

AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON, D. C. 20623
BIBLIOGRAPHIC INPUT SHEET

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Batch 39

1. SUBJECT CLASSIFICATION	A. PRIMARY	TEMPORARY
	B. SECONDARY	

2. TITLE AND SUBTITLE
Preliminary workshop report (on) science and technology policy, planning, and management in Egypt

3. AUTHOR(S)
(101) National Research Council. Board on Science and Technology for Int. Development

4. DOCUMENT DATE 1975	5. NUMBER OF PAGES 20p.	6. ARC NUMBER ARC
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7. REFERENCE ORGANIZATION NAME AND ADDRESS
NAS

8. SUPPLEMENTARY NOTES (Sponsoring Organization, Publishers, Availability)

9. ABSTRACT

(Science and Technology R&D)

10. CONTROL NUMBER PN-AAC-409	11. PRICE OF DOCUMENT
12. DESCRIPTORS	13. PROJECT NUMBER
	14. CONTRACT NUMBER CSD-2584 GTS
	15. TYPE OF DOCUMENT

CSD-2584 GTS
PAPAAC-909

PRELIMINARY WORKSHOP REPORT

Science and Technology Policy, Planning and Management
in the Arab Republic of Egypt

Held in Cairo, Arab Republic of Egypt

May 3-8, 1975

Jointly Sponsored by:

Academy of Scientific Research and Technology,

Arab Republic of Egypt

United States National Academy of Sciences

National Science Foundation (U.S.A.)

NOTE

The Workshop on Science and Technology Policy, Planning and Management in the Arab Republic of Egypt (ARE) was a joint effort of the ARE Group on Science and Technology, the ARE Academy of Scientific Research and Technology, the Board on Science and Technology for International Development of the United States National Academy of Sciences - National Research Council (NAS), and the Office of International Programs, National Science Foundation.

The NAS received support for this workshop through funds provided by the Office of Science and Technology, Bureau for Technical Assistance, Agency for International Development, under contract AID/csd-2584, Task Order 1. International transportation and per diem expenses for all U.S. participants were borne by the National Science Foundation.

WORKSHOP REPORT
Science and Technology Policy, Planning and Management
in the Arab Republic of Egypt
Cairo, May 3-8, 1975

I. Background Information

A. Origin

At a meeting in Cairo in June 1974 an Egyptian - U.S. Joint Cooperation Commission was formed to strengthen mutually beneficial contacts and establish programs in the economic, scientific, and cultural fields. A Joint Working Group on Technology, Research and Development (JWG) was established at the government level to further cooperation in applied sciences. The JWG at its first meeting in November 1974 recommended that a seminar, or workshop on research and development planning and management be held in the spring of 1975.

In a parallel effort in July 1974, representatives of the Academy of Scientific Research and Technology of the ARE and the United States National Academy of Sciences initiated discussions on cooperative activities to help link S & T to Egyptian national development goals. A workshop on national science policy planning was suggested as a first activity for the two academies.

The above discussions prompted the Arab Republic of Egypt Group on Science and Technology and the Egyptian Academy to sponsor jointly with the U.S. National Academy of Sciences and the U.S. National Science Foundation

two meetings in Cairo in the spring of 1975. The first was a Symposium on Science Policy Planning to exchange views and experience on a theme linking science policy to Egyptian national development. The Symposium was held at the National Research Centre in Cairo on April 30 and May 1, 1975 with three American participants and an average participation of sixty on the Egyptian side. The Symposium was both exploratory and preparatory to the Workshop on Science and Technology Policy, Planning and Management held May 3-8, 1975, also in the ARE Academy in Cairo.

B. Workshop Objectives

The goal of the workshop was to bring together persons from Egypt and the United States to identify problems and share experiences in the management of research and development in universities and applied research institutes. Both groups recognized that an examination of the problems in R & D management faced by Egypt could neither be done in detail nor could specific solutions be suggested within the time period available to them. The group could, however, seek to identify key constraints in research management, understand some of the special parameters which may exist that impede their removal, and suggest mechanisms by which further progress might be made. The conclusions and recommendations section of this report is the product of that joint search for an understanding of constraints on research management and suggests steps which would help to resolve problems so that Egyptian research and development may become even more effective in meeting national goals.

C. Procedures and Participants

Workshop sessions were held in the Council Room of the Academy of Scientific Research and Technology at its headquarters in Cairo,

101 Kasr El-Eini Street. All sessions were conducted in English.

A list of the participants from Egypt is given in Annex I; participants from the U.S.A. in Annex II. The chairman, co-chairman and rapporteurs for the sessions are listed in Annex III.

D. Agenda

Saturday, May 3, 1975

9:30 - 10:00

Formal Opening and Welcome

H.E. Mahmond Fauzy, Ex-Vice President
of the Republic

Dr. Mohammed H. El-Guebeily, Minister of
Scientific Research and Atomic Energy

Dr. Abdel M. Abou -El-Azm, President,
Academy of Scientific Research and
Technology

Dr. A. F. Ismail, First Under Secretary of
State, Ministry of Higher Education

Dr. H. Guyford Stever, Director, National
Science Foundation, U.S.A.

Dr. Franklin A. Long, Professor of Chemistry,
Cornell University, Ithaca, New York, U.S.A.

10:15 - 1:00

Session I: National Science Policy and
Planning

Function, formulation, implementation and
promotion

4:30 - 7:00

Session II: National Science Policy and
Planning, continued

Objectives, methodology, economic aspects,
finance, forecasting

Sunday, May 4, 1975

10:00 - 2:00

Group visits to:

National Research Centre
National Agricultural Centre
Helwan Iron and Steel Company
El Tabbin Metallurgical Institute of
Higher Studies

Tuesday, May 6, 1975

9:30 - 12:30

Session III: The Research Environment

Incentives, coordination, linkages,
cooperation among scientists and
institutions, supporting services

4:30 - 7:00

Session IV: Research Programmes

Appraisal, choice of alternatives and
priorities, organization, application
of research results, special charac-
teristics of multidisciplinary re-
search

Wednesday, May 7, 1975

9:30 - 12:30

Session V: Management of Applied Research
Institutes

Organization, development, administrative
problems, evaluation of R & D

4:30 - 7:00

Session VI: Transfer of Technology

Building up national indigenous capabilities,
choice, adaptation, generation, terms of
agreements

Thursday, May 8, 1975

9:30 - 12:30

Session VII: Manpower

Projection and planning for scientific
and technical manpower, continuing
education

4:30 - 6:00

Session VIII: Conclusions and Recommendations

II. Conclusions

In the detailed discussions between the U.S. and Egyptian participants, members of each group outlined their methodologies for conduct of research and development. As a result of these interactive discussions and comparisons, the workshop is led to the following conclusions:

1. Egypt does not have a formally enunciated national science policy but the various science oriented agencies which it has established and the funds it provides for research and science education constitute a significant implicit national policy. The existence of a Ministry for Scientific Research and Atomic Energy is one component and the Academy of Scientific Research and Technology is another. The national policy which makes available free university education and which guarantees jobs to university graduates including scientists and engineers is another element. Of particular importance is the sizeable effort in applied research and development as represented by the National Research Centre, the Agricultural Research Centre and the specialized research institutes, organizations, which in total employ about 4,000 professional research workers.

2. Management of this large and complex set of organizations is a formidable task. Effective management requires clear delineation of the objectives of the organizations, procedures for performance, provision of high quality leadership and maintenance of good working conditions and challenging tasks to motivate the research staff. It is also important to consider those links between the various research groups and specially between the applied R & D groups and the putative users of their output, i.e., their "clients." The Academy of Scientific Research and Technology and its specialized Councils play important coordinating and guidance roles.

3. Management of university research is a very different problem from that of applied research institutes. Universities have teaching as their major task with research as a central component of training of graduate students. Management effectively resides in the academic departments. Even though the educational system pays basic salaries for faculty research workers as well as for demonstrators and assistant lecturers, national support programs for libraries, research facilities and study leaves are essential if university research is to remain of good quality. The Academy has given some support by way of funds for selected university-based research projects, of national importance.

4. Egypt's applied research program is a very sizable effort but its execution probably requires considerable restructuring and re-direction if it is to be maximally effective. Utilization of the facilities of applied research laboratories for university-oriented thesis research, is at least a distraction and at worst a conflicting element to the formal objectives of the institutes. The centres and institutes need additional research equipment, adequate libraries and, above all, adequate technicians and other supporting personnel. Clear objectives and strong management are also needed. There should be a close coupling between the level of funding of applied research institutions and the importance of their objectives to identified national needs. Linkages between the research groups and their user "clients" appear to be relatively more adequate for the agricultural research institutes and under continuing development for the research institutes oriented to industry.

5 Technology transfer to Egyptian industry from other nations and from multinational corporations has been and will continue to be a major element in Egypt's industrial development. There is a variety of possible transfer mechanisms but for any of them to be successful the continuing participation of able R & D groups within Egypt, currently available or newly formed, is an essential ingredient. Indigenous technical efforts are important in the selection of the technologies, in their adaptation to Egyptian conditions and in maintaining effective operation. This need alone is a strong argument for an effective industrially oriented R & D structure.

6. The development and maintenance of effective linkages and communication paths, horizontal among the various research institutions, also vertical up to the national agencies and Ministries, and down to the user groups, is an important but difficult requirement which necessitates long term and constant effort. The Academy is playing an important role in this effort and should continue to do so.

7. There are other important opportunities for the Academy and its councils to aid the national R & D effort. Increased coordination and program evaluation is one area for more effort. Provision of central facilities, e.g., libraries, computers and other items of special equipment, is another. Expanded programs of data gathering, analysis and forecasting of Egypt's supply of, and demand for scientific and technical manpower will be useful. An expanded program of supplemental financial grants for research support will be particularly helpful.

III. Recommendations

1. Major efforts should be made to increase effectiveness and efficiency of Egypt's applied research laboratories.

Among the important needs are: Definition of specialized objectives for each laboratory, provision of the required tools for effective operation including an able staff, strong management, good working conditions and adequate support facilities. To permit the development of some research of the very highest quality the concept of "centers of excellence" might be applied to selected research areas in some of the best university departments and applied research institutes. Selection of research fields for centers of excellence should be based in considerable measure on national research and manpower needs. The development of close linkages with the user groups for the research product should be established and maintained. Research organized by means of definite projects is very desirable as well as increased use of contract research in which the research clients help develop the project and then pay for it. Close collaboration between the National Research Centre and some of the specialized research centres is desirable and indeed some amalgamations of closely linked groups could be very useful.

2. The existence of substantial programs of university oriented thesis research in applied research laboratories seriously complicates and conflicts with the laboratories mission and the practice should be phased out as quickly as possible.

To respond to genuine needs of staff this should be accompanied by increased programs of on-the-job training and opportunities of staff to take leaves of absence to return to universities for advanced training.

3. Promotion and salary increases for professional staff of applied research institutes should be based almost exclusively on their contributions to the furtherance of the institutes research projects.

Accomplishment of this recommendation will require new legislation and regulations. Specifically there should be basic modifications in the current coupling of staff promotions to attainment of advanced degrees and formal publications.

4. Management training programs should be developed to improve the management of the R & D effort, particularly in the applied areas.

5. To insure continued high quality of university research it is essential that better provision be made for equipment, libraries and supporting services.

6. Programs of data gathering, analysis and prediction for scientific and technical manpower should be strengthened to help insure availability of the required manpower for national needs and to avoid imbalances in the educational programs.

7. The formulation of a national science plan, including appropriate programs of applied research should be done in close conjunction with the formulation of a clear national strategy for economic and social development within the framework of the overall national plan.

The objective should be to build up national indigenous capabilities and to obtain optimum utilization of resources.

8. To insure effective transfer of technology and minimize its costs there should be appropriate revisions of national legislation and international practices.

The objective should be to minimize constraints and at the same time to give increased flexibility to the transfer process. There are a number of differing and useful ways for the transfer of technology and it is important that all be under national control and yet be readily available.

9. Additional, intensive follow-on, joint study efforts can enhance the development of appropriate science policies and aid in the structuring and management of Egypt's research programs.

Possibilities are:

In A.R.E. A. Joint case studies to be carried out in Egypt on these, and related topics:

1. Examples of the best applied research institute studies and identification of the most important components of these studies.

2. Ideal instances of linkages between applied research institutes and industry.

3. Optimum practices in using scientific manpower, developing recruitment and promotion policies and projecting future needs.

B. Follow-up seminars in:

1. Management of applied research institutes; assessment and evaluation of programs.

2. Problems of technology transfer and building up of national scientific and technological capabilities to do development and engineering design to establish new productive enterprises.

C. Assistance from the U.S. to the Academy of Scientific Research and Technology projects program, particularly on:

1. Assessment and evaluation of these projects and their progress.
2. Some particular aspects of these projects, in the form of consultation with experts, workshops, short term training (4-6 weeks) or required equipment.
3. Strengthening capabilities in certain areas in research units which would be of benefit on a nation wide basis.

In U.S.A. Short study tours (3-4 weeks) to the relevant institutions and facilities in these and related areas:

- Management of applied research
- Management of University research
- Contract and grant procedure
- Preparation of research project proposals with clear definition of research objectives
- Development of policies and planning for science and technology
- Evaluation of research projects.

ANNEX I

List of Egyptian Participants

Workshop on Science and Technology Policy, Planning and Management

I. Academy of Scientific Research and Technology

Dr. A. M. Abou El-Azm, President
Dr. O. El-Mofti, Vice President
Dr. A. G. Abd El-Samei, Vice President
Dr. Moustafa M. Hafez, Scientific Advisor
Mr. Adel A. Sabet, Director General
Dr. Y. Hussein, Member, Technical Bureau
Mrs. Abla El-Bishry, Member, Technical Bureau

II. National Research Centre

Dr. Mohamed Kamel, Director
Dr. A. F. Rizk, Research Professor (Pharmacology)
Dr. A. I. Naguib, Research Professor (Microbiology)
Dr. O. Galal, Research Professor (Nutrition)
Dr. M. H. Fadl, Research Professor (Paper and Cellulose)
Dr. N. I. Ashour, Assistant Research Professor (Botany)
Dr. A. L. Hussein, Assistant Research Professor

III. Research Institutes

Dr. M. Fahim, Director, R. I. Observatories
Dr. Bahram Mahmoud, Secretary General, Petroleum Research Institute
Dr. A. A. Abd El-Azim, Deputy Director, Metallurgical Research Institute
Dr. P. P. Bhatnagar, UNDP Project Manager, Metallurgical Research and
Development Institute
Dr. A. Lotfi El-Sayed, Deputy Director, Metrology Research Institute

IV. Service Centres

Dr. A. Kabesh, Director, National Information and Documentation Centre
Eng. M. El-Alayli, Director Scientific Instruments Centre

V. Atomic Energy Establishment

Dr. Hamed Rushdi, Director, Radiation Technology Research Institute

VI. Universities

Dr. Hassan Ismail, President, Cairo University
Dr. Ibrahim Badran, Vice President, Cairo University
Dr. K. El-Doweini, Professor, Faculty of Science, Ain Shams University
Dr. Kamel Al-Asbet, Dean, Faculty of Agriculture, Cairo University
Dr. Hassan El-Sbelgi, Vice Dean, Faculty of Engineering, Cairo University
Dr. A. R. Goafar, Professor, Faculty of Agriculture, Cairo University
Dr. Salah Shahbender, Director, Cancer Research Institute, Cairo University
Dr. S. Moustafa, Lecturer, Faculty of Sciences, Cairo University
Dr. Mohamed Morsi Ahmed, Secretary General, Union of Arab Universities
(Ex-Minister of Higher Education)

VII. Ministries

Dr. Moustafa Hafez Mohamed, General Supervisor, Agricultural Research Centre
Dr. Abdou Sallam, Chairman, Organization of Serums and Vaccines (Ex-Minister
of Health)
Dr. A. F. Ismail, First Under Secretary of State, Ministry of Higher Education
Dr. Aziz El-Bindari, Chairman, Family Planning Organization
Dr. Sobhi Abd El-Hakim, Professor, Cairo University and Advisor, Family
Planning Organization
Eng. Kamel Maksoud, General Director, Industrial Planning, Organization
for Industrialization, Ministry of Industry
Dr. H. Ghanem, Organization for Industrialization, Ministry of Industry
Dr. A. M. Said, Under Secretary of State, Ministry of Manpower
Dr. A. Azer, Researcher, National Centre for Social and Criminological
Research
Dr. M. A. Hassan, Chairman, Industrial Research Council, Member Academy
Council, (Ex-Minister of Industry)

VIII. Regional Organizations

Dr. M. A. Kassas, Assistant Director General, Arab League Organization
for Education, Culture and Science (Ecology)

ANNEX II

List of American Participants

Workshop on Science and Technology Policy, Planning and Management

1. Franklin A. Long (Chairman), Professor of Chemistry and Henry R. Luce Professor of Science and Society, Cornell University, Ithaca, New York
2. Robert F. Christy Vice President and Provost, California Institute of Technology Pasadena, California
3. F. J. Darnell Associate Director, Central Research and Development Department E. I. Du Pont de Nemours and Company Wilmington, Delaware
4. Richard S. Davis Dean, College of Technology University of New Hampshire Durham, New Hampshire
5. David Lewis Assistant Director, Program on Policies for Science and Technology in Developing Nations, Cornell University Ithaca, New York
6. Roy L. Lovvorn Administrator, State Cooperative Research Service, U.S. Department of Agriculture Washington, D. C.
7. Richard F. Neblett Director for Contributions, Exxon Corporation New York, New York
8. Everett V. Richardson Director, Engineering Research Center Colorado State University Ft. Collins, Colorado
9. Charles Wolf, Jr. Head, Economics Department, Rand Corporation, Director, Rand Graduate Institute, Santa Monica, California

Staff

J. Allen Holt

Office of International Programs
National Science Foundation
Washington, D. C.

Jay Davenport

Office of the Foreign Secretary
National Academy of Sciences
Washington, D. C.

ANNEX III

List of Chairmen and Rapporteurs

Session I: National Science Policy and Planning

Chairman: Dr. A. M. Abou El-Azm
Co-Chairman: Dr. Franklin A. Long
Rapporteur: Mr. Adel A. Sabet
Co-Rapporteur: Mr. Jay Davenport

Session II: National Science Policy and Planning, continued

Chairman: Dr. A. Ismail
Co-Chairman: Dr. Charles Wolf, Jr.
Rapporteur: Dr. Aziz El-Bindari
Co-Rapporteur: Dr. David Lewis

Session III: The Research Environment

Chairman: Dr. M. Morsi Ahmed
Co-Chairman: Dr. Robert F. Christy
Rapporteur: Dr. A. F. Rizk
Co-Rapporteur: Dr. Richard F. Neblett

Session IV: Research Programmes

Chairman: Dr. Mostafa Hafez
Co-Chairman: Dr. F. J. Darnell
Rapporteur: Dr. M. A. Kassas
Co-Rapporteur: Dr. E. V. Richardson

Session V: Management of Applied Research Institutes

Chairman: Dr. Mohamed Kame1
Co-Chairman: Dr. E. V. Richardson
Rapporteur: Dr. Hamed Rushdi
Co-Rapporteur: Dr. F. J. Darnell

Session VI: Technology Transfer

Chairman: Dr. M. A. Hassan
Co-Chairman: Dr. Richard Davis
Rapporteur: Eng. Kamel Maksoud
Co-Rapporteur: Dr. R. Christy

Session VII: Scientific and Technical Manpower

Chairman: Mr. A. M. Said
Co-Chairman: Dr. R. E. Neblett
Rapporteur: Dr. O. El-Mofti
Co-Rapporteur: Dr. David Lewis

Session VIII: Conclusions and Recommendations

Chairman: Dr. A. M. Abou El-Azm
Co-Chairman: Dr. Franklin A. Long
Rapporteur: Mr. Adel A. Sabet
Co-Rapporteur: Dr. J. A. Holt