APPLIED SCIENCE AND TECHNOLOGY RESEARCH IN EGYPT

Quarterly Report No. 15 - Phase II
April - June 1985

Contract Number NEB-0016-C-00-1058-00
Project Number 263-0016

Report prepared by:
Board on Science and Technology for International Development
Office of International Affairs
National Academy of Sciences/National Research Council
Washington, D.C.
August 1985

INTRODUCTION

This is the fifteenth quarterly report, Phase II of the Applied Science and Technology Research Program in Egypt covering the period April - June 1985. The program is supported under Contract NEB-0016-C-00-1058-00 of the United States Agency for International Development (AID) with the National Academy of Sciences/National Research Council (NAS/NRC).

An overview of each Project for Phase II of the program which began in July 1981 was presented in the tenth quarterly report (January - March 1984); a summary of Phase I activities covering the years 1978-81 was written in June 1982.

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APPLIED SCIENCE AND TECHNOLOGY RESEARCH PROGRAM IN EGYPT

PHASE II: FIFTEENTH QUARTERLY REPORT

April - June 1985

A. Program Policy, Planning and Management

- Joint Consultative Committee (JCC)

The fifteenth meeting of the Joint Consultative Committee, JCC-XV, was held in Washington at the headquarters of the National Academy of Sciences/National Research Council (NAS/NRC) on April 1-2, 1985; a summary of JCC-XV was included in the fourteenth quarterly report (January-March 1985 pp. 6-8; and Annex B, pp. 40-52). JCC-XVI is scheduled to be held at the Academy of Scientific Research and Technology (ASRT) in Cairo, Egypt, November 26-28, 1985. No meetings of the JCC executive committee were held during the April-June 1985 reporting period.

- Science and Technology Policy (S&T) Measures

With the completion of Seminar III (November 1983), U.S. AID concluded its financial support for the S&T Policy Measures Project. Sectoral S&T policy planning activities continued in the Ministries of Agriculture, Industry, Construction, Energy and Irrigation with coordination from the ASRT Committee on S&T Policy.

A proposal for upgrading of national and sectoral capabilities of technology management with particular reference to the textile and food industries has been prepared by Dr. Essam Galal, special advisor to the ASRT President. The proposal (See Annex B) cannot be funded under the Applied Science and Technology Research Program

but is under consideration within the ASRT for inclusion as a future activity with or without international technical and financial assistance.

- Research and Development (R&D) Management Systems

Meetings of the ASRT R&D Management Steering Committee were continued during the reporting period April-June 1985. Informal reports from R&D management development committees within research institutes affiliated with ASRT were received and reviewed. R&D management groups in the Central Metallurgical Research and Development Institute, the Petroleum Research Institute as well as the National Research Centre are preparing projects meeting their specific needs.

The Management Steering Committee worked with the task force group on information systems which was created by the ASRT President in March. The task force is responsible for the preliminary design of an ASRT management information system. Recommendations and a report are expected by September.

B. Summary of Project Status

- More and Better Food (MBF)

1. Role of Women in Development

The MBF project has a central goal of furthering community self-sufficiency. One means of achieving the goal is direct contacts between farmers and NRC scientists aimed at joint problem-solving for increased agricultural production that will raise family income. Another is a broadly based health education

program which, coupled with improved agricultural production, is designed to promote better nutrition.

Increasingly, the importance of women in rural development is becoming better recognized by planners and other decision makers. Thus the planning process itself needs to incorporate women as members of all planning teams. Early in 1985, Dr. Helen Henderson, anthropologist from the Women-In-Development program, University of Arizona, worked with Dr. Zebaa Motagally, Associate Professor of Animal Nutrition, National Research Centre, to assess the impact of the More and Better Food Project on women in the demonstration villages of Kafr al Khadra and Omar Makram. They examined the dairy and poultry projects as aspects of MBF which have a special impact upon village women.

Research in several areas around the world indicates that women from low-income circumstances tend to invest a large part of whatever earnings they have in their children's nutrition. The same pattern has been observed in Egypt where farm women's small but steady income from the sale of dairy products, poultry and vegetables does play an important role in the household economy and is largely spent on food. Thus, women's work meets not only the needs of the family through non-paid activities (child raising and household sustenance such as cooking, sewing and cleaning) but also gains additional status when it contributes in small but significant ways to the family income.

The concept of "household enterprises" is important to the understanding of the role of women in the economy. Their work,

such as poultry raising and the conversion of surplus milk products to butter or cheese, though not highly remunerative, offers what may be the only opportunities for women to participate in the money economy.

The dairy project in Kafr El Khadra and in Omar Makram took place in demonstration centers in the two villages and was aimed at women as active participants. Each served as a "model" of a small dairy utilizing technologies appropriate to village level for separation of milk and making of cheese. In addition, the centers served an educational purpose by working with women in milk processing, stressing cleanliness of home produced products, and encouraging the use of non-conventional but simple improvements in cheese and butter making, even when done in the home.

The women who participated in the project were found to use profits from the sale of butter and cheese to buy food and non-food items such as clothing for their families. Milk products were also used as in-kind payments for hired laborers working in the family fields and as support or gifts for family members residing outside the immediate family residence. These small sums produced regularly during the milking season provide an important income source to meet household daily needs, to maintain social networks and to help the poor.

At the present stage of economic development in rural Egypt, household enterprises have another important function aside from the most obvious one of supplying immediate family needs. Household enterprises are labor intensive, require little capital,

and employ persons who lack training for more specialized work. The activities provide a small but steady potential for income to women in a manner consistent with accepted cultural practices and add to the esteem of women in traditional households.

Similarly Drs. Henderson and Motagally examined poultry raising in the two villages as it affects the role of women, household income, family nutrition, and other social-economic factors of the family.

The poultry project began in the two villages at approximately the same time in 1979 and 1980. Dr. Zeba A. Motagally and Dr. Hatem Mohamed Ali from NRC were the catalytic persons in interesting villagers to participate. They invited a few villagers to raise chickens in new ways, explaining both the requirements and the risks involved as well as the potential for income. In a technical sense the two scientists were the "principal investigators" for the poultry project and the extension advisors for the families that participated. They held workshops and visited the projects because the method required those participating to use chickens of a special breed, to isolate the animals from other household flocks, to control the range of the chicks, to provide special feed and water, and otherwise to regulate all factors in the production cycle. Project focus was on household production, not on large broiler or egg-laying units. Nevertheless the goal of the NRC scientists was to help small producers introduce major improvements in poultry raising which

previously were largely in the province of larger, commercial Egyptian producers.

In Kafr El Khadra 8 families out of 80 interviewed were chosen by the MBF team for participation in the project in 1979. Equipment consisting of a small heater, lamp and feeding apparatus was purchased amounting to approximately LE 70 per family. It was understood that all costs would be subtracted from proceeds after poultry sales. Participants were also responsible for paying for chicks and for feed rations. As other villagers realized that these first participants were profiting, confidence in the project increased. By 1984 there were 70 families enrolled with a total of 88,000 chickens produced during that year. Profits averaged LE 350 per 1000 chicks. In addition to reserving some of the chick production for family use, profits from the sale of poultry were used for household appliances (washers, television sets or refrigerators), savings for the purchase of additional land, schooling for children, clothing, and for supplementing the family food budget.

The project in Omar Makram followed a similar pattern to that in Kafr El Khadra.

Interviews with both participants and non-participants in the two villages revealed that women played the predominant role in the animal care. Men may have been at the interface with the NRC representatives and the agents for marketing the poultry, but it fell to the women to be responsible for raising the chicks.

The poultry activity continues in both villages even without the formal, direct involvement of the NRC scientists. Collaboration between Dr. Zebaa Motagally and Dr. Helen Henderson also is continuing aimed at developing procedures to extend the methods used in the two villages more broadly.

In April Dr. Zebaa Motagally, who is an associate professor of animal nutrition at NRC in Cairo, came to the United States. She attended the second conference of the Association for Women in Development, Washington, D.C., April 25-27, 1985, where she had the opportunity to meet specialists from many countries concerned with the role of women in agricultural development. She also travelled to Tucson, Arizona to collaborate with Dr. Helen Henderson at the Department of Anthropology, University of Arizona. Together they reviewed data from the cottage dairy production and the poultry production projects, both of which have had significant inputs from village women from Kafr Al Khadra and Omar Makram. Their reports as inputs to the MBF project summary report are now in the final stage of preparation.

2. Measurement of Socio-economic Variables

In June 1985, Dr. Amin Abdou, agricultural economist from the NRC in Cairo, spent two weeks at the University of Arizona using the computer facilities to analyze data from nutritional and agricultural baseline surveys in the demonstration villages to ascertain the significance of the socio-economic variables. Dr. Abdou is reviewing:

-- The corn production project to seek a better understanding of factors which led to sustained adoption of new varieties at Omar Makram but reversion to older varieties and production methods at Kafr al Khadra.

-- The peanut production project at Omar Makram to analyze those factors which promoted the 40% yield increase with the view toward sustaining the increase and improving the benefits that accrue to the farmers.

-- The variables affecting non-participation in MBF agricultural projects in each of the two demonstration villages.

-- Health and nutrition effects of participation vs non-participation in the agricultural projects.

-- Socio-economic effects of other major interventions and activities such as poultry production, wheat, onion, tomato and other vegetable crops.

• Technical and Socio-Economic Evaluation of Irrigation Systems in New Lands (Land Reclamation)

During this period (April-June 1985), the project principal investigator Dr. Hassan Wahby, Director, Water Distribution and Irrigation Institute, left Egypt for an extended leave-of-absence. Dr. Abdel Hady Rady took over responsibilities as Institute Director and project principal investigator. Agreement was reached with Dr. Rady that Dr. James Fitch, agricultural economist who is a consultant from Yakima, Washington, and was an agricultural specialist for over two years for the Ford Foundation in Egypt, will visit in early August to review with the project team the

technical and social/economic study dimensions of the program. Dr. Fitch has also served as a consultant for the More and Better Food project.

Although the principal technical factors for a successful irrigation scheme are an adequate supply of water and an efficient drainage system to prevent salinization, non-technical issues such as the social and health infrastructure, the water management system, availability of irrigation and community maintenance services, a transportation system for access to markets, and educational opportunities for children are also essential to assure long-term viability of new settlements. EARIS (The Egyptian-American Rural Improvement Service) dating from 1952, with one project near Alexandria in the Delta and two in the Fayoum, is an AID-assisted land reclamation program and is an example of the importance of investment in infrastructure (roads, housing, hospital, and schools). Beyond the initial provision of these services, institutional and management frameworks are needed to provide continuous maintenance, village governance and informal communications so essential to the settlers. Thus the study design for this demonstration project of the ASRT must build on a careful review of all lessons learned and assure that a broad spectrum of technical and non-technical factors are incorporated into the implementation at each of the three reclamation sites.

- Development and Application of Biogas Technology in Rural Areas of Egypt

During May and June, Dr. Mohamed El Halwagi, principal investigator for the project and organizer of the November 1984 International Conference on Biogas Technology Transfer and Diffusion held in Cairo, traveled to the U.S. and Europe to make editorial and publication arrangements for the conference proceedings. In Washington he worked with the BOSTID staff on preliminary editing of the conference papers and met with the AID Office of Energy staff regarding their support of the publication process. He also traveled to the University of California at Los Angeles to meet with Dr. Robert Mah, School of Public Health, to review and edit the papers on bioconversion and pathogen control. In Boston he visited conference participant Dr. Donald Wise, Dynatech, for additional editorial assistance. In London he met with representatives of Elsevier Publishers to explore the possibility that they publish the proceedings. In Frankfurt, Germany, he visited GATE/GTZ, the second largest contributor to the conference, to discuss their partial funding of publication costs. (Note: These activities were undertaken with non-project funding from a grant to NAS/NRC by the AID/Washington Office of Energy in the Bureau for Science and Technology.)

- Investigation and Evaluation of Egyptian Bentonites for Industrial Applications

No report for this period.

- Preparation of Selected Pharmaceutical Chemicals

Essential bench-scale experimentation relating to ten pharmaceutical chemicals is completed. They are:

1. Acetazolamide, a diuretic for treatment of glaucoma
2. Chloroquine, an anti-malarial agent
3. Ethambutol, an anti-bacterial agent used in the treatment of tuberculosis
4. Ethamsylate, used as an anti-hemorrhage substance
5. Furosemide, a diuretic
6. Isoniazid, an anti-tubercular and anti-actinomycotic agent
7. Mebendazole, an anthelmintic for intestinal parasites
8. Naphazoline, a vasoconstrictor and nasal decongestant
9. Sulphamethoxazole, an anti-bacterial substance
10. Trimethoprim, an anti-bacterial substance

Bench-work includes not only the investigation of chemical syntheses but optimization of the steps with careful attention to economic viability, technical feasibility, process safety and minimization of environmental hazards. Based upon these preparatory steps the project team has consulted with persons familiar with scale-up to pilot-plant level and has concluded that the work should proceed to the pilot-plant stage.

(Note: Delivery of kilogram quantities of the chemical intermediates has not been completed. Some of those chemicals are in transit at the port of Alexandria awaiting customs clearance and release to NRC.)

Special acknowledgment should be made to the Arab Company for Drug Industries and Medical Appliances (ACDIMA) and El Nasr Pharmaceutical Chemicals Company for the supply of 32 chemical items needed in the preliminary investigation of ethamsylate,

ethambutol, acetazolamide and ibuprofen. The companies have also agreed to provide the necessary bulk quantity chemicals and special intermediates required for the pilot-plant work for these four end products.

C. Discussion

Summary of Project Status April-June 1985
Applied Science and Technology Research Program

Project	Goals	Status
1. Program Policy, Planning and Management		
1.1 JCC-XV	• Review project status	• JCC-XV held April 1-2, 1985; Summary in Quarterly Report 14
	• Conduct discussion on lessons learned from S&T cooperation	• Airlie House meeting held March 30-31, 1985; Summary in Quarterly Report 14
1.2 JCC-XVI	• Review program; make final recommendations to sponsoring groups	• JCC-XVI scheduled for Cairo, November 26-28, 1985
1.3 S&T Policy	• Complete all activities, Seminar III	• Remaining financial obligations settled and payments completed, Seminar III
	• Review project concept for upgrading technology management in industry	• Project concept discussed at JCC-XV
		• Because S&T Policy element completed for Phase II, no new projects can be funded
1.4 R&D Mgt.	• Preparation of design, mgt. information system for ASRT/NRC	• Steering Committee appointed by ASRT President
	• Conduct long-range R&D mgt. program review for S&T sector and prepare operational plan	• In preparation by ASRT Steering Committee for R&D mgt.
2. Demonstration/R&D Projects		
2.1 More and Better Food	• Review participation of women in MBF poultry & dairy projects	• Working visit to USA of Egyptian scientist (Dr. Zebaa Motagally)
		• Draft reports prepared

	• Review impact of agricultural interventions on nutritional status in Omar Makram/Kafr al Khadra	• Working visit to USA of Egyptian agricultural economist (Dr. Amin Abdou)
	• Continue analysis of all elements MBF project for final report	• Dr. Galal to work with Arizona group in July
		• Dr. El Nockrashy to work with NAS/NRC in Washington August 1985
2.2 Biogas Technology	• Preparation of report, 1984 Biogas Technology Transfer Conference	• Editing and technical review of papers by conference chairman, Dr. El Halwagi
		• Negotiations for publication of conference proceedings
2.3 Tech/Socio Evaluation of Irrigation Systems	• Continuation of field work, 3 sites	• In process
	• Appoint new project principal investigator	• Dr. Abdel Hady Rady, Director, Water Distribution & Irrigation Systems Inst., Min. Irrigation, appointed
	• Arrange visit to Egypt of U.S. specialist	• Preparations made, early August 1985 visit by Dr. James Fitch, Ag. Econ. as consultant for NAS/NRC program
2.4 Bentonite Clays	• Completion of pilot plant activiation activities, El Tebin	• In process
2.5 Pharmaceutical Chemicals	• Bulk chemicals delivered for pilot plant	• In Alexandria awaiting customs clearance
	• Preparation of visit by pilot plant expert, Upjohn Chemicals	• Arrangements completed for mid-August visit, Mr. Fay Cunningham

ANNEX A

TRAVEL FROM EGYPT

April 1 - June 30, 1985

NAME	DATE	PURPOSE	PLACES VISITED
MORE AND BETTER FOOD			
1. Zebaa Motagally Assoc. Prof. Animal Nutrition, NRC	April 24-May 12	Attend conference in Washington; plan strategies to recruit and train women from demonstration villages in improved methods of cottage dairy production and marketing	2nd Conference, Association for Women in Development, Washington, D.C Dept. of Family & Community Medicine, Univ. of Arizona, Tucson
2. Amin Abdou Professor of Agric. Economy, NRC	June 16-July 3	Analyze nutrition data from baseline surveys of demonstration villages; explore influence of socio-economic factors on nutritional status of villagers	Dept. of Family & Community Medicine, Univ. of Arizona, Tucson
APPLICATION OF BIOGAS TECHNOLOGY IN RURAL AREAS OF EGYPT			
3. M. M. El Halwagi* Head, Pilot Plant Laboratory, NRC	May 16-June 18	Editorial and publication arrangements for proceedings of Nov. International Biogas Conference 1984	NAS, Washington, D.C. AID, Washington, D.C. Univ. of California at Los Angeles Dynatech, Boston, Mass. Publishers in London and in Frankfurt, Germany

* Travel expenses provided by AID S&T/EY

TRAVEL TO EGYPT

April 1 - June 30, 1985

NONE

ANNEX B

Design of a Project for Upgrading National and Sectoral Capabilities in Technology Management in the Textile and Food Industries

(Prepared by Dr. Essam Galal, Special Advisor, ASRT)

Technology development in Egypt must aim at an ultimate goal of achieving an active partnership in the global market for scientific and technological generation and trade.

It is evident, however, that the upgrading and extension of the national scientific and technological capabilities and infrastructure in a manner equal to the existing demands of the Egyptian technology market will be a protracted, expensive, and laborious undertaking requiring time, resources, and reorientation.

Even selective technological generation and adaptation will only achieve a significant contribution in the framework of medium term programmes and plans.

Meanwhile, a significant technological contribution to the Egyptian economy can and should be currently realized through a widespread upgrading of the efficiency of technological management capabilities of already functioning institutions and personnel, both at the national and sectoral levels.

Upgrading these capabilities is an obvious necessity for the national application of available resources and investments both economically and socially. The move would also rationalize the competitiveness of the Egyptian market, both nationally and sectorally, on the basis of a more viable balance between short-term attractiveness of rewards and long-term stability, both being equally vital for motivating technology development.

Project Goal

With the increasing dependence of modern development on advancing technology, technology management itself is becoming a decisive function in all development activities. It is almost equally as important for central policy formulating and planning as for sectoral target setting, feasibility studies and implementation scheduling.

In Egypt, there are acute shortages and gaps in technology management capabilities in manpower and infrastructure both at the national and sectoral planning levels. There are a few opportunities or channels for supplying or acquiring the necessary information and training for the large number of organizations and personnel involved. The goals, therefore, of the proposed project are:

- Organize training courses for specialized categories of technology management.
- Tailor courses in the light of surveys of needs, functions and practices.
- Assess and follow-up project evaluations.
- Help design and make ready specialized courses and training units.
- Organize case and unit studies in technology management.
- Motivate further education and training of higher-level experts and educators.
- Motivate and organize international cooperation in the field of Egyptian technology management.

Programme

For the purpose of immediate and medium term Egyptian needs, we propose the following categories of technology management within areas of the project support:

1. Management of Technology Planning
   - National and sectoral development plan interpretation in technology terms
   - Target identification and setting
   - Feasibility assessment
   - Indicators identification
   - Multi-sectoral coordination
   - Follow-up and evaluation

2. Management of Technology Choice
   - Information acquisition, transmission and monitoring
   - Technology assessment in terms of technical, economic, and social parameters
   - Supply and services requirement
   - Marketing
   - Future potential

3. Management of Technology Transfers
   - Prioritization of needs
   - Feasibility studies
   - Planning
   - Financing
   - Progress monitoring, adaptation and assessment
   - Organization and management
   - Follow-up and assessment

4. Management of Technology Development
   - Prioritization of needs
   - Feasibility studies
   - Planning
   - Financing
   - Progress monitoring, adaptation and assessment
   - Organization and management
   - Follow-up and assessment

Surveys

The surveys should be conducted in accordance with assistance from international experts, local experts and sectoral personnel.

The surveys must seek information necessary for an appropriate design of training programs for the related groups and sectors.

Follow-up and Assessment

Yearly seminars for participants from the courses, together with sectoral management and science technology personnel, are envisioned. The seminars would be designed to assess impediments to the application of new management systems and to review the impacts of new methods which have been applied.

Unit Case Studies

Experts of the project (international and national) with graduates of the courses would undertake case studies on the basis of the experience gained from the surveys and other project activities.

Each study would be designed to identify the role, contribution, structures, mode of operation and effectiveness of current practices in technology management in an institution or an industrial process across several institutions.

Duration

- It is proposed to organize one course of each type in 1985. Each course would last from 10-14 days preferably with on-site living arrangements for tutors and students.
- Assessment studies would begin during a second year.
- One case study per year would be undertaken.

Selection of Students

The selection of students/participants is the responsibility of the sectoral and unit managers according to specifications issued by the project experts and advisors.

Publication

All reports are to be published in a limited edition (500) in Arabic with English summaries. Special substantive cumulative reports will be published in full in both languages at the appropriate times.

Host

The Egyptian Academy of Scientific Research and Technology will be the host.

Collaborating institutions are:

- National Research Centre
- Cairo, Alexandria and other regional universities and higher institutes
- Sectoral management and research institutes
- National central research centres in planning administration

International Support

It is intended that existing contacts with the following named organizations will cover the requirement for the tutors and supervisors.

Each course is estimated to require 2-3 foreign experts; each survey one expert; and each case study 1-2 experts.

1. U.S.A.

   - The George Washington University, Washington, D.C.
   - The Technology and Policy Programme, Massachusetts Institute of Technology, Cambridge, Massachusetts
   - The Polytechnic Institute of New York, Brooklyn, New York
   - Other. It is hoped the following organizations will also be available to assist:
     -- Office of Technology Assessment, U.S. Congress, Washington, D.C.
     -- The Sloan School of Management, M.I.T., Cambridge, Massachusetts
     -- The U.S. National Academy of Sciences, Washington, D.C.

2. International

Developing country experts from countries such as India, Korea, Singapore, and Mexico and from international organizations such as the World Bank, UNIDO, and UNCTAD.

Direction

Principal investigator: Prof. E. E. Galal, Advisor on Technology Policy and International Cooperation to the President of the Academy of Scientific Research and Technology, Cairo.

Investigators

1. Two science and technology experts
2. Political science expert
3. Planning and management expert
4. Industrial expert
5. Education and training expert

Temporary Advisors

For 1 - 3 months in specialized sectors, e.g., agriculture, energy, communications, etc.

Research Workers

Two research workers with science, technology, engineering or management specialities will be continuously employed on a rotating basis, as may be required.

Finance

First Year Courses:		
Expenses per course	$25,000	
Total for 4 courses		$100,000
Foreign Experts		
Per expert	$ 3,000	
Total for 8		$ 24,000
Egyptian Experts		
For courses, 5/courses		
For surveys, 3/surveys		
Total 23		$ 12,500
Publication & Secretariat	$ 8,000	$ 8,000
Renumeration		
Investigators, consultants, research workers and assistance		$ 50,000
GRAND TOTAL		$194,500

Principle Investigator
Prof. E. E. Galal