

Rural Off-Farm Employment
Assessment Project

Working Paper No. 30

Northern Region Industrial ~~Service~~ Institute:
Evaluation and Planning Perspectives

by

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April 1981

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Kasetsart University

With the Assistance of

Michigan State University

Ohio State University

FOREWORD

This paper is one of a series produced by the Rural Off-Farm Employment Assessment Project at Kasetsart University. The project is funded by the U.S. Mission of the Agency for International Development in Thailand under Project No. 493-0306. The objective of the Project is to provide information to the Royal Thai Government, USAID, and other international donors, to be used to identify and develop appropriate policies and programs for the rural non-farm sector in Thailand.

The Working Paper Series is designed to share interim or preliminary results on different aspects of the Project work. Some papers also discuss methodologies to be used in future studies.

A list of Working Papers produced to date, along with a list of Research Papers of the Project, is included at the end of this report. Copies of papers in either series can be obtained from Dr. Tongroj Onchan, Director, Center for Applied Economics Research, Kasetsart University, Bangkok 9, Thailand.

Tongroj Onchan
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1. ISI Background

The Northern Region Industrial Service Institute (ISI) was launched in Chiang Mai in 1972 with UNDP/UNIDO support. This support extending from 1972 to 1978 involved the provision of expatriate experts and total financial assistance in the amount of US\$1,717,470 which, for the same period, was matched by Thai Government counterpart funds in the amount of Baht25,275,590 (= \$1,263,780). The Institute became fully Thai supported from 1979 onwards. Historically, the Northern Region ISI was instituted as a branch of the Bangkok based ISI to provide the same range of services, namely: industrial technology and product development, extension and training, provision of industrial information, and industrial promotion. The Chiang Mai ISI has tended to place more emphasis on local handicraft and home industry than its parent institute which is more city and town firm and factories oriented. Although policy is not always consistent, the trend now is to give more autonomy to this Institute and to develop it into a regional center for industrial promotion and support, acting as the implementing agency for all Department of Industrial Promotion (DIP) units. Since the beginning of the current budget year 1981, all Bangkok based activity of the DIP Cottage Industry and Thai Handicraft Promotion Divisions in the Northern Region has been transferred to this ISI, complete with personnel and budget.

2. Administrative structure and personnel

The structure and personnel of the ISI are given in the following organizational chart. Numbers in parentheses indicate number of approved

positions which may or may not be filled. Thus there are currently 165 approved positions at ISI but actual staff total only 143. The main reason for the discrepancy is that even if positions are approved by the Ministry, funds to hire staff to fill them are not always provided by the Budget Bureau.

1. Directorate: Total 2 (2)
 - Director 1 (1)
 - Assistant Director 1 (1)
2. Administration: Total 37 (39)
 - Chief 1 (1)
 - Financial section 2 (5)
 - Supplies and transportation section 27 (28)^{1/}
 - General section 8 (8)
3. Industrial Service Unit: Total 15 (17)
 - Chief 1 (1)
 - Extension section 5 (5)
 - Training section 6 (6)
 - Information section 3 (4)
4. Industrial Promotion Unit: Total 5 (13)
 - Chief 1 (1)
 - Economics and statistics 1 (3)
 - Marketing 2 (5)
 - Finance and accounting 2 (4)

^{1/} Includes 8 drivers.

5. Design Unit: Total 9 (9)
 - Chief 1 (1)
 - Industrial product design 3 (3)
 - Graphic design, packaging, display 2 (1)
 - Handicraft design 3 (2)
6. Industrial Technology Unit: Total 36 (41)
 - Chief (1) - Assistant Dir. Acting.
 - Engineering 5 (5)
 - Machine shop 6 (6)
 - Foundry 2 (3)
 - Heat treatment 4 (4)
 - General wood working 4 (4)
 - Bamboo and rattan 5 (6)
 - Agricultural engineering 2 (4)
 - Sheet metal working 3 (3)
 - Maintenance and repair 5 (5)
7. Ceramic Unit: Total 11 (12)
 - Chief 1 (1)
 - Other staff 10 (11)
8. Handicraft Unit: Total 27 (31)
 - Chief 1 (1)
 - Lacquerware section 7 (8)
 - Bamboo and rattan 6 (8)
 - General 13 (14)

Total staff and positions: 143 (165)

Of the 165 positions at ISI, 80 are civil service positions, and the remaining 85 are contracted employee positions. The pay of staff in both statuses is roughly equivalent for the same kind of work. The main difference (and disincentive) of the employee status is that possibilities of promotion are severely curtailed as the leader positions (directors, heads of divisions or sections) are restricted to civil servants. As in the case of civil servants, employees also have retirement benefits based on years of service but this is paid in a lump sum on retirement and not in the form of a monthly pension (an option also available to civil servants). The ISI civil service positions are distributed by grade as follows:

Grade 7	1
Grade 6	5
Grade 5	6
Grade 4	23
Grade 3	29
Grade 2	11
Grade 1	5

What this means in practice can be gathered from table 1. All of the unfilled ISI positions are in the grades 1 - 3 category. There is now a policy of phasing out contracted employee positions and replacing them by civil service positions.

Finding good and willing candidates to join the staff of the Institute has been a bit of a problem. Once recruited however, the staff tends to be stable and there is little turnover. The ISI currently has

Table 1: Civil Service Positions

<u>Grade</u>	<u>Typical Occupants</u>	<u>Range of salary in Baht/month</u>
11 (highest)	Highest Govt. Officials	10,745 - 15,225
10	DG's, Under Secret. of State	9,785 - 14,565
9	D'ty DG's	8,885 - 13,365
8	Directors of	8,045 - 12,265
7	Division	7,265 - 11,225
6	Chiefs of Division	5,945 - 10,745
5	Important positions in a Division	4,245 - 8,045
4	New graduates entering	3,225 - 6,245
3	the Govt. service	2,385 - 4,925
2	Clerical staff, janitors,	1,905 - 4,025
1	drivers, etc.	1,080 - 3,045

a solid core of veterans in the supervisory positions but the general profile of the staff is very young, most being in the 30 years old or younger group. Training background is very diverse ranging from formal university degree training, to technical college diploma courses, to non-formal on-the-job training. It varies from division to division.

The Director, Khun Padetpai has a Master's degree in mechanical engineering from Georgia Tech.

In the Industrial Service Unit, the extension and training people are generalists. The Head, Khun Wim Longhut has an MBA in extension. Four have bachelor's degrees: 1) in engineering and 2) in economics. The others have technical college diplomas. All junior staff of this section take an extension training course given at ISI Bangkok after one year of experience in the field. This is a seven week full-time course for extension officers including four weeks of lectures on a variety of topics such as industrial financing, communicating, report writing, extension strategies, personality development, etc, and three weeks of field work. None of the staff of the small information section have formal training in information science. The Head has a BA degree in languages.

All six staff of the Industrial Promotion Unit have formal training in economics. The Head, Khun Phimphan has a Master's degree; the others, BA's.

All nine staff of the Design Unit have formal training in design, either a Bachelor's degree or a diploma, acquired either in a faculty of architecture, a school of fine arts, or a technical college.

The Industrial Technology Unit includes 9 engineers with BSc degrees in industrial or mechanical engineering, and 17 technical college graduates. The remaining 10 staff received no formal training.

The Ceramic Unit staff has 4 BSc graduates in chemical engineering or general science and 4 technical college graduates. The remaining 3 are skilled workers without formal training.

The Handicraft Unit staff has the least formal training. Only 3 out of 27 have degrees; they are also the only civil servants in the Unit. The remaining staff are skilled workers without formal training.

3. Budget, ISI Northern Region

The ISI budget since its inception in 1972 is given in the graph in Figure.1.

It is difficult to evaluate the operational cost of the ISI during the founding years as much of the budget was used for capital expenditures such as construction and equipment, and perhaps also for the support of expatriate advisers at higher than Thai rates. As the situation has now more or less stabilized, the budget of the current fiscal year (1981) gives a fairly good picture of the actual cost of the ISI operation.

The total budget is Baht 6,811,900 (\$340,595) which is 30% higher than the budget of FY1980. The increase is due mainly to the fact, already mentioned, that all cottage and handicraft industry promotional activity previously handled by DIP Bangkok was transferred to ISI Chiang Mai with the budget to support it in the amount of Baht 1,220,400, over and above the regular ISI budget of Baht 5,591,500 for FY1981.

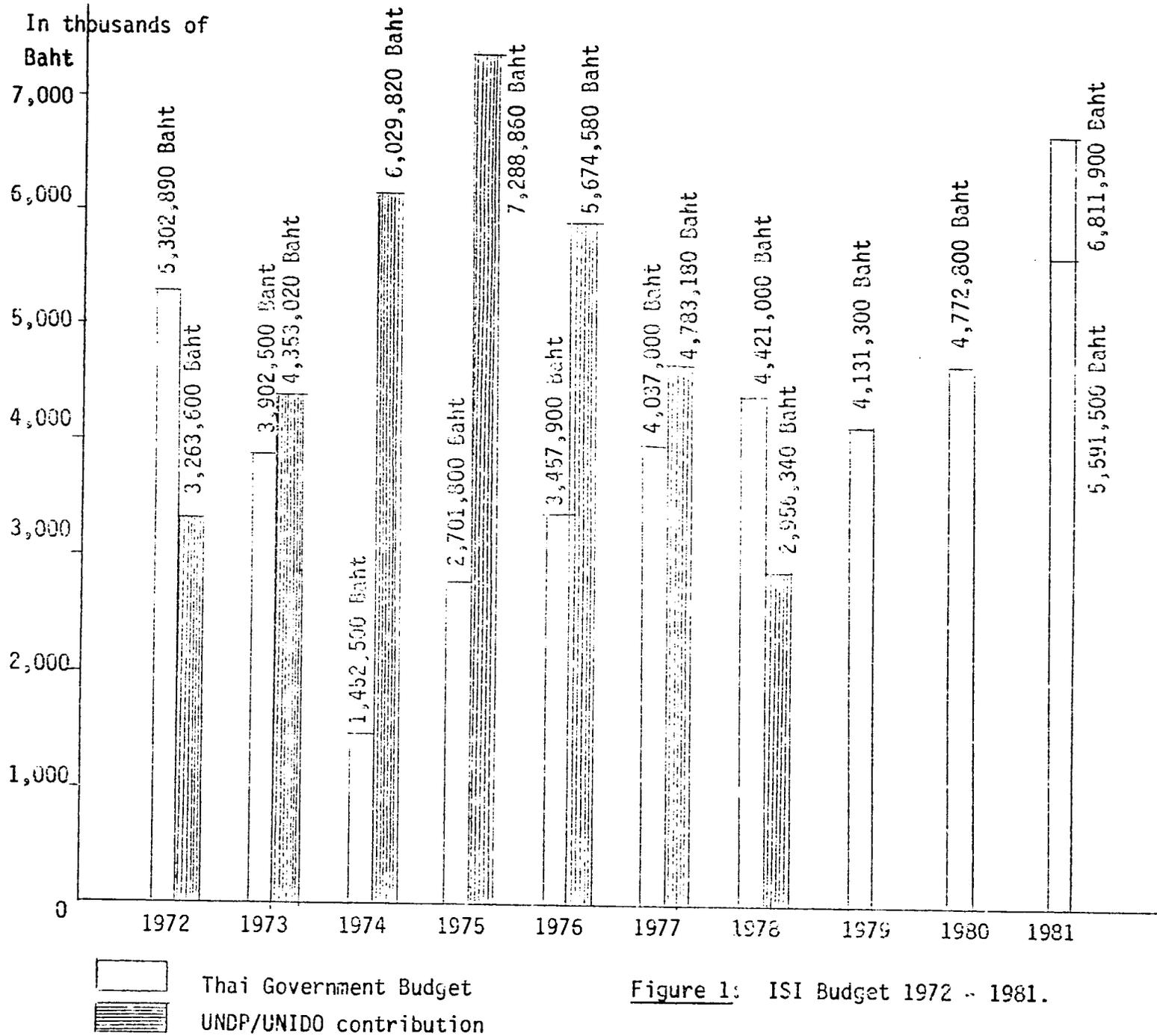


Figure 1: ISI Budget 1972 - 1981.

The break-down by budget categories is as follows:

1. Salaries		
1.1 civil servants	2,514,640	
1.2 permanent employees	1,682,220	
1.3 occasional hiring	46,500	
Sub total		4,243,360 (62.30%)
2. Travel, maintenance, repairs		628,790 (9.24%)
3. Public utilities		278,890 (4.10%)
4. Non-durable supplies		967,160 (14.20%)
5. Durable supplies, equipment, etc.		423,700 (6.21%)
6. Land purchase and construction costs		240,000 (3.52%)
7. Exhibitions		20,000 (0.30%)
8. Miscellaneous		<u>10,000 (0.15%)</u>
Total		<u><u>6,811,900(100.00%)</u></u>

No budget break-down by activity is available but as salaries are by far the largest budget item (62.3%), a rough idea of the relative share of the budget absorbed by each unit of the ISI can be obtained on the basis of the proportion of personnel assigned to each, as follows:

1. Directorate and Administration	27.30%
2. Industrial Service Unit	10.50%
3. Industrial Promotion Unit	4.20%
4. Design Unit	6.30%
5. Industrial Technology Unit	25.20%
6. Ceramic Unit	7.70%
7. Handicraft Unit	<u>18.80%</u>
	<u><u>100.00%</u></u>

4. The Northern Region ISI operation

It would be misleading and artificial to attempt to understand the ISI operation looking only at the work of its organizational units on a one by one basis. It is an integrated operation which is the main reason for its effectiveness and its most attractive feature. The work of all units dovetail into one another. Although the formal extension and training sections are in the Industrial Service Unit, most staff in other Units are involved in extension and training also. The Design Unit produces designs for the Industrial Technology, Ceramic and Handicraft Units at their request, but the latter also produce designs on their own. The Industrial Promotion Unit constantly calls on the other units for design, technology and training to promote the production of marketable items. Handicraft production, training and promotion are the specific responsibility of the Handicraft Unit, bamboo and rattan items for example, but other Units are also involved in different ways. The ISI Director is dissatisfied with the current organizational structure and has prepared a conceptually neater scheme for approval, grouping, for example, all bamboo wood processing technology activity in one section. Notwithstanding what has been said, the following paragraphs review the ISI activity unit by unit, but it should be borne in mind that the activity described is more often than not accomplished in collaboration with other units.

4.1 Industrial Service Unit

4.1.1 The extension and training sections of this unit in practice function as one. The staff of 12 (including the Chief of the

Unit) are generalists, either economists, or technicians. These are the "salesmen" of the ISI operation in the field. Six are responsible for small scale industry and six for handicraft and home industry. Each has responsibility on principle for a certain territory within the Northern Region, drumming up business, as it were, for the ISI, making its services known and investigating requests for their services. Once a "client" has been identified, they act as coordinators between this client and the relevant Unit and Section within the ISI. Although no arrangements have been formalized, they also liaise with others government agencies up-country such the Border Police, CD Department, ARD, etc. As their personnel have no technical expertise, the ISI is often in a position to be of considerable assistance in technical projects. For example, an unnecessarily large amount of money might have been budgeted to build a brick kiln in a village area. The ISI can help save a lot of money by advising that no kiln is necessary for that type of brick which can be produced just as well and much more cheaply by open firing using rice husk. The most common form of cooperation however is to respond to their requests for training sessions in home and handicraft industry.

Much training is currently conducted or coordinated by the ISI in up-country locations. The trainers are either its own staff, staff especially hired for a given course, or DIP Bangkok-based technical Division staff. The latter currently include only the Textile Division as the ISI now have their own home and handicraft industry trainers. Training courses of this type usually have to be co-sponsored as the ISI

budget has provisions only to pay salaries, travel and perdiems for the trainers. Funds for materials (e.g. cotton or silk) and equipment (e.g. looms) have to be provided by another source. For example, if the Border Police or the CD Department put in a request for training in blacksmithing bamboo working, or weaving in one of their project areas, they must provide funding for all but trainer costs. This is sometimes provided by volunteer organizations such as the Lions Club. Besides being dictated by specific requests by various sponsoring organizations, the content of training is also determined by demand for a certain product. For example, a few months ago, a trading company wanted to purchase something like 2 million bamboo fans of a model not produced locally. For several weeks, ISI trainers did practically nothing else but teach local villagers to make these fans, not to lose this source of income.

4.1.2 The Technical Information Section of the Industrial Service Unit has three main functions:

a. Documentation center. This activity is plugged into the national technical documentation center at the Thailand Institute of Science and Technology Research at Bangkok, Bangkok, and has access to its resources. The ISI center also gathers documentation on its own and subscribes to a numbers of technical journals.

b. Publications.

- The Northern Region ISI Journal: 500 copies, 6 times a year. Its articles, written in

simple language, give technical information in all areas of ISI involvement. It also serves as an ISI newsletter, reporting on current activities and making announcements of forth-coming activities: training courses at ISI, exhibitions, etc. for the benefit of prospective participants.

- A transcription of the table of contents of the technical journals received by the center. (For internal circulation.)

- A monthly abstract journal with a distribution list of 70 industrialists. A typical issue contains 50-60 abstracts. Readers interested in the articles abstracted can get a photocopy free of charge on request.

- "How to do it" manuals giving ideas on things to build that are cheap, easy to make and can sell. Some of these are used in ISI training programs. Some describe items produced by ISI R & D, for example, an improved hydraulic ram. This comes out in two parts. First a rather brief announcement giving a summary description of the item and its uses is sent on to persons on their distribution list. Those seriously interested in the item can request the companion much more elaborate manual describing it in detail.

c. Enquiry service. This is for industrialists wanting information of any kind relating to present or projected enterprises. Most of those who write or or come in person want statistics of various kinds and market information.

These services are used more by more educated industrialists, technical college students, and extension workers of various organizations.

4.2 Design Unit

By its very nature, this unit relates broadly to all technical units of the ISI providing designs as requested for products to be executed by them, either strictly industrial products or handicrafts. In this function it seems to dabble in almost anything. Its graphic Design and packaging section also has a very broad function. It produces trade marks for enterprise owners requesting them. For example, the distinctive trade mark of the Chiang Mai Dew Drop Drinking Water Processing Plant is of their contriving. They prepare artistic posters for various purposes. They respond to requests for packaging designs for industrial produce which are both functional and distinctive. This was done, for example, for a tea leaf processing factory in Mae Taeng. To quote Khun Amarin Ukoskit, the head of this Unit, the unit has a basic capacity to do all these things. It does not achieve the standards of the better Bangkok or international firms but their capacity is sufficient to meet the needs of the Northern Region. An examination of their work confirms this evaluation. No other organization in the North provides these services.

The services of the Unit fall into four broad categories: (1) responding to requests for designs, (2) training and seminars in design techniques: drawing and execution, (3) product development, and (4) design promotion and exhibitions.

Requests for designs come from many sources for many different kinds of products. These requests are first discussed with the requesters to understand their needs. A design is drawn and discussed once again. If the design is satisfactory and the requester so desires, a prototype is executed, the only expense to the requester being payment for the materials used. If the request comes from a government agency, even this is done free of charge. Requests for designs and prototypes for furniture have come from furniture factories and the Teak Wood Carving Cooperative on how to make furniture using less wood, knockdown furniture, or furniture designs eliminating some production problems. Many requests come from the handicraft industry for designs for hats, handbags, etc. or for designs to print on cloth, batik, to etch on lacquerware etc, or for figurine prototypes to be made of wood, plaster, ceramic etc. Some requests are for agricultural equipment such as a special cart to be used when picking strawberries, and even for paraplegic devices. Most training activity recently was in printing techniques, for example, the silk screen technique to transfer designs on paper or cloth. There is also training in dyeing, tie-dye for example, and in batik making. In product development, there is a great deal of experimenting to explore new ideas using different materials, alone or in combination: vegetable fibre, wood, plastic, fibre glass, metal.

Locally made gold plated orchids were developed here, for example. Much of this activity is obviously done jointly with the technical units of ISI. This Unit is also active in organizing exhibits of various kinds to disseminate its designs and products. The ISI participates actively in the important Chiang Mai Winter Fair, for example.

4.3 Industrial Promotion Unit

This Unit, headed by Khan Phimphan Charoetrat, theoretically has 3 sections but is so understaffed that all six staff work together as one team to accomplish all tasks. What they accomplish with limited means is amazing.

With Colombo Plan assistance, they have conducted a very thorough study of the context of small industrial enterprise development in Nakhon Sawan province in connection with the proposed Regional Industrial Development and Promotion Project. The results were published in a solid two volume report. Unfortunately, the project was dropped and the report not used. Data gathering activity continues to be done on a reduced scale mainly in relation to the planning of the Northern Region ISI as a regional industrial promotion center and of the setting up of satellite sub-regional centers in the north. The current strategy is to concentrate more on activity yielding quick and visible results as described below. Evaluation of ISI interventions in extension and training is done routinely as standard follow-up.

Secondly, this Unit has also been providing investment services for producers, buyers and even for financial institutions. A few examples. They conducted investment feasibility surveys for speci-

fic firms or investors e.g. to set up peanut oil and rice bran oil factories. They have provided advice and training in management and accounting procedures. When SIFO was still active, they played a mediating role for small local investors seeking loans. More recently they have played the same role in relation to IFCT to obtain a 6 million baht loan for a bamboo product factory. Their dealings are with the Lampang branch of IFCT. In turn, this branch and even the Lampang Bank of Thailand Regional Office consult them on specific investment projects. The Unit has referred its clients to other organizations for services the ISI cannot provide. For example, a bamboo products factory was referred to a Bangkok firm for a solution to a production problem. The ISI has played an active role in planning Northern Region industrial estates under the IEAT. Finally, over the past year, the Unit has played a very active and effective role in gathering market intelligence and bringing producers in contact with buyers, with considerable benefit to the producers. This last activity merits further elaboration.

The main problems of development of the handicraft industry have been marketing, production, design and finance. Market needs are not known. When a large buyer places an order, production capacity is inadequate to meet it. Local traditional handicraft designs are not to the taste of a more sophisticated market. Finally, producers lack the funds to engage in larger scale production.

As a first step to solve these problems, the Unit made a rough survey of handicraft production in the region and persuaded the producers to provide specimens of this produce to be exhibited at ISI in

an ad hoc showroom provided for this purpose. At first, the producers did not see the point in doing this and were not interested in increasing their production. A showroom with exhibits was organized nonetheless.

The next step was to identify the market and its needs. Letters were sent to commercial attache's of all embassies in Bangkok requesting information on potential buyers in their countries and asking to be put in contact. Large trading firms in Bangkok were contacted directly, inviting them to send representatives to view the exhibits and to provide information on the types of produce they were interested in. The response was good. The ISI is now in contact with some 20 such firms who sent representatives to Chiang Mai. Besides being shown the exhibits at ISI, they were also brought around to visit the producers. One of these representatives bought about 400,000 Baht worth of samples on one trip. Tentative orders are then placed either for a product on display or for a product using the same material or production process but of a completely different design. The largest first order came from the Loxley (Thailand) Co. in the amount of Baht 3 million for lacquerware. (Some influence was used here as the Chairman of the Board is a Thai Khunging friend of Khun Phimphan.)

Problems to be solved then are, one, how to organize production on the scale needed to fill the order and, two, how to get the producers to accomplish a design which is new to them. To solve the first problem, in the case of the Loxley order for example, Khun Phimphan and her team made a careful survey of all lacquerware and related production in Chiang Mai province by number of firms

and workers, source and quantity of raw materials available, types of production, and output. In this way, they were able to identify and organize a group of producers large enough to fill the order. Those needing special skills to meet the specifications of the order were given special training in the Lacquerware Section of ISI.

The Unit does not handle financial transactions directly. Contracts are made directly between the traders and the producers but these are scrutinized by the ISI who provide advice and assistance to both parties, often leading to modifications in the contract making for more satisfactory arrangements. The contract specifies the quantity and quality of goods, schedule of delivery and of payments. This is explained by ISI to the producers to make sure they understand.

Large trading firms are not used to dealing with small producers and are unfamiliar with their working capital problems. ISI negotiated payment arrangements which were quite unusual for them. These take one of three forms: (1) payment on delivery as the goods are produced; (2) an advance of 30% is made of the total payment; (3) Letter of Credit to a bank. In some cases, as some small producers did not even have enough capital to start production, Khun Phimphan served as a personal guarantor for small loans. If products are not delivered on schedule, contracts usually specify a penalty of 10% of the payment.

It is interesting to note that these trading firms which are quite satisfied with the present arrangements do not like to deal

with Narayana Phand which is supposed to be doing this. The Narayana Phand organization is not geared to the wholesale trade, among other reasons, because it does not have the capacity to make quantity deliveries. The ISI on the other hand seems to have found the magical formula for handicraft promotion: identification of market outlets and their needs, identification of producers and their capacity, capacity to train so that production capacity matches market needs. It is also interesting to note that this Unit has not been successful in dealing with retail outlets, the Central Dept. Store for example. The volume of produce requested is too small for the prices offered.

In less than one year, this Unit has generated approximately 15 million baht worth of orders. The big money spinners are, first, lacquerware, followed by ceramic, batik and wood carvings. Bamboo products are coming up fast. Estimated net profit to producers is more than 50% of what the buyers pay for their product. The profitability of the venture is becoming more and more obvious as these producers indulge in conspicuous consumption: adding new rooms to their homes, buying fancy stereo equipment, colour T.V.'s, air-conditioned pick-up trucks, etc. As word gets around, more and more producers and even other handicraft promoters are seeking to plug into the program. A few more large orders and it will really take off.

When orders are received or negotiated by this Unit, preference is given to producers who have provided specimens of their work to exhibit in the ISI showroom. There are currently about 100 of these, the changwats most heavily represented being Chiang Mai, Lamphoon,

Prae and Pitsanuloke. The following list gives an idea of the range of products:

Lacquerware	Bamboo veneer products	Embroidery
Ready made clothes	Wood carvings	Crocheting
Place mats	Paper figurines	Batik
metal jewelry	Artificial flowers	
Handbags	Ceramic	
Instant antiques	Blue and white porcelaine	
Umbrellas	Gold plated flowers	
Basketry	Hand weaving	

The Unit is presently working on a directory of producers, obtaining data from Changwat Industrial Officers.

4.4 Industrial Technology Unit

This and other technical units such as the Ceramic Unit and the Lacquerware Section function according to the general mandate of ISI which is service (extension), training, product development (R and D) and enterprise development. All functions are interlinked. It is difficult to describe the operation in terms of a program or a curriculum. One can start by identifying a number of areas of expertise and special staff interests within these areas. These are:

(1) metal working including foundry, machine tooling, and metal processing of various kinds. Agricultural engineering falls into this category, the current major project of which is the development of an inexpensive and efficient hydraulic ram based on a Taiwan model.

(2) Wood processing technology with main emphasis on bamboo and rattan processing.

(3) Lacquerware.

What is done in these fields is determined predominantly in response to specific requests directed to the Institute by persons of various categories:

a. Industrial producers with problems: the production is of low quality because of inadequate equipment, improper technical or organizational procedures, etc.

b. Industrialists requesting assistance to set up an enterprise. They want raw materials tested, advice on equipment and procedures, instruction on how to use them.

c. Would be industrialists looking for ideas and trying their hand at different skills at ISI in order to identify some line of production they feel they can engage in successfully.

All activities in a real sense are part of an overall process. First contacts, as mentioned, are usually established by extension workers. Then the technicians move in to identify the problems, R & D is usually conducted in this context: to develop a technology that is appropriate to solve the problem. Training is also conducted in this context.

The following are some examples of these interventions.

- A small ice cream factory employing 11 - 12 workers was using a very ineffective and unsanitary hand driven mixing process. It

could not afford expensive imported equipment. ISI designed and produced an efficient, sanitary and cheap substitute.

- The matoom fruit derived from the bael tree is popular in the North. It is used to prepare a cooling drink which is said to have many properties. It is a diuretic, a laxative and it relieves pile pains. A factory was set up in Chiang Mai in 1976 to process this fruit which must first be dried. ~~It~~ then becomes very hard. Machinery used to slice it was hand driven, inefficient, slow and dangerous to operate. ISI assistance was sought. A new slicer was designed and built. A first prototype was unsatisfactory. A second model was designed and built which was fully successful. In fact, it received an international award.

- The Pitak Pong Foundry in Chiang Rai which employs 8 - 9 workers produces metal for agricultural equipment. Its equipment was antiquated and could produce only 50 - 100 kg. of metal/ ^{a day} and many orders received could not be filled. The factory was visited by 3 ISI engineers who provided advice on extending the workshop and procuring new equipment which brought the capacity of the foundry up to 2 - 3 tons a day..

- The ISI designed and produced a tea leaf cutting device for a tea factory in Mae Taeng which is said to be just as effective and much cheaper than the kind of equipment used in Malaysia.

- The huge Chiang Mai Food Complex, a food processing industry in Lamphoon including, among others, the Thai Farming Co., has been lying idle for two years because of bad management. The Governor of Lamphoon now wants this industry reactivated and has asked the ISI

to check out the machinery to see if it can still be used.

The ISI has been very active in the last couple of years in developing the technology of bamboo wood processing with the help of Japanese experts. The rationale of course is that other sources of wood are decreasing whereas bamboo is abundant and cheap. There are 50 species of bamboo in Thailand, only 32 of which are well enough known to have names in Thai. The project studies the properties of these species and develops products on this basis. It is difficult material to work with however, because it is brittle and difficult to bend. Different techniques using open flame and boiling are being experimented with.

A line of furniture has been designed and produced using the "mai pai rai" variety of bamboo which has a solid core, much like rattan. Training in these techniques has been given to furniture factory workers but no factory is yet producing it seriously, perhaps because it is too difficult, the designs are not sufficiently attractive, or market promotion has been ineffective.

Another line, bamboo veneer, also developed at ISI, has been much more successful. It consists of several layers of bamboo woven mats pressed together with a bonding agent to produce a solid waterproof board. This can be used as a building material such as wall board or can be pressed into different shapes such as plates on which designs can be added. These can be quite attractive. Several firms are producing this product in the area, ISI providing training and technical advice as well as designing and producing processing equipment such as bamboo slicers, presses for various shapes, etc.

4.5 Ceramic Unit

This unit, one of the strongest and most active of ISI, has excellent facilities and skilled staff. It provides the full range of ISI services but mostly at its Chiang Mai base. Although the ceramics industry is fairly widespread in the Northern Region, budgetary constraints make it impossible to visit plants regularly. All that can be afforded and what is done is four field visits a year, each of about 10 days duration. The Unit is well known however, and as it is the only organization providing these types of services to the industry, those who need them willingly come to Chiang Mai.

Ceramic falls into 3 categories: porcelain which is translucent and water resistant, stoneware which is water resistant but not translucent, and earthenware, the lowest grade, which is water absorbing. The ISI unit has not yet ventured into porcelain (nor glassware which is technically a ceramic) but handles all aspects of stoneware and earthenware production, aesthetic and utilitarian, from artistic items, to household containers, to building materials.

Training is an important part of the Unit's activity. There were approximately 10 sessions in the past year, each lasting from 3 weeks to one month, with not more than 10 participants to a class. Trainees are either students or skilled workers sent by factories or by prospective factory operators. Training covers all aspects of production: use of potter's wheel, forming, glazing, types of materials to be used, and firing. There are even courses on the economics of production: what kinds of products can be produced in the most cost effi-

cient way given the availability of which kinds of raw materials and investment funds in a specified amount.

Consulting and providing services are also routinely executed. These include, for example, the testing of raw materials, and advising on factory problems such as kiln design, colour, glazing, firing, etc. The following are examples of services provided.

- Siam Celadon, Sankamphaeng, 20 workers. Assistance to build an oil fired kiln and technical assistance for glaze and colour

- Plitaphan Sankhalok Chiang Mai. Assistance to improve quality of glaze.

- Mae Rim Ceramic Studio, 40 workers. Assistance to develop a wall tile. Design a wood firing 17 m³ kiln.

- Maeng Rai Kiln. Problem: cracking of product during biscuit firing. Reason identified: not good firing schedule and poor forming of product. Firing graph prepared and staff given training.

- Thaladon Construction Brick Co., Chiang Mai, 70 workers. The kiln was built to be lignite fired. Assistance provided to convert it to burn sawmill wood scraps instead because it is cheaper and can be obtained on credit.

This unit also engages in R & D, the results of which are passed on to users. Some current projects:

- For a Lampang blue and white porcelaine factory, a satisfactory product from a 1,200^o C, firing, reduced from 1,350^o C. (N.B. blue and white porcelaine is not technically "porcelaine" as it is not translucent.)

- Making stoneware using white clay from Utaradit.
- Develop a lead-less glaze for tiles. Traditional Thai red tiles use a lead based glazing, the preparation of which constitutes a health and environmental hazard. The project is experimenting with a borax based glaze fired at 900 C.
- Development of enamelware with metal coating for jewelry.

4.6 Handicraft Unit

The main sections of this Unit are the Bamboo and Rattan Section and the Lacquerware Section. The activities of the first have already been described in relation to the Industrial Technology Unit. The importance of the Lacquerware Section was made clear in the discussion of the marketing activity of the Industrial Promotion Division. It deals in all aspects of production from the analysis and treatment of the ^{sap of the} Sumac tree, the natural lacquer varnish which turns hard and black on drying, to the preparation of the wooden base form, to drawing, gilding and colouring. Its main activity consists of training in the execution of the various techniques. The training is more than basic as trainees are taught how to produce truly beautiful specimens using gold and silver inlay, gold and silver leaf gilding, Japanese style colouring, and the very time consuming but exquisite egg-shell inlay. The Unit is frequently consulted on technical problems, the most frequent of which is associated with the quality of the sumac sap. Sap of good quality is difficult to acquire. It is frequently adulterated, contains too much water, etc. and has to be treated and mixed properly before it can be used. The ISI has designed and produced equipment to

do this. The Unit is also constantly requested to produce traditional or modern motif designs for reproduction.

The General Section of this Unit does nothing but training and the training of trainers for other organizations such as the CD Department. The trainers are women, and what is taught is traditionally women's crafts: embroidery, crocheting, making artificial flowers, the making of basic garments such as shirts and blouses, school uniforms, batik making. The training is basic and the product not yet marketable. Most of the training is done in rural areas. A typical class of learners consists of at least 30 women. As mentioned, the ISI also coordinates training in spinning and weaving. The trainers are not provided by this Unit but by the DIP Textile Division in Bangkok.

5. ISI coverage by area and type of activity

The Northern Region ISI has a mandate to provide services to all 17 changwats of this region. It is clearly not achieving this objective at present for all of its services. Data on training programs by locations is available only for the last four months of 1980. There were in total 53 training activities. The distribution by changwats is as follows:-

Chiang Mai	25	47.2%
Lampang	3	5.6%
Chiang Rai	3	5.6%
Utaradit	6	11.4%
Phrae	2	3.8%

Phayao	7	13.2%
Nan	2	3.8%
Mae Hong Son	<u>5</u>	<u>9.4%</u>
TOTAL	<u>53</u>	<u>100.00%</u>

Eight of the 17 changwats were served and 47.2% of this activity concentrated in Chiang Mai province.

Table 2 gives a breakdown of technical services provided by the ISI by locations. The data cover the 12 months of FY1980 and are derived from the ISI summary annual report. These data reveal that 10 of the 17 Northern Region changwats have received technical services from the ISI but the distribution is extremely unequal. More than 92% of these interventions were concentrated in changwats Chiang Mai and Lampang.

6. Users' perception of ISI services. A sample of ISI clients were selected for in-depth interviews on their perception of ISI services received and on their problems as producers in general. The sample included the following firms:

1. Nai Wicha Somphanit. Lacquerware producer, 7 workers, Chiang Mai.
2. Thai Bamboo Industry. Bamboo handicraft, 6 workers in factory, Chiang Mai.
3. Wood Carvers Cooperative, Chiang Mai.
4. Anusorn Co., Ltd. Agricultural implements, 40 workers, Chiang Mai.

5. Siam Royal Orchid Co., Ltd. Gold plated flowers, 70 workers, Chiang Mai.
6. Siam Celadon Ltd., Part. 28 workers, Sankamphaeng.
7. Raengjai Bamboo Wares. Bamboo furniture, place mats, wall board, basketry, 50 workers, Sankamphaeng.
8. S.V. Furnishing Co. Furniture factory, 10 - 20 workers, Chiang Mai.
9. Tana Processing Ltd., Part. Dew Drop drinking water processing plant, 20 workers, Chiang Mai.
10. Cotton weaving training center, Ban Chiang Doi, Doi Saket, Chiang Mai.
11. Hill Tribe Handicraft Project. Wholesale & retail outlet, Huay Kacw Road, Chiang Mai.

As the sample was selected by ISI it is probably biased in their favor but any real accomplishments are worth examination. A companion report will present the details of the findings in case study form. What follows is a summary of the findings concerning the sample's perception of ISI services received. All firms are unanimous in making a positive evaluation of these services. The ratings go from useful, to excellent, to indispensable. To start with reasons of the lowest order, no other organization provides these services in the Northern Region. It is therefore convenient to have the ISI in Chiang Mai. Otherwise they would have to go to Bangkok. Moreover, the services are provided free of charge. The ISI staff they dealt with were said to be competent and anxious to help. The ISI facilities and equipment are excellent and

Table 2: Northern Region ISI
 Technical Services: Consultations and Advice
 12 months : FY1980

Location of Intervention	Type of Intervention	Production and Industrial Engineering	Marketing and Accounting Assistance	Design & Packaging	Ceramic Production	Metal Working	Wood work and Wood Product	Total
Chiang Mai		28	69	28	47	3	11	186
Lampang		3	10	-	12	1	-	26
Lamphun		1	1	-	-	-	-	2
Chiang Rai		1	2	-	2	-	-	5
Mae Hong Son		2	-	-	-	-	-	2
Utaradit		1	-	1	-	-	-	2
Phayao		-	1	-	-	-	-	1
Nakhon Sawan		-	2	-	-	-	-	2
Phrae		-	-	-	1	-	-	1
Nan		-	-	-	2	-	-	2
Total Northern Reg.		36	85	29	64	4	11	229
Angthong		1	-	-	-	-	-	1
Surin		-	-	-	1	-	-	1
Bangkok		-	23	1	1	1	1	27
Abroad		-	13	-	-	-	-	13
Grand Total		37	121	30	66	5	12	271

willingly made available by ISI authorities. Six of the eleven firms would not be in operation today had they not received ISI technical support. For four of these, their product was developed at ISI (bamboo veneer, gold plated flowers, mechanical multi-cropping tiller.) Four of the firm owners received basic training for the production of their product at ISI. The workers of five of the firms were trained at ISI. Four of the firms received technical advice in the selection of equipment to set up their enterprise. In three cases, some of the equipment was designed and produced by ISI. Four of the firms use the technical services of the ISI on a continuous basis to solve production problems. One of the firm owners received training in management and accounting procedures. Another received advice and assistance in applying for a loan from the IFCT. Two of the firms use ISI equipment to manufacture some items of their production. Four of the firms received considerable help in marketing their product through the identification of channels or the organization of exhibits for their produce. Several mentioned the contribution of the ISI in upgrading their skills and learning about new techniques and products through special training courses, seminars and publications.

There were a few negative comments, some legitimate, others less so. One firm accused the ISI of revealing its trade secrets (Siam Royal Orchid Co.). This poses a dilemma for ISI whose mandate among others is product development to be shared with local producers: what to do when a local producer who, as in this case, provided the capital used by the ISI technicians to develop the product, insists on exclusive rights to production? In the rural development venture in Amphoe Doi Saket, the

organisers of the program are grateful for the provision of trainers to run the cotton weaving training center, but complain that courses are too short to allow the trainees to become truly proficient. Finally, there are two unreasonable complaints. The ISI has provided no help to firms in dealing with authorities e.g. to expedite registration of factories, to modify repressive policies of the Forestry Dept. with regard to the purchase of teak wood, etc. Secondly, the ISI has done nothing to solve the perpetual and universal problem of lack of working capital of small producers. Small loans are still next to impossible to obtain.

7. Conclusions and recommendations

It is obvious from the preceding analysis that the Northern Region Industrial Support Institute has many attractive features and an impressive record of accomplishments. Its most attractive feature is its comprehensive approach to industrial enterprise promotion bringing together in one package all of the essential components needed for successful enterprise development: training and extension, technical information services, product development, new enterprise identification, technical support services, investment services, marketing support, all provided in response to specific needs of actual or potential local producers and in close consultation with them.

No formal analysis of the performance of the ISI from a management point of view was attempted to determine its efficiency rating and cost effectiveness. Such an exercise competently conducted could prove useful. Some thought is currently being given to structural changes

in the organization of the Institute by its authorities to increase its efficiency and give it more focus. This can help but in the last analysis the quality of performance is influenced more by the caliber of human resources and motivation. There is no easy formula to improve these however. The majority of the staff are young, inexperienced and not very highly qualified. This obviously has bearing on their effectiveness in dealing with problems of industrial promotion and suggests the need for further staff development.

As in the case of other government agencies, the ISI is service and not profit oriented. Given the present state of development of industry in the North, it could probably not support an ISI having the status of a State Enterprise or a private corporation as few could afford its services if they were not provided free of charge. Notwithstanding, it does seem incongruous and an inappropriate use of public funds that obviously prosperous firms should not have to pay for the services they use when they clearly could afford to do so. It would not seem unreasonable and would make the ISI operation more cost effective to establish clearly qualified categories of users. Some would be required to pay more or less commercial rates for professional services. Others would get subsidized rates. Only very specifically qualified users would be entitled to the promotional privilege of getting the services free of charge.

Cost effectiveness considerations also suggest a reexamination of Research and Development policies. It seems to be a waste of funds and inappropriate from a management point of view for the Northern Region

ISI to engage in R & D in areas other organizations in Thailand are involved in more intensively and more competently, especially if those organizations belong to the same Department or Ministry. Thus, the Bangkok ISI is highly specialized in metal working and furniture design and production, and conducts intensive R and D in these areas. This should then be left to them and the Northern Region ISI should concentrate its R and D on region-specific industrial needs or, at least, on areas of its own excellence which does not duplicate the work of others. This is not to say that it should not make use of, or provide training in, the R and D results of other organizations if they have relevance for the region.

Despite its name, the Northern Region ISI falls far short of giving full coverage to all provinces under its mandate. As mentioned in the analysis, technical services extended outside of Chiang Mai and Lampang are almost a residual category. The provision of training has a somewhat better distribution but its usefulness is open to question without the back-up of complementary services. Several reasons were given by ISI staff to explain this situation: lack of budget, and lack of staff and time. The first reason is compelling and the solution obvious: more funds are needed to allow the staff to travel more widely within the region. The next two reasons might be valid but need further examination to be really convincing. Is it really true, as stated, that all available staff time is needed simply to respond to requests for services and that no time is left over to be more than simply responsive to requests of users in the immediate vicinity of the

ISI? A related consideration is the selection of tasks and users. The ISI is clearly not reaching all categories of industrial enterprises and potential users, nor is it suggested that they should, given limited resources. It would seem that appropriate target groups are those showing real potential for development, a criterium that the ISI seems to be following, but they need to be sought out and nurtured more actively. A useful exercise to be recommended to the administrators of this program would be a time and task allocation study: how much time is spent by the ISI staff doing what. This would permit better planning of time allocation and, with a more judicious determination of priorities, point to possibilities of extending ISI activity more broadly in critical areas of intervention.

DIP authorities are not unaware of these problems but there does not appear to be any firm policy on how to solve them. Two approaches have been suggested. The first is the idea of establishing sub-regional centers manned by a small and balanced staff representing the various areas of ISI expertise who would be responsive to local needs. There would be three such centers in the Northern Region outside of Chiang Mai. This idea has been revived recently in a slightly different conceptual framework at the urging of a World Bank Mission. The idea now is to establish ISI coordination centers in growth centers ("muang lak") to promote industrial growth having a spread effect in these locations. The ISI Industrial Promotion Unit is doing preliminary documentary research in this connection to study the characteristics of the region and identify target groups. Staff are being assigned tentatively. The whole

exercise is leading up to the feasibility study requested by the World Bank. A second approach which is also being considered actively is to assign an industrial promotional role to the Changwat Industrial Offices. It is not clear however how this can be done other than providing liaison and information which they are already doing, given their rather specific factory control function.

However desirable, and regardless of whatever official status the Northern Region ISI is granted as a Regional Industrial Promotion Center, the present ISI is still far from fulfilling that role. A name change is contemplated, Industrial Promotion Institute, but it is still in fact a "service" organization in that it is still more responsive than promotional. If it is to become the dynamic implementing agency of all DIP functions envisioned for the Northern Region, it should ideally go beyond its present role of providing services to existing enterprises and, combining both planning and implementation, have a capacity to identify industrial potential, to plan and conduct feasibility studies for the development of new enterprises, and to provide the supportive services needed to implement projects identified as feasible and promising.

It should be theoretically possible to develop this capacity without great financial outlays and the need to greatly increase manpower if it were possible to coordinate the considerable human and institutional resources currently in place. To mention a few:

a. NESDB, Bangkok and Chiang Mai. It has a planning capacity but no functional involvement in implementation. It has no direct links with ISI.

b. Industrial Economics and Planning Division, Bangkok and Chiang Mai. Linkages with DIP and ISI are weak. The Chiang Mai center is largely redundant.

c. The Industrial Estate Authority of Thailand is active in the North and coordinates with the ISI. This coordination would need to be better articulated.

d. The Thai Handicrafts Center (Narayana Phand), Bangkok is a market outlet for Northern Region handicraft but coordinates poorly with ISI.

e. Changwat Industrial Officers have a good working relationship with ISI and are a good source of field information.

f. Ministry of Commerce: Depts. of Foreign Trade, Internal Trade, Business Economics, Commercial Relations. They potentially could be of great assistance to the ISI handicraft marketing operation but they seem to function almost as competitors.

g. DOL Institute for Skill Development, Lampang, has good workshop facilities and instructors. Despite the fact that it works in the same technical areas as the ISI, there is no contact or coordination whatsoever.

h. Chiang Mai University. It has an impressive potential for research and planning that is largely unutilized by the DIP for industrial promotion. There is cooperation with ISI in technical fields however, e.g. ceramic production, industrial waste water disposal.

i. Chiang Mai Technical College. Several ISI staff are part time instructors.

j. CD Dept., PW Dept., ARD, Mobile Development Units, Border Police, etc. All of these agencies are supportive of ISI activity but coordination is not systematic.

This list of organizations actually or potentially involved in industrial development support perfectly illustrates both the strengths and the weaknesses of the promotional system. If it were possible to channel the very considerable financial, material and technical resources already in place into a unified plan of action for industrial promotion, the end could be achieved comfortably without the need for additional outlays. Given the structure of the Thai Government however, the fact that these resources are distributed in so many separate agencies makes coordination virtually impossible without radical structural and organizational changes. Except at the very top, all lines of command are vertical. Communication across agencies at a medium and lower level is slow and inefficient because all messages and requests for action must go up to the top, across, and back down again. An incipient line of horizontal command is emerging at the changwat level but it is weak and inadequate for the purposes of regional coordination.

There is much awareness of the need for structural reforms in DIP. A suggestion that was made at ISI to achieve unified action in industrial promotion is to set up a task force under the NESDB umbrella which is the only high level government agency with horizontal linkages having enough authority to enforce unified action. There is a precedent for this in the various sub-committees of the NESDB to tackle specific problems e.g. the Sub-Committee on Small-Scale Water Resources Development. To be

truly effective, such a task force would have to be regionally based and be more closely involved in plan implementation than current NESDB committees. In order to achieve this, if not identified with the ISI, it should at least be closely associated with it.

Without waiting for government structural reforms, the ISI is sensibly moving ahead in the implementation of a plan of demonstrated feasibility for regional home and handicraft industry promotion, this sector being given priority for the time being over town factories. In so doing, it is capitalizing on its recent highly successful experience in handicraft marketing development. The plan has three straightforward elements:

1. Survey of handicraft production potential.
2. Survey of the demand for this production by national and international markets.
3. Development of services in support of production and marketing.

It is hoped that some donor support will be provided to help implement this program. Support should be extended for any or all of the following:

- a. Region wide survey of handicraft production potential.
- b. Industrial Promotion Unit staff development to acquire more sophistication in quality handicraft market operations. This would include familiarization with the markets in general and with firms in particular, and the acquisition of knowledge about and appreciation for marketable product design. This could be done in many ways. e.g.

- Provision of a first rate short term consultant on these matters.

- Study tours to handicraft marketing centers abroad: Singapore, Manila, Jakarta/Yogyakarta/Bali, Hong Kong, Seoul, etc.

- Internship in progressive firms in Thailand and abroad.

Staff development is also needed in handicraft production financing expertise.

c. Strengthening of the ISI Design Unit in this connection for design creation and appreciation. Participation of Silpakorn University and Thai artists?

d. Handicraft Center Building including:

- A permanent showroom to exhibit handicraft production
- Office facilities for handicraft production supportive services: for producers; consultations and assistance for paper work, contracts, information on buyers and loan sources, etc.

for buyer services: consultations, introduction to products and producers, general broker functions.

The ISI currently has no regular facilities for these purposes. A meeting room is used as an ad hoc showroom which has to be emptied of exhibits when there are meetings. The ISI hopes to acquire a piece of the adjoining property which belongs to the MOI Factory Control Division to build the Center. The current budget includes Baht 240,000 for this purpose, an amount that will need to be supplemented.

e. Hiring of additional staff for the Industrial Promotion Unit which is badly understaffed.

Appendix

List of persons interviewed
(Chiang Mai, March 9-19, 1981)

1. Mr. Padetpai Meekun-iam, Director, ISI
2. Ms. Phimphan Charoatrat, Chief, Industrial Promotion Unit, ISI
3. Mr. Ti , Industrial Promotion Unit, ISI
4. Mr. Amarin Ukoskit, Chief, Design Unit, ISI
5. Mr. Wim Longkhut, Chief, Industrial Service Unit, ISI
6. Mr. Wiraphon , Industrial Service Unit, ISI
7. Mr. Suthep , Industrial Service Unit, ISI
8. Ms. Pranee Chaiwang, Chief, Technical Information Section, ISI
9. Mr. Jaron Unsuwan, Chief, Industrial Technology Unit, and
Assistant Director, ISI
10. Mr. Somboon Aranyapak, Chief, Ceramic Unit, ISI
11. Ms. Atiya , Handicraft Unit, ISI
12. Mr. Wanchai Radchadamat, Chief, Bamboo & Rattan Section, ISI
13. Mr. Wicha Somphanit, Lacquerware Producer, Chiang Mai
14. Mrs. Samorn Manaboon, Owner and Manager, Thai Bamboo
Industry Co., Chiang Mai
15. Mr. Surachai Surrephong, Manager, Teak Wood Carvers' Coop.
16. Mr. Suraphon, Ctee Member, Teak Wood Carvers' Coop., Chiang Mai
17. Mr. Somyos Nimmanahaeminda, General Manager, Anusarn Co., Ltd.
Chiang Mai
18. Mr. Danai Leosawathiphong, General Manager, Siam Royal
Orchid Co., Ltd., Chiang Mai

19. Mr. Ruang Nimmanahaeminda, Chairman, Anusarn Co., Ltd.
Chiang Mai
20. Mr. G.A.R. Fullerton, Manager and Partner, Siam
Celadon Ltd., Part., Sankamphaeng
21. Mrs. Songsi Nanthawarat, Manager, Raengjai Bamboo
Wares Co., Sankamphaeng
22. Mr. Chaveng Kosiapirug, Manager, SV Furnishing Co.
Chiang Mai
23. Miss La'or Wongchai, Manager, Tana Processing Ltd., Part.
Chiang Mai
24. Head Abbot, Amphoe Doi Saket Ecciaistical Council, Promotor
Doi Saket otton eaving training center.
25. Mrs. _____, owner, hand loom weaving factory,
Ban Chiang Doi, Amphoe Doi Saket
26. Capt. Narong Pukdee, Border Police, Dir. Hill Tribes
Products Foundation
27. Ms. Mali Sisaringkan, Treasurer, Dir. Hill Tribes Products
Foundation
28. Ms. _____, staff, Hill Tribe Handicraft Project
Huay Kaew Rd. Chiang Mai store (PW Dept.)

Publications of Rural Off-Farm Employment Assessment Project

RESEARCH PAPERS

- No. 1 Tongroj Onchan, Pradit Charsoambut, Richard L. Meyer and Donald C. Mead, "Description of the Rural Off-Farm Employment Assessment Project in Thailand", October, 1979.
- No. 2. Donald C. Mead and Pradit Charsoambut, "Rural Off-Farm Employment in Thailand: Phase I Survey Results", June, 1980.

WORKING PAPERS

- No. 1 Merle Menegay and Vinich Veerayangkul, "Kenaf Processing in North-Eastern Thailand", August, 1980.
- No. 2 Tongroj Onchan, "The Textile Products Industry in Rural Thailand", August, 1980.
- No. 3 Pradit Charsoambut, "The Silk Weaving Industry in North-Eastern Thailand", August, 1980.
- No. 4 Pradit Charsoambut, "Mat Making and Fish Net Making in North-Eastern Thailand", September, 1980.
- No. 5 Merle Menegay and Vinich Veerayangkul, "Agricultural Hand Tool, Animal Implement, and Machinery Manufacturers in Towns within Chiang Mai, Khon Kaen and Suphan Buri Provinces", September, 1980.
- No. 6 Saroj Aungsumalin, "The Brick Industry in Chiang Mai: A Preliminary Survey", September, 1980.
- No. 7 Somsak Priepprom, Rapeepun Jaisaard, Richard L. Meyer, "Farm Household Modelling: Objectives and Methodology", November, 1980.
- No. 8 Merly Menegay, Suwapote Lekawathana, Vinich Veerayangkul, "The Fruit and Vegetable Processing Industry in Selected Areas of Chiang Mai, Khon Kaen, and Roi Et Provinces", November, 1980.
- No. 9 Richard L. Meyer, "Formal Credit Supplies for Rural Enterprises", November, 1980.
- No. 10 Donald C. Mead and Vinai Artkongharn, "Profitability and Efficiency: Some Preliminary Survey Results", November, 1980.
- No. 11 Jeerakiat Apibunyopas, "An Economic Analysis of Employment in Kenaf, Cassava and Sugarcane Production and Processing in Northeast Thailand", November, 1980.

Publications of Rural Off-Farm Employment-Working Papers (cont'd)

- No. 12 Yongyuth Chalamwong and Richard L. Meyer, "Wealth and Credit: A Descriptive Analysis of Farm Households Balance Sheet", November, 1980.
- No. 13 Saroj Aungsumalin, "Financial and Economic Analysis of Selected Small-Scale Industries", November, 1980.
- No. 14 Ripeepun Jaisara, "Preliminary Results of Farm and Household Modelling in Chiang Mai", November, 1980.
- No. 15 Somsak Priepprom, "Preliminary Results of a Rainfed Agriculture Model in Khon Kaen Province", November, 1980.
- No. 16 Tongroj Onchan, "The Ready-made Garment Industry in Rural Thailand: An Overview", November, 1980.
- No. 17 Orasa Kiatying-Unsulee and Richard L. Meyer, "Distribution of Farm and Non-Farm Enterprises in Farm Households", November, 1980.
- No. 18 Preeyanuch Apibunyopas, "Entrepreneurship: A Survey Result", November, 1980.
- No. 19 Vinich Veerayangkul and Merle Menegay, "The Kuaytiaw Processing Industries in Selected Areas of Chiang Mai, Khon Kaen and Roi-Et Province", November, 1980.
- No. 20 Vinich Veerayangkul and Merle Menegay, "The Soybean Curds Processing Industry in Selected Areas of Chiang Mai, Khon Kaen and Roi-Et Province", November, 1980.
- No. 21 Saroj Aungsumalin, "A Study of Cement Product Industry in three provinces of Thailand: A Preliminary Report", November, 1980.
- No. 22 Yongyuth Chalamwong, "Economic Analysis of Labor Supply of Farm Families to Non-Farm Enterprises: A Preliminary View", November, 1980.
- No. 23 James Boomgard and Merle Menegay, "A Market Systems Approach to Research on Small Scale Industries", November, 1980.
- No. 24 James Boomgard, "A Preliminary Assessment of the Furniture Subsector in Three Provinces of Thailand", November, 1980.
- No. 25 Somchai Teepthana, "The Brick Industry in Selected Provinces: A preliminary report", November, 1980.
- No. 26 Sumala Sirichoti and Richard L. Meyer, "Employment and Unemployment in Farm Household", November, 1980.
- No. 27 Annaj Thiravanich, "Preliminary Results: Farm Household Model in Roi-Et Province", November, 1980.

Publications of Rural Off-Farm Employment - Working Papers (Cont'd)

- No. 28 Pradit Charombut, "Silk Weaving Industry: Preliminary Results", November, 1980.
- No. 29 Jacques Amyot, "Small Industrial Enterprise Supportive Institutions A Preliminary Assessment", January, 1981.
- No. 30 Jacques Amyot, "Northern Region Industrial Support Institute: Evaluation and Planning Perspectives", April, 1981.