



TDRI

Quarterly NEWSLETTER

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Strategy for Water Quality Management of the Chao Phraya River *

Dhira Phantumvanit and Winai Liengcharernsit

The quality of a society's life and well-being depends on the quality of its environment. The Chao Phraya is more than just a river, it is the symbol of the nation. Historically, it was Thailand's bloodline--feeding the rich rice fields of the Basin--and still serves as the route for our splendid, majestic royal barge processions. Keeping the Chao Phraya clean is not only a national responsibility but a pressing environmental need.

The most developed area of Thailand--the Bangkok Metropolitan Region (BMR)--is fed by the lower Chao Phraya and Thachin rivers. It is in this area that the city of Bangkok and its satellites (the five adjacent cities of Nonthaburi, Samut Prakan, Nakhon Pathom, Pathum Thani, and Samut Sakhon) have grown and prospered. Indeed, the population of the BMR now stands at 8.2 million with projected growth of up to 11.5 million by the year 2001. The dominance of this region is shown by the fact that half of all national economic growth between 1970 and 1986 was a result of activities generated in the BMR (NESDB 1986).

The positive effect of economic development in this area has also resulted in the deterioration of the water quality of its two major rivers--the Chao Phraya and Thachin. Now, the level of dissolved oxygen and coliform bacteria in the lower reaches exceeds some National Environment Board (NEB) standards.

Population growth and industrialization are the two main culprits. And,

* This article was summarized from TDRI's complete project report, "Development of a Framework for Water Quality Management of the Chao Phraya and Thachin Rivers" prepared for the National Environment Board.

as Thailand moves toward NIC status, more population congestion and industrial development can be envisaged--with accompanying increasing levels of water pollution. Indeed, there is no central waste treatment facility for Bangkok. Individual households use septic tanks. Hotels, hospitals and government housing estates have their own small waste-treatment facilities. As a result, most of the klongs in Bangkok are already polluted beyond redemption.

Water Quality Standards

The Chao Phraya River has been classified by the NEB according to intended use. The fact that standards for major parameters have been specified and set reflects the intention of the government to maintain water quality at appropriate levels.

If the lack of financial resources were not a constraint, the technology is available to keep the river clean. There are well-known ways to treat conventional (biodegradable) wastewater generated from household runoff or industrial effluents. However, in Thailand, as in other developing countries, funds for abating water pollution are scarce. Water pollution, when competing with other immediate issues, is often not regarded as the first development priority.

Thailand has been relatively successful in supplying clean water to its water consumers, especially in municipalities. However, we have not seriously tackled the polluted wastewater they then generate. We have, so far, left the task--of purifying our wastes--to the generosity of nature whose assimilative capacity has reached its limits. Hence the pollution of our klongs.

Chao Phraya River Water Quality

Dissolved oxygen (DO), usually present in clean water at the level of 7 mg/l or more, is one of the best indicators of organic pollution. DO is necessary for the survival of fish and other aquatic life. The decomposition of organic pollutants, such as those in municipal sewage, depletes the natural oxygen in the river. The amount of DO is governed by several factors besides pollution load. They include temperature, flow and tidal conditions.

Depressed sag curves reflecting low DO measures have been indicated for many years. The area most affected is the reach between Klong Toey Port and Memorial Bridge--and this area is spreading. This is evident by comparing historical records with recent data.

Data on DO levels during high tide and low tide in the Chao Phraya River in 1984 showed that there was no difference in DO levels at the lower reaches. This indicates that the degree of pollution has increased since DO is no longer completely recovered during low tide.

Table 1 summarizes water quality in the Chao Phraya River from 1981 to 1984. As indicated, the DO in the lowest reach (kilometer 7 to 62) fell below the proposed standard of the National Environment Board and the lowest reach of the river was designated as class 4. Class 4 water is intended for industrial use; it can be used as water to be supplied to consumers only after extensive treatment.

The middle reach (kilometer 62-142) is designated as class 3, which is suitable for agricultural use and for water supply after normal treatment. Protection of this reach is important because the Metropolitan Waterworks Authority (MWA) pumps water from Sam Lae (about kilometer 90) to supply water for Bangkok. As indicated in Table 1, the coliform bacteria often exceed NEB standards, an indication of pollution from sewage.

The Problem

If the goal now is to restore the quality of our klongs and rivers, what direction should we take? To start with, we might try to comply with the water quality standards which have al-

ready been established by the NEB. Previous studies have recommended the installation of conventional sewerage systems. Our challenge in Thailand is how to derive a lower-cost system that meets the basic requirements of adequate sanitation--not how to adopt one of the standard sewerage systems in use in more developed countries.

Technical Alternatives

A proper sewerage system is often recommended for collecting domestic waste water. This conventional system relies on a network of underground sewer lines that transports waste to a treatment plant or a disposal site, a solution adopted during the mid 1800s in Europe when many European cities faced the problem of inadequate sanitation due to rapid growth. Indeed, underground sewers solve the problem of wastewater disposal successfully, but the price is high. In many developing countries today, the situation differs vastly from that faced by Western countries. At the time when they decided to adopt underground sewers, London had only about two million people and Hamburg, Paris and

Table 1 Average Water Quality in Chao Phraya River During Low Flow (1981-1984)

| Reach | Parameter | NEB Standard | Average Low Flow ¹ Conditions in Year | | | |
|---|-------------------------|--|--|-----------------|---------|---------|
| | | | 1981 | 1982 | 1983 | 1984 |
| Km 7-62 Water Quality Class 4 | DO, mg/l | 2.0 | 1.1 | 1.6 | 1.2 | 1.3 |
| | BOD ₅ , mg/l | 4.0 | 2.2 | 2.2 | 2.2 | 1.3 |
| | Coliform, MPN/100 ml | NA | 83,000 | >8,700 | 209,300 | 163,000 |
| | Cd, mg/l | 0.005 ² , 0.05 ³ | - | - | <0.0005 | 0.009 |
| | Pb, mg/l | 0.05 | - | nd ⁴ | 0.012 | 0.008 |
| | Hg, mg/l | 0.002 | - | - | 0.005 | 0.0003 |
| | Salinity, ppt | NA ⁵ | - | 2.9 | 2.8 | 2.6 |
| Km 62-142 Water Quality Class 3 | DO, mg/l | 4.0 | 4.6 | 5.1 | 4.4 | 4.1 |
| | BOD ₅ , mg/l | 2.0 | 1.5 | 1.1 | 1.3 | 2.1 |
| | Coliform, MPN/100 ml | 20,000 | 33,700 | 15,700 | 16,800 | 14,800 |
| | Cd, mg/l | 0.005 ² , 0.05 ³ | - | - | <0.0005 | 0.0004 |
| | Pb, mg/l | 0.05 | - | nd ⁴ | <0.005 | 0.012 |
| | Hg, mg/l | 0.002 | - | - | <0.0001 | 0.0002 |
| | Salinity, ppt | NA ⁵ | - | 0 | 0 | 0 |
| Km 142-379 Water Quality Class 2 | DO, mg/l | 6.0 | - | 7.0 (July) | 7.2 | 7.0 |
| | BOD ₅ , mg/l | 1.5 | - | 1.2 (July) | 1.9 | 2.1 |
| | Coliform, MPN/100 ml | 5,000 | - | - | 11,800 | 9,000 |
| | Cd, mg/l | 0.005 ² , 0.05 ³ | - | - | <0.0005 | 0.001 |
| | Pb, mg/l | 0.05 | - | - | 0.011 | 0.005 |
| | Hg, mg/l | 0.002 | - | - | 0.0004 | <0.0002 |
| | Salinity, ppt | NA ⁵ | - | 0 | 0 | 0 |

Source: NEB, 1985b.

Notes: ¹ Average during low flow months.

1981: Jan to May 1982: Jan to Aug

1983: Jan to July 1984: Jan to May

² When hardness < 100 mg/l as CaCO₃.

³ When hardness > 100 mg/l as CaCO₃.

⁴ nd = not detected.

⁵ Salinity standard is not set, but flow in the river is regulated to maintain salinity at Memorial Bridge to less than 1 ppt.

New York had less than one million. But today, there are over 5.6 million people in the BMA. Clearly, the scale of the wastewater disposal problem is much greater than that faced by developed countries 100 years ago.

Climate is clearly another important difference. A tropical climate is ideal for pathogen survival. The result is that poor sanitation becomes one of the chief causes for the spread of hookworm, diarrhea, enteritis, cholera, and typhoid. Most systems originating in the temperate regions emphasize the reduction of BOD, and are less concerned with pathogen destruction. Whereas the destruction of these pathogens should be the first priority of any tropical wastewater disposal system.

Remaining questions surround the options available for Thailand? Unfortunately, past studies have not sufficiently detailed alternatives to a conventional sewerage system. Since cost is clearly a constraint, low-cost technology should be applied, with the possibility of gradually upgrading to a sewerage system if required. Some alternatives are as follows:

- o An Interceptor System. The fact that the cost of installing a system of sewers to collect wastewater from every household is prohibitive has prompted the idea of not using lateral sewers. Instead of collecting wastewater from every house with a pipe network, wastewater would be intercepted before reaching the klongs. This can be achieved by using interceptors. The advantage of this system is that it would avoid the high cost of lateral sewers. In conventional sanitary systems, the sewers typically account for 80 to 90% of capital costs and more than 65% of total annual costs (Otis, 1987).
- o On-site Treatment. The on-site option refers to treating wastewater of an individual house or a group of houses. A number of technical options are available--ranging from septic tanks to small activated sludge units which do not require large-scale planning and organization. Another advantage is that on-site treatment can be easily upgraded. (On-site treatment is in fact the method in actual use in Thai-



land today. The defacto standard is to use one or two chambers made of concrete rings. In the cities, the effluent is usually connected to storm drains.

- o Water Conservation. Water conservation has two significant implications. A reduction in water consumption reduces raw water demand as well as the amount of wastewater to be treated; indeed, experience in developed countries points out that there are a number of steps which can be taken to conserve water. For example, the use of treated wastewater for gardening, the use of adjustable shower heads and modified flush toilets designed to consume less water.

All the technologies mentioned above can be implemented concurrently. The main objective is to introduce affordable technologies so that the cleaning up of our klongs and rivers can begin. The calculation of the pre-feasibility study on the introduction of intercepting sewers clearly confirms the significant reduction in the overall cost of the proposed wastewater treatment when compared to the costs of a conventional sewerage system.

Financing and Costs

The key questions are how much to spend for water pollution control, and how to generate the required investment. A related question is that of cost effectiveness whose rough measure can be expressed as per capita project cost. In 1981, the JICA proposal to sewer 10 zones of the BMA gave an estimated cost

of 36,671.1 million baht serving a population of 5.6 million. The per capita cost would be 6,548 baht at the end of 1980 prices on which, using an annual inflation rate of 4%, becomes 8,617 baht in 1987.

Under the "Regional Cities Development Program," the Khon Kaen municipality wastewater management program will consist of the ongoing installation of wastewater interceptors along both banks of Klong Rong Muang and the construction of an oxidation pond. The costs of the interceptors and oxidation pond are 20.3 million baht and 23.9 million baht respectively (Knight et al, 1983). In the year 2001 the population served will be 124,660. Therefore the per capita cost is about 355 baht. Using an annual inflation rate of 4%, the 1987 per capita cost can be calculated as 415 baht.

In 1987, the Public Works Department (PWD) commissioned DHV Consulting Engineers to identify urban sanitation and wastewater systems for secondary cities. It was concluded that to provide all the necessary infrastructure to an average town of 60,000 persons, the cost would be about 25 million baht. If a wastewater treatment plant were included, the cost would rise to between 40 and 50 million baht and per capita cost would work out to 833 baht. Thus, these estimates show a wide per capita cost range--between 415 and 8,617 baht.

What these figures imply is that it is considerably less expensive to invest with appropriate technology which is suited for the local area and that the per capita cost certainly has a direct relationship to the degree of congestion.

Without a proper sewerage system, Bangkok now pays a high daily cost for water (in terms of the increasing cost of treating raw water) because water is an indispensable raw material for economic activities, a factor in land depreciation and a determinant in the deterioration of health due to water pollution. A rough estimate of the quantity of opportunity lost due to water pollution is estimated at more than 1.1 billion baht per annum.

The present value of economic benefits of water quality control for the BMR area would be approximately 18,000 million baht. These estimated benefits are based on cost savings in the treat-

ment of raw water supply, the stimulated output due to lower cost of clean water, land value appreciation and health improvement. These do not include other benefits that are difficult to quantify, such as navigation, aesthetics, tourism, ecology and recreation. From the financial study, it may be concluded that we may not be able to afford not to invest!

Recommendations

1. It is recommended that the clean-up effort should begin with implementing the Ratanakosin Water Pollution Control Project during the remaining period of the Sixth Plan. The associated cost as estimated by the BMA is 400 million baht. Results of this project would serve to demonstrate how to clean up the klongs of Bangkok. Recently, the Committee for the Development of the BMR recognized the issue of water pollution and has responded by establishing a sub-committee to oversee this matter. This would be the appropriate forum to expedite the long-term clean-up effort.

Pollution abatement should be carried out using appropriate technology commensurate with a developing country. A conventional sewerage system entails excessive cost beyond our means. On the other hand, interceptors, relying on existing rights-of-way along the klongs, and avoiding the exorbitant cost of pipe-laying under crowded streets, are a viable alternative. The Ratanakosin pilot project may validate the benefits of this approach.

2. Concurrently, it is recommended that a feasibility study leading toward the design phase for the remaining zones and for the Thonburi side should be undertaken. In this connection, the proposed feasibility study may be considered as an extension of the "Feasibility Study on Purification of Klong Water in Bangkok" project which is ongoing under the sponsorship of JICA. Once priority is affirmed, the acquisition of funds from bilateral sources should be undertaken.
3. There is technical difficulty in simulating the waste load amount and

SCIENCE AND TECHNOLOGY MANPOWER: SUPPLY AND DEMAND ISSUES

Kopr Kritayakirana
Peter Brimble

The recently completed study entitled "The S&T Manpower Situation in Thailand: Supply and Demand Issues" aims to provide information on manpower availability, especially in the areas of biotechnology, electronic technology and material technology. Its overall purpose is to help the Science and Technology Development Board (STDB) assist the Thai Government in formulating strategies and policies that will accelerate the growth of Thailand's technological capability.

Present S&T Manpower Situation

There have been a number of studies on S&T manpower in Thailand which give widely varying results. Results range from an estimated 28,213 persons in both the public and private sectors at the degree level (National Research Council 1979), to 111,039 persons in the public sector, 25,923 with degrees and 85,116 below the degree level (Ministry of Science, Technology and Energy 1981), to an estimated 478,877 persons in both the public and private sectors, including those at the degree level and below the degree level (Ministry of Science, Technology and Energy 1986).

The most detailed S&T manpower study was conducted by the Human Resources Institute (HRI) for MOSTE in 1984. Results gave a total of 154,392 S&T personnel (86,220 in the public sector and 68,172 in the private sector). These numbers were estimated from results of field surveys; they cover most public and the private sector manufacturing and service subsectors. Using the survey results, a table of S&T manpower coef-

ficients (by industry and by type of employer) was prepared. There are, however, major limitations in the accuracy of these coefficients arising from various imperfections in the survey.

Supply of S&T Manpower

The TDRI study compiled detailed and comprehensive statistics on the production of S&T manpower by the entire formal Thai educational system. S&T manpower production from the following institutions was covered:

| | |
|-----|--|
| 16 | Government universities |
| 23 | Private universities |
| 28 | Campuses of the Institute of Technology and Vocational Education |
| 202 | Government vocational colleges |
| 363 | Private vocational colleges |

For the purposes of the study (largely in order to correspond to the technology areas of interest to the STDB) S&T manpower was broken into five broad areas of specialization, namely:

| | |
|---|-------------------------------------|
| B | Biotechnology Manpower |
| E | Electronic Technology Manpower |
| M | Material Technology Manpower |
| T | Related Technology Manpower |
| S | Basic Sciences Discipline Manpower. |

A detailed classification scheme for S&T areas of specialization is shown in Table 1. Official statistics from related government authorities were compiled and aggregated to yield detailed S&T manpower production estimates for

Table 1 Classification Scheme for Areas of Specialization of S&T Manpower

1. Biotechnology (B)
 - B1 : agricultural fields, such as general agriculture, botany, zoology, animal science, and forestry
 - B2 : food science
 - B3 : bioscience, including biology, biochemistry, bacteriology, biotechnology, and biophysics
 - B4 : pharmacy
 - B5 : other health fields
2. Electronics Technology (E)
 - E1 : computer science, including computer engineering
 - E2 : electrical engineering, including electrical, electronic, and communications engineering
3. Material Technology (M)
 - M1 : mechanical engineering
 - M2 : metallurgy, including material science and mining engineering
4. Related Technology (T)
 - T1 : other engineering, including civil engineering, sanitary engineering, survey engineering, agriculture and irrigation engineering, and other engineering disciplines not covered under E, M, T2, or T3
 - T2 : chemical engineering
 - T3 : industrial engineering
5. Physical Science (S)
 - S : basic science disciplines, such as physics, chemistry, geology, marine science, general science, and other sciences

Table 2 Production of S&T Manpower

| Area Code | 1980/81 | 1981/82 | 1982/83 | 1983/84 | 1984/85 | 1985/86 |
|-------------------------------|---------|---------|---------|---------|---------|---------|
| Postgraduate Degrees | | | | | | |
| B1-B3 | 188 | 188 | 228 | 185 | 281 | 271 |
| B4-B5 | 433 | 460 | 583 | 639 | 654 | 851 |
| E | 32 | 60 | 99 | 78 | 77 | 52 |
| M | 8 | 29 | 16 | 8 | 12 | 11 |
| T | 66 | 84 | 80 | 93 | 108 | 115 |
| S | 67 | 52 | 54 | 50 | 49 | 56 |
| S&T Total | 794 | 873 | 1,060 | 1,053 | 1,181 | 1,356 |
| Formal Education Output | 2,339 | 2,479 | 2,745 | 2,979 | 3,450 | 3,778 |
| Bachelor Degrees | | | | | | |
| B1-B3 | 1,594 | 1,744 | 1,585 | 1,438 | 1,971 | 2,183 |
| B4-B5 | 2,716 | 2,773 | 2,406 | 2,274 | 2,659 | 3,012 |
| E | 459 | 491 | 685 | 701 | 840 | 927 |
| M | 364 | 402 | 546 | 557 | 667 | 727 |
| T | 935 | 1,074 | 896 | 963 | 1,086 | 1,155 |
| S | 630 | 566 | 779 | 597 | 562 | 545 |
| S&T Total | 6,698 | 7,050 | 6,897 | 6,530 | 7,785 | 8,549 |
| Formal Education Output | 38,396 | 38,543 | 52,947 | 54,682 | 60,889 | 55,587 |
| Below Bachelor Degrees | | | | | | |
| B1-B3 | 7,835 | 13,869 | 12,556 | 19,180 | 17,272 | 18,759 |
| B4-B5 | 412 | 351 | 132 | 155 | 90 | 445 |
| E | 7,586 | 9,038 | 11,107 | 18,908 | 16,668 | 19,691 |
| M | 16,682 | 17,532 | 19,106 | 28,720 | 22,624 | 23,589 |
| T | 8,318 | 9,173 | 11,108 | 18,778 | 14,880 | 22,563 |
| S | 32 | 28 | 32 | 0 | 21 | 27 |
| S&T Total | 40,865 | 49,991 | 54,041 | 85,741 | 71,555 | 85,074 |
| Formal Education Output | 103,485 | 121,808 | 133,602 | 209,947 | 171,841 | 183,382 |
| Total S&T Manpower | | | | | | |
| B1-B3 | 9,617 | 15,801 | 14,369 | 20,803 | 19,524 | 21,213 |
| B4-B5 | 3,561 | 3,584 | 3,121 | 3,068 | 3,403 | 4,308 |
| E | 8,077 | 9,589 | 11,891 | 19,687 | 17,585 | 20,670 |
| M | 17,054 | 17,963 | 19,668 | 29,285 | 23,303 | 24,327 |
| T | 9,319 | 10,331 | 12,084 | 19,834 | 16,074 | 23,833 |
| S | 729 | 646 | 865 | 647 | 632 | 628 |
| S&T Total | 48,357 | 57,914 | 61,998 | 93,324 | 80,521 | 94,979 |
| Formal Education Output | 144,220 | 162,830 | 189,294 | 267,608 | 236,180 | 242,747 |

Note: See Table 1 for definition of Area Codes.

the period 1976 to 1986. A summary of the results for the academic years 1980 to 1986, broken down by area of specialization and level of education, is presented in Table 2.

In order to compare future output with future demand projections, S&T manpower production (or output) projections (to the year 2001) were calculated using the simple linear trend extrapolation technique. In order to account for leakage as a result of graduates continuing their education or deciding not to work, production statistics were adjusted using detailed Ministry of Education and Ministry of University Affairs survey data obtained from graduates.

For the purposes of the study, production figures, adjusted for leakage, were taken to represent the "supply" of S&T manpower to be compared with the demand projections. Both production and supply data estimates are shown in the final demand/supply graphs (see Tables 3, 4 and 5).

Projection of Demand for S&T Manpower

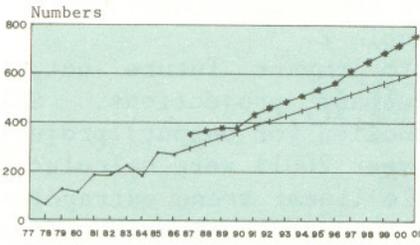
The demand for S&T manpower was projected from the present to the year 2001, which corresponds to the end of the Eighth National Economic and Social Development Plan. Projections employed the standard manpower requirements approach for manpower planning using output projections from the TDRI Macroeconomic Program's computable general equilibrium model. Two scenarios of economic development were employed:

1. The base case involving moderately high growth (more or less along current trends); and
2. The high case with somewhat accelerated growth in the technologically-based sectors of the economy.

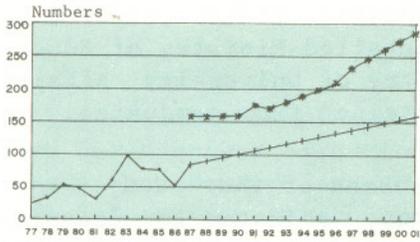
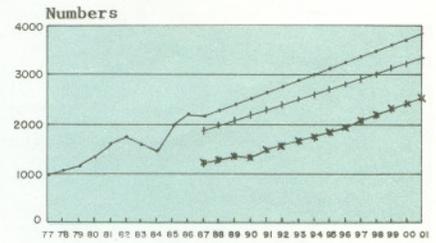
S&T manpower coefficients reflecting present S&T manpower usage levels in different economic sectors were obtained from the HRI/MOSTE survey. Adjustments were made based on more recent data and classification schemes. Demand projection results for the five technological expertise categories and the three levels of education (postgraduate, bachelor

Table 3 S&T Postgraduate Manpower (Base Scenario)

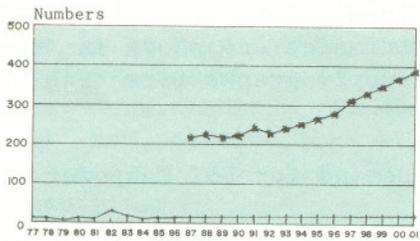
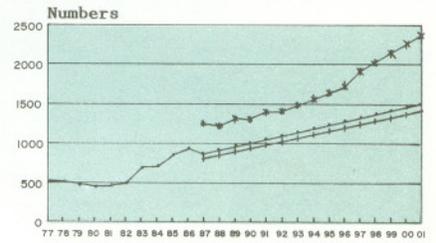
Table 4 S&T Bachelor's Degree Manpower (Base Scenario)



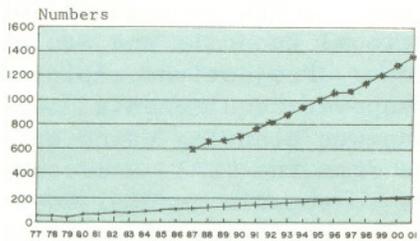
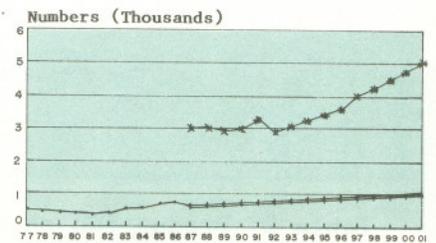
Biotechnology Manpower



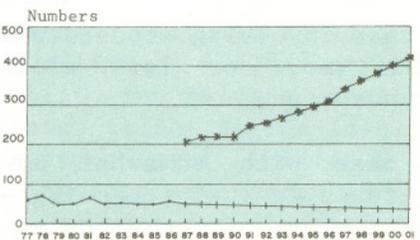
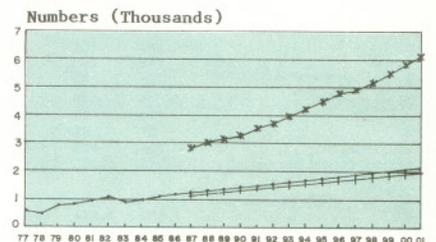
Electronic Technology Manpower



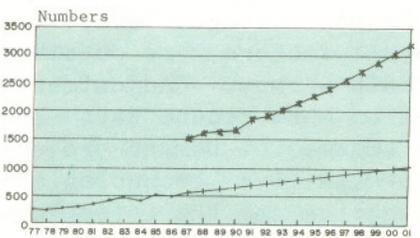
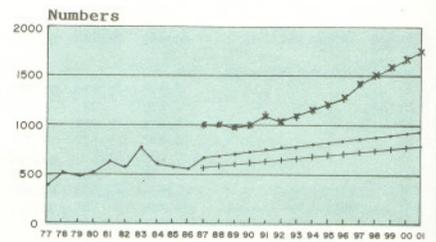
Material Technology Manpower



Related Technology Manpower



Basic Sciences Manpower



Total S&T Manpower

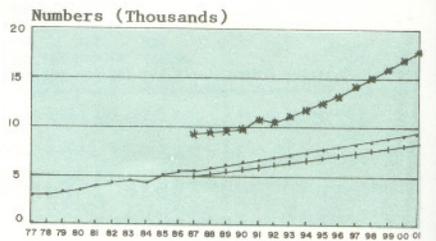
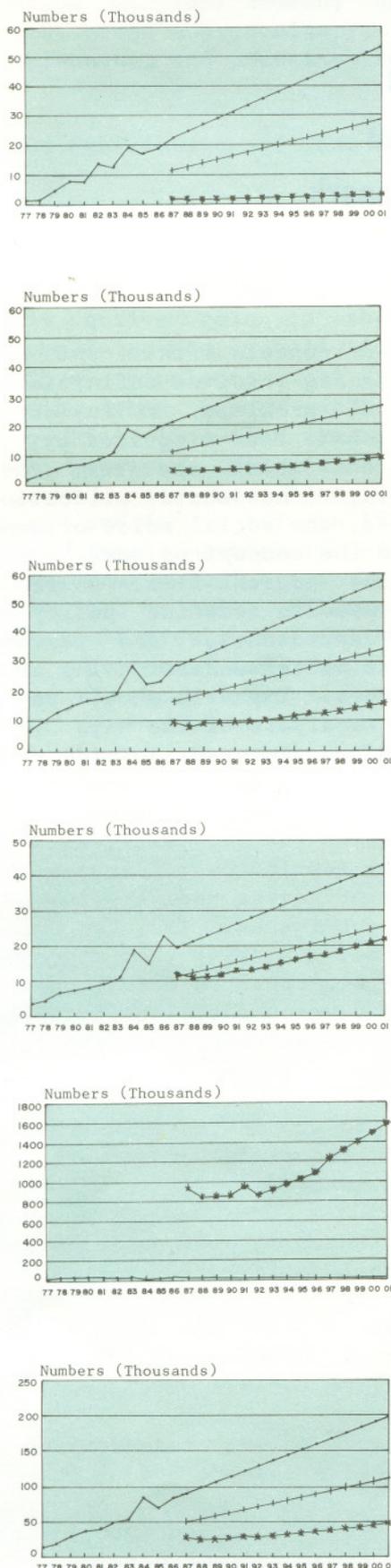


Table 5 Below Bachelor's Degree Manpower (Base Scenario)

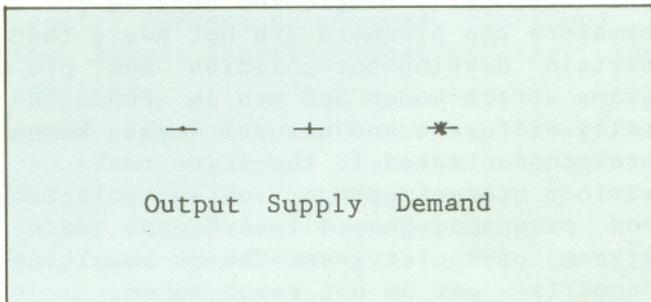


degree and below bachelor degree) for the base case scenario are shown in Tables 3, 4 and 5.

Conclusions and Recommendations

From this simple supply and demand comparison of projected S&T manpower, there are clear indications of critical shortages of postgraduate S&T manpower in all areas except biotechnology. Such shortages may well have the effect of hampering accelerated economic growth through reliance on the development of technological capability. At the bachelor degree level, with the exception of the biotechnology area, supply falls seriously short of estimated demand. (Note, however, that these results are somewhat ambiguous owing to the lack of data on agriculture and health personnel). For below-bachelor-degree-level personnel there appears to be an excess supply in three areas: biotechnology, electronic technology and material technology. However, supply and demand appear to be fairly closely balanced in "Related Technology" (such as civil and industrial engineering).

Major limitations are the uncertainties and ambiguities in the S&T manpower coefficients on which the demand projections are based and the simple linear trend extrapolation made in supply projections. More meaningful S&T manpower analysis could be undertaken in the future if more reliable S&T manpower coefficients could be obtained, for example, in a more comprehensive and systematic survey of actual employment of S&T manpower in the Thai economy. Other work which should contribute to more effective understanding and planning of S&T manpower includes further study of the costs and quality of the educational system producing S&T manpower and the functioning of labor market mechanisms.



Thai Women in National Development

Suteera Thomson
 Orapin Sopchokchai
 Daranee Charoen - Rajapark

The world has recently paid more attention to women's needs and concerns as a result of the United Nations declaration that 1976-1985 would be the "Decade for Women." However, although measures were issued to promote and improve women's status and quality of life, they were not entirely successful. This is partly due to the lack of understanding about women's issues and about the real causes of women's problems.

Women play an integral role in any country's social, cultural, and economic development; they constitute nearly half of all human resources. Indeed, overlooking their productivity and potential can lead to undesirable results in the process of national development.

Integrating Women into Development Planning

Historically, many development efforts have focused on improving women's participation in domestic activities and in community development. Not much consideration has been given to women's actual and potential roles in non-domestic productivities and in other important aspects of national development. Women's needs and concerns are often unintentionally overlooked because policymakers and planners are not aware that certain development policies and programs affect women and men in fundamentally different and unequal ways. Women are concentrated in the lower ranks of various target groups; often policies and programs, geared toward the mainstream of society--and their resulting benefits--just do not reach women.

Another concern with recent development planning involves definitional and conceptual problems. Policymakers and planners have been misguided by certain assumptions about the term "head of household," household allocation of resources, the social roles of women and men, and the concept of work.¹

At the present time, there is an urgent need to redefine policy directions, approaches, and assumptions through a better understanding of gender differences. Emphasis should be placed on the analysis of the ways in which women and men interact, divide responsibilities, allocate risks and resources, share burdens, organize their labor, and plan for the future. TDRI, as a policy research institute, recognizes the importance of gender analysis in national development issues. Therefore, in January, 1988, a working team was appointed to prepare a research agenda on women in national development. Institute research issues were selected on the following bases:

- o Need to concentrate in areas where women predominate and/or are disadvantaged;
- o Importance to the establishment of national policy;
- o Relevance to the goals of the National Development Plans and the Long Term Women's Development Plan;
- o Lack of policy research on these particular issues; and
- o Possible integration into the present TDRI research framework.

This article is a result of the preliminary work done to date on this project and it focuses on the status and contribution of Thai women; national development plans and machinery; development planning; and priority research areas.

Status and Contribution of Thai Women

Women compose nearly half (49.7%) of the Thai population (53,397,745)² with the majority, 81%, of them residing in non-municipal areas.³ Thai women play an especially active role in the labor market comprising nearly half (46.0%) of the employed population (25,852,500).⁴ The female labor force participation rate of 67.5% is less than the male rate of 77.8%;⁵ however, the female labor force growth rate has been steadily increasing and it was between 1977 and 1983 that female labor force growth (3.78%) overtook male labor force growth (3.24%).⁶ The majority of women are employed in agriculture, followed by commerce, services, and manufacturing (Table 1). Of those employed, there is a greater number of women than men in only one industry, the commerce industry.

Due to urbanization, modernization, and a changing economy, the percentage of women in the agricultural sector has dropped from 87.55% in 1960⁷ to 61.27% in 1987.⁸ As expected, the percentage of those entering industries and services has increased. Female migrants to the Bangkok Metropolis in 1985, numbering 51,125 (vs. 32,935 for males) have limited job opportunities due to lack of education, skills, and experience. The majority of these migrants, 57%, enter the city seeking employment opportunities and income. Of those female migrants 15 years of age and over, 72% are single.⁹ Nearly 60% of the female migrants to Bangkok under the age of 25 work as domestic servants.¹⁰ Those remaining find employment as hawkers, petty traders, and vendors in the informal sector, and as factory workers in the various manufacturing industries. Women especially dominate the textile, clothing, shoe, and food-processing industries. Another area of employment for female migrants is sexual services. An increasingly large number of women go into prostitution related work; this has resulted in a myriad of social problems.

Looking at wages, the average monthly income for women was generally lower than that for men. For example, in municipal areas 13.2% of employed men earn more than 5,000 baht a month, compared to 6.7% of employed women. In the private sector, the average wage for women is about two-thirds that of men across the board. Wages in the government sector are, however, almost equal because of the fixed salary scale. In fact, the average monthly wage of 3040.6 baht for a female government employee in non-municipal areas is slightly higher than the average male wage of 2953.5 baht.¹¹

Figure 1 shows average monthly income levels of women and men in selected industries. It is clearly seen that a greater percentage of women are found in the lowest income bracket of these industries.

In relation to work status, it can be seen from Figure 2 that the only group where there are more women than men is in the unpaid family worker group. Men are the overwhelming majority in all other categories.

Table 1

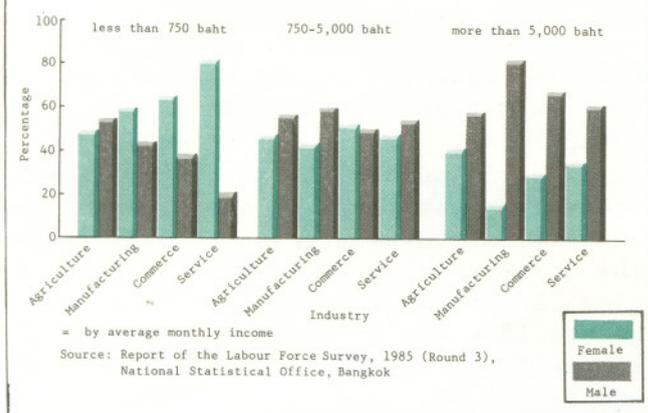
DISTRIBUTION OF THE EMPLOYED POPULATION
BY INDUSTRY AND SEX (IN PERCENTAGES)

| Industry | Females | Males | Total |
|--|---------|-------|-------|
| Agriculture, Forestry, Hunting and Fishing | 32.1 | 36.3 | 68.4 |
| Commerce | 4.8 | 4.4 | 9.2 |
| Services | 4.7 | 4.7 | 9.4 |
| Manufacturing | 3.6 | 4.4 | 8.0 |
| Construction, Repair and Demolition | 0.4 | 1.9 | 2.3 |
| Transport, Storage and Communication | 0.2 | 1.9 | 2.1 |
| Mining and Quarrying | 0.1 | 0.2 | 0.3 |
| Electricity, Gas, Water and Sanitary Services | - | 0.4 | 0.4 |
| Activities not Adequately Described | - | - | - |

Note: Percentages may not add up to 100% due to rounding and exclusion of negligible figures.

Source: Derived from Report of the Labour Force Survey 1985, Round 3, National Statistical Office, Bangkok.

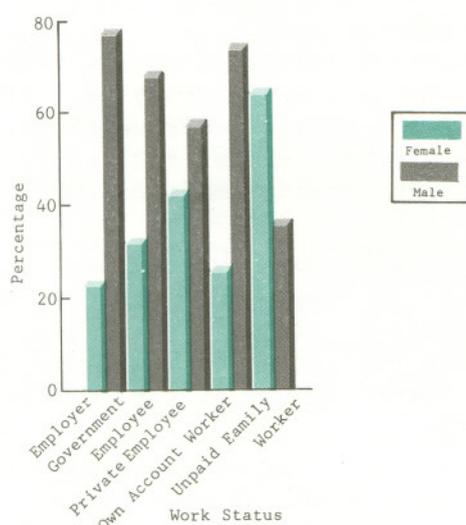
Figure 1 Comparison of Employed Persons by Income Level* and Selected Industries



Unemployment rates for females were higher than for males. The rate for females in the current labor force is 4.3% as opposed to 3.1% for males. Among migrants, unemployment rates were higher at 5.1% for females and 4.5% for males.¹² These higher female unemployment rates can be partly attributed to women's comparative lack of education.

Education is the major determinant of modern sector employment; therefore, the lower educational level of women contributes to their low wages, poor opportunities for advancement, and lack of skills and knowledge. Females tend to be somewhat less educated than males

Figure 2 Distribution of Employed Persons by Work Status and Sex



Source: Report of the Labour Force Survey, 1985 (Round 3), National Statistical Office, Bangkok

with a literacy rate of 84.4% (vs. 91% for males).¹³ In general, women have less education than men; indeed, 10% of employed women (compared to 5.2% of employed men) have no education. Figure 3 shows the level of education attained by women and men in selected industries.¹⁴

Turning to the political arena, it is clear that women's participation at local and national levels has not been significant. On the local level in 1987, only 0.4% of elected Kamnan and Phu-Yai Bahn are women.¹⁵ On the national level, ever since the first elections were held in 1933, only 2.3% of the members of the House of Representatives were women.¹⁶ Currently in 1986, the figure stands at 3.5%. In regard to appointed Senators, 1.9% are women.¹⁷ The political arena has traditionally been a male-dominated field in Thailand.

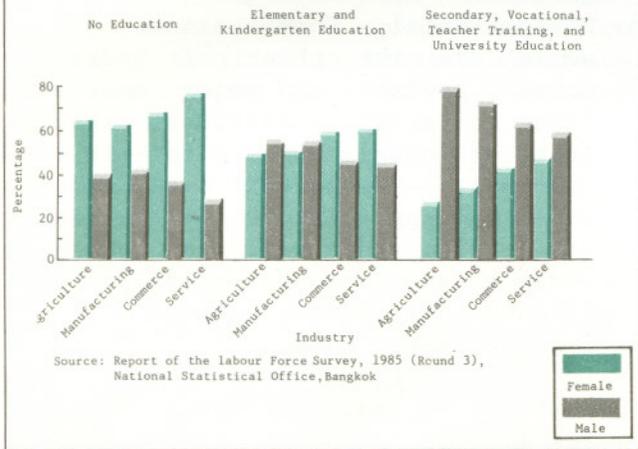
In Thai Law, women are not granted equality under some laws and by some law enforcement practices. There are still laws barring women from some civil service positions, from entering military and police academies, and from divorcing their husbands on grounds of adultery, even though men may claim divorce on these grounds. Further, enforcement on employment and prostitution laws is very lax; this leads to the continued exploitation of women.

Lastly, while the status of Thai women has clearly improved in past years, societal attitudes concerning women are slow to change. There exist stereotypes of women as weak, indecisive, emotional, dependent, less productive and only suited for domestic roles.¹⁸ The effect of stereotypes is that they are psychological barriers.¹⁹ Women who actually believe that they are dependent, passive, and emotional will undermine their own--as well as other women's--development and achievements. These stereotypes must be changed before there is significant improvement in the status of Thai women.

Thai National Development Plans, Programs and Government Machinery

The Thai government became increasingly aware of the plight of women when the United Nations declared 1975 the International Year of Women and 1976-

Figure 3 Comparison of Employed Persons by Educational Attainment and Selected Industries



1985 the Decade for Women. Being a UN-member country, Thailand adopted International Women's Year objectives and sent a delegation to participate in the World Conference in Mexico City. As a result of the conference, more attention has been paid to the development of women. This can be seen in the National Economic and Social Development Board's decision to include women in the Fourth and Fifth National Economic and Social Development Plans (1977-1981, 1982-1986 respectively).

The Fourth²⁰ and Fifth²¹ Plans focused on women's employment, educational, health/nutritional, social, and political problems. Some specific problems cited were the illiteracy rate among women; malnutrition (especially during pregnancy); employment promotion and wage discrimination; educational opportunities; limited opportunities in politics and public administration; social attitudes reflecting beliefs that men are more productive than women; and the lack of a central coordinating national machinery for women's affairs.

While it is indeed progress for women to be included, it is disappointing that the Plans only recognize women's problems without always specifying how and when they are to be alleviated. To what extent the government has implemented and will be implementing these plans is of great concern as recommendations and targets have not yet been achieved. However, most disappointing is the fact that the Sixth National

Development Plan (1987-1991) does not include women as a special target group (as in the Fifth Plan) and does not make any special reference to women.

In addition, the government (through a special task force) issued a "Long-Term Women's Development Plan" (1982-2001).²³ The Long Term Plan is more comprehensive than any of the five-year Plans as it deals specifically with all groups of women. Specific targets for the next 20 years were set in the areas of health, education, employment, public administration, politics, and the law. However, while the 20 year Plan provides a series of indicators for policy formulation, it does not set interim targets that can be integrated into five year Plans and no specific measures have been mapped out to implement the 20 year Plan. Indeed, some consider the Plan too ambitious and do not believe that the targets will be met due to the lack of effective national mechanisms, political will, and available funds.

In 1979, a national Commission was established under the National Economic and Social Development Board to formulate national plans and policy direction for women. In 1983, the Nation Commission on Women's Affairs was officially mandated to act as the central coordinating agency for the governmental and non-governmental sectors, as the promoter of women's development, and as an overseer of national plans concerning women. The Commission is chaired by a Deputy Prime Minister and, at present (April, 1988), has the Director General of the Community Development Department as its secretary.

There are several government organizations involved in women's development. The main ones are the Departments of Agricultural Extension, Community Development, Non-Formal Education, and Public Health. These key government Departments and the National Commission on Women's Affairs have made contributions to women's development by carrying out research, organizing worthwhile programs, and educating the general public about women's needs and issues. However, these organizations also have several common problems. They suffer from the lack of (1) coordinated effort, (2) resources (human and financial), and (3) follow-up and evaluation. Also, quite

importantly, the projects and programs of these organizations still tend to focus on the domestic role of women.

Priority Research Issues

Since January 1988, when this effort was undertaken, we have been identifying areas of concern and evolving research project priorities. Eight project areas have been identified to date as follows:

1. Socioeconomic Development: Determinants of and Impact on Thai Women's Status. This study proposes to characterize the current socioeconomic situation of Thai women and to investigate the determinants of Thai women's status, of the impact of that status on others and of the impact of the changes that are likely to occur in the next decade. This knowledge will provide the base information for any policy formulation concerning women.
2. Decision Makers in Rural Development. Since the local election law changed in 1982, there have been a number of women elected as Phu-Yai Bahn and Kamnan. Their ability and work performance has been acceptable²⁴ though many of them face problems. Female Phu-Yai Ban and Kamnan chair the village committee and Tambon Council respectively; they are community leaders who are key actors in rural development at the grass-roots level. This study will examine their effectiveness and the constraints placed on them as decision makers.
3. Technological Development for Thai Agricultural and Rural Development. This study proposes to investigate the channels through which technologies are introduced and the extent to which these channels incorporate women's needs to particularly improve their non-domestic productivities. Roles women play as participants, beneficiaries and extension workers in technology transfer programs will also be examined.
4. Rural Income. Rural women participate in a wide spectrum of activities in the household, family farm, rural economy, and community. Many of these activities generate subsistence income for the family. To address the nationwide problem of rural poverty, the nature and sources of rural income must be better understood. This study plans to explore rural women's farm and non-farm income generation activities.
5. Environmental Conservation. Since women are the principal users of forest products and major contributors to farming activities, the extent of women's involvement in environmental conservation and government training programs will be examined. The study will also look into women's existing and potential roles in environmental conservation.
6. Entrepreneurs. This study proposes to analyze the effects of rapid industrialization, urbanization, and legislation on women entrepreneurs. Special emphasis will be placed on those in the informal sector who have the least amount of training, skills, and experience. Since there are many prosperous women entrepreneurs in the formal sector, this study will also explore the reasons for their success.
7. Manufacturing Industries: Work Conditions and Occupational Safety and Health. This study proposes to examine the working conditions and occupational health of laborers in the various manufacturing industries. Issues of concern include lack of labor law enforcement concerning work hours, holidays, overtime, and employer liability; injuries, disability, disease, and death resulting from certain jobs; and the measures taken to reduce occupational risks and hazards.
8. Human Resources Management in the Public Sector. Women now constitute more than half of the total number of Thai civil servants, key actors in charting the direction of development. It is interesting to note that only a small percentage of women occupy executive positions. This study aims to identify policy directions for the optimal use of human resources in the public sector. Attempts will also be made to explore measures to improve professional capability and performance effectiveness of civil servants in the integration of women into national development.

Conclusion

Due to economic, cultural, political and social changes, it is clear that attempts should now be made to better integrate women into the development process. Women deserve special attention because of their multi-faceted disadvantages and constraints, and also because development has a different impact on women than men. The eight priority research issues outlined above, propose to examine and assess the impact on women

and their roles in development, modernization, and industrialization dealing specifically in areas where women predominate and/or are disadvantaged. Policy-makers and development planners should work on specific plans to improve women's productive opportunities and reduce the burden of their work. To effectively meet women's needs, enhance their productivity, and ensure their access to resources and development benefits, the potential role of women in all development efforts should be considered.

NOTES

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- 3 Government of Thailand, National Statistical Office, Report of the Labour Force Survey, Whole Kingdom, Round 3 (Bangkok, August 1985)
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- 5 Ibid.
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- 9 Government of Thailand, National Statistical Office, Survey of Migration into the Bangkok Metropolis, the Vicinity of the Bangkok Metropolis, and Khon Kaen Province 1985 (Bangkok, 1985)
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Dr. Narongchai Akrasanee : an Interview with TDRI's New Executive Vice President

Marcia Hamilton

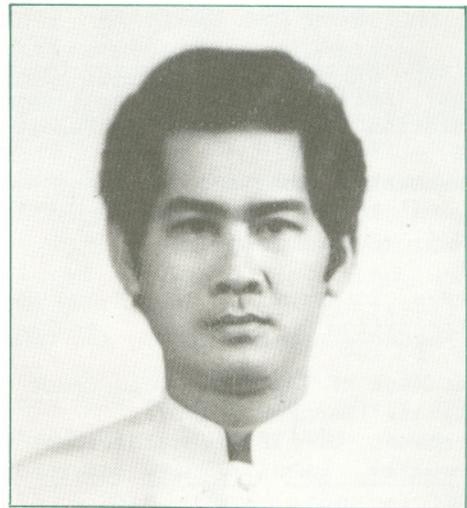
(This interview was held just before Dr. Narongchai left for the United States to do ten weeks of study and planning--in preparation for assuming his position at TDRI--at the Federal Reserve Bank of San Francisco. His work as a visiting fellow at the Bank was sponsored by the Asia Foundation. Dr. Narongchai will take up his new responsibilities at TDRI on July 1, 1988.)

Background and Involvement with TDRI

Q: As a founder of TDRI, what were some of your dreams/plans/hopes for the Institute at the outset?

The idea of having a policy research institute in Thailand started almost ten years ago. At that time, Dr. Vinyu Vichit-vadakan, Dr. Snoh Unakul and I were working closely on a number of policy matters and we felt that Thailand definitely needed a strong policy research institute.

We first received a grant from the Ford Foundation and, in 1980, with Dr. Vinyu as Research Director, did a preliminary study in which we designed TDRI. What we produced became the blueprint for the Institute. However, having finished the blueprint, we had difficulty in raising funds to establish it. But when the Canadian government became interested in expanding its technical assistance to Thailand, we thought that Canada would be in a good position to support this particular program. So, when we began negotiating with the Canadian Government (as a result of the Prime Minister's official visit to Canada) an agreement was reached for CIDA to grant funds to establish TDRI.



CIDA, of course, had been assisting Thailand for a long time, but the turning point of CIDA's interest occurred when the Canadian Government decided to increase its technical assistance to Thailand--and, at that time, it decided that policy research was an important element of that assistance. Then TDRI was established. After the agreement was signed, we drafted documents on organizational structure and found a location agreeable to Dr. Snoh, Dr. Anat and me--at the Rajapark Building. We did a lot of work to get the Institute going. I was very much involved in setting up TDRI.

Q: What are your views on the Institute's development to date?

At the outset it would have been difficult to imagine that TDRI would have grown as fast as it has. We didn't think that the Institute would grow so quickly. We thought we would develop the Institute gradually, so that its foundation would be firm and its securi-

ty would be ensured. When Dr. Anat--a man of vision, intelligence and capability--became President, he started TDRI off in a very big way. He obtained a number of research projects and programs and TDRI became very large. Certainly, this is the kind of TDRI I want to see, but maybe it happened a little too quickly. Indeed, one problem Dr. Phaichitr has is to keep this momentum going. So, to secure a place for TDRI, I think a number of adjustments need to be made, so that the Institute will grow with stability.

A policy research institute is judged by two factors, two outcomes--one is its publications and the other is its influence on policy direction. TDRI publications have started off rather slowly. Again, this is because one cannot do everything. This is a matter of strategy. When Dr. Anat started the Institute, the strategy was to carry out as many projects as possible and then start publishing. But I think now is the time that TDRI should concentrate on research publications because the Institute will be judged by its peers, by its colleagues and by other institutions--in and outside of Thailand--on the basis of its published work.

Although it takes time--everywhere--for policy recommendations to be accepted and implemented, their acceptance also depends on how much you want your views to influence policy. If you are determined that your views must be heard, then you take action to ensure that they are really influential. One can't just mention something and hope that society will accept it. I think that the Board of Directors, the Chairman and the President all agree that there is a need to, in the next few years, really strengthen the Institute's influence (in terms of policy direction) in Thailand.

I am one of the members of the Board who is much in favor of the idea of gradual, stable and secure development with focus on public dissemination of TDRI's work. The reason that I think this is very important is that we owe a debt to the public. The Government gives TDRI privileges that few other institutions in Thailand have. So, we owe it to the Thai people--not only to tell them about the work we do--but to do work

that is useful to them and in their interest.

Dissemination is an important issue. We have to open up and let the public know what we are doing. One possible approach is to create a TDRI forum where we present our ideas--a means by which we let the public know what we are doing. It could also be broadcast or telecast. I hope when I join TDRI I will be involved in organizing this forum. But, of course, in addition to the forum, we need to publish articles (not academic articles but informational articles) on the work that we do and on the views that we have.

Also, we need to state our views in a very objective manner. A research institute should not aim to criticize, but to inform, to explain, to analyse and, at the most, to draw policy implications. Even making policy recommendations is not always necessary nor advisable.

We should focus on current issues because that is the way we can best relate to the public at large. Also, one can relate the work that TDRI has done (or is doing) to current issues. Sometimes, even the real views of TDRI experts on a particular issue are good enough. One doesn't have to do research on all subjects. When one has some expertise in a subject area one certainly has certain views about what is right, what is wrong and what might be useful for society. So, I think this is the direction we want to take--streamlining TDRI operations, making the work that we do more relevant to current social issues. On the other hand, one might say that everything we are doing at TDRI is relevant and related to current issues; certainly, the public at large doesn't know much about it. So, we need to make our organization and its views known.

The Move to TDRI

Q: What you do at IFCT is very important. What made you decide to accept Dr. Snoh's request to move to TDRI as Executive Vice President?

I have honestly felt all along--since TDRI was set up--that I should be there. I was very much involved in the begin-

ning. In fact, the reason that I didn't try to have my term extended at ESCAP (where I was when we began to plan the Institute) was because I was hoping to move to TDRI. I didn't because TDRI got started later than I expected and, by that time, I was already very much involved in my work at IFCT. And I felt that the work I was doing at IFCT (on rural industrialization and small-scale loan and export loan programs) was very important. I compared my work to the work at TDRI. There, Dr. Anat was fully in charge and I felt that my service was not as necessary. So, when the office started operating in 1984, I decided to stay at IFCT to work on programs involving export and small-scale industries promotion. Now, after four years, these programs have a momentum of their own. Export promotion no longer needs pushing, everybody is doing it. And, although the small-scale industry loan program may still need development, I feel that its promotion requires many other actions besides credit--particularly a proper policy framework. So, when Dr. Snoh talked to me about coming to TDRI, about the need for work on industrial policy, trade policy and international economic relations, I felt that, relatively speaking, I could contribute more to this kind of work.

Actually, my move to TDRI is natural. My experience has been much like conceiving a baby, having the baby born and then not having been there to take care of your child. This has always been my sentiment. So, I decided to move. It in no way means that the work at IFCT is unimportant. It is very important. But, maybe, at this time, I can contribute more to the work at TDRI.

Q: How do you see both of your roles--as both Executive Vice President and Director of the Industry, Trade and International Relations Program?

I have worked very closely with Dr. Snoh for 20 years. We definitely consider ourselves a team and it is to our benefit to continue to work together. Both Dr. Snoh and Dr. Phaichitr see me in a double role: one is as the Director of the Industry, Trade and International Relations Program. This Program is definitely not growing as fast as it

should--relative to the rates of growth of the Thai industrial sector and Thai foreign trade and relative to Thailand's position in the international economic community. This Program is definitely too small. I will be responsible for developing it to a size commensurate with the present Thai economy. In addition, Dr. Snoh and Dr. Phaichitr also feel that TDRI needs to relate more to the public (as I mentioned earlier) and needs to grow with stability and security. So, institutional development will be a very important aspect of my work--especially now when we are trimming down and adjusting ourselves for long-term growth. Therefore, I was asked also to serve as Executive Vice President to help in the area of institutional development.

In each of my roles, I will have a number of things to do which have already been discussed with Dr. Snoh and Dr. Phaichitr. We focused on what I would do that the President does now and concluded that Dr. Phaichitr would continue to concentrate on TDRI research quality control and I would concentrate on external relations. In that sense I think we will complement each other very well. I also hope to take a load off of the President's shoulders in terms of certain social obligations and public relations--greeting visitors, attending receptions. But in terms of my work, specifically, as the Executive Vice President I will focus on:

1. TDRI's relationship with the private sector. One cannot talk about policy without taking into consideration the role of the private sector. I have spent many years working with the business community and am in a good position to help establish TDRI/private-sector linkages.
2. TDRI's relationship with the government sector. TDRI is already doing a number of projects with the Thai government and I will focus on continuing our work in this area.
3. TDRI's Policy Research Work. We should make our work relevant to the problems of Thai society. TDRI is already concerned with this issue. The Institute does two kinds of research--

one is TDRI-designed research and the other is research requested by other agencies and donors. In the future, I certainly would like to see more TDRI-designed research. But, of course, this depends very much on how much independent funding we can obtain for such a research approach. Of course, there are trade-offs for being independent; so a balance has to be achieved.

4. TDRI and Public Relations. One still has to bear in mind the debt we owe to the public. So, public relations and dissemination of our findings and views to the people will be very important aspects of my involvement.

5. A Permanent Home for TDRI. In order to ensure secure institutional development I have been working (and will continue to work) with Dr. Snoh and Dr. Phaichitr to secure a permanent home for the Institute--a building of our own.

Q: As Director of the ITR Program, how will you augment the lack of research in the areas of trade and industry? On what will you focus?

In the capacity of the Director of the Industry, Trade and International Relations Program I would very much like to initiate some research on industrial development strategy. In fact, industrial development strategy has been my interest all along. Many of my contributions--publications, lectures, etc--have been related to this subject. But I must admit that during these last four years, I have not done as much work in this area as I would like to. I think a most dynamic and important area is the Thai industrial sector. If we do not set the direction of industrial development and growth, it could be detrimental to society and to the growth of industry itself--in terms of environmental problems and constraints.

Another area of interest is the international economic community. We have to manage our relationship with many of our major lenders and economic partners. Therefore, research on bi-lateral, regional and multi-lateral international economic relations is very important. If we talk about trade and exports and include export of services, this now

accounts for 35% of our GNP--a very, very large percentage. Whatever happens to this particular sector will have a vital impact on our economy. So, we need to be fully informed about trade. I would concentrate on this area as well.

We owe it to the Thai People--not only to tell them about the work we do--but to do work that is useful to them and in their interest.

Q: Would you like to comment on your views concerning NIC status; the GSP; the Uruguay round of GATT negotiations; "trade in services"; and Thai exports?

When we talk about industrial and trade development in Thailand, one cannot avoid talking about Thailand's present position in the international economic community. This community seems to be giving us a place--a status--by calling us a "NIC"--a newly industrialized country. The term (and concern with the consequences of NIC status) has definitely generated a lot of public debate, interest and confusion. I think--too much. I believe that Thailand is now rather important in the international economic community. And being important, we really deserve to have some kind of recognition. The recognition that is given is the "NIC" label. The term "NIC" is very much like

a trademark or a well-known brand name. Thailand now has a trademark that will immediately attract the attention of international business investors and traders. Having NIC status says, "pay attention to Thailand. There are business opportunities here." So, I feel that we should not overreact to the term. We should not get too excited about it, we should not reject it and we should not be too proud of it. We should just recognize this term in a matter-of-fact way, accept our position and behave accordingly.

To be in a good commercial position means that the international community is going to reduce your handicap and will look at you more as a competitor. I feel that international business is very much like sports. When you are new to the game, in a less privileged position, then you deserve a handicap in order to compete fairly. When you improve, then you should not expect as big a handicap. In fact, you should expect your handicap to be reduced--otherwise the game would not be fair. So the NIC trademark, the symbol, has both advantages and disadvantages. But I think both are natural.

In fact, you must anticipate a reduction in your privileges. You should start thinking about extending assistance to less privileged countries. We should think of our neighbors who are not as fortunate as we--countries like Bangladesh, Nepal, Sri Lanka, Burma, (even Indochinese states--if and when they become more stable politically). This is the way for the world community to develop. If everyone waits for privileges and complains when they are taken away, I don't think a society, a true world community can ever develop. In fact, the Thai Government has now recognized its new position. We now give some assistance to Nepal and Sri Lanka. Also, DTEC gives scholarships to students from neighboring countries to come to study in Thailand. So, officially speaking, we have already started to recognize that we are in a little bit better position than before. It is our responsibility to assist less privileged countries, especially since we have gone into a non-deficit era. We used to be a large deficit country in every sense of the word. We had to

borrow a lot of money to cover this deficit, but now we are gaining surplus and we have started using the surplus to pay back our debts. So we can think about assisting other countries.

So, I think the word "NIC" means something very important. If one interprets the term "NIC" to mean that we are too strong and that our advantages will be taken away, I think that is the wrong attitude toward that term. One should accept this term simply as a "level," anticipate and then accept the reduction in privileges. Even without the label, now Thailand is a more professional player.

This brings us to the GSP situation, another issue that is attracting a great deal of attention. The GSP is very much like a sports handicap. It was invented by UNCTAD (the United Nations Conference on Trade and Development) on behalf of developing countries, most of whom were underprivileged. The GSP concept is definitely a good concept; it gave many developing countries a chance to participate in international economic competition. In fact, many countries have reached the point where they no longer need it. So, when we talk about GSP we definitely have to regard it only as a temporary handicap geared to help one grow into a competitive position. And as I said before, when you get into a better position then you should expect privileges to be taken away. At the moment, of course, Thailand still needs certain privileges, but not all of them. I believe Thailand should take advantage of having GSP status as long as it lasts. But we should be anticipating and planning for the time when it is removed.

Another issue which is of current interest is the importance of the GATT round of negotiations on trade and tariffs. GATT (General Agreement on Tariffs and Trade) was invented by developed, industrialized countries--by those countries trading mostly in manufactured goods. So, ten years ago GATT was not relevant to Thailand. But now, with our manufactured exports exceeding our primary commodity exports and with our primary commodities being processed into semi-manufactured goods, GATT is extremely relevant. I am glad that the government is taking a strong interest

in GATT, but I feel that the Thai people are still not well informed about this important activity. It will be only through GATT that global trade issues will be settled--otherwise one would have to resort to a number of bi-lateral arrangements. And if all trade agreements were bi-lateral, it would be most time consuming. Again, I can't help giving a sports analogy. GATT is very much like the International Olympic Committee that sets general rules for a sport--how the game should be played. With general rules, the game is able to be played more easily and fairly.

Without such rules, whenever a game is played, both teams would have to decide on the rules and they would change each time you played a different team. And you can imagine how complicated that would be! Every country in the world should make an effort to help make GATT really work. It will save lots of time and resources. As far as Thailand is concerned, I think that, so far, we have done quite well. Our Deputy Commerce Minister has been very active in GATT discussions and the government has actively supported this round.

Another issue I think is important is "trade in services." We rarely talk specifically about this. Somehow, when we talk about trade we mean merchandise rather than services. But with world technology developing so fast and with the world's standard of living rising so quickly, people are beginning to need many other things besides merchandise. Physically speaking, there is only a certain amount of merchandise that one can consume. So, the rising standard of living and advances in technology simply mean that there will be an increasing demand for (and supply of) non-merchandise activities--tourism, transportation, telecommunications, finance and banking, etc--which are services. And if you look at the volume of international trade, you will see that the volume of

"trade in services" is expanding much faster than the volume of trade in merchandise.

In Thailand, trade in services is expanding very fast. Service exports amount to about a third of our export earnings; therefore, we need to pay a lot of attention to these services and learn how to better promote travel and tourism, airline transportation, data processing and financial services. It will be to our benefit. Of course, we still do not know all about the factors determining the supply and demand of these services, so we need to study the subject in greater detail.

Thailand's export development so far has been very natural. We produce labor-intensive goods more cheaply than many other countries and our entrepreneurs are very imaginative; they know how to produce things that are in demand on the international market. So, exports from Thailand have developed well along these lines. The area of consumer goods is growing very fast in the international market--garments, jewelry, toys, plastic products, furniture, leather goods, sporting goods. So, it is not a matter of whether we should or should not concentrate on these products, it's a matter of market mechanisms. This group is moving forward already. Of course, later on, when the size of the consumer-product sector is larger, then there will be opportunities to develop intermediate goods. Again, this is already happening with metal and petrochemical products which are being developed to serve our consumers. This growth should indeed continue, if we do not obstruct market forces.

Q: Is there anything else you would like to add?

Only that I very much look forward to July when I will begin my work at the Institute.

Dr. Narongchai Akrasanee, TDRI Executive Vice President. Industrial Policy Advisor, NESDB; Advisor to the Federation of Thai Industries. Formerly: Senior Vice President, IFCT; Development Economist, UNESCAP; Dean, Faculty of Economics, Thammasat University; Visiting Fellow, Kobe University/NBER, New York/University of Minnesota/Federal Reserve Bank of San Francisco.

Is Appropriate Technology Appropriate for Thailand ?

Twatchai Yongkittikul

Marcia Hamilton

The three-day international conference on "Implications of Technology Choice on Development" held in Pattaya on March 23-25--and jointly sponsored by Appropriate Technology International (U.S.A), Queen Elizabeth House (Oxford University, England) and TDRI--did not only address "implications" of technology choice but the meaning of the term "appropriate technology" (AT) itself. Appropriate technology was examined in the context of a developing world in which import substitution, export promotion, and investment incentives play major roles.

Dr. Sanga Sabhasri, Permanent Secretary of the Science, Technology and Energy Ministry, opened the conference by stressing Thailand's need "to compete more successfully in the world market." He stated, "We plan to keep up with the new technology and aim to reach [other] newly industrialized countries. At the beginning there is a need to apply technology which is appropriate to generate more employment, improve income distribution and fully utilize resources," going "through the process and develop[ing] our bio-resources and apply[ing] technology to promote small-scale, labor-intensive manufacturing efforts. But to address this issue, we need to know the barriers that prevent developing countries from achieving their aims. We must further search for policies and measures to overcome them."

Copies of the papers presented and of the conference evaluation results and proceedings may be obtained through ATI at the following address:

Appropriate Technology International
1331 H Street, N.W.
Washington, D. C. 2000
U.S.A.

In discussing the current National Social and Economic Development Plan, Dr. Sanga said that the Plan calls for maintaining "an appropriate balance in the technology choices we make," and continued, but "how do we promote the development of relatively large and modern industries and promote small and medium-scale manufacturing activities at the same time? We are also applying technology to agricultural and rural development. The strategy of our plan involves being responsive to opportunities that open up as a result of favorable external economic conditions and concurrently provide increased employment opportunities for the rural poor." He charged the more than 50 participants with the task of producing recommendations that could be used by "government officials and private entrepreneurs to make technology choices that are right--choices that will make optimal use of the results of science and technology."

Dr. Phaichitr Uthavikul, TDRI President, then addressed the participants, raising several issues and questioning some AT assumptions. He stated, "mainstream" scientists and technologists "have tended to dismiss the AT movement as composed of people who want to reinvent the wheel," but added that this view was "extremely unfair." However, he also criticized the AT assumption that all one has to do is "reject modern technology, select the right packages, and all one's problems will be solved." He went on by stating that "developing countries are too poor to afford the luxury of inefficiency. So whatever is done in the name of appropriate technology, the efficiency criterion must not be neglected."

Ton de Wilde, President of ATI, addressed the group on major issues affecting small-scale enterprise develop-

ment. He emphasized that, although development philosophers and governments stress the importance of small-scale enterprise development, credit for economic growth and blame for cultural disintegration go to large-scale enterprises--as do most government resources. He then presented Dr. Frances Stewart, fellow of Somerville College and senior research officer at Queen Elizabeth House, Oxford, a recognized expert in the field of appropriate technology. During her keynote address (and a number of times during the conference) she clearly stated her position--that AT benefits the unemployed, the under-employed, and small local firms and threatens the bureaucracies and large business concerns.

In his March 23 article in The Nation, Peter Mytri Ungphakorn wrote that "the conference [brought] together a number of contrasting approaches that were in confrontation right from the beginning." He stated that many participants believed that "economic policies in developing countries are often biased towards the development of inappropriate technology--technology that fails to meet perceived goals of development such as the most efficient and effective use of resources, job creation, employment of less skilled labour, the use of local materials, the

manufacture of products for low-income consumers, or the development of small-scale production units."

Ungphakorn further stated, "...for the most part, participants concentrated on what they saw as economic biases against appropriate technology. This is partly related to the weaker economic power of the rural poor, and attributed to policies such as import substitution, export promotion, investment incentives and foreign exchange policies that depress agricultural product prices and make imports or locally manufactured goods more expensive."

Speakers were Dr. Carl Liedholm of the Department of Agriculture, Michigan State University ("The Effect of Policy and Policy reforms on Non-agricultural Enterprises and Employment in Developing Countries: A Review of Past Experiences"), Q. Ahmad ("Appropriate Technology and Rural Industrial Development in Bangladesh: the Macro Context"), Bart Duff ("Changes in Small-farm Rice Threshing Technology in Thailand and the Philippines), Romeo M. Bautista ("Macropolicies and Technology Choice in the Philippines") and Mingsarn Santikarn ("Macro-Policies and Appropriate Technology: Case Studies in Thailand"). Dr. Mingsarn Santikarn's paper on case studies in Thailand is summarized below.

Macro - Policies and Appropriate Technology : Case Studies in Thailand

Dr. Mingsarn Santikarn *

It is commonly accepted that developing countries are overly endowed with labor resources in relation to capital. The standard conclusion following such an assumption is that the appropriate technology for such a coun-

try ought to be labor intensive. This paper reviews a number of case studies in Thailand, examining the impact of macro-policies on the choice of technology in the agriculture and manufacturing industries.

* This summary of Dr. Mingsarn's paper only focuses on the case study sections and does not include preceding overview sections on the Thai economy, the employment situation, and the agricultural and manufacturing sectors. The entire paper is available through the Department of Economics, Faculty of Social Science, Chiang Mai University.

Agriculture

Empirical studies on the appropriate choice of technology in Thai agriculture have tended to focus on farm mechanization. Thai farmers have adopted a variety of mechanical equipment, including knapsack sprayers, water pumps, threshing machines, and tractors.

In discussing farm mechanization, a distinction ought to be made between mechanization for land improvements and mechanization for production. Large tractors are associated with land improvement and are generally used in clearing new land. While the use of large tractors for such a purpose is once-and-for-all, the flow of employment generated is ongoing; thus, the introduction of large tractors during the expansion of land frontiers is not thought to have had a negative employment impact in Thailand. Pump-based irrigation is also considered employment generating as water pumping is more efficient in delivery water than traditional pedal methods.

The debates on appropriate choice of technology center around mechanization of farm operations. Many Thai case studies on the impact of farm mechanization on employment center on the axial flow thresher. The consensus is that mechanical threshing is socially acceptable in Thailand because of labor shortages and reluctant increases in real wages. In addition, farm size has increased in some areas due to the overall expansion of the cropped area. Another argument in favor of mechanization is its "timeliness" which allows increased cropping intensity and better output quality.

Government Policies Affecting Agricultural Employment

The Thai government subsidizes farm credit through BAAC, which first issued loans for agricultural mechanization in 1979. But empirical studies show that government-subsidized credit has not increased the rate of farm mechanization. The government's protection of the local farm machinery industry also affects farmers. Government tariff, foreign exchange and pricing policies result in the net transfer of resources

from the agricultural sector to the rest of the economy, and hence discourages the adoption of farm equipment despite increases in land-man ratios.

Manufacturing

The Thai manufacturing sector has a dualistic nature, i.e., a modern manufacturing enclave surrounded by a vast subsector of small- and medium-scale enterprises. Most studies on Thai manufacturing have concentrated on the modern, large-scale sector, especially that portion promoted by fiscal policy. Although a large number of studies examined the choice of technologies in this sector, the universal approach involved computing capital-labor ratios based on the value of fixed assets. There are only two major studies that assess the impact of macro-policies on choice of technology--one conducted on the effect of different levels of spinning technology on employment and skill generation in the Thai textile industry and another that investigated the technological dynamics of the tapioca pelletizing industries.

The BOI grants investment incentives to firms deemed vital to national development. Some of the incentives are considered to cause factor price distortions and hence affect the choice of technology.

The choice of Spinning Technology

Managers in sampled textile firms were asked if they would have chosen a different level of technology if the Thai government had not granted tax exemptions on imported capital equipment. The majority of the managers from the sample firms claimed that they were not affected by the policy. However, foreign firms seemed to be more affected than local firms.

To further examine these responses, the unit costs of output of two spinning mills were calculated, based on various assumptions. The first mill represents an intermediate technology and the second, semi-advanced technology. The most striking outcome of these hypothetical cost estimates is that, in the promoted case, the unit cost was substantially lower than in the non-pro-

moted case. It is evident that, up to 1982, promoted firms would operate at a lower unit cost than non-promoted firms even if they selected relatively modern technology. Since capital cost takes up more than 70% of total primary factor cost, the effect of the prices of capital on the reduction of absolute unit cost is most evident. Moreover, the increase in interest rates has greater effect on unit cost than the removal of tax concessions. This probably explains why the majority of firms claimed that their choice of technology was not affected by concessionary tax policy.

Although promoted firms can operate comfortably using modern technology under prevailing capital prices, it is not clear why firms did not use intermediate technology to maximize their profits. Other studies also found that modern, large-scale firms used more capital-intensive technology than was appropriate for profit maximization.

The Tapioca Pelletizing Industry

Tapioca pelletizing technology was first introduced in Thailand in the mid-1960s. Earlier, Tapioca feed was exported in the form of chips or meal. The press, the main piece of machinery, was imported. As exports of tapioca

pellets grew dramatically, small-scale local factories now mushroomed. Thai machinery shops were able to adapt the imported press and produce their own. Subsequent adaptations and modifications were made to suit local conditions. The unit cost was approximately 60 % of the cost of imported equipment.

Local equipment requires 3-6 man hours per ton of product compared to 1.1 man hours for the imported version. But if the employment generated by the related engineering industry is also considered, the total employment generated from the use of local equipment was four times greater than that generated by the use of imported equipment. The study found that the tapioca processing and local engineering industries are well linked, resulting in rapid expansion and technological dynamism. Results also showed that firms which financed the engineering development and initial production of local equipment were relatively small, and more or less disconnected from government investment promotion measures that augmented other incentives to import capital embodied technology. In other words, investment promotion policy encourages investments of large plants that rely on fully imported technology which is relatively labor saving.

(Dr. Mingsarn concludes this paper with some final remarks and conclusions as follows:)

Some Final Remarks

Two final remarks are in order. First, the previous case studies in the manufacturing sector have been discussed under the framework of two-factor analysis. Since 1973, a third factor--energy--has emerged as an important factor. Although the two case studies discussed earlier are not affected by this trend (owing to their low energy requirements) energy cost may not be ignored for many industries; for these the two-factor model would cease to be an adequate framework for analysis. This is similar to the case studies in agriculture prior to 1980 when other factors could not be held constant.

Secondly, proponents of appropriate technology (defined loosely as labor-intensive technology) tend to rely excessively on micro-level evidence. While the present author agrees that relative factor price distortions should be eliminated as much as possible, the concept of "appropriate technology" should not be applied indiscriminately. The problems of unemployment may have to be considered within a macro- rather than a micro-framework. Within such a framework, different sub-sectors may be allowed to play different roles using different techniques with different factor proportions so long as the overall balance does not leave any abundant resources idle. The appropriate choice for a certain industry may not be the appropriate (defined as relatively labor-intensive) technology.

Conclusion

It has been shown that until 1980, the agricultural sector has done its best to absorb the fast-growing labor force, but the closing of the land frontier (starting toward the end of the 1970s) has sharply reduced the capacity of the land to nurture the additional work force. The modern, large-scale manufacturing industries, on the other hand, have shown a limited capacity to generate employment. It is time to assess more rigorously and accurately the total outcome of macro-policies, not only on agriculture and manufacturing, but also on service employment. This paper has only gathered evidence from preliminary studies undertaken to date. More work has to be done (and hopefully done properly) to provide at least a partial solution to the employment problem--the paramount issue in the next decade.