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SCIENCE RESEARCH POLICY OF THAILAND

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Science policy is generally said to be the sum of each country's efforts to enhance and effectively use its science and technology potential. The process consists of planning, programming and development of both manpower and institutions to meet national goals.

At present Thailand's science policy is not an explicit part of its development plan. Nevertheless there are guidelines for priorities and allocation of scarce resources. We also have machinery to advise the government, for instance the natural science committees of the National Research Council and the advisory committee on science and technology appointed by the Cabinet and under the National Economic and Social Development Board. Section 74 of the Constitution promulgated in October 1974 obligates the government to support science and technology in carrying forward national development. This concern is quite clear among our scholars and scientists but has so far been less evident among the nation's top political leaders.

Influence of science and technology on economic growth

What modern science and technology do for us is in principle quite simple: they permit us to get more output per unit of input–this is the secret of modern growth, and it is apparent in the application of new seed varieties, new industrial processes, new techniques for the maintenance of health and the transmission of knowledge. This phenomenon is quite clear from the patterns of Thailand's own growth. Historically, our economic growth rates were low, barely matching population increases, and the growth process itself occurred principally by "extensification", i.e. simple expansion of cultivated areas[1]. Thus, gross national product expanded, but slowly, while GNP per capita hardly grew at all. The recent situaion is much different. During the 1961–1969 period, the GNP grew at an annual rate of 10.4%, while, after adjusting for population growth, the per capita increase in GNP averaged 6.8% per year. Moreover, the growth rates by sector illustrate the effects of new science and technology: the modern sectors of electricity and water supply and mining and quarrying grew at rates of 24.0% and 18.5% per year respectively, while our traditional agriculture, where modern science and technology are least used, grew at but 8%[2].

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For a nation like Thailand, with limited resources, the efficiency consideration is particularly important—with the little we have, we must do the most possible. In our economic growth plans we must also, though, incorporate consideration of diversification, so that we do not depend solely on one crop or one export, and of self-sufficiency in essentials, so as to protect national independence.

The manpower situation

The special nature of our manpower situation also deserves comment. From the viewpoint of economics, human beings are just commodities, "factors of production," with a price and a rate of output. But human beings are people, and we must consider them foremost as such. In this regard technologies are not neutral–they are either capital-intensive or labor-intensive. The former substitute machines for men, and reduce the demand for labor, or at least unskilled labor. Labor-intensive technologies, on the contrary, substitute men for machines, reduce the demand for capital, and increase the return to labor, especially relatively unskilled labor.

In a capital-scarce, labor-surplus economy such as Thailand's, we would expect technologies to be labor-intensive. We have, after all, a population growth rate of 3.1% per year, one of the highest in Asia[3]. But we know that this is often not so despite what classical economic theory tells us. For many reasons, there is a bias toward capital intensity, to the detriment of our labor force. One reason is that managements prefer to deal with obedient machines rather than the multipilicity of wants and desires of individual human beings. Another is that the workers themselves may artificially raise the minimum wage above its natural market value. Some engineers contribute to this problem by their preference, despite relative costs, for the most "modern" technology, which is necessarily capital-intensive. Due to the shortage of indigenous engineering talent, developing countries also tend to import inappropriate new technologies "lock, stock and barrel" from the advanced countries. Finally, governments themselves sometimes contribute to difficulties by artificially reducing the price of capital.

For all these reasons it is urgent for a developing country like Thailand to encourage, to the maximum feasible extent, its own science and technology capability. At the same time, we must be sensitive to all the various non-scientific factors which shape the kinds of technologies we actually use.

In 1973 a comprehensive study was carried out to determine the number of qualified people in science and technology fields and their skill and experience levels[4]. The findings reveal that there are 15,944 scientists with bachelor's or more advanced degrees. Twenty-seven percent of this number have advanced degrees. The majority of these sceintists–58%–work in government service, with a full 19% in the universities. However, the functional activity with the highest number of graduates is engineering–30%– and next is agriculture. Sixty-six percent of these scientists work in the capital, where 61% of the scientific agencies are also located. Thus we may infer that Thai scientists prefer bureaucratic careers in the metropolis. Fortunately, three regional universities have succeeded in in drawing a significant number of graduates into the provinces. One of the survey's

important recommendations is that attempts be made to increase the proportion of scientific manpower in the private sector and outside Bangkok, in order to extend progress into the rural areas.

National Research Council and Applied Scientific Research Corporation of Thailand

More than a decade ago our government recognized the importance of conscious efforts to shape science and technology activity in the Kingdom. The 1959 National Research Council Act, as revised in 1964, gave the National Research Council the responsibility of advising the government on natural science and social science policy.

The broad charter directs the National Research Council to support science policy projects to support national development and to serve as a point of contact with foreign institutions and agencies whose work is relevant to our own concerns. To do this, the National Research Council employs some 120 civil servants consisting of 3.33% special grade 8.33% first grade, 42.5% second grade, 16.67% third grade and 29.17% fourth grade. Their work is carried out in four functional divisions: the Office of the Secretary, the Division of Compilation and Coordination, the Division of Translation and External Affairs and the Division of Social Science Research. Substantively, there are five committees on science and technology: Engineering and industrial research, medical science, agriculture and biology, chemistry and pharmaceutical science, and physical science and mathematics, which have set science research policy for the next five-year period. In addition, the NRC has also set up an ad-hoc committee on national research policy as well as implementation (see appendix).

The Applied Scientific Research Corporation of Thailand also plays a very significant role in science and technology activities in the Kingdom. It was founded in 1963 in the realization that a bureaucratic organization may be inappropriate for applied research due to the inflexibility of budgetary procedures, the lock-step career pattern, and generally low salary levels. Consequently the ASRCT is an autonomous government enterprise, which controls its own funds and may contract with private industry for work. It also may take scientists, engineers and technicians on for short periods of time for special projects, and levels of renumeration are competitive with private industry. While this approach appears potentially promising, no formal evaluation has yet been conducted.

The past and the future

Thus, over the past 15 years science research policy activities have made some progress in achieving formal recognition from high levels of government. Unfortunately, efforts have been distinguished by the formalism, and not by substantive achievement.

We must frankly admit that progress in this field has been so rapid, while trained human resources are so limited, that we are far behind in applying ourselves to the sophisticated problems of science and technology policy in Thailand. We know there are many irrationalities in the present situation, and many things we could do, if we had the manpower, the budget, and especially the attention of the nation's top leaders.

On the positive side, there is great promise for the future, and we are making steady progress toward our goals. Especially in the last couple of years we have been able to accomplish a great deal, and the degree of international cooperation in our efforts from UNESCO, FAO, SEAMEO, ASCA, ASEAN and other international organizations is particularly heartening. The important point is that the members of the scientific community must be concerned with more than just the work of their own disciplines. We must also have a sensitive concern in our day to day activities for the broader social, cultural, economic and political factors which pull us toward or tear us away from the social goals our country has set.

References

1. Ingram, J. (1972) *Economic Change in Thailand*, Stanford University Press, California.
2. *National Income of Thailand*, 1958–69 ed. Table 53.
3. *World Bank Atlas*, 9th ed. (1974), p. 12.
4. *Survey on Scientific and Technical Manpower and Organizations in Thailand Fiscal Year* 1973 (1973) Office of the National Research Council, Bangkok.

Appendix

The Physical Science and Mathematics Branch

The Physical Science and Mathematics Branch has formulated its research promotion policy as follows:

1. To promote high quality research in the study of both basic sciences and mathematics and work which may be applied directly to improve living conditions.

2. To promote feasible and suitably relevant research that can be applied in the future by promoting cooperation among various universities and government agencies.

3. To promote less experienced but high potential researchers to perform high quality research.

4. To promote applied industrial research, especially in industries that require indigenous raw materials.

Topics suggested for research are:-

1. Energy:

– study and analysis of data on the use of energy, energy sources and the application methods for Thailand and other countries,

– study of the feasibility and suitability of the application of various forms of energy such as sunlight, wind, and various forms of nuclear energy.

2. Environmental conditions and resources:

– study of basic data relating environmental conditions and resources,

– study on macroenvironmental conditions such as the analyses of satellite photographic data.

3. Research that promotes and encourages able and skilful students to have more interest in physical sciences and mathematics.

4. Research that promotes the understanding of general physical sciences and mathematics stressing quality in order to understand international technical movements.

5. Uses of various data and information including the use of computers for data and information compilation.

6. Study of world trends in research related to local conditions and relevant to Thailand, e.g., atomic energy as an electricity source and computers for data and information compilation.

The Medical Science Branch

The Medical Science Branch will formulate the following policy:

1. To support research that leads to the solution of national medical and health problems.

2. To promote qualified scholars to submit more worthy research projects to the National Research Council of Thailand for financial support by acquiring more technical procedures for the benefit of the public.

3. To promote institutional research in the form of contract research. The research topics for this should be ones required by government agencies and private organizations in seeking the solutions to medical and health problems.

Topics suggested for research are:-

1. Infectious diseases.
2. Malnutrition.
3. Diseases caused by polluted environment, either natural or man-made.
4. Family planning.
5. Study of medical and other biological data of the people in Thailand (genetic, physiology, anatomy, tec.).
6. Mental health problems including narcotic addiction.
7. Problems on medical and health services.

These studies may involve analytical research that requires medical social science principles or operation research in order to analyse current practices and to acquire better methods or systems for the future.

The Chemical and Pharmaceutical Sciences Branch

This scientific branch has not yet formulated research policy particularly for chemical and pharmaceutical sciences. However, the determination on priority and needs

would follow the policy set by the NRC Ad-Hoc Committee on Research Policy as follows:

1. The research must be implemented in the promotion of the welfare, capability and comfort of the people.

2. The research must be conducted to solve economic, social, cultural and environmental problems in order to maintain the integrity and virtuous culture of the country.

3. The research must enhance technical knowledge which will lead to the development and evolution of science and technology.

The Agriculture and Biology Branch

1. Research work that leads to the solution of important and urgent problems encountered by agriculturists or agriculture.

2. Research work for the improvement in quality and quantity of important agricultural production and food.

3. Study of agricultural systems in order to maximize the utilization of available factors and/or to preserve the agricultural and biological environment.

4. Research work on harvesting, storing and manufacturing for food and industries of agricultural products to be used as raw materials.

5. Research work for maximum yields.

6. Basic biological studies on the increase of production.

Topics suggested for research are:-

1. Important and urgent problems:
   - fertilizer shortage problems,
   - the control of Patanga grass-hopper,
   - the control of some plant diseases,
   - local cattle and water-buffalo.

2. Quality and quantity of important agricultural production and food:
   - quality and quantity of plant production, e.g. rice, corn, coconut,
   - quality and quantity of fishery production, e.g. fish, shrimp and other marine animals,
   - quality and quantity of livestock production, e.g. swine, water-buffalo, cattle, fowl.

3. The utilization of available factors to improve and/or to preserve the agricultural and biological environment:
   - multiple cropping system,
   - water use system,
   - land use system,

– use of natural bio-organisms for the suppression of plant pests.

4. Harvesting, storing and manufacturing of agricultural products to be used as raw materials for food and industries:

– storage of cereal seeds, fish products, livestock products, etc.,

– improvement of crude rubber to be used as raw material for rubber industry,

– production of paper pulp, pigments, plant vinegar, vegetable oil.

5. Maximum yields:

– the procedures of making food and various products from soybean,

– the manufacturing of animal products and by-products.

6. Basic biological studies on the increase of production:

– the life cycle of plankton,

– vegetative propagation.

The Engineering and Industrial Research Branch

This technical branch has set criteria in judging the importance of research work as follows:

1. Responds to majority need.
2. Gives high return in relation to investment.
3. Has a high probability for achievement.
4. Results in the appropriate use of natural resources for economic and social security.

Research projects suggested to be carried out during the five year period will be as follows:

1. The drainage of rain water and sewage.
2. The study and solution for environmental problems.
3. The solution for traffic problems.
4. The utilization of natural fuels.
5. The economical use of energy.
6. The research and promotion of local raw material use for industry.