THE ROYAL THAI GOVERNMENT
MINISTRY OF INDUSTRY

THE STUDY
ON
THE PROMOTION OF METALWORKING INDUSTRIES
IN
THE KINGDOM OF THAILAND

SUMMARY

JANUARY, 1985

JAPAN INTERNATIONAL COOPERATION AGENCY

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Executive Summary

A. Background of the Project

Under the Fifth National Economic and Social Development Plan which will extend from 1982 to 1986, the metalworking industries has been identified as one of the priority sectors and it has been expected to grow not only as a industry having strong linkages with other priority industries such as Agro-based, Chemical and Heavy industries but also as a industry which support leading industries such as mining, construction, textile, and automobile industries.

Most of the joint venture companies with foreign enterprise have been requested to increase the local portion of parts by the Government of Thailand and looking for and bringing up the firms which produce parts of international quality. However, the growth of these firms is not still enough and most of metalworking firms are small and medium size having low level technology. It's therefore very urgent to develop these companies to modern companies which have a higher level of technology.

To make concrete plans for promotion and development of metalworking industries with most favourable efficiency, it's essential to analyze metalworking industries from the various aspects, especially, from the aspect of supporting industries by scientific method. In the survey carried out as part of an international project by the Japan International Cooperation Agency (hereinafter referred to as "JICA") and Technonet Asia, small and medium-scale metalworking industries were analyzed by unique statistical method. However, the whole structure of the metalworking industries has not been explained from the viewpoint of relation with big companies and small and medium scale metalworking industries. Therefore, to analyze the structure from this viewpoint is indispensable for leveling up the metalworking industries, particularly, small and medium size metalworking industries.

The Government of Thailand requested the Government of Japan to provide technical cooperation in conducting a study on the promotion of metalworking industries (hereinafter referred to as "the Study").

The Government of Japan, at the request of the Government of Thailand, decided to extend technical cooperation in conducting the Study.

JICA, the official agency responsible for the implementation of the technical cooperation programs of the Government of Japan, undertook the Study and dispatched the preparatory survey mission twice (on July, 1981 and on September, 1983). After the discussion on the problems that the metalworking industries are facing with the authorities of the Kingdom of Thailand, both parties agreed to sign "Scope of the Study on the Promotion of Metalworking Industries in the Kingdom of Thailand".

B. Objective of the Study

The Study aims at formulating an implementation programs for the promotion of the metalworking industries in Thailand in order to contribute to the implementation of the National Development Plan and establishment of self-supporting economy, with special focus on the following points.

(1) Technological upgrading of small/medium scale firms.

(2) Strengthening of interrelation between large and small/medium scale firms.

C. Definition of the Metalworking Industries

In this Study the metalworking industries are defined as those performing one or more of the following operations and producing one or more of the following kind of products.

Processes:

(1) casting
(2) forging/heat treatment
(3) sheetwork/welding
(4) plating
(5) machining
(6) machine assembly
(7) presswork

Products:

(1) agricultural machinery
(2) pump, valve
(3) mold and die for plastics, gear
(4) parts for automobile
(5) hand tool, machine tool (simple type)

D. Area of the Study

This Study covers the whole area of the Thailand. In the meantime, about 70% of total firms are located in Bangkok Metropolitan Area. Therefore, in principle the area investigated is limited within 100 km from Bangkok.

E. Integrated Promotional Measures of Metalworking Industries in Thailand

Role	Main findings/Problems	Countermeasures	(IL)
Technology	1. Continuous use of obsolete and less efficient machines	Priority facility list to be modernized.	G
	2. Shortage of qualified middle managements	Re-education scheme/implementation (Processes/Products wise)	G
	3. Shortage of accessibity to practical engineering retraining for engineers	Newly establish specialized organization and re-education	G
	4. Less developed level of technology and management	Newly establish specialized orgnization and re-education	G/F
Management	5. Continuous use of obsolete and less efficient machines	Priorty facility list to be modernized	P
	6. Less developed management sense of entrepreneurs	Newly estabiish sepecialized organization and re-education	G
	7. Shortage of mutual reliablity, excahnge and cooperation among firms	Promote specific industrial associations and information exchanges	G/P
	8. Less developed specialization	Promote industrial restructure	G
Organizing/ Cooperating	9. Inadequate industrial association	Promote specific industrial associations (Processes and Products wise)	G/P
	10. Difficulty of targets and roles setting because associations are covering wide rage of industries	Promote specific industrial associations (Processess and Products wise)	G/P
	11. Shortage of cooporative activities	Promotion of cooporative activities	G
Financing	12. Continuous use of obsolete and less efficient machines provision of financial	support for modernization	G
	13. Less developed specialization	Promote industrial restructure	G
Policy & institution	14. No specific promotional body	Newly establish specific promotional body	G
	15. Inadequate function and activities of ISD	Newly establish specitic promotional body	G
	16. Inability of coordination function among various policy and measures	Newly establish specitic coordination and planning body	G
	17. Shortage and inability of education and training	Rehabilitation and rebuilding of education and training system	G
	18. Lack of protection and support for start-up industries	Recognition of promotional export industries and their support	G
	19. Inadequate suppporting measures for export industries	Recognition of promotional export industries and their support	G
	20. Inability of test, inspection, test production and entrusting job services	Newly establish specific service institute and easy accessibity for public services	G
	21. Shortage of governmental skill authorization system	Development and promotion of governmental skill authorization system	G
	22. Shortage of various legal program	Support promotional measures by various legal program	G
	23. Inability of extension and diagnosis services	Training of service officer and utilization of external experts	G
	24. Shortage of mutual cooperation among ASEANs	Establish mutual information exchange system and technology sharing system	G/A
Relocation of firms	25. Inadequate pollution control	Promotion of anti-pollution facilities and relocation of firms	G
	26. Lack of specialized industrial estate for metalworking industries	Promotion of cooperative activities, modernization of facilities, anti-pollution common facilities and relocation of firms	G/F
	27. Shortage of industrial estate for smaller firms	Promotion of cooperative activities, modernization of facilities, anti-pollution common facilities and relocation of firms	G/F

Promotion Program

NB : Implimentation level (IL) (1) G : Government level
(2) P ; Private level
(3) G/P; Government & Private joint level
(4) F ; Firm level
(5) A ; Aseans level

Government level program

1. Idea of the independent core institution for implementation of promotional measures
2. Scheme for promotion and guidance of the modernization of the industrial structure
3. Sheme of preferential treatment for start-up industries
4. Scheme for promotion and rearing of export industries
5. Scheme for industrial relocation
6. Scheme for technological promotion project
7. Scheme for promotion of the establishment of industrial organizations by type of processes and products
8. Legislation scheme
9. Scheme of school education and vacational training programs

Private sector level program

10. Scheme for promotion of the establishment of industrial organizations by type of processes and products

Government/Private cooperation level

11. Joint operation Scheme of government level scheme item 1 & 6 in future (long term target)

Firm level program

12. Scheme for promotion of cooperatives
13. Upgrading of the technology and management level

ASEANS level program

14. Scheme for regional mutual cooperations

Promotional priority project

Project proposal 1
Metalworking industry promotion center

Project proposal 2
Expansion and reinforcement project of financing system

Project proposal 3
Small and medium scale industry relocation project

Project proposal 4
Market study project for promotion of export industries

Study on Promotion of Metalworking Industry in the Kingdom of Thailand (Summary)

1. Social and Economic Structure

1) Permanent excess of imports over exports (Particularly in foreign trade of capital goods and durable consumer goods)

2) Agriculture dependability type

3) Industrial sector

(1) The rubber, sugar, food, lead, and wood industries which are the primary products processing industries in Thailand have already made progress as the export industry.

(2) The textile and cement industries are currently growing up into the export industry from the import substitution industry.

(3) Although import substitution of such as agricultural machinery, motorcycles, automobiles, etc. is being promoted and developed and there are some modernized technology intensive type enterprises existing as leading sector, the metalworking industry in Thailand is in the initial stage of industrialization as a whole.

2. Policies for Industrialization

The promotion of the engineering industry (EI) (Metalworking industry + Electric industry) was included for the first time in the 5th 5-year Plan (1982 - 1986) and subsequently the engineering industry was designated as a priority industry to be preferentially promoted in the 6th 5-year Plan for the purpose of promoting the growth of the industry sector. In this connection, various policies are currently being undertaken by the Industrial Restructuring Committee (Chairman: the Minister of Industy).

3. Metalworking Industry in Thailand

The share of the metalworking industry in Thai GDP was about 2.27% in 1982 and it is estimated that this percentage remains almost unchanged even in 1984. Time is required for upbringing of the metalworking industry because it relates closely to other various industries and is a skill and technology intensive industry.

For sound upbringing of the industrial structure in Thailand throughout the further long terms, it is very important to continue steady effort even from now on, though timing of promotion of this sector seems to be a little late.

1) Trade and demand structure

Generally the import dependability is high and the import substitution type industrial structure has made progress in the cycle of 5 years to 10 years. some of the labor and skill intensive industries and products will come to have the competitive power through this period so that they will have the potentiality of growing up to the export industry. Of those, agricultural machinery, pumps, valves, hand tools, simple machine tools, automotive parts, small gears, various molds/dies, etc. will make growth steadily in the background of the social structural demands if tangible promotional measures are made to localize them as the stable potential products in the future.

The parts supply system necessary for fabrication of such products should be materialized by Promotion of small & medium scale industries having higher productivity and quality.

2) Present situations by products

Real state of the metalworking industry for production of main targets products are ;

(1) Agricultural machinery

As for agricultural machinery, the engine section maintains comparatively stable quality because of its being manufactured as a joint venture with foreign capital. The body section that supports the engine, however, is produced by the small and medium scale firms of Thai capital, and due to deficiency in engineering skill in each production process, the products are fraught with problems. The products therefore should not only be designed to suit the locality, but measures should be taken to improve the quality and to standardize the common parts as quickly as possible.

(2) Pumps and valves

Large sized pumps are centrifugal pumps for tin mines,, medium sized ones for irrigation use and small sized one for public housings. The most serious problem in the pumps for tin mines is the short life caused by selection of the materials, and many of the pumps for irrigation use are the improted pumps. On the other hand, small sized pumps have a large quantity of demand, but they are manufactured diffusively so that the effect by mass production is unobtainable.

(3) Molds/dies and precision parts

The demand for molds/dies is active, supported by the demand for plastic products. Accordingly, the precision parts industry including the most advanced technology and labor intensive skill factors is one of the fields to be positively upbrought in the future.

(4) Hand tools

This demand will grow securely because hand tools are required by all the fields. However, the keypoint to the growth is how combination among qualitative need, capital and manpower should be made rationally in individual production process and how the structure of the relevant firm should be formulated in response to the days' request. In this meaning, it will be a good example for the growth that an enterprise has manufactured hack saws in Thailand and exported them to the neighbouring countries.

(5) Machine tools (Simple type)

Many of the machine tools in use at the small and medium scale industries in thailand are the imported machines from Taiwan, China and East Europe, etc. These are the middle-class products. Localization of these items as import substitution of imported those machines should be included in the short to medium term policy in order to meet the stable potential demand for them. currently there are about two manufactures engaged in production of these machine tools. It is necessary to strengthen the basic infrastructure of the machine tool industry by upbringing of the supporting industries (especially casted and forged parts industry) in addition to support of these two existing manufacturers.

(6) Automotive parts

This survey show that 30 enterprises (about 12.8%) are engaged in automobile parts industries. Analysing these firms in detail, most of them are the manufacturers with a side job, not specialized manufacturers. From such real state, it is difficult for small and medium scale firms to adopt a mass production system. Special promotional measures for restructuring industries in order to make firms specialize will be required to strengthen this field in the future. For the purpose, the induction policy for upgrading industrial structure will be effective.

3) Present situations by kinds of processes

(1) Casting

In this field, the use of subcontractee is most active similarly to the plating industry. In many cases, however, the quality level of their products is considerably inferior to the international level. As for the price conditions, their products are getting more competitive internationally. But it will be a serious subject in the future how the qualities can be improved with the price conditions kept unchanged.

(2) Forging

There are only two or three firms who can produce the forged parts meeting the needs from the modern industries, except those using the traditional forging system just like a black smith in a village.

One or two companies, of these, have already closed the operation for their bad financial standing. Judging from such a current situations, the upbringing of the forging industry is in the two alternatives, that is, "Should the forging industry be brought up under the governmental general policy?" and, otherwise, "should the upbringing of modern forging firms with capital and technology intensive factors be delayed a little more?".

However, from the view of the effective use of the social capital, it is necessary to support, at least, the existing firms for further sound growth and the watching by the governmental agency will be required to protect them from discontinuance of production activity.

(3) Sheetwork, Welding and Pressworks

This field is building up steadily the industrial base, backed up the stable domestic demand. However, the possibility of participating in this field with comparatively small capital causes the number of enterprises to have increased and overcompetition in the market. This field is advancing into the market as subcontractee and supplier of press-formed parts and the technical support for mainly improvement of the quality will be required for this field.

(4) Machining and machine assembling

Machine shops with only a few lathes and drilling machines account for as much as almost 1/4 of the total.

Of these, 28% are engaged in machining of products that require precision, 18% in machining that requires a fair degree of accuracy and 40% in machining that does not require much accuracy. The remaining 14% seem to be engaged in machining of specialized parts (some of which required precision and some only a fair degree of accuracy.) For the time being, it would be advisable to place the emphasis of support for improvement of technical skill on the 28% of the machine shops which are considered in the longer range to improve the potential of the industry as a whole, and then try to upgrade the other groups in turn.

The shops engaged in the assembly of machinery are smaller in number compared to those in the machining industry. In the process of modernization of the industrial structure, it is important to let them acquire the basics of the art of machining and machine assembling and to help strengthen these industries by inducing production control techniques.

(5) Plating

The plating is one of the fields whose dependability on subconstractee is great. The most serious subject in this field is the plating quality. For this reason, it will be indispensable to give technical guidance for improvement of the plating quality.

4) Present situation of locations and environment

The metalworking industry is located at the urban area of Bangkok so that pollution to its sorroundings is getting significant more and more. It will be, therefore, necessary to review the location of the metalworking industry in the relation with re-location of the industry.

Particularly the promotion of an model industrial estate for a group of specialized small & medium scale metalworking industries is expected as one attractive means to develop the metalworking industry.

4. Industrial Promotion Agencies in Thailand

Although there is no agency specializing the metalworking industry, there are about 16 governmental agencies and about 12 private organizations who are respectively associated with development and promotion of the metalworking industry. ISD who is an vital agency for development and promotion of the industrial engineering has managed independently its ceramic institute and textile institute for the purpose of improving and promoting the special industries, in response to the days' request. a special agency for the metalworking industry should be preferably be established, without fail, to moneuver the direction of promotional measures in the metalworking sector through the 5th and 6th five-year plans and to implement it. As the metalworking industry is a skill & technology intensive industry, a governmental agency, if established, will have many things to do for upbringing and promotion of the sector. Although the present ISD has this kind of function and role, it was planned by UNDP about 20 years ago and is too old accordingly to upbring and promote the metalworking industry. The growth of this field is very significant. For this reason, it will be reasonable to establish an independent agency as a vital part of the development and promotion agencies, assuming the condition which the metalworking industry should be put after 10 years from now.

And this agency should execute the implementation of the governmental policies while leading other governmental agencies and private organizations.

5. Subcontracting Activities in Metalworking Industry

Currently such few competitive firms as can produce high quality in low cost are upbrought. Therefore, orders from plural contractors are concentrated to one excellent subcontractor who can meet the technical requirements from joint ventures with foreign capital, that is, the subcontractor market is in a tendency of almost monopoly in a form of reverse pyramid. This tendency of monopoly will cause failure of "the principle of proper competition" and consequently the unreasonably high cost will possible be transfered to the share of the nation. Generally subcontracting activities is currently spreading. However, it is necessary to further promote the mutual dependability among firms and upbring specialized subcontractor.

6. Technical Level of Metalworking Industry

Viewing the technical level from three factors of price, delivery time and quality the indice of which can be actualized easily, even any factor has encountered many problems. From these viewpoints, there is no way other than to commulate minor improvements, step by step for increasing the capability of the whole metalworking industry. To solve the problems which were found upon analysis of the current situations, metalworking specialists, especially middle managements should be trained and educated for a current time. Viewing the technical level of the subcontractor group as those of joint venture with Japanese company, joint venture with others than the Japanese and of the enterprises with Thai capital, the subcontractors' technical level is graded up higher in the order of those with Japanese capital, those with other foreign capital and those with Thai capital. Accordingly, the qualification criteria of subcontractor becomes different and this may impair the sound upbringing of the industrial structure. For this reason, it will be importance to upgrade the technical level of the whole bottom. In addition to this, however, upbringing of special firms with the seeds to grow up to a modern subcontractor should be promoted as a measure for prompt effect.

7. 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, e) strengthening Thai Industrial Standards (TIS) with Thai Industrial Standards Institute (TISI) 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 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 and presswork etc. 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 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.

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.

8. Outline of Priority Projects

The part to be played by the government in connection with the fostering of metalworking industry consists of four columns.

1) Creation of independent kernel institutions for promotion of the metalworking industry, focusing principally on technical aspects.

   (1) Development of human resources.
   (2) Transmission and diffusion of information.
   (3) Introduction, settlement and improvement of techniques.
   (4) Coordination of schemes related to the aforesaid items.

2) Financial support for implementation of the modernization of the industrial structure.

3) Implementation of the rationalization through the rearrangement of industries.

4) Marketing support for promotion of export.

In other words, it is possible to realize a powerful promotion policy through the implementation of measures referring to 1) Promotion of technology, 2) Financial support, 3) Industrial rearrangement, and 4) Development of market.

These measures are described in the followings in the form of implementation projects aimed at providing the clue for realization of the promotion policy.

Project Proposal 1: Metalworking Industry Promotion Center (MIPC)

1) Background

In considering the implementation of a balanced development of an industry like the metalworking sector which covers a very wide range of activities, it is indispensable to create an institution playing a leading role in the process, in order to realize an efficient coordination and mutual complementation between the various public and private institutions playing the functional roles required to materialize the promotional measures. The ISD located in the DIP is equipped with the technical facilities required for promotion of the metalworking industry and has been working somehow or other since its establishment in 1966 with aid of the UNDP. In reality however, it did not succeed at making pace with the rapid development of this industry occurred in the recent years, and is far behind of an up-to-date level.

The metalworking industry, which is sometimes called technology-intensive industry, requires an incessant technical development and high-level skill, which means manpower of high grade.

The Government of Thailand has specified the metalworking industry as priority development industry in the 5th and 6th Quinquennial plans (1982-1991), and has taken priority measures to foster it.

This project, which has the function of kernel for development of the metalworking industry, is proposed by taking into consideration the background described in the foregoings.

2) Purpose and Role

This Institute plays a vital role in development of the metalworking industry in Thailand, whose main services are as follows. (Particularly to support small-to-medium enterprises)

(1) Training and education of personnel
(2) Transmission and spread of technical information
(3) Introduction and improvement of engineering
(4) Planning and adjustment of development plan

3) Implementing Agency

Metalworking Division of ISD shall be reorganized as one division of DIP independently from ISD and ranked in the same level as ISD.

4) Organization (separate)

5) Function

The Institute shall be assigned with the following functions to achieve the specified purpose.

Purpose	Function
(1) Training and education of personnel	Seminar, workshop, training, etc.
(2) Transmission and spread of technical information	Patrol guidance, diagnosis of enterprises, statistic and publishing, technical information (circular), transfer and interchange of engineering, etc.
(3) Introduction and improvement of engineering	R and D, working under consignment, trial manufacture of products/parts, test and inspection, market research, feasibility study, etc.
(4) Planning and adjustment	Drafting, adjustment and implementation of various plans, organizing field, specializing of enterprises, promotion of specialized enterprises, promotion of high precision enterprises, standardization, approval of form, qualification and certification, etc.

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)

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 Promotion Center (MIPC)

Function, Role and Activity Program Phase-2 (5th - 7th 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			
													Test & Inspection					Research and survey				
	Entrepreneurs, 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, F/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	○	○	○	○	○				○	○		○							○	○		

Metalworking Industry Promotion Center (MIPC)

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

6) Human Resource Development Curriculum

The program for development of human resources will be implemented by following the seminars and training course curricula standardized successively in conformity with the time-series functions and roles described before, by making the most of audio-visual materials and educational manuals prepared in advance.

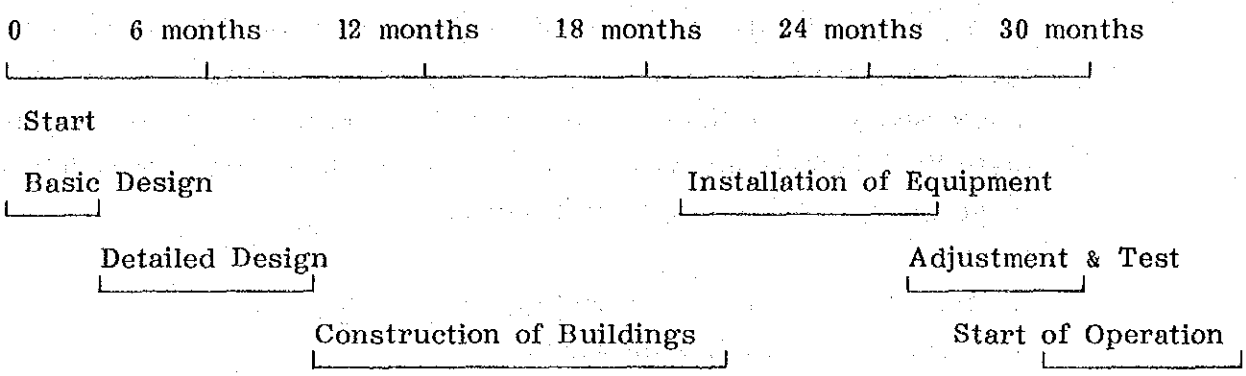
In the PHASE 1 (from the starting year to the 3rd year) the curriculum will have the following scale.

Theme	No. of Courses	No. of Students	Man-day
Casting	10	800	3,700
Welding	2	160	800
Machining	6	480	1,080
Machining design	3	210	1,100
Gear design	8	400	2,115
Total	29	2,050	8,795

7) Extension Services and Business Diagnosis Curriculum

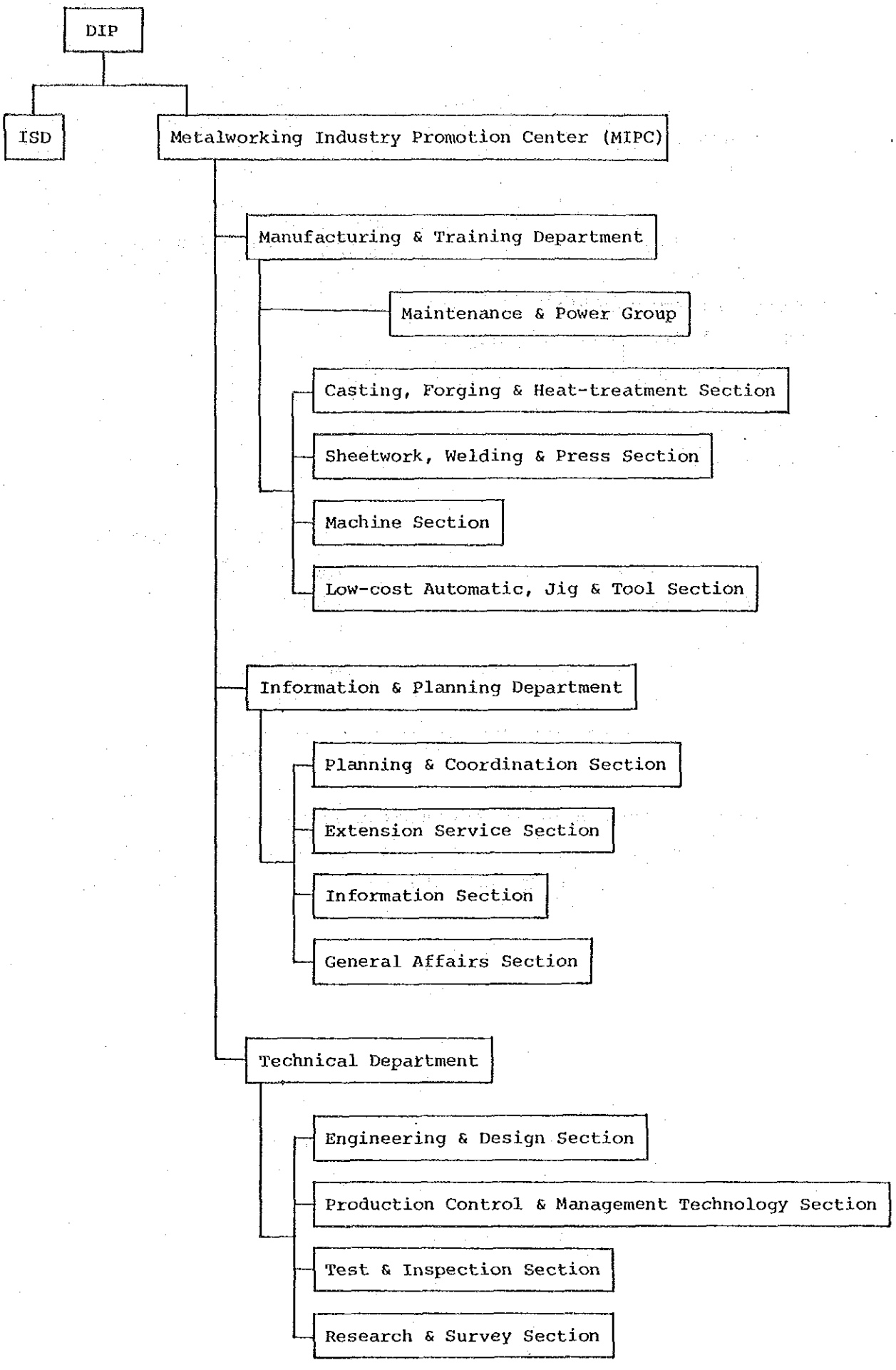
Item	Year				
	1st	2nd	3rd	4th	5th
Less than 1 day	50	80	100	120	140
Less than 2 months	12	24	30	35	40
From 2 to 6 months	3	6	10	15	20
No. of persons to be trained	1,000	2,000	2,000	2,000	2,000

8) Schedule



9) Organization

This institution will be established as an independent promotional institution under the jurisdiction of the Department in Industrial Promotion of the Ministry of Industry, at the same hyerarchical level as the existing ISD.


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

10) Personnel Plan

Item	Year 1st - 4rd	5th - 7th	8th -
Civil Service	48	55	60
Permanent Contract Staffs	25	26	27
External Expert (Local & Foreign)			
Long term	12	10	5
Short term	24	38	45

11) Budget

(Unit: 1 million Baht)

Land acquisition	Approx. 180
Land preparation	Approx. 4
Building cost	Approx. 90
Facility & equipments cost	Approx. 230
Utility connection cost	Approx. 1
	505

Software development cost for start of operation	Approx. 30
Annual running cost at the start of operation	Approx. 9
Annual running cost in the 3rd year	Approx. 12

Project Proposal 2: Financing System for Small and Medium Scale Metalworking Industries

1) Background

The metalworking industry is a technology-intensive industries, and it is indispensable to keep the combination of the human resources and the material resources (facilities & equipments and materials) always in optimum state in conformity with the needs of the times, in order to maintain the relative advantageous position of the metalworking industry of Thailand within the world economy. Furthermore, this project aimed at developing and strengthening the existing public financing institutions is purpose in conformity with the details described in the followings, with the purpose of converting the metalworking industry of Thailand from the current non-specialized stage to an advanced stage of specialization with a mature relationship of mutual complementation between individual firms.

2) Purposes and Roles

(1) Dissolution of the existing SIFO and its absorption into a new organization.

(2) Establishment of the special financing system for modernization of facilities & equipment of small and medium scale metalworking industries.

(3) Establishment of the system for complementation of the financing of small and medium scale industries.

(4) Improvement of the effectiveness of the financing of small and medium scale industries.

3) Implementing Institution

(1) Financing agent system

Tow distinct financing channels will be provided, i.e., the Small Industry Finance Corp. (SIFC) to be newly established and agents (commercial banks and financing agents) in order to execute the financing in the most effective way.

(2) Credit complementation system for small and medium scale business financing

The credit complementation for financing of small and medium scale business will be provided by two distinct channels, i.e., the Small and Medium Business Financing Insurance Corporation and the Credit Guarantee Association.

4) Functions

(1) SIFC

a. Definition of the basic financing policy
b. Nomination of the agents and determination of the financing limit
c. Evaluation of the financing decision report of the agent and remittance of the financed sum.
d. Reception of the refundment of the principal and interests from the agent
e. Payment of commission to the agent and bearing of risk (20 percent)
f. Auditing of the agent

(2) Agent

a. Acceptance of financing application
b. Evaluation of the credibility of the applicant as well as project
c. Decision of financing and request of remittance
d. Signature of financing contract and execution of financing
e. Inspection of the spending of the financed money and supervision of the business operation state

f. Remittance of the repayment of the principal and interest to the SIFC
g. Risk bearing (80 percent)
h. Reception of commission

(3) Credit Guarantee Association
a. Acceptance of application and decision of guarantee
b. Subrogated performance and execution of the right of demanding compensation

(4) Small and Medium Scale Business Credit Insurance Corporation
a. Acceptance of loan guarantee insurance
b. Repayment of the subrogate performance sum (70 to 80 percent)

5) Source of Funds

More study and discussion on this matter will be required.

6) Types of Industries and Products Object of the Metalworking Industry Financing System (One Example)

a. First priority order (special)
Casting industry, sheetwork & welding industry, machining & machine assembly industry (including precision machines), heat-treatment, low cost automation, agricultural machinery, dies, gears.
b. Second priority (ordinary)
Forging industry, plating, press, pumps, valves, hand tools, machine tools, automotive parts.

7) Scale of Businesses Object of Financing

The current amount of the fixed assets or the capital of the firm should be under 5 million Baht.

8) Demand of Fund by Items

- Improvement and modernization of facilities & equipments (ordinary)
  Under 1 million Baht
- Improvement and modernization of facilities & equipments (special)
  More than 1 million Baht
- Establishment of new firms
  More than 1 million Baht

9) Forecast of the Total Demand of Funds (exclusively in the metalworking sector)

Approximately 50 million ฿

10) Real Rights Object of Financing (Refer to the full report for details about specific facilities & equipment by type of processes and by type of products).

a. Operating fund
b. Mechanical facilities
c. Building & factory
d. Land & land improvement
e. Others (to be examined case by case)

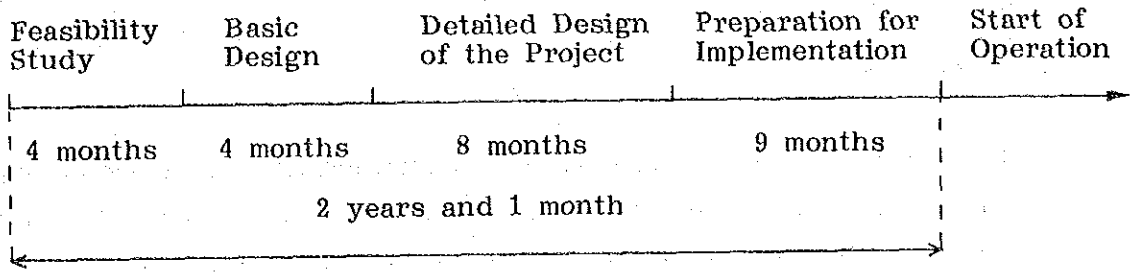
11) Mortgage

Land, building, machinery, facilities & equipments and other security to be provided by the head office of the agency bank.

12) Interest Rate and Term of Repayment of Principal

Interest rate: Not exceeding the prime rate
Terms of reimbursement: Under 15 years

13) Schedule


Feasibility Study
Basic Design
Detailed Design of the Project
Preparation for Implementation
Start of Operation
4 months
4 months
8 months
9 months
2 years and 1 month

Project Proposal 3: Rearrangement of Small and Medium Scale Metalworking Industries

1) Background

Part of the small and medium scale metalworking industries located in the metropolitan area of Bangkok are facing serious problems of location. On the other hand, it is necessary to foster a modern subcontracting system in order to cope with the needs of sophistication of the industrial structure. This project is propose as one of the means to solve said multifarious needs in an intensive way.

2) Purposes and Roles

(1) Collective removal of establishments located in street areas (promotion of the collectivization).
(2) Improvement of the profunction environment, management constitution and urban environment of street areas (pollution control and upgrading project).

3) Implementing Institution

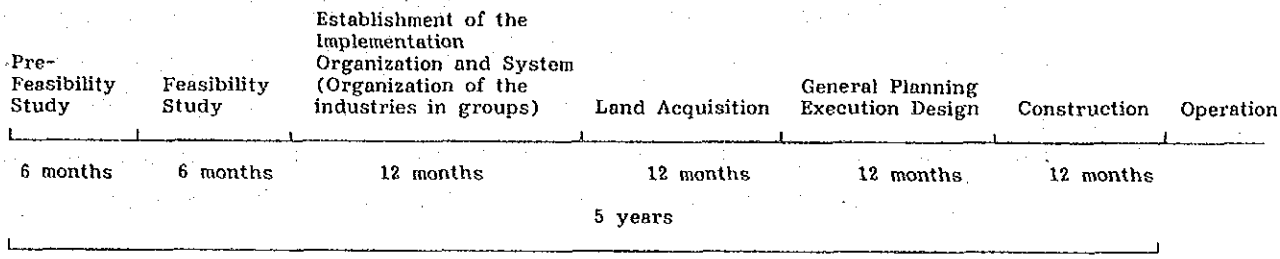
Two distinct alternatives are proposed in connection with the institution that will take charge of the implementation of this project under the planning, design and coordination of the Department of Industrial Works (DIW), i.e., the cooperative of industries (first order of priority) and private developers (second order of priority). The cooperative of industries or a management company will take charge of the management of the facilities and equipments.

4) Contents of the Project

(1) Removal of the group of industries related mainly to agricultural machinery (machining, machine assembly, sheetwork, welding, plating) from the main roads of Bangkok and their collectivization.

(2) Industrial estate project for small scale industries aiming at accommodating supporting industries of the Eastern Sea Board (mini industrial estate project).

5) Schedule



Project Proposal 4: Market Study Project for Promotion of Export of the Metalworking Industry

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 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 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 and presswork 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.

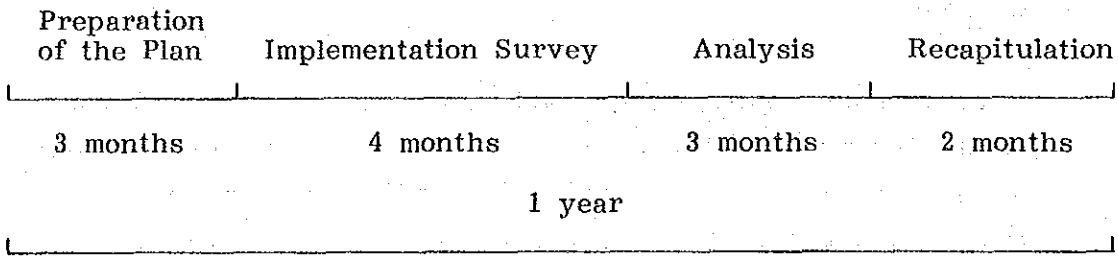
2) Purpose/Role

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 TMDPC (Thai Management Development and Productivity Center) of the 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



5) Budget

Approximately 1 million Bahts