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Workshop on Science
Planning and Policy
in
Thailand
3-6 July 1972

Final Report

Bangkok, Thailand.

Office of Science and Technology
Bureau of Technical Assistance
Agency for International Development

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Workshop
on
Science Planning and Policy in Thailand
Bangkok 3 - 6 July 1972
Final Report

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Final Report of

The Workshop on Science Planning and Policy in Thailand

I. Introduction

By the kind approval of the National Executive Council (NEC) of Thailand, the Workshop on Science Planning and Policy in Thailand was held at the National Research Council (NRC) and the Applied Scientific Research Corporation of Thailand (ASRCT), in Bangkok, from 3 to 6 July 1972. The Workshop was under the joint sponsorship of the National Research Council of Thailand and the National Academy of Sciences (NAS), U.S.A. Support for the Workshop was provided by the Government of Thailand and the Agency for International Development (AID) of the U.S.A.

A. Objective

The objective of the Workshop was to consider the role of science and technology in relation to the development of Thailand, with particular emphasis on mechanisms for planning and implementing science policy in Thailand.

B. Participants

A panel of eleven U.S. participants attended the workshop through the auspices of NAS. The participants are distinguished scientists and engineers, who are also experts in the field of science policy and planning, staff experts from the office of the Foreign Secretary of NAS and from AID in Washington, D.C. The Chairman of the Delegation was Professor Dr. Harrison Brown, Foreign Secretary of NAS. A list of the U.S. participants is given in Appendix A1.

Participants from Thailand included scientists and engineers from government, universities, and officials of relevant governmental agencies and ministries. Appendix A2 is a list of the Thai participants and an additional selected group of non-Thai nationals, currently resident in Thailand who participated in the Workshop.

A list of observers is given in Appendix A3

Staff support for the Workshop was provided by the office of the National Research Council and Applied Scientific Research Corporation of Thailand.

Local Secretariat is listed in Appendix A4.

C. Agenda

The agenda for the Workshop was mutually formulated by the NAS and the NRC of Thailand. The complete agenda is given in appendix B.

Prior to the formal opening of the Workshop briefings were given, at various government Ministries and Agencies for the NAS participants, according to the schedule given in appendix B2.

The Workshop was formally opened on 4 July 1972 with reports by Dr. Pradisth Cheosakul, Secretary-General, NRC, and remarks by Professor Dr. Harrison Brown, and Mr. William Littlewood, Associate Director, Office of Science and Technology, AID. The keynote address was given by H.E. Lt. General Boonruan Buacharoon, Under-Secretary, Office of the Prime Minister, who represented the Chairman of NRC.

Following the opening ceremony, the participants divided into five working groups for detailed discussions of current problems in science policy and planning and some possible solutions. The discussions were completed by the following day and the results and recommendations of the individual working groups were presented to the Plenary Session for discussion. The Plenary Session was chaired by Professor Insee Chandrastitya, Chairman of the Executive Committee, NRC assisted by the Rapporteurs listed in appendix B3. A preliminary draft of the final recommendations was prepared by a drafting committee, also listed in appendix B3. The preliminary draft was presented to the Plenary Session for discussion on the final day. Comments on the draft were made from the floor and a final draft of the recommendations was written and approved by the entire session.

II. Report of the Workshop

Opening Ceremony.

The Secretary-General of NRC, Dr. Pradisth Cheosakul set in motion the opening ceremony of the workshop by introducing the keynote speaker, Lt. Gen. Boonruan Buacharoon. Dr. Pradisth took note of the importance of science policy and planning in developing countries. He then presented a short historical review of science policy and planning in Thailand and the action which the Kingdom has taken to implement some of the recommendations made by past experts. In addition, he also pointed out some of the difficulties which Thailand has experienced in implementing many of the other recommendations which have been made, particularly those which related to the specific infrastructure needed to marshal the scientific and technological resources required to achieve national development goals in Thailand. It was with these difficulties in mind that aid for assistance was discussed with Professor Dr. Harrison S. Brown, and the NAS, and ultimately led to this Workshop.

Professor Dr. Harrison S. Brown spoke about the many problems facing developing nations and stressed the potential role of science and technology in finding solutions to these problems. He spoke of the importance of developing nations building up a local scientific and

technological expertise which will lead to the creation of an indigenous problem-solving competence. It was with the hope of providing their colleagues in developing nations with assistance in establishing such a competence that lead the National Academy of Sciences to undertake a variety of collaborative programs to meet this goal. The workshop on Science Planning and Policy in Thailand was viewed as a beginning of a long and mutually beneficial collaboration between the two nations towards similar aims.

Mr. William H. Littlewood of AID addressed the Workshop that the role of AID in this Workshop was to provide a portion of financial cost and moral support necessary. He also discussed briefly the need for scientific and technological planning and policy for the economic and social growth in a nation. In closing, he emphasized the absolute necessity of a basic foundation for science and technology for the future development.

In his keynote address H.E. Lt. General Boonruan Buacharoon welcomed the U.S. panelists and the participants to the workshop. He expressed his appreciation to the NRC, NAS and AID for their excellent collaboration in undertaking the Workshop. The role of science and technology to Thailand's development, he said, was well recognized by the government. He expressed both pride and concern about the use of scientific and technological resources in the Kingdom---pride at the growing rate of application and concern that these resources were not being developed and utilized in the most beneficial manner. The two most important questions in his mind were how to apply the nation's scientific and technological resources in the most efficient manner, and what administrative structure is necessary to accomplish this goal. Finally he indicated that the government was looking forward to receiving the conclusions and suggestions of the Workshop and that they will be given the most careful consideration.

The full texts of the remarks by the four opening speakers is given in appendix C.

Working Group Discussions

Rather than the presentation of academic papers, the Workshop focused on informal discussions. Appropriate and necessary background information was provided by preliminary briefings and through NRC. Five separate sectorial groups were established in the areas of Industry and Engineering; Agricultural Production; Natural Resource Development, Medicine, Public Health and Environmental Quality; and the Academic Sciences. The Chairman and Rapporteur of each group are included in appendix A2.

Each Working Group began its assignment with discussions of human resources and the development of science and technology in Thailand. The existing systems and practices for training Thai scientists and engineers were analysed to identify strengths, weaknesses and requirements for change. The condition of present and future employment opportunities was studied and career structures for Thai scientists and engineers were examined. Special attention was given to the possible benefits for various aspects of the human resources utilization that might be derived from establishing "centres" of scientific and technological excellence within Thailand.

These and other features of the situation were brought together in consideration of the existing systems of manpower planning. Conclusions were to emerge about the possible need for some form of overall coordination and planning of the crucial human resource aspect of scientific and technological development in Thailand.

The second point of focus was the institutional base for the development of science and technology. Scientific and technological activity requires for its effective performance an infrastructure of facilities. Working discussions considered the existing institutions for providing these infrastructural facilities in Thailand. The strengths and weaknesses of the important linkages among the various scientific technical and other institutions in each sector were to be analysed. Careful examination was to be given to the institutional facilities and co-operative links that are available to enable Thailand to draw on the vast amount of research and development being carried out abroad and on the enormous stock of technology which exists overseas.

It was hoped that the working discussions would not merely identify problems by analysing these and other situations, but would also define the needs, if any, for some form of co-ordination or planning of these institutional aspects of Thailand's scientific and technological development.

Working discussion also focused on various problems relating to the coordination and planning at sector and national levels of the use of scientific and technical resources for sectorial development. Critical attention was given to the planning and coordinating structures and systems, both national and lower levels, that are available to ensure the optimal use of scientific and technical resources in each key area - industry, agriculture, health and the academic sciences.

The main questions tackled were to be of the following type:
How are research priorities determined, and how do they match up to the priorities of national social and economic development? How are research and training activities coordinated to ensure maximum benefit at minimum cost? What are the existing government policies relating to the development of science and technology? Are these appropriate? What are the existing administrative structures for policy development, implementation, and coordination? Are these appropriate for the needs of the country?

Final conclusions were drawn up relevant to each of the five key areas. These conclusions given in appendix D relate both to policies and to the administrative structures for policy development and implementation concerned with the main topics of discussion human resources, the institutional structure, and the system of planning and coordination.

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U.S. Panelists of the Workshop on Science Planning and
Policy in Thailand
3-6 July 1972

.....

Group I : Industry and Engineering

Professor Brewster C. Denny Dean, Graduate School of Public
Affairs, University of Washington,
Seattle, Wash.

Mr. William A.W. Krebs Vice President, Arthur D. Little
Inc. New York, N.Y.

Group II : Natural Resource Utilization

Professor Harrison S. Brown Foreign Secretary of the National
Academy of Sciences. Washington, D.C.

Mr. William Littlewood Associate Director, Office of Science
and Technology, AID. Washington, D.C.

Group III : Agricultural Production

Dr. Albert H. Mosoman Director, Malaysian Agricultural
Research Development Institute,
Ministry of Agriculture & Cooperatives,
Kuala Lumpur, Malaysia

Mr. John Hurley Professional Staff Associate, Board on
Science and Technology for
International Development, National
Academy of Sciences, Washington, D.C.

Group IV : Medicine, Public Health and Environmental Quality

Dr. Howard A. Minners Chief, Geographic Medicine Branch,
National Institute of Allergy &
Infectious Diseases, National Institutes
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Mr. John P. Milton Consultant, President's Advisory
Panel on Timber & the Environment, and
Scholar, Woodrow Wilson International
Center, Washington D.C.

Dr. Noel Vietmeyer Professional Staff Associate, Board on
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Group V : Academic Sciences

Dr. Arnold B. Grobman Dean,
Rutgers College, Rutgers University
New Brunswick, New Jersey

Dr. Sidney Passman Head, Science Policy Research Section,
National Science Foundation, Washington,
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Workshop on Science Planning and Policy in Thailand
Bangkok, 3 - 6 July 1972

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Chulalongkorn University
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Rapporteur

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Ministry of National Development
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Reporter

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Workshop on Science Planning and Policy in Thailand
Bangkok, 3 - 6 July 1972

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Stanford Research Institute, NRC

Mr. Martin Bell
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and

National Research Council Staffs

**Agenda for the Workshop on Science Planning and Policy in Thailand
(4 - 6 July 1972)
to be held at the National Research Council of Thailand and
Applied Scientific Research Corporation
(Documentation Centre Building)**

Tuesday, July 4

- 8.30 - 9.15 a.m.** **Registration**
- 9.30 - 10.30 a.m.** **Opening Ceremony**
Report by
Dr. Pradieth Cheosakul
Secretary-General of the National
Research Council
Professor Dr. Harrison Brown
Foreign Secretary of the NAS.
Mr. William Littlewood
Associate-Director, Office of Science and
Technology, AID.
- Keynote Address by**
Representative of Chairman, National
Executive Council
(Under-Secretary, Prime Ministry Office)
- 10.30 - 11.00 a.m.** **Coffee break**
- 11.00 - 12.00 a.m.** **Working Group discussions**
From this point until Wednesday p.m. Participants
to the workshop will be divided into "sector
groups" according to their interests, 5 "sector
groups" are suggested below. Some of these
"sector groups" may be subdivided into groups
small enough for full participation of all
members, (e.g. there may be two groups concerned
with industry).
- Sector Group**
- 1. Industry and Engineering**
 - 2. Natural Resources Utilization**
 - 3. Agricultural Production**
 - 4. Medicine, Public Health and Environmental**
Quality.

5. Academic Sciences

~~1.30 - 2.00 p.m.~~

First Discussion Group Session

Presentation of position statements to each sector groups.

1.30
~~2.00~~ - 3.00 p.m.

Second Discussion Group Session

Each group to discuss with reference to its sector :

Human Resources for Science and Technology Development

- A. Manpower planning
- B. Science education and training
- C. Engineering education and training
- D. Employment opportunities
- E. Status of scientific and technical careers
- F. "Centers of Excellence" approach

3.00 - 3.15 p.m.

Coffee break

3.15 - 4.30 p.m.

Third Discussion Group Session

Each group to discuss with reference to its sector :

The Institutional Base for Science and Technology Development

- A. Required infra - structure for science and technology
- B. Linkages among all sector institutions and agencies.
- C. Utilising R & D from abroad.
- D. Utilising technology from abroad.
- E. Cooperative links internationally.

Buffet dinner in honor for participants, at the Liberty Hotel

Wednesday, July 5

- 9.00 - 10.30 a.m. Fourth Discussion Group Session
- Each group to discuss with reference to its sector :
- The Coordination and Planning at Sector and National Level of the Use of Scientific and Technical Resources for Sectoral Development
- A. Determination of research priorities - present practice and future requirements.
 - B. Coordination of research and training activities - problems and requirements.
 - C. Government policies - existing and required
 - D. Administrative structures - existing forms and desirable alternatives.
- 10.30 - 10.45 a.m. Coffee break
- 10.45 - 12.00 a.m. Working group preparation of conclusions from four discussion sessions, and nomination of representatives for report drafting committee
- 1.30 - 2.30 p.m. Plenary Session
- Presentation and discussion of groups' conclusions on Human Resources and Institutional Base (Discussion session 2 and 3)
- 2.30 - 3.30 p.m. Plenary Session
- Presentation and discussion of groups' conclusions on the Coordination and Planning at Sector and National Level of the Use of Scientific and Technical Resources for Sectoral Development.
- 3.30 - 3.40 p.m. Coffee break
- 3.40 - 5.00 p.m. Continuation of Plenary Session
- ~~3.40 - 4.30~~ p.m. Drafting by small group of participants of
8 00 - 10.00 final workshop report.

Thursday, July 6

11.00 a.m. - 1.55 p.m. Plenary Session

Presentation of draft workshop report,
conclusions and recommendations.

~~1.30 p.m.~~

Discussion and final revision of draft

2.00 p.m.

Closing.

Schedule
On Monday, July 3, 1972
for
U.S. Panelists of the Workshop on Science Planning and
Policy in Thailand

9.00 - 10.30 a.m.

All groups

Visit National Economic Development Board,
1½ hours; a brief discussion on "Economic
Development in Thailand : Problems and
Priorities"
Director Economic and Social Planning
Division.
(Dr. Snoh Unakul)

~~8.30 - 8.15~~
~~10.40 - 11.00~~ a.m.

Group IV

Visit Ministry of Public Health
The Under-Secretary of State for Public
Health
(Dr. Komol Pengsitong)

11.00 - 12.00 a.m.

Group I

Visit Ministry of Industry; brief discussion
The Under-Secretary of State for Industry
(Professor Yos Bunnag)

Group II

Visit Ministry of National Development;
brief discussion.
Senior Technical Officer,
Technical and Planning Office
(Dr. Kanhaeng Sathirakul)

Group III & V

Visit Kasetsart University

~~10.50~~
~~11.15~~ a.m. - 2.45 p.m.

Group IV

Visit Faculty of Science, Faculty of
Public Health, Faculty of Tropical Medicine
and Faculty of Medicine, Mahidol University.
Acting Dean of Social Sciences and Humanities
(Professor Jajaval Osathanondh)

2.00 - 3.00 p.m.

Group I

Visit Applied Scientific Research
Corporation of Thailand; brief discussion.
Chairman and Governor
(Dr. Tab Nilanidhi)

Group II + III

Visit Royal Forest Department; brief
discussion.

Group ~~III~~ & V

Visit Office of the Atomic Energy for Peace.

3.30 - 4.30 p.m.

All groups

To National Research Council, Bangkok;
visit Secretary General of NRC., 1½ hour,
a brief discussion on "An Overview of the
Science Policy Mechanism in Thailand".

Plenary Session

- Chairman : Professor Insee Chandrastitya
Chairman, Executive Committee, NRC
- Rapporteur : Dr. Pradisth Cheosakul
Secretary-General, NRC
- Deputy Rapporteurs : Dr. Irwin H. Billick
UNESCO Adviser, Science Policy, NRC
Professor Brewster C. Denny
Dean, Graduate School of Public Affairs,
University of Washington
Mrs. Sakuntala Bhodhiprasart
Special Grade Scientific Officer, NRC
- Assistant Rapporteur : Mr. Chobvit Lubpairee
Second Grade Scientific Officer, NRC

Drafting Committee

1. Dr. Pradisth Cheosakul
2. Professor Brewster C. Denny
3. Dr. Irwin H. Billick
4. Dr. Natth Bhamarapravati

Workshop on Science Planning and Policy in Thailand
Report
by
Dr. Pradieth Cheosakul
Secretary-General, National Research Council

Your Excellency:

Recognizing the contribution of science to the human welfare, over fifty developing countries, as stated in a Unesco communication, have established some sort of a machinery to advise their governments on science policy, e.g., the sum of each nation's measures taken to increase, organize, and use its scientific and technological potential, with the objective of achieving its overall development goals. The machinery for such a purpose may take various forms such as ministry of science and technology, national council for science policy, national science development board, science advisory committee to the chief of state, national academy of sciences, and others.

Based on the above definition one could rightly note that Thailand already has a science policy, because, on the one hand, there are many initiatives and undertakings by agencies, institutions, and officials to increase the country's scientific and technological potential or, on the other, to organize and use these resources to obtain national goals. Yet, while this is true, there is also a widespread knowledge among those interested in science and technology in Thailand that some deficiencies prevent us from reaping the full potential benefits which could and should accrue from our resources. In pondering the reason for this, one usually comes back to the same answer that the existing infrastructure for increasing, organizing, and using science and technology in Thailand is somewhat less than optimum. It is for the purpose of pinpointing the deficiencies in our infrastructure and of reaching a consensus on how to correct those that we are now initiating this workshop.

I think before we go further, however, it would be useful, especially for our American colleagues, to recount some of the events that have led us to the conclusion that infrastructural changes are required today to achieve our full scientific and technological potential. For at least two decades we have deliberated the question of what was needed to achieve that state of exponential growth in science and technology that we have witnessed in a number of other countries. It was in the early 1950's that both Professor Julian Huxley and Sir Charles Darwin carried out their missions under Unesco sponsorship to advise us on what should be done in this respect. Let me quote for you one of Sir Charles' findings: "After considering...the deeper aspects of the matter I have concluded that for any permanent affect on your national life what is needed is a long term policy of developing science here in general." During Sir Charles' stay in Thailand we took one of our first steps in this direction by making the decision to establish a national research council for which an act was proclaimed in 1956.

There were other advances in the area of science and technology during that decade but at its close we had still not effectively needed Sir Charles' advice. Still there was no long term policy for developing science.

It was at the beginning of the following decade that, in response to our request, the United Nations approved the dispatch of an expert to advise us in the development, promotion, and planning for science. In June of 1966, Mr. Frank Nicholls of the Commonwealth Scientific and Industrial Research Organization of Australia came to Thailand. As a result of his mission we were able to pinpoint many weaknesses and needs in our system—not the least of these was the requirement for all scientific efforts of the country to come under the purview of a single organization or agency.

Many advancements in science and technology took place during the 1960's. The Applied Scientific Research Corporation of Thailand was established under the sponsorship of the National Research Council and UNIDO as recommended by Mr. Nicholls. A Military Research and Development Center was set up with the cooperation of the U.S. Advanced Research Project's Agency. A research reactor installed with the assistance of AID went critical during the period. Three regional universities and one in the Bangkok area were started; and existing universities expanded to provide graduate training in science and engineering. Also during the decade there was significant growth in the nation's industry.

In addition to these quantitative increases in scientific and technological resources, the National Research Council Act was revised in 1964 to increase its responsibility of advising the government on natural and social science policy matters. So, for the first time Thailand had an organization with the responsibility of developing science policy and all scientific efforts came under its purview. Unfortunately, however, the Council found itself in much the same position as the U.S. National Science Foundation did in its early days when it was given a similar responsibility. In both cases it soon became clear that without sufficient authority and funds it was impossible to be effective in the policy making role.

We, therefore, decided to seek advice from Unesco which in 1967 sent Professor William Van Vorst to survey and document our development and utilization of science and technology. He was followed in 1969 and 1970 by Professor Arthur Solomon of Harvard University. Professor Solomon made a number of definite suggestions to us about what he thought the nature and mechanics of an infrastructure for developing science policy in Thailand should be. While we may agree on a requirement for marshalling our scientific and technological resources to achieve national development goals in Thailand, we have, unfortunately, not been able to reach any agreement on the specific infrastructural arrangement that we should create to satisfy this requirement. To pursue this matter further Unesco under the Technical Assistance Programme has just provided the National Research Council with the service of Dr. Irwin Billick for one year as an advisor in science planning.

During my official visit to Washington, D.C. last year I had the grand opportunity to discuss with my celebrated friend, Professor Harrison Brown of the National Academy of Sciences, our difficulty to establish a national science policy in Thailand—a problem on which I used to seek Professor Brown's advice during every past General Assembly of the International Council of Scientific Unions. As a suggestion to solve this problem he told me of an experience he had recently had in one country with a background somewhat similar to ours. He explained how that country assembled their leading scientists, engineers, economists, industrialists, and policy makers, and arranged for them to spend several days with a selected panel of U.S. experts brought together by the National Academy of Sciences. At the conclusion of the workshop which dealt with infrastructural problems related to the development of a science policy, a consensus was reached that finally led to successful infrastructural changes. It seemed to me that this was exactly what was called for in Thailand. I had some discussions with colleagues here and then further discussions with Dr. Brown's representatives with regard to the implementation of his proposal. As a result we are assembling here today to consider again the question raised by Sir Charles almost two decades ago in the hope that we may arrive at a science policy which will allow us to mobilize our vast existing resources for the economic and social development of the country.

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Remarks

by

Professor Dr. Harrison S. Brown

Foreign Secretary, U.S. National Academy of Sciences

Mr. Under-Secretary of State, Dr. Pradisth, fellow scientists,
ladies and gentlemen:

Speaking for my American colleagues, it is a great honor and pleasure for us to be with you today to participate in this important symposium. As I viewed the flags of our two nations flying together as I entered the building and as I see them in this room, I am reminded that today, the fourth of July, is the birthday of our country and that, in 1776, when the United States was born, Thailand had already been a successful, mature nation, with a thriving, beautiful culture for centuries. It is said that with age comes wisdom and so during this symposium my colleagues and I look forward to learning a great deal from you.

As I travel about the world and spend time with my scientific colleagues I find that it makes little difference whether I am in England, or France or Brazil or Japan or Thailand. We scientists are able to communicate with each other because we share a common language and a common culture. Even more important, I find that we scientists tend to look at the basic overwhelming problems which confront humanity today in very much the same way. We share common concerns about the problems of war, disease, hunger and poverty and we want to do what we can to enable mankind as a whole to live in peace and in comfort with dignity. We all know that when we look at the world from a purely technological point of view, hunger and deprivation are inexcusable and we all want to apply science and technology to the task of accelerating development.

No matter where we turn in the development area we see that new technology is needed for the solution of problems. It is simply not possible for the 3,700 million human beings who now inhabit the earth to live in reasonable comfort without massive infusions of industrialization, research and development. Certainly the 6,000 million persons who will inhabit the earth at the turn of the century will depend upon new techniques to an even greater extent than we do.

It is often said that the main limitation to development is money. In a sense this is true, but only in a narrow sense. Were transfers of capital from the rich countries to the poor suddenly to be

greatly increased, we would then probably encounter the most critical of all factors which limit the rate of development. We would be limited by the availability of problem-solving and decision-making capacity -- in other words by the availability of the kinds of trained people who are necessary to carry out the development process.

Certainly the elimination of hunger, disease and deprivation in the world requires much larger transfers of capital from the rich countries to the poor than have thus far been seriously considered. But the achievement of the goals also requires a better understanding of the role of the technically trained person in the development process. Present rates of development and present approaches to the acceleration of development are clearly inadequate. A quantum jump is needed and it seems probable that such a jump, if it takes place, will have its origins within the technical community.

Most of us recognize that the problem of the economic development of the poorer countries is enormously complex, requiring a multiplicity of actions. Throughout the process leaders are called upon to make a diversity of complex and difficult decisions. All too often they lack the combination of wisdom and knowledge which is necessary if the correct decisions are to be made. Frequently the required knowledge itself is simply not available.

An economy which is based upon technology must be backed up by a substantial "problem-solving competence" covering a broad spectrum of activities, ranging from management to economics to engineering and science. This competence is necessary if solutions are to be obtained to development problems as they arise. All too many development plans either ignore or give low priority to this need.

The creation of an indigenous "problem-solving competence" really means the creation of an ability to undertake research and development. It means creating the cadres of engineers and scientists who can apply their talents to their country's development problems. It means creating the institutions which will enable the scientists and engineers to work effectively.

It is often stated that while it is true that research and development have contributed substantially to the economic development of the richer countries, the poorer ones can now solve most of their technical problems of development simply by importing the necessary technology from the more technologically advanced countries. If this were true, it would be unnecessary for the poorer countries to attempt to build up their own local scientific-technological competence. It is sometimes argued further that at the very least the poorer nations should postpone attempts to establish sophisticated national scientific establishments, including adequate research facilities and post-graduate training, until the development process is well under way.

3.

The evidence speaks strongly against this view. For example, if technologies are to be imported, persons must be in the position of making informed, wise decisions as to the technologies which are most appropriate. Rarely can foreigners become familiar with the culture and problems of a country to the extent necessary. Furthermore, a given technology is usually designed for a particular physical-economic-social environment and is often inappropriate when transplanted to other environments. Under the circumstances it is frequently desirable to modify technologies as they are transferred. In addition, many of the problems encountered in the development process simply cannot be solved outside the environment in which the problems arise.

It is such considerations which prompted the National Academy of Sciences shortly after world war II to engage in a variety of collaborative programs in which we work with our colleagues in developing countries on programs aimed at strengthening the local research and development competence so that science and technology can truly be an important tool in accelerating the economic and social development of the nation. We hope that this symposium will make the beginning of a long and mutually beneficial collaboration.

Remarks

by

Mr. William H. Littlewood

Associate Director, Office of Science and Technology, AID

Your Excellency, distinguished guests and workshop members:

I am indeed honored to be an observer here, representing the United States Agency for International Development (AID).

The role of AID in this particular workshop is to provide a portion of the financial cost and moral support necessary. My own office, the Office of Science and Technology of AID is very much aware that the economic development of a country cannot progress rapidly unless there is organized an effective policy and infrastructure that will adequately generate and support the applied scientific and technological base upon which so many things depend in a healthy economy. An economy will not expand solely upon cultural, social, economic and political advances. Selected scientific and technological innovations and policies are necessary: —

- to better utilize natural resources such as forests and minerals,
- to increase agricultural productivity through better genetic strains and appropriate fertilizers,
- to improve health through better medicine and nutrition,
- to protect the environment,
- to develop new and appropriate industries for production of local and export goods,
- to stimulate an expanded system of higher education in science and technology,
- and to promote many other advances.

I would like to refer to the recent United Nations publication entitled "World Plan of Action for the Application of Science and Technology to Development". I quote:

"If science and technology are to make an effective contribution to development, there must be a direct relationship between science and technology, and government policy. Obviously, it is not for those specialized in science and technology to establish overall development goals. Science and technology do, however, set the feasibility limits in which these goals must be considered, and they also point to research programmes that could lead to developmental breakthroughs. A Government's science and technology policy should therefore dynamically affect all activities in which the methods and achievements of science and technology are being used to enhance the national development in all fields."

"...Governments have started to recognize that scientific activities may be effectively directed towards practical objectives... and Government science policies are nowadays concerned with all scientific and technological activities ranging from basic research to the practical application of new knowledge." (End of quote)

It cannot be overemphasized that those bilateral discussions are about the shape and nature of an all-important base; a foundation. The design, size and visibility of this scientific and technological base varies greatly around the world, but its presence in each country is absolutely necessary to development. This foundation must also be constructed with sufficient power to do an effective job; a weak infrastructure and policy will only waste time, money and resources, and require rebuilding later.

I appreciate very much this opportunity to observe this important workshop, and to learn more about your wonderful country and people. I am happy to join others in wishing this to be a most successful meeting in its development of recommendations which I believe will prove vital to the future economic advancement of Thailand.

Thank you.

Keynote Address

by

**The Representative of: H.E. Field Marshal Thanom Kittikachorn
Chairman of National Executive Council
(Under-Secretary, Office of the Prime Minister)**

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Distinguished guests:

It is a great pleasure for me to learn from the report presented by the Secretary-General of the National Research Council and remarks made by Dr. Harrison Brown and Mr. William Littlewood that the U.S. National Academy of Sciences and the Agency for International Development has collaborated with the National Research Council of Thailand in organizing the Workshop on Science Planning and Policy in Thailand.

To most of us, I think the most vivid examples of the application of science and technology have occurred in the area of space exploration military weaponry. Here we picture such systems as space ships, inter-continental ballistic missiles and numerous other gadgetry that just a few years ago we thought of as being science fictional. While these applications are indeed spectacular, it is by no means clear that they are the most important. This is especially true from the viewpoint of a nation such as Thailand. For example, think of the importance of agriculture to our people and then think of the truly notable gains that science and technology have made in this field. As yet we have only begun to sample the advantages that await our further exploration and work in this area. Also in the area of industrial development we have seen what the growth of science and technology has accomplished for several of our Asian neighbors. As a matter of fact in almost all areas of national concern, this field of knowledge and its application reap important and beneficial result. There should be no question in anyone's mind as to the value of science and technology to our development. I assure you that this is well recognized by our government.

Not only is the importance of science and technology increasing for Thailand as it is for other countries but, as Dr. Pradisth Cheosakul, Secretary-General of the National Research Council has noted, our scientific and technological resources have been growing at a significant rate. This has been a continual pride to me. At the same time, however, it has been a cause of increasing concern. I, at times, fear that not only are these resources being developed in an ad hoc fashion but that they may be being applied in a similar way--or worse yet, may not be being applied at all. It is of the most urgent concern that we focus and utilize these resources that have come to us at such a high cost and that likewise have such a high potential for aiding us in our achievement of national plans and goals. The major questions for us then are,

how does one achieve the application of science and technological resources to the country's problems in the most efficient manner? And further, what, if any, are the administrative changes required to accomplish this? It is on these topics that I hope you will be able to provide the government with valuable advice. I look forward to receiving the conclusions and suggestions of this workshop, and you may rest with confidence that they will be given the most careful consideration as we make further attempts to develop and utilize our scientific and technological resources for the improved welfare of the nation.

Now, at this auspicious moment, I hereby declare open the Workshop on Science Planning and Policy in Thailand. I would like to thank all of you, especially those distinguished participants from abroad, who have kindly spared their precious time to participate in the Workshop for the actual benefit of Thailand. Finally I wish the Workshop all the successes in accordance with your objective.

**Workshop on Science Planning and Policy in Thailand
Findings and Recommendations**

The participants of the Workshop met on July 3-6, 1972 and discussed the major problems facing Thailand in the uses, support and policy for science and technology in the development of the country. The Workshop conducted its deliberation in five sectorial groups, e.g., industry and engineering, natural resources, agriculture, health affairs, and education in science. These groups took note of parallel efforts in the sectors in the course of their deliberations. The principal findings and recommendations as approved by the plenary session of the Workshop are presented below. Available as appendices are reports from sectorial groups on specific subjects which are the views of the sectorial groups and also show the wide range of our consideration.

Science and technology have a major role to play in the economic and social development of Thailand. However, at present Thailand lacks well defined policy, adequate financial support and appropriate organizational mechanisms for the development and the maximum utilization of its manpower and material resources in science and technology, and for the planning in these areas. Appropriate organizations for science policy at the highest level of the government must be established. While a number of constructive suggestions have been made by the sectorial groups and are included in the attached reports, it is recognized that the precise organizational structure cannot be defined at this time.

It is, therefore, recommended that:

- The government appoint a committee to conduct a thorough study of the structure of science and technology in Thailand and to make definite proposals for an effective governmental administrative structure which is capable of defining, planning, and implementing the national policy in science and technology for economic, educational and social development.
- Members of the proposed committee be selected from both government and the sectors, including professional societies and be composed of scientists, technologists and other experts.
- Without regard to any future organizational changes, the planning for science and technology be carried out on the basis of adequate analysis. Current capability and expertise in relevant government agencies begin immediately to perform detailed analyses and studies of the problems related to science, technology and national development. The results of these studies should be integrated into the Third National Economic and Social Development Plan as early as possible in order to make an effective contribution to the welfare of Thailand during the next 5 years.

- Urgent attention be given to improve present personnel policies including those on salaries, promotion and reward systems, and career opportunities, particularly for young scientists, technologists and technicians. A recurring theme in our discussion has been that the current personnel policies relating to careers in science and technology are limiting and will continue to limit both the advancement of science and technology and their effectiveness in meeting the needs of the country.

The general recommendations above for the improvement of the overall policy and organization for developing and utilizing science and technology for national development, while absolutely essential, will not alone meet the full range of needs in each of the individual sectorial areas. The attached reports of the sectorial groups of the Workshop, which were received and discussed in the plenary session, provide an indication of the range of problems and some possible solutions.

Sector I
Industry and Engineering

- (1) The importance of science and technology for national development in Thailand is not sufficiently recognized.
- (2) There is a requirement for better coordination of scientific and technological activities between units of government and with the private sector.
- (3) There is a need for better balance of funding among scientific activities and also between these activities and other economic activities in relation to their importance to national goals and plans.
- (4) Any plans or policy changes that would correct the above three situations are only likely to be obtained if the need for the changes are backed up with solid analyses and studies.
- (5) Science and technology requires, in many instances, a very long lead time for payoffs from present investments. This is quite often longer than the 5 year period covered by National Economic and Social Development Plan.
- (6) The group identified a current interest in, and capability for, conducting detailed analyses and studies of the problems relating to science, technology and industrial development. This interest and capability is located in existing institutions such as NEDB, NRC, and ASRCT, as well as other governmental organizations. Without regard to any future organizational changes, these capabilities could now be used to provide analytical data as a basis for integrating plans for the utilization of science & technology with those of the National Economic and Social Development Plan. Under the authority of a special Committee these studies should be encouraged & facilitated.
- (7) It was further decided that this special temporary committee representative of professional groups should consist of scientists, technologists, economists, and development planners. The functions of this committee would be to make specific recommendations to the government with respect to the most effective administrative structural arrangements for ensuring that scientific and technological considerations are included in the nation's operating programs.

SECTOR II
NATURAL RESOURCES UTILIZATION

1. Natural resources under discussion involved both human as well as material resources of the country. Among the material resources of importance to Thailand's national economy are

- (1) Land
- (2) Water
- (3) Minerals and Fuel resources
- (4) Forestry
- (5) Wild life
- (6) Atmosphere
- (7) Scenic, historic, and cultural sites

2. The group agreed that Thailand lacks adequate mechanisms for determining scientific and technical needs and priorities, for assessing optimum levels of funding for research and development and for arriving at guidelines for determining optimum research, development and other technical expenditures. The group noted that the National Research Council under its present enabling legislation is not and cannot be an adequate mechanism for these purposes.

3. The group recommends that a thorough study be made by a commission, appointed at the highest levels of government, of the handling of scientific and technical activities within the government ministries. The commission should recommend changes in the National Research Council's structure, support and operating procedures in order that it can more effectively serve as an adequate mechanism for advising the government on scientific and technical needs, priorities and funding. The commission should also consider the establishment of additional mechanisms at the highest levels of government for ensuring that the scientific and technical needs of Thailand are adequately supported and administered.

4. In order to develop adequate numbers of trained professional scientists and technologists who can work on Thailand's problems of resource development and utilization, the group suggests that serious consideration be given to the establishment of a Natural Resources Research Training Center. This center which could be attached to a university would provide post-graduate education in appropriate fields such as geology, hydrology and water management, soils and land management, forestry and resource economics. Research would be undertaken by both faculty and advanced students in those areas which are of great importance to the future development of Thailand.

5. Serious consideration should be given the establishment of bilateral science cooperation programs with the National Academy of Science of the USA and with similar organizations in other technologically advanced countries. Specifically the National Academy might be asked to give advice during the study recommended above of the organization of science and technology in Thailand and of the organization and role of the National Research Council. At a later date the Academy might be asked for help in the implementation of specific recommendations which might be made by the investigating commission.

6. Bearing in mind the importance of the government organizational structure in the problems of natural resources assessment, development, utilization as well as conservation, the group was of the opinion that serious consideration be given to the grouping of the government agencies dealing with material resources under one single ministry. Such a reorganization would, among other advantages, gainfully contribute towards harmonization and speedy implementation of scientific and technological activities of the country.

7. In reviewing the existing problem of shortages of scientific and technical man-power in the Government sector, the group recognized that one of the most important limiting factors was related to the salary and wage system of the Thai Government service. Improvement of the prevailing system was urgently needed. Without immediate actions on the part of the Government in this respect, any hope for a firm start on scientific and technological development could hardly be attained.

Sector III

Agricultural Production

I Human Resources for Science and Technology Development

Science education and training at technical and research levels in general meet present and future needs for Agriculture. There are no major problems in meeting the numbers of scientists and technologists needed in this sector, but their effective utilization under the Civil Service system leaves much to be desired. Main constraints are (1) lack of coordination of efforts between the departments requesting new positions and the Civil Service granting new positions, (2) need for special training of recruits for departmental jobs, (3) improved training of recruits for research investigation, (4) restricted promotion procedures and opportunities for research careers as compared with administrative posts, (5) officers not wanting to live and work upcountry, and (6) surplus of new graduates compared to available Government jobs or other employment opportunities.

Recommendations:

1. Improvement of recruiting procedures to obtain adequate numbers of high quality research officers.
2. Establishment of a dialogue between education and technical departments to develop special training programs for technical school graduates.
3. Approval by the Civil Service Commission of more new positions for MS graduates.
4. Improvement by the Universities of the quality of graduates destined for research.
5. Provision of more scholarships for training toward advanced degrees for research positions.
6. More attention by the Civil Service to the promotion of productive research officers on the basis of merit, up to Special Grade level.
7. Provision of incentives by the Government to scientists and technologists who live and work upcountry.

II The Institutional Base for Science and Technology Development

The institutional infra-structures are inadequate. There are increasing capabilities and resources for agricultural science and technology in Thailand but procedures should be improved for directing these resources more effectively to support national development goals.

Linkages among agencies are weak. Technological advances from abroad are often useful but further adaptive research is usually needed to make them fit Thailand conditions. Cooperative international links are good and useful and should be expanded. Main constraints are 1) inadequate procedures for cooperative use of research resources, 2) the lack of an effective agency to give adequate linkage among departments or agencies doing research, and 3) foreign assistance that does not in many cases meet the country's requirements or priority problems.

Recommendations:

1. There should be in depth study of NRC, and also of procedures to improve planning & coordination of agricultural science and technology by the Government Sector, helped by foreign experts.

2. There should be more cooperative use of research resources.

3. Research capabilities must be strengthened to be able to adapt imported technology and to pursue other research to suit Thailand requirements.

4. Joint Planning of technical assistance by donor countries & Thailand should be improved to insure that such assistance is directed to high priority problems of Thailand.

5. Cooperation among Asiatic countries to interchange new materials & knowledge should be encouraged.

III The Coordination and Planning at Sector and National Level of the Use of Scientific & Technical Resources for Sectoral Development

Technical feasibilities as well as economic objectives should be taken into account in selecting priorities for agricultural development. This would require more discussion between planning and technical departments. Further increase in agricultural production in the future will depend more heavily on new technology and less on use of new land. Dispersed responsibility for research of the present time and lack of periodic reports limit the understanding of the nature and scope of research underway and also limit the effective use of new technology for development.

Recommendations:

1. Improved dialogue should be established between development planners and technologists to determine priorities and feasible opportunities in agricultural development.

2. The support for research on the priority commodities in the National Economic and Social Development Plan, and also on potential new crops and livestock problems in further agricultural diversification, should be increased.

3. Annual workshops and reports on priority program areas should be arranged by the technical departments to assess progress in research and development and to supply more promptly the new scientific and technological advances for use in agricultural development.

4. Consideration should be given to setting up a body for planning, coordinating and implementing scientific and technical programs for agricultural development. This should be done, however, only after an in-depth study of existing activities, resources, and responsibilities by a team of qualified and experienced Thai agriculturists assisted by external specialists in organization of agricultural research and development systems.

Sector IV

Medicine, Public Health and Environmental Quality.

Human Resources for Science and Technology Development

Problems The several problems besetting the health care system of Thailand include

- (a) Improper manpower planning
- (b) Inadequate production of personnel
- (c) Maldistribution of personnel
- (d) Improper use of personnel
- (e) External brain drain of professionals.
- (f) An insufficient emphasis and lack of coordination of environmental studies at the undergraduate level.
- (g) A shortage of environmental engineers and scientists.
- (h) Promotion and career advancement is not based on achievement.
- (i) Scientific and technical excellence is diluted amongst many institutions.

Recommendations

- (i) There should be a national health planning activity capable of acquiring statistics and making effective recommendations.
- (ii) Provision of incentives to attract health personnel to the rural areas should be made. These incentives should provide monetary, educational, career advancement and security benefits, etc. to rural health personnel.
- (iii) More medical faculties and centres should be established in the rural areas.
- (iv) The increased use of paramedical and auxiliary personnel, should be encouraged
- (v) Curriculum modification to emphasize the team health approach toward community medicine health care.
- (vi) Postgraduate and continuing education should be encouraged and expanded at the national and regional level.
- (vii) In undergraduate science and engineering curricula there should be an emphasis placed on environmental studies and systems approach to problem solving.
- (viii) Promotion should be based on achievements and capabilities. Scientific and technical productivity should be a major factor in promotion.

- (ix) Provided that the centre of excellence concept is pragmatic approach to problem solving it is welcomed as a measure of concentrating technical and scientific excellence. The centre should function as a training, educational, research and development organ. It should (1) be free of civil service salaries, (2) have a high quality administrative infra-structure (3) be able to attract international funds and (4) be self supporting through outside grants and contract research: its viability being dependent upon its quality.

The Institutional base for Science and Technology Development.

- Problems
- (a) The health care system of Thailand is ill-organized and ill-defined. There is minimal governmental infrastructure for environmental quality control.
 - (b) There is little effective linkage between institutions and agencies in health care and environmental protection.
 - (c) Fundamental science can be directly imported to Thailand but applied and social sciences must be modified for local application.
 - (d) The technology imported from abroad is often misused which results in negative benefits and in harmful side effects which have not been forecasted.

Recommendations

- (i) A reorganization and definition of the healthcare system is urgently needed.
- (ii) The creation of a body with planning, monitoring, legislative and enforcement capabilities is urgently required for environmental protection.
- (iii) Local research and development must be expanded, solutions to Thailand's environmental problems may be solved only here, not abroad.
- (iv) There should be careful scrutinization of new technologies being imported to Thailand. This should be a function of national health and environmental agencies.
- (v) We support the emphasis on family planning program and suggest increasing the support in this direction.

The Coordination and Planning at Sector and National Level of
the Use of Scientific and Technical Resources for Sectoral
Development.

- Problems
- (a) There is minimal Policy and priority determination in research activities leading to inadequate guidance and coordination in this area.
 - (b) Research grants are given to research programs without regard to the overall national needs and priorities.
 - (c) The highest advisory body to the government responsible for guidance in science policy, research and training does not take an active part in its formation and implementation. As a consequence there is no effective science policies for Thailand.
 - (d) Administrative structures are not adequate in this sector, alternatives are suggested below.
 - (e) The motives behind international aid giving and the need of aid programs to be identified with the donor often has an adverse effect on the aid program.

Suggestions

- (i) In order to meet the needs for advancement of research and development three forms of fund acquisition programs should be available to the research worker and agency (a) NRC funds available based upon the technical merit of the proposed research (b) research contracts obtainable from both private and governmental sectors (c) training grants to enhance production and quality of research workers.
- (ii) Administrative structures. The following suggested infrastructures are directed towards improvements in use of existing and future resources for policy, planning and implementation of integrated health services and integrated environmental quality control programs. As is indicated, the proposed National Health Council would advise the Ministry of Public Health and comprise representatives of universities, educational and research institutes, and the armed forces, municipal authorities as well as the Ministry of Public Health. A National Health Science Committee should be created under the National Health Council to deal with science and technology in health problems. This would act in parallel to the proposed National Environmental Health Commission dealing specifically with human health problems related to environmental quality.

The Ministry of Public Health should be reorganized to provide for a Straight integrated line of authority from regional through provincial headquarters to health centers and subcenters and midwifery station.

- (iii) In view of the broad scope of general environmental problems of Thailand it is suggested that a separate National Environmental Council with an executive committee should be established and report directly to the cabinet on matters of environmental quality control. It should have supporting subcommittees in the areas of water, air, noise, soil, urban settlement, food, environmental health, open space, and integrated management and protection of natural resources. The National Health Science Committee of the National Health Council should be directly related to the environmental health subcommittee of the National Environment Council.

Sector V
Academic Sciences

I Discussion opened by recognizing the need to establish and make the case for developing an active and self sustaining, indigenous science base. National decision makers must choose among many demands for resource. Academic sciences can find its place among these demands, only after the importance of an indigenous science capability to national development has been made convincingly to decision makers.

While establishing the case fully would require detailed study, the committee perceived a number of contributions which have not been fully appreciated. These contributions to development from academic sciences were

- (1) The provision of a manpower base competent and versed in science to conduct R & D, and other technical activities.
- (2) The development of technological gate keepers. These are people who are in touch with and can understand developments outside the nation and introduce these to the nation — rather than relying on others to do this.
- (3) The improvement of science teaching through active research in the subject. This interested involvement will also stimulate interest in science among the students and reduce the rote learning elements in teaching.
- (4) The provision of a sound base to receive students trained overseas.
- (5) The provision of a capability to recognize priorities and growth areas — rather than having these set by default from outside the nation.

Part II

Morning Session 4 July 1972

Thai participants reviewed the present situation on the science education in Thailand as related to the following:

- (1) Science Education and administrative structure.
- (2) Attempts to coordinate Science and Technology in Thailand.
- (3) Problems that hinder the progress of the science education and research in Thailand. These problems are:

- 3.1 Weak career attraction in science compared with other professional subjects.
- 3.2 Low salary scale and benefits for scientists.
- 3.3 Lack of incentive and injustice in professional promotion.
- 3.4 Rigidity in administration and management procedures that discourage research

Afternoon Session 4 July 1972

Human Resources for Science and Technology Development

- (1a) Manpower planning is still at an early stage leaving a lot of room for improvement.

(1b) There is a shortage of middle level manpower.

- Thailand should not import a package of science education and training from abroad.
- Graduate program in science should be encouraged in Thailand.
- Science training should be harmonized with the social requirement.

On status of scientific and technical careers

- Promotion should be based on merit such as work on scientific research.
- Should consider ways and means to improve the status of the scientists in this country e.g. , financial rewards recognition of those who serve the country in extra to their regular duties.

3rd Discussion group session

The Institutional Base for Science and Technology Development

Under the heading of Utilising R & D and technology from abroad

- Should have a good counter part with good co-operation.
- Well planning in advance is needed.
- Not all advisors to assist our country, should be top level experts who only advise but there is a need for consultants to work hand in hand with local scientists and technologists.
- A short term advisor should be avoided. To make any projects get full benefit, a long time project should be considered.
- It is also true that in some cases, a group of specialists will be needed.

III Recommendations

Recognizing the importance of the balance between academic sciences development and application of science for development, the Group would like to make the following recommendations.

A. It is recommended that there be a Science Policy Planning Board that works closely with the National Economic Development Planning Board of the country. The major functions of the board are as follows.

1. To formulate science policy for the Council of Ministers (Cabinet)
2. To consider (for endorsement) plans concerning scientific research of various government departments.
3. To give advice to the Cabinet on science and technology.

The major tasks of the Board at present are

1. To consider ways and means to promote scientific and technical activities.
2. To consider ways and means to improve the quality of education and research in science and technology

3. To consider ways and means to improve professional advancement, reward and attraction in science and technology.
4. To survey potentials in science and technology in Thailand so as to solve the immediate needs for national development and to recommend establishment of future problems or mission-oriented institutes that address directly to the needs.
5. To formulate a plan for science and technology development that is consistent and complementary with the National Economic and Social Development Plan.

The Board should be chaired by a Minister who has an interest in science. The Board should be composed of key persons in other planning agencies and individual scientists.

B. In the near future an intensive study or/Panel/Seminar on future needs of science and technology for Thailand should be launched. This study should be conducted by noted Thai scientists in all areas as well as other representatives from government departments and the private sector concerned with science and technology. It should be stressed that in planning such a task, follow-up action on recommendation should be an important component of this study.

C. In order to coordinate the present research activities in Thailand, it is recommended that NRC conduct and publish periodically reports on research projects conducted in Thailand. These research activities would provide also a means of identifying areas of research capabilities.

D. It is recommended another meeting/seminar consisting of representatives from all 5 groups be held within 6 months to finalize the recommendations of the Workshop.
