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DISCUSSION OF SMALL AND MEDIUM INDUSTRY TECHNOLOGY AND ENERGY (THAILAND) *

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Introduction

Thailand, like many other developing countries believes that industrialization would be the principle avenue to economic development. It has officially placed the important to the industrial development since 1961. The first and the second National Economic and Social Development Plans put more emphasis on building public infrastructure to support industrial growth and collecting information for further planning. The third and the fourth plans more specific goals for industrialization were created, these included the decentralized industrialization, export promotion, the equality distribution of income between the urban and rural population, and the acceleration of regional economic development. The fifth plan is the present plan (1982-1986) and the first time for Thai government to give the important role of science and technology (S&T) for industrial development. To achieve the industralization, science and technology policies and measures have been implemented as follows:-

- Information on existing technology will be extensively disseminated.
- Strengthening the country's scienctific and technological base such as emphasizing manpower development, research instituted etc.
- Encouraging have been provided for the private sector by tax deduction for utilizing the modern technology that can save energy and protect environment.

The implementation of science and technology policy is the the function of Ministry of Science, Technology and Energy (MOSTE) and other agencies related to S&T activities like the Ministry of Industry, various universities.

Small Industry : An overview

Other countries may define the definition of small industry in different ways, however, Thailand gives the meaning of small industry as enterprise with less than 2 million bath investment and less than 50 workers. The majority of small industries are family type business, managed by the head of the family who owns them. Those owners possess experience from previous occupation either in some commercial activity or employment as skilled workers in some industrial jobs. Their education back ground is not high, it may be average in secondary school grade.

The three major basic aspects for small industry are marketing, financial and technology. Most of the owners are likely to lack of formal training of these functions. They have learnt the skill of management, empirically, from trial and error method in their everyday operations. Most of small enterprenues have limited experience in particular aspect, so the finest operation of the business is quite impossible.

The factory for small industies are set in various parts of the country. It depaends on raw material location and marketing attraction. For metal product industry mostly locates in town, while the food processing industry is established close to raw material supplyers.

Support in Technical Advisory

Technical advisory for small and medium scale industries has been given by a number of government divisions and state-enterprises, some of which are mentioned below:

a. Industrial Service Division (Under Department of Industrial Promotion, DIP)

Its functions involve the assistance in technical matters for small engineering industries such as metal-working, furniture-industry etc. The services include training and advisory in relation to abreasted technology of production design and testing of industrial production, furniture industry development, techniques in packaging and package design, administration and management in factory, and product-making survey.

b. Northern Industrial Promotion Centre (Under DIP)

The functions of this center are the development of industry of all kinds and sizes in Northern region which include the advisory, organizing of training courses, seminars, exhibitions, provision of information service on production technology, advanced management, funding, marketing assistance, promotion on industrial products by organizing contests on standardized products, undertaking feasibility study of newly-established industries using local raw materials, assistance to private sector to establish industries in order to provide employment opportunities for local people.

c. Textile Industrial division (Under DIP)

This division is responsible for the assistance to textile industries in training skilled workers on textile technology, the service in inspection of products standard and quality, the improvement of

production process, the service in product design to suit the market needs, the development of textile industry management, research and development of production process, and the advisory in order to increase efficiency of man and machine.

d. Thailand Institute of Scientific and Technological Research (Ministry of Science, Technology and Energy (MOSTE)

Its activities regarding research service, technical advisory to small and medium industries include the testing of industrial standard, repair and calibre of scientific apparatus and procurement of scientific and technological information and documents and solving of production problems encountered in these industries.

e. Science Service Department (Under MOSTE)

Regarding small and medium industries, this department is responsible for the research on utilization of by-products, the analysis of quality control of industried products; and the provision of science and technology information, research and extension service for food processing.

Support in Non-Technical Assistance to Small and Medium Industries

a. Industrial Productivity Division (Under DIP)

Its activities include organizing training courses; giving advisory to small and medium industries regarding accounting management, marketing management, personel management, organization planing, production management, and computer service; the division acts as a coordinating unit for Asian Productivity Organization and request Japan's expertise assistance to Thai business firms.

b. Small Industries Finance Office (Under DIP)

The activities of this office involve the advisory to the potential small industry investors; the analysis of loan proposal; and the collection of data, statistics and information on loan approval and small industry performance. The amount of loan is limited to 1 million baht (US.$37,000).

c. Thai Handicraft Emporium (Under DIP)

It is responsible for the marketing sale and design of Thai handicraft in accordance with the need of foreign markets; the promotion of Thai handicraft export; and the display on Thai handicraft from every regions.

d. The Industrial Finance Corporation of Thailand (IFCT)

IFCT, the government enterprise under the Ministry of Finance, was established in 1966. At present, head office is located in Bangkok. The main objectives are not only providing fund about 200,000 baht to 5,000,000 baht for small and medium industry but also serving acknowlegement information concerning with cost deduction, effective in management and administration. For wide service through out the country, regional branch will be located.

Description of Technical Institutions which could Serve as Technology Resource

According to the TSDS phase I requires the industrial sector of high priority as : metal-working, wood-working and food processing. The following report will be confined on the three major industries as mentioned:

A. Metal-working

There are many institutes have responsibity in the fild of metal-working. Those institutes are Department of Industrial Promotion, Chulalongkorn University, Thailand Institute of Scientific and Technological Research (TISTR) etc, however, three outstanding institutes will be mentioned as:

- Department of Industrial Promotion (Ministry of Industry)

The Extension of Mechanic and Metal Centre have the role in training for engineers and technicians industry, service the information and advisory to improve metal engineering.

- Chulalongkorn University (Ministry of University Affair)

Faculty of Engineering does the metal research for industry in semi-finishing metal, welding metal, methodology heat metal of steel and Quality Control Service. There are 9 technologist running the requested research.

Thailand Institute of Scientific and Technological Research (TISTR)

There is a division under TISTR involve in metal working technology and ceramic technology. The task of this division included.

- Research and development for inprovement of national resource, at put the aim to metal product especially for mechanical parts, electric and electronic compenents.
- Give the service to industry by testing their products.

At present most metal working technological institutes take the role of extension service instead of being and research institute. They get the abreast technology from foreign countries such as Japan or Taiwan rather than produce it themselves. According to technological support and aid from Japan, department of industrial promotion, Ministry of Industry (MOI) will be able to give effective service to small industry in the near future. Ministry of Science, Technology and Energy (MOSTE) also places the important to metal technology by preparing to establish "The National Centre for Metal and Material Technology." However, the TSDS scheme for metal working will be run effectively by creating the co-operation among MOI, MOSTE and Ministry of University Affair.

B. Wood-working

The Forest Industry Organization (FIO) under the jurisdiction of the Ministry of Agriculture and Cooperatives. The Principal Objectives of the FIO are:

1) To serve the state and public in all phases of forest industries.
2) To undertake business concerning forest industries such as forest exploitation, sawmilling, kilndrying, wood preservation, wood distillation, plywood and veneer manufacturing and other wood-based industries.

3) Reforestation, conservation and improvement of forests for potential use for the state and under the FIO's own initiatives.

4) Research in forestry.

FIO's Activities*

1. Timber Harvesting: By having recourse to modern technology and also appropriate traditional means, machines and vehicles and elephants and in-forest workers are employed by the FIO in timber harvesting activities. The FIO maintains, attached to its field offices in various logging regions all over Thailand, a force of about 100 working elephants and specialized logging equipment and transport vehicles, crawler tractors and rubber-wheeled tractors with an approximate total over 500 units. It gives no less than 4,000 job opportunities annually.

Manpower :	Undergraduate Degree	228	Persons
	Employees	4,000	Persons

* From Brochure of FIO.

2. Timber Processing : The FIO owns and operates three sawmills with the professed aim to stabilize prices of sawn timbers. They are 1) Mai Thai Sawmill (for Teak), 2) FIO 1 Sawmill and 3) FIO 2 Sawmill (for Non-Teak), Two sawmills-the first and second-are located in Bangkok while the third is located in Ayutthaya. Additional processes for kilndrying and preservative treatment are available to improve the quality of sawn timber products.

3. Wood Preservation Plant : To acquaint the public with the benefits to be gained from utilizing treated lumber for constructional purpose, the FIO Wood Preservation Plant has beenactive in its campaigns to promote wood preservation treatment and related activities. Service is available to all patrons in impregnation, drykiln and planing of lumber while a recent development project is in operation to utilize treated Yang and other suitable semi-hardwoods or hardwoods in pre-fabricated house construction. It is eviden from our experience in this field that durability of timbers is remarkably extended after appropriate treatment. The FIO Wood Preservation Plant is located in Bangkok.

4. Drykiln and Wood-Product Factory : Established in 1955, the FIO Drykiln and Wood-Products Factory has since been persuing diverse activities as follows :-

(1) To introduce to the public the utilization of kilndried lumber the practice of which was new in this country at that period.

(2) Production of standardized doors and windows from kilndried lumber.

(3) Production of furniture and office furniture products from Teak and Teak Bond Wood for local market and export of finished or semi-finished furniture products.

A new production line was added recently to produce export quality decorative doors for foreign markets.

5. The FIO Bond Wood Factory : With the purpose of initiating a new form of wood residue utilization, the Forest Industry Organization as established a pilot plant in Lampang Province to product Teak Bond Wood panels (laminated Teak strips panels) from logging, thinning and transportable sawmill residues. The finished Teak Bond Wood panels, corresponding in sizes to sawn Teak, are made from squared Teak strips, usually very small pieces ($\frac{1}{2}$ inch x $\frac{1}{2}$ inch x 8 inches) glued together. Because of the strips used are so small, they can be produced from residues or wastes which would otherwise be left useless in the forest as fire hazard. The product showing texture of Teak strips (without face veneer) are very attractive. They are used for interior decoration, furniture manufacture and other useful applications.

Department of Industrial Promotion has established other division which takes the responsibility for transferring wooden furniture technology to small industry. The division's personals have been trained for extensioning new technology by Japanese technologists. It can be said that this division rarely does technological research. TSDS scheme for wood working may begin with this department and co-operates with an interesting university.

C. Food Processing

Institute of Food Research and Product Development (IFRPD) under Kasetsart University, purposal of the institute are :

- To do research in Food Science and Technology in order to improve the economics of the food and agricultural industries in Thailand.
- To assist in improving the quality of raw materials used in the food industry.
- To improve the quantity and quality of food products in Thailand

- To produce new nutritious foods at low cost.
- Provide technological assistance and service to other bodies interested in all aspects of food.
- To cooperate with other government departments in scientific research and education in food science and technology.

The activities have been done.

1. Research Projects Algae
2. Kaset Protein
3. Baby Food
4. Wine Making
5. Soy Products
6. Coconut Cream
7. Military Combat Ration
8. Canned Foods
9. Child Nutrition Centres Field Trial

Manpower : undergraduate degree 93 persons
researcher 53 persons

The Science Service Department (SSD), TISTR Chiangmai University, Khon Kaen University Songkla University also could be prominent technology resource institutions if they have sufficial financing supported.

Those institutions except TISTR give the priority to home economic instead of giving service to small industry. TSDS scheme can be impremented by building up the co-operation among, TISTR, IFRPD, and Ministry of University Affair to act as technological service for small industry.

Conclusion and Recommendation

As mentioned before Thailand has nearly all kind of industrial supportive institutions that can provide assistances to small industrial development, but the growth of this small industry still in a question. That may be explained as :-

1. The supportive institutions scatter their activities.
2. The education gap between the technologists and factory owners is so wide.
3. The factory owners don't trust in technological supportive institutions.
4. The factory owners don't have competence to improve their production while getting a abreast technology from supportive institutions.

To make the small industrial development success in getting technological supported from institutions the following measures and strategies may consider for effective results.

a) Build up the tie relation and good cooperation among high level policy maker institutes, technological institutes, and small industrial sector.
b) Create the technological reputation for supportive institutes.
c) Build up the virtual relation among technological institute extension service institute and small industry.
d) Strenthen technological absorptive capability for small industrial owners by information service and training from supportive institutes.
f) Make a good linkage between small industry and other economic activities such as marketing, financial, and management institutes.

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