-total	505 million Baht

2) Development cost of operation system

Operation system (software)	30 million Baht
Training of Thai staff	5
Dispatch of experts	10
sub-total	45 million Baht

Total cost required before the operation is totaled approximately at 550 million Baht.

3) Operation cost

Annual operation cost in the first phase:	9 million Baht
Annual operation cost the second and third phase:	12 million Baht
Annual training cost:	5 million Baht

Table 10.1.4-2 Master Schedule of Construction

	1984	1985												1986												1987											
	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Basic Design Mission	—																																							
Basic Design	—	—	—																																					
Detailed Design											—	—	—	—	—	—	—	—	—	—	—	—																		
(Land Preparation) Thai side								—	—	—	—	—	—																											
Building Construction													—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—												
Installation of Equipment																							—	—	—	—	—	—	—	—	—	—	—	—						
Adjustment of Machinery																																			—	—	—	—	—	—	—
Operation Start-up																																								o—
Operation Programa Soft-ware Development																	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—						
Dispatch of Export (Option)													-	-	-	-	-	-	-	-	-	-	Option						-	-	-	-	-	-	-	-	-	-	-	-
Training of Staff								2p			2p												2p			2p														

10.1.5 Future Plan

(1) Regional Technical Development Centers

This project, as mentioned at the beginning, is aiming at technology upgrading of the engineering industries, in particular, small and medium scaled metalworking industries in Bangkok and its surrounding area, focusing the fundamental processes such as casting, forging, welding, electroplating and machining.

As expressed in the National Development Plan, the localization of industries and the promotion of local small industries are inevitable for promotion of employment and for absorption of surplus workers of rural sectors.

For the purpose of improvement of the situation some technical development centers are needed to upgrade fundamental technologies closely related to regional industries. These centers should aim at product-oriented technologies, while the Bangkok Center aims at process oriented technologies, for example farm machinery, hand tools, food processing machines and wood and bamboo working machinery, etc.

It will be necessary that these centers should cooperate each other for technical information, co-research and entrusting research, taking leading role of the central MIPC in Bangkok.

(2) Measures for diversification and sophistication of the industry.

The MIPC does not aim at the most advanced technology, considering the present technology level of Thailand, therefore, it will be substantial that technology fields of the MIPC staff, training curricula and facilities should be improved and innovated gradually coping with diversification and sophistication of the industry in the country, for instance

- Surface treatment technologies as well as electroplating
- Nitriding, Tufftriding, CVD and PVD treatment
- Die casting, cost wax, and centrifugal casing
- Frictional welding, Electro-beam welding, Non-ferrous metal welding
- Super alloy and industrial ceramic materials, etc.

10.2 Project Proposal 2.

Expansion and Reinforcement of Financing Systems for Small and Medium Scale Firms

10.2.1 Objects of the Proposal

(1) To expand and reinforce, both quantitatively and qualitatively, the financial support of the Government to the small and medium scale metalworking industries by establishing a dedicated financing organization for small and medium scale firms to be operated under a more efficient agency loan system in view of the problems of the ongoing Loan Scheme for Small Industries Development (LSSID) centering around SIFO.

(2) To newly install in the loan program operated by the agency loan system a special lending system for modernization of facilities and equipment of the small and medium metalworking industries in order to accelerate the modernization of facilities and equipment of these industries from the financial angle.

(3) To create a financial credit supplementing system for small and medium scale firms, by which to liquidate the problems of insufficient security which constitute the bottleneck in extending loans to these firms, in order to offer indirect support to the dedicated financing organization for small and medium scale firms.

10.2.2 Background of the proposal

The field survey conducted this time revealed financing to be a critical problem for the small and medium scale metalworking industries. On the other hand, the number of respondents who answered that they received financial support of the Government was less than 5% of the small and medium scale metalworking firms surveyed.

This is evidence of the needs that exist for financial support by the Government for the small and medium scale metalworking industries.

The Government has been exerting its efforts in extending financial assistance to the small and medium scale industries ever since the cabinet approved the Loan Scheme for Small Industries Development (LSSID).

The role played by LSSID in financing the small and medium scale firms, however, is extremely small (Its outstanding loan as of 1981 was 0.1% of the total. Source: Dr. Narongchai, "Small and Medium Scale Enterprises in Thailand", December 1982) due to its being besieged by numerous problems such as on the scale of the enterprise eligible for loan, the limit on the amount of loan, the amount of securities to be demanded, administrative procedures for lending, etc. in addition to the many basic problems that it must tackle with as a financial institution run by the SIFO – Loan Board – KHRUNG Thai Bank triumvirate.

For more efficient loan by the Government to the small and medium scale firms, therefore, it is necessary to establish a dedicated financial institution to be operated by a more efficient agency loan system for the small and medium scale firms.

Also, in order to modernize the already old and obsolete facilities and equipment which are one of the major causes for the low production efficiency and poor product quality of the small and medium scale metalworking industries, a special financial assistance measure under a special lending system for modernization of their facilities and equipment of medium and small scale engineering industries is necessary.

Lastly, the financial credit supplementing system for small and medium scale firms is being proposed because of the needs to supplement the deficient credit strength of the small and medium scale firms in view of the fact that the deficiency of collateral is constituting a major obstacle to loan under LSSID.

10.2.3 Organization and Function

(1) Agency loan system

As already touched on in 7.2 (Metalworking Industry Promotion Measures), this system is composed of the following three parties: the Small Industries Finance Corporation (SIFC) which is the provider of long term, low interest funds, the commercial banks who, as agents, execute agency loan, and the general small and medium scale firms who are the potential borrowers. The functions performed by each of the three parties are as follows.

1) SIFC

1 Setting of the basic policy for loan
2 Appointment of agents and clarification of policy
3 Determination of the limit of loans per every quarter and every agent
4 Review of the report on lending decisions submitted by agents and remittance
5 Receiving of the repayment of principal and interest from agents
6 Payment of handling commissions to agents
7 Risk taking on loans (up to 20% of bad debts)
8 Periodical auditing of agents

2) Agent

1 Receiving of the application for borrowing from clients
2 Analysis of creditworthiness (including assessment of the borrower's ability to put up collaterals) of the clients and evaluation of projects (from the aspects of technology, production, financing, management, market, economic conditions, etc.)

3 Decision on lending, and request for remittance
4 Conclusion of loan agreement and implementation of loan
5 Follow-up after lending (how the loan is used, operating status of the client)
6 Receiving repayment of principal and interest from client, and remittance of same to SIFC
7 Risk taking on loan (up to 80% of bad debts)
8 Receiving of handling commission

3) Client
1 Application for loan
2 Conclusion of loan agreement and receiving of loan
3 Repayment of principal and interest payment

In terms of organization, the problem of great importance is to determine what sort of organization the SIFC should be.

Ever since the recommendation of the World Bank in 1978 that "SIFO shall be an autonomous legal entity", the issue of whether it should be a "Corporation" or a "State Enterprise" is still the center of controversy. The Ministry of Finance, whose concern is over the snowballing of deficits of the state enterprise, strongly insists on its being a "Corporation" in which 50% or more of the capital is paid in by the private sector.

Since each form has its merits and demerits, it should be decided upon only after thorough discussion.

(2) Financial credit supplementing system for medium and small scale enterprises

The liability supplementing system is seen in Japan and in other overseas advanced countries as a system to promote the small and medium scale firms. In creating this system, it is considered necessary to thoroughly compare and examine the precedents in the advanced countries.

The following is just one example of the liabilities supplementing system. Fig. 10.2-1 shows the structure of the credit supplementing system.

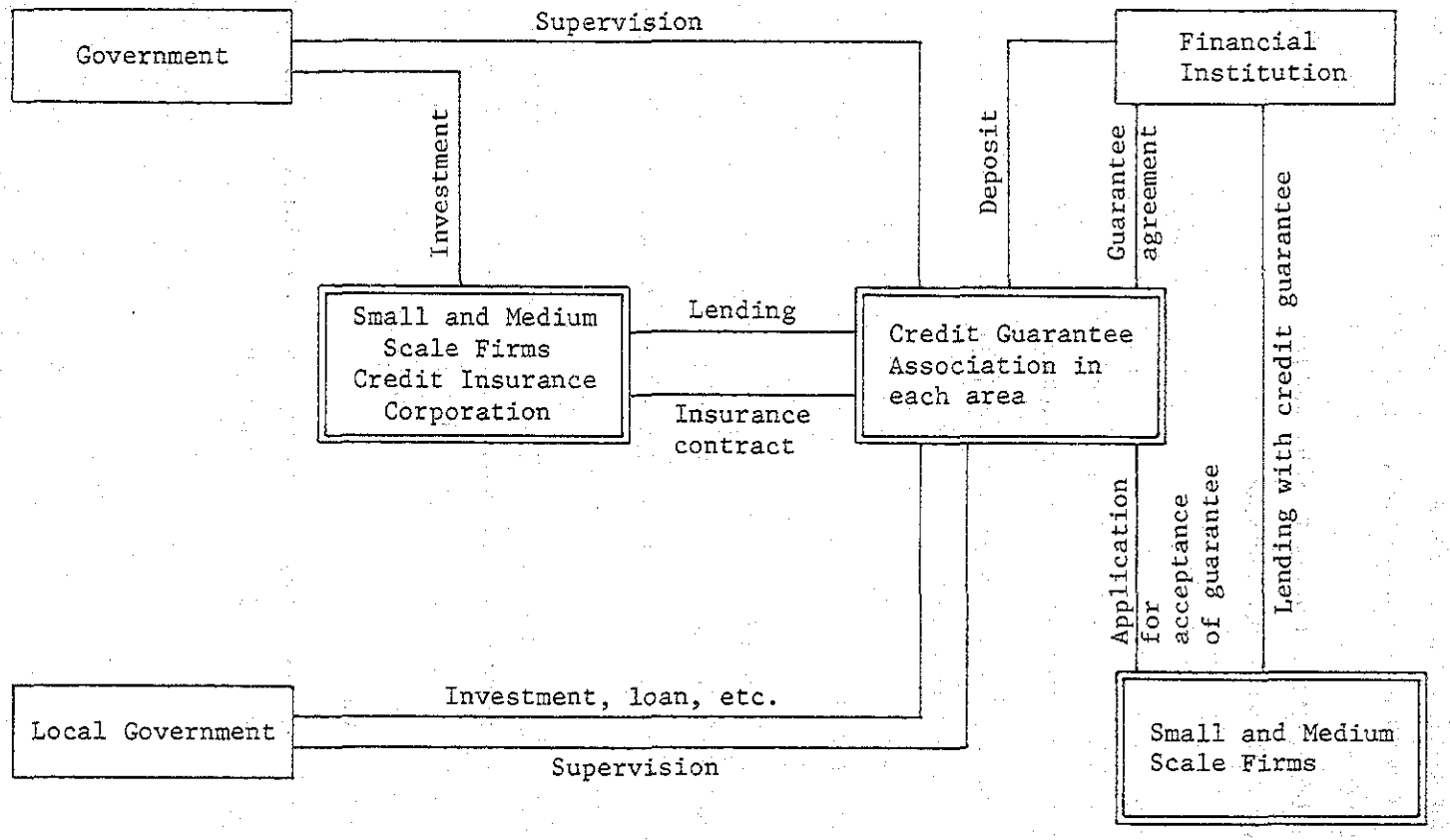


Fig. 10.2-1 Structure of the Credit Supplementing System

1) A Credit Guarantee Association shall be created in each area to which the small or medium scale enterprise shall apply for guarantee. Based on this application, the Guarantee Association shall decide on extending guarantee to that small or medium scale firm. With this guarantee, the small or medium scale firm concerned can receive a loan from a financial institution while the Guarantee Association buys an insurance on the guarantee extended to that small or medium scale enterprise from the Credit Insurance Corporation.

2) In the event of a default by the small or medium scale firm in the repayment of the loan with guarantee, the Guarantee Association shall repay the loan to the financial institution in lieu of that small or medium scale firm (subrogated performance). The Guarantee Association which made the payment in subrogation shall receive insurance amounting to 70 to 80% of the amount paid in subrogation from the Insurance Corporation.

3) The Guarantee Association, in the event that it has made payment in subrogation to the financial institution, shall acquire the right to demand compensation from the small or medium scale firm concerned. When the Guarantee Association has obtained performance from the small or medium scale firm by virtue of its right for compensation, it shall pay 70 to 80% of the sum received to the Insurance Corporation.

4) The Small and Medium Scale Firms Credit Insurance Corporation shall be established by the equity contribution of the Government. The Credit Guarantee Association shall be operated by the equity investment or loan of the local government and the Insurance Corporation. In order to alleviate the fiscal burden on the Government, the equity participation of the financial institutions and small and medium scale firms in the Insurance Corporation and Guarantee Association shall also be considered.

10.2.4 Supply Sources of Funds

In the Loan Scheme for Small Industries Development (LSSID), the amount of available fund was about ฿ 200 million (allocated share of the Government about ฿ 50 million and that of the Khrung Thai Bank about ฿ 150 million). The maximum outstanding balance of loans on the other hand was ฿ 128 million in 1979 so that no apparent shortage of fund has ever occurred. However, the fund would have run short if only with the allocated share of the Government. Also, because of structural problems in the lending program, there seem to be idle funds.

Under the agency loan system, funds from commercial banks as in LSSID cannot be counted on. Furthermore, the financial condition of the Thai Government is quite stringent. Hence, it is definitely necessary to discuss on the supply sources of funds.

About 50 million ฿ is estimated as the total fund demand of the metalworking industry. The following shows the basis of a calculated amount (฿ 50 million).

- Fund demand of the firm which was surveyed in JICA/TECHNONET ASIA joint research project in 1978 = ฿ 50 million (The respondents were asked to estimate the capital investments needed for expansion/modernization purposes. Total amount of capital investments is ฿ 50 million.)
- Number of respondents = 316
- Approximate population size = 1,000
- Rate of the applicants to the total number of metalworking firms is one to three (supposing)
- Formula = ฿ 50 million x (1000/316) x 1/3 = ฿ 53 million = ฿ 50 million

10.2.5 Lending Policy

(1) Type of industries eligible for support

In the Loan Scheme for Small Industries Development (LSSID), loans are extended to four types of industries, namely, manufacturing, specified services, hand crafts and cottage industry, but a number of the industries, for example automobile assembly, are not eligible for loan as shown in Table 10.2-1. However, as manufacturing includes "hand tools", "metal products", "agricultural machinery" and "building materials" and services include "automobile repair and tuning" and "ship repair", the metalworking industries are within the scope of eligible industries.

Accordingly, the type of industries eligible for support may be basically the same as those covered by the Loan Scheme for Small Industries Development (LSSID). However, in order to be as specific as possible, the seven type of industries and the five products selected during this survey project must be clearly mentioned here.

Table 10.2-1

Type of industries presently not eligible for support

1. Rice mill
2. Saw mill
3. Sugar factory
4. Ice-making factory
5. Match-making factory
6. Gunny-bag mill
7. Carbonated drink factory
8. Distilleries, Brewery
9. Tobacco factory
10. Slaughter house
11. Printing shop
12. Soap factory
13. Spinning factory
14. Jute pressing factory
15. Monosodium glutamate factory
16. Plywood factory
17. Cement factory
18. Spraying factory
19. Manufacturing of Thai and foreign medicines
20. Manufacturing of wet and dry cells
21. Cold storage
22. Automobile assembly
23. Mechanized paper factory
24. Motion picture production
25. Enterprises being given financial support by the Industrial Finance Corporation of Thailand

(Source: Japanese Expert Team, SIFO Scheme, July 1983)

(2) Scale of the enterprise eligible for loan

According to the ongoing Loan Scheme for Small Industries Development (LSSID) the amount of fixed assets or equity capital of the firm applying for loan must be ฿ five million or less to be eligible. As the survey conducted this time revealed that about 90% of the small and medium scale metalworking industries are capitalized at ฿ four million or less and loan for the large scale firms are provided by IFCT, the scale of the eligible firms under the new system may be the same as the ongoing LSSID.

(3) Amount of loan

In the ongoing Loan Scheme for Small Industries Development (LSSID), the maximum credit that can be extended to any individual firm is up to ฿ one million per case. In the case of small and medium scale metalworking industries, the maximum amount of loan under the new system may be the same as the ongoing LSSID in principle.

And, setting aside the problem that how many percent of total needed fund should be provided with due consideration to the special lending system for the modernization of facilities and equipment of small and medium scale metalworking industries, more than ฿ one million credit should be considered because as shown in Table 10.2-2, unit price of the equipment and facilities eligible for the special lending system is about 2 to 3 million ฿.

In order to get fruitful result from the special lending system, lending policy putting emphasis on limited processes and products must be adopted in stead of scattering about small amount of money to all industries.
Table 10.2-2 shows the one example of the priority by products and processes for the special lending system which is made with due regard to priority by products and processes in "the Summary of this report" and "Chapter 4.3.1".

(4) Purpose of borrowing

According to the ongoing Loan Scheme for Small Industries Development (LSSID), the purposes of borrowing must be within the following scope which also seems appropriate for this proposed system.

1) Working capital
2) Purchase of machinery and equipment
3) Cost of building and factory
4) Cost of land and land improvement
5) Purchase of other facilities and equipment

For the small and medium scale firms, raising the necessary working capital is indeed a big headache. The ongoing LSSID lends the working capital only in conjunction with the lending of capital investment fund (provided, however, that the loan of working capital is as a rule within 30% of the total amount of loan). It is considered necessary therefore to create a separate lending program for the lending of working capital.

(5) Collaterial security

In the ongoing Loan Scheme for Small Industries Development (LSSID), properties which are acceptable as collaterial securities are the following:

1) Factory site or other land owned by the applicant or by any person who has agreed to pledge his properties as the security of the applicant.

2) All buildings including those which are on the land on which mortgage has been settled by other financial institutions.

3) Machinery and equipment registered in accordance with Section B.F. 2514 of the Machinery Registration Law.

4) Guarantee extended by the head office of a commercial bank.

One of the three pillars of the current proposal for expansion and reinforcement of the financing system for small and medium scale firms is the previously stated "financial credit supplementing system for small and medium scale firms". The guarantee by the "Credit Guarantee Association" under the small and medium scale firms financial credit supplementing system would therefore be accepted as collaterial security.

(6) Interest rate and repayment of principal

The following are the changes in the interest rate under the ongoing Lending Scheme for Small Industries Development (LSSID).

	Up to October 1976	Up to February 1982	Up to March 1983	Thereafter
Interest on loan	9%	9.5%	16%	14.5%
Interest on deposit	3%	4%	6%	6%
Prime rate	10.5 – 12%	10 – 19%	16 – 18%	14.5%

As the above table shows, the interest rate under the new system also must be lower than the prime rate. Also, the loans for facilities and equipment which need to be urgently modernized under the special lending system for modernization of facilities and equipment of small and medium scale metalworking industries must be extended with an especially low interest rate.

As for principal repayment plan, normally a period of three to ten years depending on the financial standing and special feature of each type of process would be satisfactory as with the ongoing Lending Scheme for Small Industries Development (LSSID), but in the special lending system for modernization of facilities and equipment of medium and small scale engineering industries, the repayment period ought to be extended to three to 15 years.

10.2.6 Office procedure for lending

One of the problems with the ongoing Lending Scheme for Small Industries Development (LSSID) is the cumbersome, time-consuming office procedure for processing loans. The basic reason for this seems to lie in the organization structure of LSSID.

In the new small and medium scale firms financing system under the agency loan system, the organization structure is simplified as described in Section 10.2.3 (Organization and Function). Accordingly, the office procedure for lending is also simplified.

10.2.7 Schedule

(1) Feasibility study for the project: 4 months
(2) Basic design for the project: 4 months
(3) Detail design for the project: 8 months
(4) Project preparation (man-power, equipment, fund, information): 9 months
(5) Project start-up: 2 years and 1 month after beginning of the F/S.

10.2.8 Conclusion

In expanding and reinforcing the small and medium scale firms financing system, a close linkage must be maintained with other small and medium scale metalworking industry promotion projects and organizations.

The lending policy keeping the accent on some targets also must be taken. Special lending system for modernization of facilities and equipment of small and medium scale metalworking industries is one of the measures along the above-mentioned lending policy.

The following measures can be listed as useful ones for promotion of metalworking industries.

On implementation of these measures, special lending system must be founded to result in success.

- Preferential treatment for pioneer industry
- Promotion of export industry
- Factory relocation
- Promotion of technology
- Encouragement of the cooperative association

Table 10.2-2

Priority by Products and Processes
For the Special Lending System for Modernization of
Facilities and Equipment of the Small and
Medium Scale Metalworking Industries (One Example)

o Products:	1st Priority	1	Agricultural Machinery
		2	Gear, Mold & Dies
	2nd Priority	1	Pump, Valve
		2	Machine Tool
		3	Hand Tool
		4	Parts for Automobile

o Processes and Equipment and Facilities Eligible for the Special Lending System for Modernization

1st Priority

1 Casting-Automatic Forming Machine
Melting Furnace (Cupola and Electric Furnace)
Shot Blasting Machine

2 Machining (Precision Machining)
Machining Center
Grinding Machine (Cylindrical, Surface)
Electrical Discharge Machine
Three Dimension Coordinate Gauge, Roundness Tester

3 Welding & Sheetwork
From GAS to Electric

4 Heattreatment
Atmosphere Control Furnace
Vacuum Furnace
Electric Furnace

Unit price of the above-mentioned equipment is about from 2 to 3 million ฿.

2nd Priority

1 Forging
2 Machine Assembly
3 Press
4 Plating
Pollution Preventive Equipment

10.3 Project Proposal 3.

Small and Medium Scale Factory Relocation Project

10.3.1 Background of the project

In accordance with the industrial development policy of the Government of Thailand, The IEAT is carrying out the development of industrial sites. The IEAT has the target of development of 3 types industrial estate.

(1) Development of provincial industrial estate

This type of industrial estate has the purpose of promoting the industries in core provincial cities in order to create opportunities of employment, and to decentralize economic growth in the local area.

(2) Development of industrial estates in satellite towns of Bangkok

This type of industrial estate has the purpose of dispersing the excessive industrial concentration of Bangkok among its satellite towns.

(3) Development of small industrial estates in urban areas

This type of industrial estate has the purpose of providing suitable environmental site for small scale industries and service industries in urban areas such as Bangkok, which can not move from urban areas.

Of the aforementioned 3 types of industrial estates, types (1) and (2) are currently in operation or under planning, and the type (3), that is industrial estates for small scale industries and service industries located in urban areas are lagging behind.
In reality however, small and medium scale factories are the most common ones, and in particular small scale factories with less than 50 employees account for the largest number. Furthermore, it must be borne in mind that as things now stand the said types of factories are one of the principal causes of pollution and other kinds of urban problems in Bangkok.

As can be seen, the relocation of small and medium scale factories is an important and urgent issue within the context of the urban and industrial policy of Bangkok and other metropolises of Thailand.

10.3.2 Purposes

This project has the purpose of carrying out the collective removal and relocation of small and medium scale factories mixed in the urban area of Bangkok, in order to improve the production environment of small and medium scale factories, the modernization of firms and the urban environment.

Furthermore, this project has also the purpose of developing industrial estates to accomodate small and medium scale factories that have the function of the supporting industries of the Eastern Seaboard Development Project which is being planned at present.

10.3.3 Contents of the project

The project consist of 2 major contents as follows.

(1) Provision of such industrial estate and "factory apartment houses", related with the removal and collectivization of small and medium scale factories.

(2) Provision of common facilities by the small and medium scale factories.

It is presumed that the following types of common facilities will be required.

- Welfare facilities for workers
  Mess hall, amusement hall, sports facilities, etc.
- Technical training facilities
  Technical training room, meeting room, etc.
- Test and research facilities and equipment.
- Store house for raw materials and products.

Three types of project systems are assumed by combining the aforesaid project contents.

(1) "Factory apartment house" project
- Provision of partitioned type factory buildings for sale and rent.
- Provision of common facilities.

(2) Mini industrial estate project
- Provision of factory sites for sale and rent.
- Provision of common facilities.

(3) Common facility project
- Provision of common facilities in existing industrial concentration areas.

10.3.4 Implementation institutions

(1) Project implementation institutions (DIW, IEAT, industrial cooperatives, private developers).

- High-priority projects and projects with conspicuous public characteristics should be implemented by such institutions as the DIW and IEAT under direct jurisdiction of the government.
- Projects to be implemented by the private firms organized in the form of cooperatives.

- Projects to be implemented by private developers. These are to make the most of the vitality of private sector and vacant land located in urban areas.

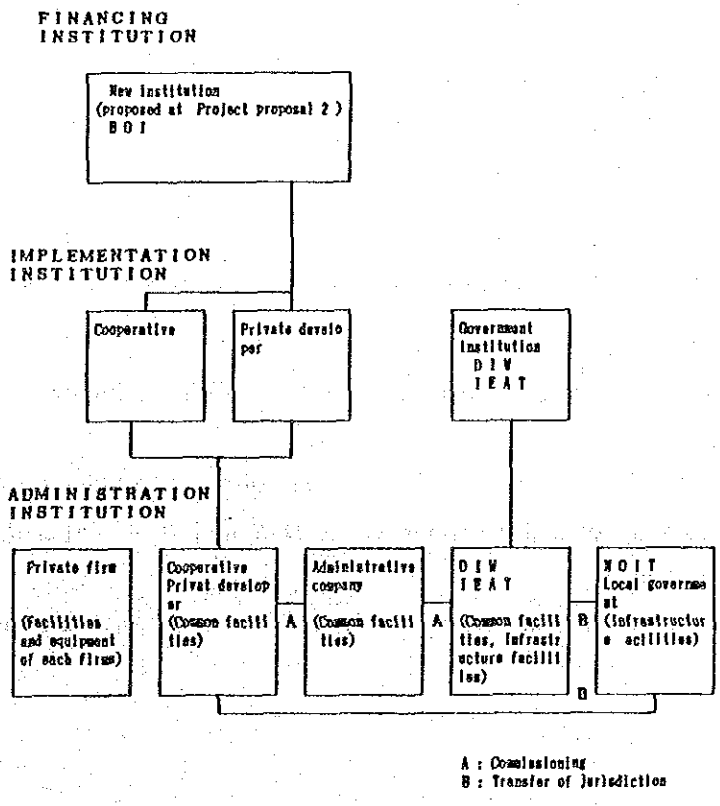
(2) Financial institutions (new institutions mentioned in the Project Proposal 2 (SIFO) and BOI)

These financial institutions have the purpose of providing low interest rate finance to help the implementation of projects undertaken by cooperatives of private firms and private developers.

- Financing to cooperatives of private firms should be given preferential treatment as an incetive for organization of the cooperatives.
- Projects for provision of common facilities should be given special financing with preferential treatment as an incentive for provision of the facilities.

(3) Administrative institution in charge of the facilities and equipment

- Each firms should take charge of the administration of monopoly facilities of the factory building and other parts of the industrial estate.
- As for the common facilities and public facilities (roads, sewerage, power facilities, etc.), the project implementation institution (DIW, IEAT, cooperative of private firms, private developer, electric power company) should take charge of their administration. On the other hand, the establishment of an administrative company in charge of the administration of the common facilities may also be recommended.



10.3.5 Alternatives for collectivization and grouping

There are 3 principal patterns regarding the collectivization and grouping of small and medium scale factories. Examples of possible cases of realization of these patterns are described in the followings.

(1) Collectivization and grouping in accordance with the scale of the factories

- "Factory apartment house" project referring to small scale factories.

(2) Collectivization and grouping in accordance with the type of process

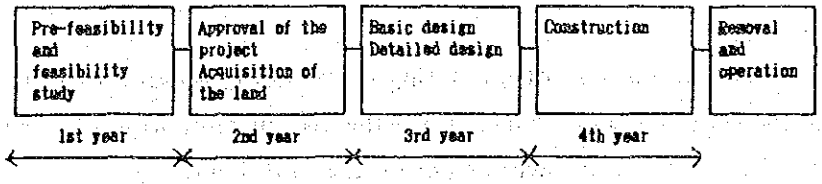
- 'Factory apartment houses ' and industrial estates of plating industry.

(3) Collectivization and grouping in accordance with subcontracting groups

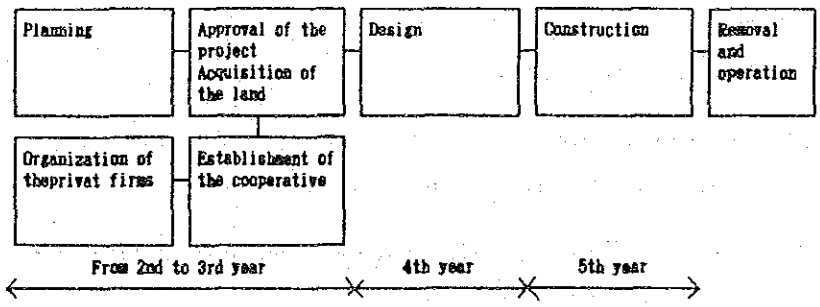
"Factory apartment house" project, mini industrial estate project and common facilities project for subcontractee firms of agricultural machinery (tractors, etc.).

10.3.6 Schedule

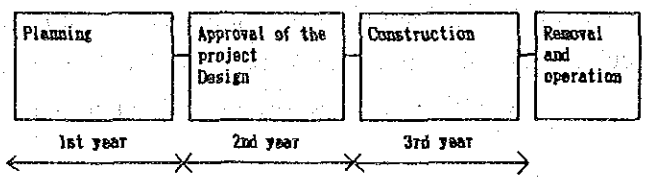
(1) Projects implemented by the DIW and the IEAT



(2) Projects implemented by cooperatives of private firms



(3) Projects implemented by private developers



10.3.7 Proposal of concrete projects

(1) Development of Industrial Estate in the Eastern Seaboard Development Area

1) Purposes

The project has the purpose of developing an industrial estate aimed at accomodating small and medium scale factories that constitute the supporting industries for the Eastern Seaboard Development.

2) Project system

- Industrial estate project
- "Factory apartment house" project

3) Types of process taken into consideration

- Sheetwork & welding
- Machining
- Plating
- Press

(2) Development of industrial estate for plating workshops

1) Purposes

This project has the purpose of promoting the collective removal of plating workshops located in the central areas of Bangkok for the sake of prevention of pollution and improvement of the production environment for the workshops.

2) Project system

- Industrial estate project
- "Factory apartment house" project

3) Principal cooperative projects

- Provision of common industrial effluent treatment facilities.

(3) Development of industrial estate related to agricultural machinery industries & development of cooperative project

1) Purposes

This project has the purpose of developing industrial estates and promoting cooperative projects in order to confirm the subcontracting structure related to agricultural machinery industries, as well as promoting the cooperation of small and medium scale factories.

2) Project system

- Industrial estate development project
- "Factory apartment house" project
- Common facilities project

3) Types of process taken into consideration

- Sheetwork & welding
- Machining
- Press

10.4 Project Proposal 4.

Market Study Project for Promotion of Export of Products made in the Metalworking Industry of Thailand

(1) Background

Part of the products of the metalworking industry of Thailand is exported, mainly to neighbouring countries, although very rarely and in very small quantities. Such being the case, it is necessary to pick up exportable priority industries from among the metalworking industries of Thailand and to apply them intensive promotion and fostering measures in order to cope with the export promotion policy of the country.

As a matter of fact, technology referring to the manufacturing of hacksaw has been transferred from Japan to Taiwan, and subsequently from Taiwan to Thailand, accompanied with improvements and adaptation at each transfer step and nowadays it has been localized with peculiarities suiting the local needs, and there are cases of small and medium scale firms of Thailand exporting their products of Malaysis and Indonesia.

On the other hand, there is a Thai foundry exporting machine tool (grinder) heads to a Japanese-capital machine tool manufacturer of Singapore which assembles the finished product and exports it to such industrialized countries as the U.S.A., Europe and Japan. Furthermore, there is a Japan-Thailand joint-venture piston manufacturer which is exporting approximately 30% of its products to Japan. As can be seen, a pattern of mutual dependence is progressing as a consequence of the gradual establishment of the scheme of international division of work in this field. Such being the case, it is desirable to consider comprehensive measures such as public financing support for plant and equipment investment, technical and marketing aid, etc., not to mention exemption and reduction of business tax, corporation tax, custom duty on imported materials, etc., in order to encourage further the said tendency.

The types of industries that have the most promising export prospect for the time being are the existing ones referring to the casting industry and related products as well as press machinery, because they have a high potential in the long range in view of the variety and depth of their products and techniques compared with other ASEAN countries. On the other hand the toy industry has the possibility of growing as a respectable export industry within five or ten years if industrial production structure, linked with metalworking industry such as mold & dies & preswork etc. are appropriate hereafter from the standpoint of start-up industry, accompanied with the upgrading of the quality and maintenance of the price competitiveness.

Thus, should appropriate development and fostering measures be taken, the metalworking industry of Thailand seems to have promising prospect of generating some export products in the medium and long range. As a consequence, the definition of the strategy referring the kinds of products to be handled in each market is a very important aspect in connection with the future materialization of development measures.

The market survey project is proposed in the followings, from the aforesaid standpoint.

(2) Purpose/Role

Execution of the market survey for fostering of strategic products in conformity with the export promotion policy proposed by the Government of Thailand, by focusing specifically on the metalworking industry of Thailand, in order to define mediums and long range industrial development policies.

(3) Implementating Institution

In principal this project should be implemented by the TMDPC (Thai Management Development and Productivity Center) of DIP (Department of Industrial Promotion), under the cooperation of the TTTC (Thai Trade Training Center) of the Ministry of Commerce and the MAT (Marketing Association of Thailand), etc., participating in subsidiary character.

(4) Schedule

Preparation of the Plan	Implementation Survey	Analysis	Recapitulation
3 months	4 months	3 months	2 months
1 year			

(5) Budget

Approximately 1 million Bahts