PD-AAZ-480

A.I.D. EVALUATION SUMMARY: PART I

A. REPORTING A.I.D. UNIT:

USAID/EGYPT
ES#: 88-11

B. WAS EVALUATION SCHEDULED CURRENT FY EVALUATION PLAN?

Yes__ Slipped__
Ad hoc x

C. EVALUATION TIMING:

Interim__ Final__
Ex Post__ Other X
(Impact Assessment)

D. ACTIVITY EVALUATED: UNIVERSITY LINKAGES (263-0211)

E. ACTION DECISIONS APPROVED BY THE MISSION DIRECTOR:	OFFICER	COMPLETION DATE
Proceed to design a follow-on activity which incorporates this assessment's recommendations for maximizing impact of future research activities. In particular, the follow-on activity should:	Adel Gohar/ Sid Chambers	12/1989

1. emphasize early and intensive end-user involvement in shaping and funding research;

2. develop a mechanism for insuring effective involvement by U.S. research institutions;

3. insure dissemination of research results by intermediary Ministries to ultimate end-users;

4. incorporate an effective monitoring and feedback system;

5. emphasize private sector involvement;

6. commence with a start-up workshop which includes all parties with a significant role to play in project implementation.

F. CLEARANCE/APPROVAL OF EVALUATION SUMMARY AND ACTION DECISIONS:

Technical Directorate	Program Development and Support Directorate	Deputy Director
A.GOHAR, HRDC/ET for J.WOOD, HRDC/ET W.GELABERT, HRDC/ET	L. ERIKSON, PDS/P C. CROWLEY, OD/PDS/P V. MOLLDREM, AD/PDS/P	C. WEDEN for

Approved: Marshall D. Brown
Marshall D. Brown, DIR

Sept 27, 1989

G. EVALUATION ABSTRACT

The University Linkages Project (ULP) was designed to engage faculty members in Egyptian Universities in applied research relevant to Egyptian development problems, to change the attitudes of academic authorities toward applied research, and to increase the capacity of universities to plan, execute and use applied research by awarding grants for research linkages and capacity building projects. This impact evaluation (4-89) was based on review of previous evaluations and project documents et al, interviews in Egypt and the United States, and on case studies of 18 research activities.

Major Findings and Conclusions:

1. The principal conclusion is that there were enough successful (defined by evaluator as producing useful results) research linkages to justify the project. The monetary benefits to the Egyptian economy from the 18 projects studied yield a rate of return on the total USAID $20.5 million investment in excess of what could be expected from infrastructure projects.
2. There is a high correlation between the overall success of projects and the early and intensive involvement of expected users or beneficiaries. On the other hand, there is little correlation between overall success and the participation of U.S. counterpart investigators.
3. One of the most pervasive sources of weakness in unsuccessful projects -- and of suboptimality in some successful projects -- is the lack of interdisciplinary thinking in design and execution. There is a tendency to focus on technical and physical output maximization criteria alone without any concern for economic (especially), social, or institutional issues.
4. When the ultimate users of research are represented by an intermediary like a government Ministry, as is often the case with Agriculture, the chances for successful widespread application of even the most technically successful research efforts are greatly diminished.
5. Some new respect for, and confidence in the ability of Egyptian university scholars to help solve real problems has demonstrably been created in the community.
6. Attitudinal changes toward applied research within the university community may not be possible until the GOE can expand its budgetary allocation for universities' non-salary budgets substantially.
7. The basic grant awarding structure is sound.

Key Recommendations

1. Preference should continue to be given to projects where the end users are willing to participate in shaping and collaborating in the research process and offering financial support.
2. The FRCU priority committees should ascertain that good prospects exist for using research results (especially in the field of Agriculture) before they approve projects.
3. Approval of research linkages should be conditioned on multi-disciplinary, especially economic, representation on the Priority Committee which reviews project proposals.
4. U.S. counterpart involvement should be rethought to permit, among other things, early involvement at the project design stage.

H. Evaluation Costs

1. Evaluation Team	Contract # OR TDY Person Days	Contract Cost OR TDY Cost (US $)	Source of Funds
Enrique Lerdau Clint Stone		$50,000	Project 263-0211

a'

A.I.D. EVALUATION SUMMARY: PART II

I. SUMMARY OF EVALUATION FINDINGS, CONCLUSIONS, & RECOMMENDATIONS

Background

University Linkages Phase I was begun in 1980 and was to have ended December 31, 1988; however, the life of project was extended to the ten year limit of September, 1990, so that research begun under Phase I could continue. The project was authorized at $27.5 million, of which only $20.5 million was obligated at the time this assessment was undertaken.

The situation in the Egyptian University community in the early 1980's was characterized by a bias toward theoretical research in faculty hiring and tenure decisions, by skill limitations for some types of applied problem solving activities, by inadequate and antiquated research infrastructure, by a tendency for research end-users to rely upon imported technology and expertise, and by few opportunities for Egyptian faculty or graduate students to engage in applied problem solving activities which were relevant to their country's most pressing development problems. The University Linkages project sought to remove these constraints by supporting research and capacity building grants for Egyptian University staff.

Purpose of the Evaluation

The purpose of this evaluation was to assess the impacts and effectiveness of the University Linkage Project (ULP 1) in order to determine whether a follow-on activity is desirable and also to suggest changes which should be considered in designing a possible follow-on activity.

Sample Selection Criteria

The evaluation team based their conclusions on case studies of 18 agriculture, energy, and industry (3 maxi and 15 mini) research linkages. These projects accounted for 1/3 of the available ULP funds on a budget basis. The sample was not randomly drawn. The FRCU and the Assessment Team made independent lists of possible projects. The FRCU was instructed to identify especially successful and unsuccessful projects. The assessment team chose possible projects on the basis of their interest in the subject matter and availability of data in English. The final sample combined projects from both evaluation team and FRCU lists.

Recommendations Regarding a Follow-on Activity

The team concluded that there were enough linkages with useful results to justify USAID/C's $20.5 million expenditure. ULP I's capacity building and attitude changing objectives were not explicitly addressed in the evaluation nor, it would appear, factored into this recommendation, because of time and resource constraints.

Rough benefit estimates were presented for four of the research linkages. According to the team, benefits from only one of these four projects is sufficient to yield a rate of return in excess of what could be expected from infrastructure projects. (+ or - 30%. Since there is no explanation of assumptions/methodology it is unclear whether this IRR is over and above the rate of inflation.) There are likely other successes among the remaining linkages which would further enhance the IRR.

Summary of Project Benefits

#	Project	$ Benefits
83202	Iron and Steel Computerized Process Controls	$6.8 million annually
84214	Aluminum Reduction Cells	$1 million annually
830603	Welding Transformers	$100,000 annually
830210	Energy Conservation in Egyptian Oil Refineries	$400,000 annually

Project Success Rating

Of the 18 successful and unsuccessful projects studied, 4 were rated outstanding by the assessment team, 6 were rated reasonable, 2 were rated reasonable but of dubious application, and 6 were rated inapplicable. (See Table 1 attached for breakdown of research projects by success rating). Three of the outstanding projects were from the industry sector and one was from the energy sector.

Characteristics of Successful Projects

o In each of the successful cases cited immediately above, the top management of the public enterprise involved not only approved the project, but put the engineering staff of the firm to work collaboratively with the academic investigators. When the main potential user was uninvolved or skeptical from the beginning, the project tended to peter out inconclusively with little prospect of application.

o All of the successful cases examined occurred with the participation of public enterprises, not Ministries. The assessment team feels that Ministries could play a far more active role in future in shaping and using research results in future.

o In agriculture, for example, where the ultimate users are, of necessity, represented by a Ministry, technical success and successful widespread application do not necessarily go hand in hand. Unless successful results are disseminated to farmers by extension agents, the successes may remain those of the experiment station.

o There should be some assurance before project approval that good prospects exist for actually using research results. For example, "if the Extension and Research Services have no programs of their own for Crop X, and no firm plans to establish them, this may be presumptive evidence against approving a mini-linkage research project on how to increase yields of Crop X."

o Traditional structures and modes of behavior, especially lack of interdisciplinary thinking in project design and execution, are a pervasive cause of weakness in linkage projects. The absence of an economic dimension impoverishes many projects as does inattention to rural sociology, land tenure, farmer behavior issues. Interdepartmental barriers and mono-disciplinary approaches are pervasive throughout the Egyptian university community.

o Linkages have not evolved between Egyptian and US universities in any significant way. Instead linkages have evolved between individual US counterpart scholars and Egyptian principal researchers. There is little visible correlation between success ratings of projects and participation of the US counterpart scholar; however some of the most important contributions made by US counterparts have been in the area of project design. Arrangements should be made to allow some preliminary participation by US counterparts before project approval.

J. MISSION COMMENTS:

On balance, this impact evaluation should prove very useful to the Mission, especially if a follow-on activity is designed. The assessment's emphasis on changes which could maximize impact of future research linkages was well justified on the basis of time and resource constraints; but questions about the impact and effectiveness of capacity building grants, and the utility of certain classes of linkages, (economic policy, for example), remain unanswered. These and other comments about the report's utility are elaborated on below.

The assessment provides a clear prescription for maximizing the impact of ULP research activities in future: preference should be given to research activities where end-users are willing to participate in shaping the research and, to the extent possible, in financing it. In areas like health and agriculture where public domain end users are represented by an intermediary Ministry, the chances for successful application of results can be maximized by giving preference to research activities which are consistent with the Ministries' existing outreach or extension programs.

The evaluation team's use of a sample which included only successful and unsuccessful projects was an economical means of distilling some generalizeable premises about ULP linkages from a large amount of data in a relatively short time. However this approach shed little light on the "typical" research linkage project, or on factors contributing to success or failure in nine priority research areas other than agriculture, industry, or energy. Successful application of economic policy studies supported under ULP I, for example, may be conditioned on an entirely different set of premises. The assessment gives us no guidance on whether priority areas other than those studied should be emphasized or de-emphasized in a follow-on activity.

Because of time and resource constraints the team decided not to address the impact and effectiveness of 82 capacity building grants in raising the applied research capabilities of Egyptian Universities. Some guidance on the utility of past capacity building efforts and ways of strengthening their impact in a follow-on activity would have been welcome.

Internal Rate of Return Calculations

The team asserts that the rate of return to the Egyptian economy from only one of the projects (computerized process control in the Iron and Steel industry) would yield a handsome 30% return to the Egyptian economy on the whole ULP program because there are virtually no offsetting costs. IRR calculations were not the main thrust of this assessment, but we note that in the absence of any discussion of methodology or assumptions this assertion cannot be verified. Using limited data available in the report, Mission staff economists have demonstrated that calculated returns can change radically (from 6% to 30%) depending on the assumptions made about the time streams for costs and returns.

Implications for Sustainability

Sustainability was not addressed outright by the evaluation team, but there are some conclusions which bear on this issue. A condition existing in the early 1980's which the ULP project sought to address was a tendency for potential research users to rely almost exclusively on imported technology and

expertise. The team has identified important satisfied ULP research end users who have a "certain amount of new respect for, and confidence in the capacity of the (Egyptian) university scholars to help solve real problems." This is encouraging. To the extent that ULP I has been successful in creating both supply of and demand for Egyptian scholars who are willing and able to provide solutions to Egyptian development problems, it has provided some foundation for a potentially sustainable system which can be elaborated on in a follow-on activity.

Doc. ULPPES, 9/21/89)
Drafter: Lottie Erikson- Disk Lottie Evaluation

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63251

THE UNIVERSITY LINKAGE PROJECT (ULP): IMPACT ASSESSMENT

by

ENRIQUE LERDAU

with the assistance of

CLINT STONE

(Consultants)

April 30, 1989

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PREFACE

This Impact Assessment was commissioned by the AID Mission in Cairo, Egypt. It was carried out in Cairo and Washington between 15 February and 30 April 1989.

The author owes very special thanks to Prof. Dr. M. M. El-Kotb, Executive Director of the Foreign Relations Committee of Universities (FRCU), which administers the ULP. His unceasing patience and willingness to provide information, explanations, documentation and logistic support were vital elements in enabling the Assessment Team to obtain an overall view of the rather complex ULP in the limited time available.

The cooperation of the Priority Committees, Researchers and Users, all of whom gave generously of their time, knowledge and opinions, is also gratefully acknowledged. They are too numerous to list individually, but without their cooperation the work would have been far more difficult and far less rewarding.

Thanks are also due to Dr. S. H. Hassanein, Secretary General of the Supreme Council of Universities, for his courtesy and support.

The help of Dr. Clint Stone was extraordinarily valuable.

Messrs. William Gelabert, Jerry Wood, Adel Gohar, Sherif Arif and Miss Lotti Erickson of the AID Mission provided helpful comments during the discussion of the work-plan, and, subsequently, of a partial first draft of this Assessment. None of them, however, is responsible for any of the errors of fact or interpretation that may have crept into the Assessment. These, as well as the opinions expressed, are the author's alone.

Enrique Lerdau

Date:

EXECUTIVE SUMMARY

1. The ULP was initiated with several objectives, which were not always well differentiated. The principal ones were:

   (a) To bring to bear on Egypt's development problems the largely untapped talents of its academic scholars, by providing them with resources for applied research;

   (b) To change the attitudes of the academic authorities towards applied research, which was allegedly undervalued vis a vis conceptual or abstract inquiry;

   (c) To increase the capacity of universities to plan, execute and use applied research.

2. It is the first of these objectives that is the principal subject matter of this Assessment. The second is considered somewhat beside the point as long as the Government's budget allocation to the universities leaves only quite negligible amounts for any kind of research. And the third is viewed as primarily a by-product of the first; capacity will rise as research is carried out, not vice versa. Failures as well as successes will provide capacity-building lessons.

3. The ULP has financed 365 individual Research Projects -- called Linkages in ULP parlance -- and consequently only a small sample could be reviewed for this Assessment. The 18 Projects reviewed account for one third of the total available ULP funds on a budget basis and for just under one quarter on an actual expenditure basis.[1] They are restricted to the three sectors -- Agriculture, Industry and Energy -- that account for 62 per cent of all projects. While the sample is not a purely random one, the selection was such as to guard against obvious biases and it is considered that the findings are significant enough to warrant some general conclusions about the ULP program as a whole.

---

[1] The reason why 5 per cent of the projects account for such a large share of project funds is that the sample includes 3 of the 6 Maxi-Linkages which, in turn, were meant to absorb almost one half of the total funds. These are relatively large (US $ 500,000 per year for at least 3 years) projects, financing a sizable number of inter-related activities. The largest number of Projects, on the other hand, the Mini-Linkages, have budget ceilings of US $ 50,000 per year for up to 3 years (extendable by one year).

4. The principal overall conclusion of the Assessment is that there are enough successful projects to consider the ULP as a whole justified. Even in the small number of projects included in the sample, a few were found whose benefits to the Egyptian economy seem large enough to yield a rate of return on the total AID investment in ULP well in excess of what can be expected from infrastructure investments.

5. At the same time, however, there are clear pointers in the experience of the past, on how to improve the program so as to reduce further the ratio of failures to successes.

6. One such pointer is the high correlation between the overall success of projects and the early and intensive involvement in them of the expected users or beneficiaries. (See Table 1.)

7. When "users" are, in fact, intermediaries between the researchers and the ultimate beneficiaries -- e.g., the Ministry of Agriculture for most agronomic research -- the eventual usefulness of even good research is especially precarious unless special measures are taken to safeguard it from the beginning. It is recommended that research proposals be rejected unless they explicitly and convincingly address this issue.

8. One of the most pervasive sources of weakness in the unsuccessful projects -- and of sub-optimality even in some successful ones -- is the lack of interdisciplinary thinking in their design and execution.

9. The most important illustration of this is the almost complete lack of concern with costs and benefits issues in research that is, nevertheless, often supposed to lead to practical recommendations regarding technological choices in major productive activities. At times the recommendations derived from some physical output maximizing criteria are merely suspect, at others they are demonstrably wrong. It is significant that in most of the most successful projects this issue did not arise because either cost savings and output enhancement went hand in hand or because investment and subsequent recurrent costs were clearly minuscule vis a vis expected benefits; but (a) these are exceptional circumstances, and (b) they are fortuitous. Other disciplines -- e.g., rural sociology, land reclamation, farm labor economics -- would also have enriched particular projects.

10. It is recommended that the Priority Committee which review project proposals, approve them and monitor their execution, be broadened so as to include some representatives of such other disciplines -- economics especially -- as may be relevant. It would be the function of these new members to ensure that projects are only approved when relevant major questions of this type are addressed in the proposal. Any extension of the ULP (or any Phase II) should be made conditional on such a broadening of the Priority Committees.

11. The ULP was meant to strengthen the Egyptian capacity to do applied research through the creation of institutional linkages between Egyptian and US universities. This has not happened in a significant way, at least in part because Egyptian universities are rather rigidly compartmentalized, with each "Faculty" (Department) maintaining a strong corporate personality (intellectual and administrative) of its own.

12. Instead, linkages have tended to evolve between the Egyptian Principal Investigators and individual US Counterpart Scholars. The role of the latter has been variable, ranging from highly productive to negligible. There actually is little visible correlation between the success ratings of the reviewed Projects and the role of the US Counterparts (see again Table 1). Since the selection process seems to have been somewhat haphazard, it is recommended that the Principal Investigators be obliged to justify their choice of US Counterparts in writing to the Priority Committees as part of their Project Proposals. It is also recommended that arrangements be made that would allow some preliminary participation to the Counterparts before Project approval. It is in project design that some of the most important contributions have been made.

13. The reporting system is not structured so as to achieve best results. On the one hand the requirement that Quarterly Progress Reports of research activities and results be issued is both onerous and useless; on the other hand, the Final Reports often fail to be comprehensive overall descriptions and evaluations of the Project as a whole. This greatly diminishes the potential impact of many good projects. It is recommended that Progress Reports be required at the most twice a year but that guidelines be issued regarding the minimum contents of Final Reports. It is also recommended that the English version of Final Reports be professionally edited under the responsibility of the ULP Administration.

14. The number of projects is too large to permit adequate oversight by the Priority Committees. At the same time, inflation has greatly eroded the purchasing power of the ceilings per project that were set in 1981. At times quite minor but essential project activities cannot be undertaken because of budget constraints. Both considerations lead to the same conclusion: there should be fewer and somewhat larger projects. It is recommended that the original ceilings be not only restored in real terms but be raised by 30-50 per cent more.

15. It is also recommended that the Administration of ULP be enjoined not only from legal but also from actual over-commitments of funds. It should be instructed to consider the full project budgets -- not only the first year's budgets (which alone are legal commitments) -- as financial liabilities; the total amount of liabilities so defined should never be allowed to exceed total ULP funds (AID, Government and users' contributions). This -- besides being prudent financial management -- will avoid the need to cancel projects on grounds other than poor

performance and will also help to keep down the total number of projects.

16. The ULP Administration is to be commended for the austerity with which the Program is managed, but may have gone a little too far in this direction. In particular, the emolument structure needs to be updated. At present the honoraria of the Follow-up Committee members and of Priority Committee members are little more than tips, and are so perceived. This is detrimental to the adequate discharge of the oversight function by these committees. The "incentive" pay of Principal Investigators should also be reviewed and its 1981 purchasing power should, as a minimum, be restored.

17. The basic Grant Awarding Structure of ULP is sound. The peer review process, while far from perfect, should be protected; it is far better than any imaginable alternative. In particular, neither AID nor the Government should try to play a greater role in the approval or administration of individual projects, nor should the Administrators of the Universities -- as distinct from the Professorate -- be given such a role. All of the above have a role to play in laying down broad policy guidance -- e.g., definition of major priority sectors, rules regarding inter-university cooperation, etc. -- but not in interfering with, or superseding, peer review.

18. The current ULP Administration policy of giving preference to projects in which the users are willing to participate financially -- and to seek such participation actively -- is excellent and should be encouraged. It provides a valuable market test of likely usefulness. Care should only be taken that it does not become the sole test of acceptability; otherwise, given the budgetary restraints on Ministries, it could introduce distorting signals. But the principle of user participation is sound; one of the most gratifying results of the ULP to date is that a number of users have already become convinced that academic scholars can help them solve practical problems and are willing to back this conviction with their own funds. This may be the main attitudinal change the ULP has produced, rather than the expected change in the attitudes of the academic authorities. It seems worth nurturing.

Table 1 SAMPLE OF CASE STUDIES: SELECTED DATA AND EVALUATION SUMMARY

Projects	Expenditures (over $000)	US counterpart affiliation	PROJECT SUCCESS RATING[4]: Outstanding	Reasonable or good potential	Reasonable but doubts about application	Unsuccessful or inapplicable	USER INVOLVEMENT RATING[3]	ROLE OF U.S. COUNTERPART RATING[4]: Major	Useful	Marginal
Maxi-Linkages										
842080 Sugar Beets	646.7	U.Cal (Berk)		x			A			x
842082 Nurs. Fruit Trs.	1800.0[1]	Clemson		x			A	x		
842083 Desert Develp.	668.7	AUC		x			A	x		
Sub-total	3113.4			3				2		1
Mini-Linkages and Capacity Improving Linkages										
Agriculture										
81001 Lentils	205.7	Wash. St. U.			x		I		x	
81005 Bananas	139.6	U. Hawaii		x			A		x	
81019 Figs	150.0[1]	U.Cal (Davis)		x			A		x	
842003 Dairy Products	63.7	Cornell			x		I			x
842100 1st Yr. Courses[2]	22.8	Boston U.		x			A	x		
Sub-total	581.8			3	2			1	3	1
Industry										
81017 Alumina	83.2	Carneg-Mellon				x	I		x	
81019 Productivity	71.6	Va. Polytech.				x	A			x
82020 Iron & Steel	128.7	Case West.Res.	x				A	x		
84214 Aluminum Cells	148.5	U.Cal (Berk)	x				A		x	
830603 Welding Transf.	123.8	Clarkson Tech.	x				A		x	
842016 Textiles	148.5	Case West.Res.				x	I		x	
Sub-total	704.3		3			3		1	4	1
Energy										
81013 Hydro-Struct.	89.3	Cath. U. (DC)				x	I			x
830201 Refinery	81.0	Brig.Young U	x				A			x
830212 Fuel Transp.	74.6	U. Mich.				x	I			x
830217 Solar Ponds	143.1	N.Mex. St. U				x	I		x	
Sub-total	388.0		1			3			1	3
TOTAL	4787.5		4	6	2	6		4	8	6

1 - Estimate 2 - Capacity building 3 - A = Adequate; I = Inadequate 4 - By Assessment Team, See Chapter II

CHAPTER I GENERAL FINDINGS

Introduction

The ULP is an imaginative attempt to use foreign assistance grant funds to support the strengthening of applied research by Egyptian scholars through the establishment of a grant-awarding structure covering all Egyptian universities, and through the establishment of university to university relations between Egyptian and U.S. institutions.

In its initial (1981) and subsequent presentations, several major themes appeared among the central objectives of the Program, and in an assessment of the degree to which the Program achieved its objectives, it is important to distinguish between them. Not all of them are equally susceptible to verification, nor may all of them today carry the same weight as they did nine years ago when the Program was launched.

The central proposition underlying the Program was that there is a sizable reservoir of skills, talent and know-how in the Egyptian academic community, which is not tapped to contribute to the solution of Egypt's development problems, and that the reasons for this are largely institutional and historical-cultural. By this was meant that empirical or applied research was not sufficiently prized and rewarded as compared with more abstract and conceptual work, that esteem and rewards (promotions, awards, etc.) went predominantly to those who did the latter, and that this created a distorted set of signals and incentives to academics as to what types of work to devote themselves to.

The realism of this central proposition is not examined or questioned in this Assessment. But an observation is in order regarding its relevance. It can well be argued that until the government's annual budgetary allocation to the universities is of quite a different order of magnitude from what it is now, the possibility of devoting more resources to applied research will not exist, regardless of how much or how little such work is valued. At Cairo University, the funds available for research -- excluding foreign assistance -- in 1989 amount to LE 50.- (US $ 20.-) per professorial rank faculty member. And in the Faculty of Agriculture at Fayoum, the total non-salary budget (again excluding foreign grants) is LE 140,000, of which LE 30,000 (US $12,000) is allocated to research. In a U.S. university this would barely suffice to finance a single graduate student, or the computer time of a moderately active researcher; granting that the purchasing power of this sum in Egypt is a multiple -- for manpower -- of its U.S. equivalent, it is still a totally negligible amount and may make speculations about attitudinal factors that keep down the amount of applied research somewhat beside the point.

Be that as it may, from the above-mentioned central proposition, several consequences were derived as far as ULP is concerned. On the one hand, it was thought that by putting up, over a number of years, fairly substantial

funds which would only be available to those doing applied research, the attitude of the academic community itself might change and the Egyptian universities, as institutions might become motivated to foster, stimulate and support such work themselves.

On the other hand, it was thought that the research work itself might pay sizable dividends to Egypt by helping to solve important social and economic development problems. In short, it would justify itself by its usefulness.

Finally, and related to the first objective, it was thought that not only the willingness of the academic establishment to generate applied work, but also -- especially in the case of the smaller and less developed universities -- the capacity to do so might have to be built up, and some ULP money was explicitly destined to this end.

It should be noted that at the time at which the project was framed, no usable tests or criteria were fixed by which the achievement of any of these objectives could be assessed objectively ex post. This is not a unique situation, but it is particularly comprehensible when issues like attitudinal changes (with no knowledge of how much time might be required to bring them about), "usefulness" and "capacity to generate" (which are hardly quantifiable anyway) are involved. The Assessment, therefore, cannot dispense with subjective judgments.

Method

In view of the above-mentioned doubts about the immediate relevance of the attitudinal issues, and in the absence of any baseline data on them and on the capacity issues, the Assessment concentrates on the "usefulness" objectives and only comments in passing on the others. This is in part a decision based on the considerations mentioned, but there is also a further reason for it. It is difficult to imagine that the desired attitudinal changes could occur if the work itself did not prove to be useful in a significant number of cases. For one thing, the most important reason for changing the attitudes of the academic establishment in the desired direction would not, in any event, be the transitory presence of foreign financial assistance -- which could at best have a seminal effect -- but the existence of important satisfied users in the community, be these government, universities, public or private enterprises or others. It is these, if they make their satisfaction known, who may show that there is a demand for such work and that rewards -- financial as well as honorific -- can be attached to it.

The approach used in the Assessment thus was to derive as much information as was possible under the given time, manpower and data limitations from a sample of research projects financed by ULP. There are 365 such projects; the sample consisted of 18. This, however, is not as small as it looks; viewed in terms of ULP funds, the following calculations

are relevant:

	Budget Basis (Average)	Expenditure Basis (Actual)
	(US $)	
3 Maxi-Linkages (500,000 per yr, 3 yrs.)	4,500,000	3,113,400
15 Mini-Linkages[1] (50,000 per yr, 3 yrs.)	2,250,000	1,674,100
TOTAL	6,750,000	4,787,500

Since the total AID investment in the Program amounts to US $20.5 million,[2] the sample covers between one fourth and one third of the AID resources devoted to it.

The sample was not a random one. Both FRCU (the Project Administration) and the Assessment Team made preliminary lists of plausible projects; the former on the basis of inherent interest in the subject matter and of data availability (especially of how much of the project file material was in English) and the latter -- at the Assessment Team's request -- on the basis of FRCU's judgments of especially successful (List A) and unsuccessful (List B) projects.

Both the Assessment Team's and FRCU's initial lists were, deliberately, much longer than could be managed; the final list includes mostly projects from the Assessment Team's list, but about one half were also on one or the other of the FRCU's lists. So as to be able to gain some insights into intra-sectoral issues, it was decided to concentrate only on the three largest sectors: agriculture, industry and energy. Together these sectors account for about 62 percent of the ULP projects.

For each research project studied, after reviewing the reports and the English language part of the document file, interviews were held with the sectoral Priority Committee,[3] the Principal Investigator (P.I.) and, where

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1 Includes one Capacity-Building Linkage.

2 Reduced from the initial US $27 million.

3 The Grant Awards Structure functions through a series of Sectoral Priority Committees, staffed by academic experts in the field as well as by official authority representatives where relevant. For Mini-Linkages a sub-committee of two, called the Follow-up Committee, usually reviews project proposals and reports to the

identifiable, the User(s). It was thus attempted to gain a picture not only of the outcome, but also of the original intention: of what work was supposed to be done; what problems it was to address, why; how it was to be used; what the expected users' involvement had been; how he (they) viewed the process ex post; whether they would in future themselves contribute to such projects if needed, etc. Interviews with a few US counterparts were also held.

In the process of this work it became clear that the concept of "applied" research was more complex than perhaps had been thought by the originators of the project. Broadly, two rather different meanings can be distinguished:

(a) Research designed directly to solve particular practical problems; and

(b) Establishing the empirical, factual basis for a particular set of issues (as distinct from conceptual, abstract theorizing). The establishment of such facts may be vital for solving many practical problems, but this may have to be done by people from other disciplines and thus would not be the direct concern of the researcher. Dam builders may need hydro-flow data built up over several years or even decades; fiscal economists may need consumer expenditure data; public health programmers may need epidemiological data, or data on food processing practices, etc. All these data gathering activities may require sufficiently complex scientific and technical decisions so as to constitute research.

The distinction is an important one because it forced the Assessment Team to broaden its original definition of "usefulness" which was essentially that of category (a). Among the projects studied, there were several in the second category and the fact that such research projects may not include proposals for immediate application, does not automatically exclude them from being either "applied" research or -- potentially -- "useful" research. If, however, there is little or no apparent chance of those who could use it being actually interested in doing so, such research would not seem to fall within what could reasonably be called successful in the ULP framework under the "usefulness" criterion.

A further point to note is that much initial time was spent setting up the Grant Awarding Structure. While this Assessment discusses certain features of this structure and makes some specific recommendations, these emerged as by-products of the work, rather than being its main area of concentration. While many of the interviews touched on procedural aspects considered important by P.I.'s or Committee members, the Assessment was not, initially, concerned with administrative processes, but with results. However, it was found that the two sometimes cannot be kept apart and that,

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Committee. They also follow the Progress Reports and advise the Committee on actions needed, including disbursements (quarterly). For Maxi-Linkages the follow-up process is more demanding.

although neither the finances nor the Administration of the ULP are the main concern of the Assessment, substantive matters in some respects depend on organizational and administrative arrangements. In such cases, some changes are recommended.

The Assessment was not able to make an authoritative judgment on the origin and full impact of what clearly was a serious problem in the life of the Program: the approximately 2 1/2 years interruption in the funding (1985-1987). But while it undoubtedly made life very difficult for FRCU and many P.I.'s, and while some projects aborted because of it, it is not likely to have altered greatly the questions of content, design and application of research with which the Assessment is primarily concerned.

Conclusions

1. There are enough successful projects under the "usefulness" criterion to consider the Program as a whole justified.

This conclusion is based on the assumption that all research is a risk taking activity and that thus a certain rate of failure must be expected. What a tolerable failure rate is depends on circumstances and on the objective function of those who finance such research, but in any event, a plausible case can be made for the proposition that the benefits to the Egyptian economy of the most successful projects in the sample for which benefits can be roughly quantified,[4] are large enough to yield a very decent return on the whole US $20.5 million AID investment. Since they are only a sample, i.e., since it must be presumed that there are some other, similar successes among the projects not studied, the economic rate of return on the investment is likely to be quite high.

2. This said, it must be added that there are certain characteristics of the success stories, and other characteristics of the failure stories, that, while not universal, seem pervasive enough to make failure -- if not success -- rather predictable for some types of projects. It would thus seem possible to increase the success rate in future by being more cautious about approving projects with the "failure characteristics."

3. Many of the projects that have yielded or are in the process of yielding -- the clearest and largest benefits are those with which a single direct user has been intimately associated from the inception of the project.

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4 See Chapter II. Conservative estimates of the Iron and Steel Project's benefit stream are US $6.8 million per year. In addition, the Aluminum Cell Project may yield at least $1 million annually, the Transformer Project (including market growth) $100,000 and the Refinery Project at least $400,000 and possibly much more. Together these yield a far better return on the $20.5 million AID investment than any investment in infrastructure.

This includes such industrial projects as the aluminum cells improvement, the iron and steel computerized process controls, and the transformer improvement project, and, in the energy sector, the oil refinery efficiency improvement project. In agriculture it includes the (Maxi-Linkage) sugar beet project. In each of these cases the top management of the public enterprise involved not only approved the project, but put the engineering staff of the firm to work collaboratively with the academic investigators.

4. On the other hand, projects in which the main potential user was either uninvolved or was informed but skeptical from the beginning (e.g., the aluminum oxide project and some of the energy projects), tended to peter out inconclusively and with little prospect of eventual practical results.

5. When the de jure "users" are not direct ultimate users, but rather are, de facto intermediaries, such as a government Ministry, the chances of success are also more precarious, although they exist.

In part, this is the result of hierarchical structures which make it somewhat haphazard whether the most relevant section or department will actually represent the Ministry. Sometimes it does, as in the case of the sugar beets and the banana project. But often, even if it does, the representative will still be an administrator, removed from the field use of the project results.

6. The above conclusion does not mean that all projects in this category are failures. But in agriculture, for example, where the ultimate users are necessarily represented by an intermediary -- the Ministry of Agriculture -- success at the technical level and successful widespread application do not necessarily go hand in hand. Agronomic experiments may lead to knowledge of better cultivation and irrigation practices, better seeds may be developed, etc. but unless such experimental results are taken over by both the extension service to spread them and by the Ministry's own research institutions -- to improve them in response to actual farm experiences -- the "successes" may remain those of the experiment stations.

It is thus up to both the proponent of research projects -- the P.I.'s -- and the sponsors and approvers -- the FRCU's Priority Committees -- to assure themselves before project approval that good prospects exist that research results will actually be used, and to reject proposals that do not offer convincing evidence of such prospects. While no binding commitments or 100% certainty can be expected, more than expressions of interest at the Ministerial level, or findings that "Crop X is important to the economy" should be demanded. Thus, if the Extension and Research Services have no programs of their own for Crop X, and no firm plans to establish them, this may be presumptive evidence against approving a Mini-Linkage research project on how to increase yields of Crop X.

7. Aside from lack of user involvement, one of the most pervasive

causes of weakness in the unsuccessful projects is the lack of interdisciplinary thinking in their design and execution.

This is a serious issue; even some of the successful projects could have been better still had they not been so totally concerned with technical (engineering or agronomic) issues, but had also concerned themselves, for example, with cost/benefit issues, with institutional issues and with social issues.

8. The absence of any serious economic analysis in projects ostensibly designed to advise firms or farmers on what improvements to adopt often undermines the credibility of the recommendations.

Whether it is agricultural research projects, which on the basis of controlled experiments, reach conclusions about optimum input mixes -- i.e., those leading to maximum output -- without concern about the marginal cost/marginal revenue relation for any of the inputs, or whether it is industrial or energy projects in which production techniques are found to be optimal -- i.e., because they are output maximizing, or energy use minimizing, or by some other physical criterion -- without concern for the cost/benefit of the required investment and current costs involved, the conclusions so reached must usually be suspect. It should be noted that in the most successful energy and industry projects cited above, these issues tended not to arise because either output increases and cost savings went hand in hand (e.g., the oil refinery) or because the investment and the subsequent recurrent costs required were clearly minuscule vis a vis the expected benefits (e.g., the computerized process control in the steel industry). And in the sugar beets project -- which stands out as a major exception in this -- economic analysis is explicitly included in the project design.

9. The absence of economic analysis is not the only one that impoverishes many projects. Other disciplines are lacking as well, sometimes with serious results.

Thus, some concern with rural sociology, land tenure and the behavior of farm labor would enrich some of the agricultural research and possibly throw light on the practicality of certain conclusions regarding desirable irrigation or cultivation practices, including forms of mechanization.

10. The lack of interdisciplinary thinking in the design of projects is only one aspect of the rather traditional structures and modes of behavior in the universities.

Administrators and part of the teaching and research staff seem to consider themselves primarily as part of their "Faculties" (Departments) and only in a more abstract, less operational sense as a part of a university-wide community of scholars with the common purpose of adding to knowledge and providing education. This often leads to viewing other faculties largely as competing claimants for resources rather than as colleagues in a common

enterprise.

This attitude is by no means universal; some of the Committee members and researchers interviewed were very conscious of the limitations which the mono-disciplinary approach imposed and would like to see a lowering of the inter-departmental barriers. But their general attitude was one of pessimism in this respect. It is noteworthy that the only instance of a genuine solution to the problem that the Assessment found was the existence of Agricultural Economics Departments within the Faculties of Agriculture, which explains why an economic dimension could be incorporated into the sugar beet project run by one such Faculty (Fayoum).

11. Nevertheless, this is an area in which ULP can and should make a contribution.

It is not up to the Impact Assessment to define precisely the most appropriate measures and institutional arrangements that could be taken to bring about an improvement. These matters have to be settled primarily within the university system. But it would seem reasonable to expect that a beginning be made by broadening the representation on the Priority Committees. There is no good substantive reason why, for example, the Industry and Energy Committees are almost exclusively composed of engineers and do not include some economists. And these should be there not to defend the interests of their Department -- i.e., to press for more funds going for purely economic research projects -- but to help improve the quality of the industrial, agricultural, energy, etc., research by insisting that, when appropriate, the individual research teams address the economic aspects of their work with the help of qualified economists (as team members, consultants or in any other suitable form of association).

12. A similar comment applies to agriculture, except here it is not engineers but specialists in agricultural sciences who dominate the Committee. By extension, it seems a reasonable inference that the required inter-disciplinary composition is also lacking on the other nine sectoral Priority Committees.

13. The ULP has not, in the main, worked out as producing university to university relations, but rather as relating individual Egyptian and U.S. scholars, or -- in the areas of some Maxi-Linkages -- Departments.

There are probably numerous reasons for this, but it appears that among them the most important may be the high degree of autarchy of the various Faculties in Egyptian universities, to which reference was already made. To get the benefit of the scholarly community of a U.S. university, used to a cooperative inter-disciplinary pursuit of knowledge as part of their everyday activities, Egyptian universities would have to be open to such inter-

departmental work themselves.[5]

14. Until that happens, the present modus operandi is not a bad one. Some of the U.S. counterpart scholars have made important contributions to the projects with which they are associated.

While they may not have brought to bear the full available intellectual resources of their universities on the projects, many were capable and well respected scholars whose help is greatly appreciated. At the same time, the Assessment has not encountered any instance in which there was any appearance of the U.S. scholar taking an unduly leading position.

15. Nevertheless, the role of the U.S. counterpart needs to be rethought on several grounds.

In a number of instances, the reason for his or her selection was not obvious. In others it was clearly fortuitous . . . based on chance acquaintances at international conferences, on personal friendships, on a former student/teacher relation, etc. In one case, a former P.I., upon moving to the U.S., immediately became the U.S. counterpart to his own project. While no systematic association could be found between the mode of selection of the counterpart and his apparent success, it would still seem more appropriate to make greater efforts to ensure that only very well qualified people be chosen. The present system seems to leave the choice to the P.I. That is not wrong, provided he presents an adequate justification to his Priority Committee, preferably before his project is approved.

16. The tasks of the U.S. counterpart seem to be viewed very flexibly.

The most common responses from P.I.'s to queries regarding the counterpart's contribution was literature searches, advice and help in procuring equipment and arranging visits (to plants, universities, etc.) in the U.S. for members of the Research Team. In only a minority of cases was direct scientific advice mentioned as particularly important and the visits of the U.S. counterparts typically were few and short. The files contain a few bits of correspondence with them; occasionally there are comments on Progress Reports, but only a small number of these seems very searching. Some of the most valuable contributions were found in the exceptional cases in which the counterparts had an opportunity to help with project design; it is recommended that arrangements be made to facilitate the generalization of this experience. (The present set-up of choice of counterpart after project approval is biased against having his help with project design.)

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5 A U.S. counterpart has observed that U.S. university departments are no more integrated -- or less parochial -- than Egyptian ones. If this is accurate, it makes the university to university linkage goal —as distinct from the scholar to scholar one -- even more chimerical.

17. The Maxi-Linkages deserve some renewed attention. There are some questions regarding the circumstances in which it might have been better to have financed the same, or very similar, activities through a series of simultaneous Mini-Linkages.

A Maxi-Linkage requires far more managerial and organizational input than a Mini-Linkage, possibly disproportionately more. This is a cost; the question is what benefits may make it worth paying this cost.

There may be scale economies; thus in the fruit-tree seedlings nursery project, which deals with several fruit, a common nursery, common facilities and common external advice (by subject matter -- pomology, entomology, etc. -- rather than by fruit) the case seems clear. The gain in economy and efficiency thus achieved would seem to be so great as to make separate Mini-Linkages, one for each fruit, seem a very poor alternative.

There also, however, are questions of interdependence of activities. The case for paying the cost of the great managerial burden -- and the inefficiencies ensuing from it -- seems weakest when various activities are being financed that have little or no common research objective and in which the success of one does not depend, importantly, on the success of the other(s). The desert development project, in which there is no self-evident common thread -- except the desert -- between its two main sub-programs, agriculture and energy, may be in this category.

Finally, there is the question of capability. In the case of a Mini-Linkage it should not be too difficult for a Priority Committee to judge, during the approval process, whether the expertise and experience of the Principal Investigator is adequate to the task.

This may be far more difficult in the case of the Maxi-Linkages, not only because far more people are involved, but also because few, if any, are likely to have ever been involved in projects of even roughly similar magnitude.[6] Thus, to approve the project, requires a far greater act of faith, and in some cases the judgment probably should be made -- but rarely can be made -- that the Research Team may not be ready to handle such an ambitious and complex task. In such cases, at least it may have to be explored whether a smaller, Mini-Linkages could accomplish part of the objective.

18. The reporting system is not structured so as to achieve best results.

There are two inter-related aspects to this. On the one hand, P.I.'s are obligated to submit quarterly Progress Reports as a condition for

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6 The fact that, as experience has shown, there is a considerable turnover of investigators after projects have started, is a further complicating feature of these projects.

obtaining the release of the quarterly tranche of their budget. These reports are scrutinized by the Follow-up Committees and their OK is required. In practice, this financial aspect seems fairly routine, if not perfunctory; in any event, the usually quite detailed quarterly reports constitute an enormous burden on the P.I.'s, far in excess of what would be justified by the fiscal purpose of the reports. Sometimes, therefore, they are delegated to quite junior team members and then may become little more than n indiscriminate recitation of facts, relevant and irrelevant. Scientifically it makes little sense to issue as formal reports what must, in effect, be merely lab notes and records of actions taken; the time intervals are much too short to make the substance interesting.

On the other hand, the Final Reports on the projects are, more often than not, quite inadequate. In part, this appears to be the consequence of the previous point: since every detail has already been reported in the quarterly reports, the P.I.'s often tend to consider the Final Report simply the last quarterly report, i.e., they merely report on the events of the last quarter. What is missing, then, is a true report on the project as a whole: its original purpose and research strategy, its execution, and its findings and their significance.

19. There are many ways to improve the reporting structure. One would be to separate the fiscal from the scientific purpose, satisfy the former by very brief (say 1-2 pages) statements, and to make the substantive reports semi-annual and require a Final Report on the project as a whole along the lines outlined in the preceding paragraph.

The subject seems directly relevant to the issue of project impact. Even the best possible research may have none if it is not accessible to others and that often is the effective result of not having good overall Final Reports. The whole here is clearly greater than the sum of its parts; to have all the details scattered through 16 (or 12 or 8) quarterly reports is no substitute for an overall account and evaluation of the nature, significance and limitations of the work performed, including, as appropriate, suggestions for further work, applications, etc. As it is now, the Final Reports often do not do justice to the work itself and unnecessarily limit its usefulness. While excessively rigid regimentation must be avoided, the fact that appropriate Final Reports often are not supplied means that a Guidelines regarding required format and contents should be issued by FRCU and adherence to it should be monitored by each Priority Committee. The abolition of one half of the onerous periodic progress reports would lighten the reporting burden enough to remove any basis for not producing adequate Final Reports.

It is noteworthy that under another AID financed research program (NARP), which encountered similar problems, a Standard Format was developed (See Appendix A). While this is more adequate for progress reports than for finals (NARP proposes it for both), its adoption by FRCU -- and its expansion for Final Reports -- would be a quantum leap forward.

20. The number of projects is too large on several grounds. One is that it strains the administrative structure of FRCU.

FRCU seems to have been laudably austere in its overhead (aside from its early possible over-investment in hardware which may have been the result of the unsatisfactory performance of the U.S. Contractor (reported in a previous evaluation). But there are complaints about payments delays other than those resulting from the funding difficulties of 1985-87; the financial records do not seem to be adequately computerized and data take a long time to reconstruct and there are other indications that the administrative apparatus is strained by the volume of paperwork.

21. Moreover, the erosion of the purchasing power of the Egyptian pound and the dollar (and the artificial exchange rate used) have made the Mini-Linkages' ceilings -- $50,000 per year -- much smaller in real terms than was originally intended. This has led to inefficient limits on necessary expenditures.

It is recommended that, in any follow-up operation, two adjustments be made:

(a) that the original purchasing power of the ceilings be restored by appropriate adjustments in the dollar amounts if not in the conversion factors,[7] and

(b) that it be upped further by 30-50 percent so as to have fewer and less skimpy and penurious projects.

22. The approval of so many projects has, apparently, led to over-commitment of funds.[8]

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7 It is recognized that these involve political issues outside the scope of this Assessment.

8 This is based on the following, admittedly crude, calculation:

	No. Approval	Assumptions	Cost Range ($ million)
Maxi-Linkages	6	$500,000/yr.- 3 years	9.0
Mini-Linkages	157	$50,000/yr.- 2-3 years	15.7-23.6
Micro-Linkages	106	$10,000/yr.- 1 year	1.1
Capacity-Building	96	$50,000/yr.- 1 year	4.8
Total	365		30.6-38.5

The approval amounts are normally the permissible ceilings, used in this calculation. Actual requirements often are less (see Chapter II), but the commitments are given by the approvals.

This is not a formal infraction because approvals are granted only for one year at a time and thus create legally binding financial commitments for only one year's expenditures at a time. But it appears that there may not be enough funds to complete all projects for the full two or three years for which they were conceived. This means that approval to extend may eventually have to be denied to some projects on grounds other than unsatisfactory performance, clearly an undesirable situation which would discredit the substance-oriented Grant Structure.

23. The expenditures of future years should be regarded as contingent liabilities against the total project funds and FRCU should be precluded from having at any time liabilities -- certain plus contingent -- in excess of the total grant and locally contributed funds.

This would ensure that the number of projects cannot be inflated beyond what is given by the funds available and by the ceilings per project by the expedient of considering only the first year's expenditures -- which are the only formal commitment -- as liabilities. (See No. 22 above.)

24. A further reason for limiting the number of projects is the need to strengthen the monitoring function.

While this has many facets, excessive numbers is one of them. 365 projects spread over 12 Priority Committees means that on average each Committee is overseeing 30 Projects, but in fact some have much more: 106 for Agriculture, 83 for Energy, 50 for Health and 36 for Industry. It would be surprising if, even with the Follow-up Committee system, oversight of that many projects could be adequately carried out by people with many other claims -- of far greater priority -- on their time.

25. The emolument structure should be updated.

This is germane to the previous point. It is good that great austerity has been imposed on the participants, but the line dividing austerity from beggarliness has been crossed. It is indecorous -- and is so perceived -- to pay Follow-up Committee members LE 15 (US $6) per Report and other remunerations are similarly undignified. The concept of an honorarium (honor pay) is different from that of a tip. In any event, it is not surprising that Committee work often suffers; rather it is surprising that it does not suffer much more. The 1981 purchasing power of emoluments should be restored and, probably, raised by another 30-50 per cent.

26. The basic FRCU structure is sound.

The program could, of course, have eschewed the creation of a new Grant Awarding Structure and made the existing academic authorities of the individual faculties responsible for the approval of research proposals and the distribution of grant funds. While some of the initial delays would have been avoided, on balance this would probably nevertheless have been a mistake. The established authorities (Deans, Vice Deans, etc.) are not

excluded from the decision-making process since many serve on the committees -- and some are P.I.'s themselves -- but they do so as individuals among professional peers, not as authoritative decision makers by virtue of their office. This seems to have introduced a salutary element of peer review and may have contributed to introducing a broader spectrum of professional opinion into the decision-making process than would have been possible under a more centralized system.

While in principle the decentralization may have caused some inefficiencies -- the possibility of duplicate procurement has been mentioned -- no actual instances of this were seen by the Assessment Team. (While most researchers got a P.C. financed by the project, these nowadays cannot be considered duplicate. In any event, at the end of each research project the equipment purchased formally reverts to the university.) The academic and political (Ministry) authorities may want to assume a more active role in laying down broad policy guidance for the program, and this would be entirely proper. But they should not become involved in the decisions affecting individual projects.

Thus, while undoubtedly improvements can be made on matters of detail -- for instance a full time finance officer would seem highly desirable -- it would be a mistake to move towards a substantially more centralized structure.

27. Research proposals should be more specific and more realistic. They often contain only very general descriptions of work programs and are particularly vague on the time dimension. For example, experience has shown that it takes at least a year -- often more -- between approval and the installation of major pieces of equipment procured under ULP. This is the result of many factors -- bidding, transport, customs delays, etc. -- and should be built into work schedules. Often this will mean that two year projects must be considered three year projects, three years become four, etc. The ULP structure should allow for this and Priority Committees should be enjoined to reject projects with unrealistic or excessively undefined work programs.

28. Several suggestions for other changes are under discussion in FRCU.

One is for the Priority Committees to define the required research projects -- not merely the broad priority areas as at present -- and then to call for "tenders" and award the grant to the best proposal. There are advantages and drawbacks to this. Among the former is the greater likelihood of getting some [illegible] priority work done; the danger is that -- especially with the prese[illegible]w composition of the Committees -- the range of the work called for an[illegible] [illegible]iginality of the ideas underlying it, may become too limited. This [illegible] could perhaps be overcome if the Committees were to make it known that they would also entertain proposals from researchers, but that a certain portion (50% ?) of their grant funds would go to work called for by them. It might be wise to let the committee in which the proposal originated (Energy) experiment with it for a year

before adopting it generally.

29. Another suggestion is to appoint one member of the Committee to the Research Team. He would then keep the Committee informed of progress.

This is meant to strengthen the monitoring and oversight function of the Priority Committees and to relieve the P.I.'s from much of their reporting burden. These are valuable objectives.

Nevertheless, it seems a rather risky proposal. Too much would depend on the personal relations between the P.I. and the committee member. Moreover, as a member of the Research Team, the latter would be in an ambiguous position as far as his loyalties and responsibilities are concerned. This would probably be a non-issue in the majority of cases, i.e., the normal well-running projects. But it would most likely be an issue precisely in the minority of "problem" cases which oversight should detect and correct.

30. Finally, several caveats are in order regarding the limitations of this assessment.

(a) It does not deal with the issue of possible overlap between ULP research and other AID financed research in Egypt (Science and Technology, NARP, etc.). These were outside the Assessment's terms of reference and could not, in any event, have been handled in the time available.

(b) It deals primarily with impact, not with technical excellence. Given the number of fields in which ULP finances research, the latter could only have been judged by a group of technical experts in these same fields and it would be presumptuous for the Assessment Team of two to arrogate to itself such expertise.

(c) One limitation which this focus imposes on the Assessment is that the Assessment is weak on judgments regarding the degree to which certain projects repeated -- with or without minor variation -- work already done outside Egypt and either readily available in the literature or purchasable on the open market at reasonable prices.[9] In the field of non-conventional and renewable energy, for example, there is some suspicion that this may be the case, but it is not one that the Assessment can substantiate. And even where this suspicion is not present, there are many projects on which the Assessment simply has to take for granted that the work is correct.

(d) This is a source of some concern because occasionally one finds in the project file English versions of plausible serious technical criticisms

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9 But it should be noted that the formation of human capital -- the creation of researchers with practical experience -- may justify even repetitive research in many cases.

by Follow-up Committee members. In such cases there usually is no record -- in English, at any rate -- of any rebuttal or of any modification in project design or implementation practices. Such evidence may be in the Arabic portion of the file, but the doubt could not be resolved in the Assessment.

(e) As already noted, the Assessment has made no systematic effort to judge the achievement of the attitudinal objectives, but the impressions received in this respect are mixed.

On one hand, some satisfied users, willing to put up some of their own money for future work of this kind, were found, and so were willing scholars to do this further work. Here success bred success; team members, including graduate students, oriented their own subsequent (and thesis) work toward practical problems after seeing that their ULP financed work had yielded results that were appreciated outside the university.

On the other hand, the Assessment found no particular evidence of striking attitudinal changes inside the university and some fragments of evidence suggesting the opposite. But these consist mainly of scattered remarks by individuals differentiating "scientific" research (good) from "merely practical" work (OK, but not deserving of academic recognition). No firm conclusions can be drawn.

(f) What would seem to be clear, however, is that as the most successful achievement of the "usefulness" objectives were usually followed by some sign of attitudinal changes, and as all these cases occurred with the participation of public enterprises, not Ministries, there is a role waiting to be played by the Ministries.

This role would not be to attempt to control the Grant Awards process, but to become an active shaper and user of research proposals, i.e., to emulate the imaginative and far sighted actions of, inter alia, the steel, aluminum and refinery enterprises. Especially the Ministries of Agriculture and Energy (but also Public Health) could become major beneficiaries of ULP if they decided to exploit its possibilities by formulating requests and adjusting their own activities.

31. In summary, in its most critical aspect the original diagnosis which engendered the ULP was correct: there are in the Egyptian universities capable and devoted scholars who are willing to put their creative energies to work on practical issues when they are given a modicum of means and incentives to do so.

The Assessment Team was impressed by the apparent competence and enthusiasm of many of the researchers, who struggled on in spite of difficulties outside their control (e.g. the funding crisis). While the research done may not be in the forefront of the world's scholarship, this was not its purpose. Enough of it was competent and useful to justify the

program. An even greater proportion may become so if the program is marginally adjusted in the directions suggested in this Assessment. And a certain amount of new respect for, and confidence in the capacity of the university scholars to help solve real problems has demonstrably been created in the community. The hoped modification of the broad attitudes of the university establishment itself may take much longer and may only become relevant when the Government is in a position to expand its budgetary allocation for the universities' non-salary budgets substantially.

CHAPTER II CASE STUDIES

Maxi-Linkage Projects

IMPROVEMENT OF SUGAR BEET PRODUCTION AND UTILIZATION

BASIC DATA

project No. 842080
Principal Investigator: Dr. Ahmed Mostager Mostafa, Dean, Faculty of Agric., Cairo University
U.S. Counterpart: Professor J. H. Hills, Univ. of California at Davis

Expenditures	AID $	AID L E	Govt. L E	Total US $
1985	6160	128831		
1986	754	20000		
1987	--	--	69992	
1988	39500	98439	180894	
Total US$ Equiv.	46414	298025	302272	646710

Reports	Period Covered	Delivered
Progress Rep. 1	1/3/85 - 31/5/85	18/11/85
Progress Rep. 2	1/6/85 - 31/8/85	1/1/86
Progress Rep. 3	1/9/85 - 30/12/85	30/9/86
Progress Rep. 4	1/12/85 - 28/2/85	10/1/87
Progress Rep. 5	1/3/86 - 31/5/86	25/10/87
Progress Rep. 6	1/6/86 - 31/8/86	22/5/88
Progress Rep. 7	1/9/86 - 30/11/86	22/5/88
Progress Rep. 8	1/2/86 - 28/2/87	22/5/88

Research Team (Principal Investigator plus:)

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Faculty of Agr., Cairo University
Dr. S. El-Nagar, Leader of Plant Production Team,
Faculty of Agr., Cairo University
Dr. S. A. El-Noor, Leader of Soil Science Team,
Faculty of Agr., Cairo University
Dr. N. A. Khalil, Team Associate,
Faculty of Agr., Cairo University
Dr. E. A. Abu Steib, Team Associate
Faculty of Agr., Cairo University

IMPROVEMENT OF SUGAR-BEET PRODUCTION AND UTILIZATION

OBJECTIVES AND SETTING

The grant proposal lists the following goals for the research:

- Establishment of a regional unit for sugar-beet research;
- Optimum agronomic recommendations;
- Optimum recommendations to solve irrigation, drainage, leaching and salinity problems;
- Optimum conditions for sugar-beet progressing; and
- Utilization of wastes and by-products as animal feed.

Egypt is not self-sufficient in sugar, producing approximately 50 percent of its needs from sugar-cane. International sugar costs fluctuate widely but a 1983 estimate p aced the annual foreign exchange cost of imported sugar at $350 million.

Sugar-cane is a perennial crop requiring fertile soil, large amounts of water and continuous use of the land for three or more years. Sugar-beets have potential for growth in poorer soils, occupy the land for nine months or less, permitting second cropping, require less water and the by-products can be processed to produce animal feed.

Sugar-beet cultivation was begun in Egypt in 1980 and has grown to an area of 42,000 feddans (30,000 farmers) which supports a 6,000 ton per day processing unit judged to be an efficient capacity under local conditions. The need for rapid processing and concomitant transportation requirements are capacity constraints. Yields vary rather widely but the current average of 15 tons per feddan is below world norms and the sugar content which has increased over time could be further improved as well.

Net farm income per feddan of sugar-beet cultivation is 36 percent or less than the income from a feddan of sugar-cane at present yields. The added income from second cropping might lead to income parity, however. Sugar-beet seeds, a major input cost, are not presently produced in Egypt since the plant does not flower without a low-temperature, dormant season.

Economic impact from sugar-beet production research can be achieved in two ways. Increased yields from the fertile soils and/or the impoverished soils in the established growing region would allow the existing processing capacity to be served by a smaller acreage. This would release fertile land for high value crops. Perhaps more importantly, research which leads to satisfactory sugar-beet production on new, marginal lands could free land now

supporting sugar-cane for the production of other, more valuable crops.[10] Reduced consumption of water might also result.

USER INVOLVEMENT

Sugar-cane (and now sugar-beets) is a "government crop," i.e., with seeds, subsidized agronomic inputs, prices, agronomic practices and standards controlled by the Ministry of Agriculture. The farmer has little or no choice in sugar-beet cultivation. Therefore, in a very real sense, the Ministry of Agriculture (MOA) is the direct user of outputs from this maxi-linkage.

Representatives of the MOA participated in the decision to fund the sugar-beet linkage and are members of the priority committee which monitors progress. The Research Team includes a senior member of ARC (Agricultural Research Center), the experimental arm of the Ministry. Since any revisions in agronomic practices must be approved and implemented by the MOA, their participation is essential.

The sugar-beet processor, Delta Sugar Company, will also be a user of research findings. Solids content, impurities, sugar percentage and other factors directly affect processing and profitability. Delta is also responsible for the sugar content measurements which determine payments to farmers. The company has actively participated in the project since the beginning providing comments, measurements and advice as appropriate.

U.S. COUNTERPARTS

The proposal contained correspondence with the Cooperative Extension Department of the U. of California (Davis) in which a list of staff members interested in possible collaborative activities was supplied. The basis for the choice of this university is not documented but most likely resulted from the extensive role of University of California (Davis) in other agricultural research in Egypt supported by USAID.

An extension agronomist from the University of California visited the Project in April 1985 shortly after this maxi-linkage had officially begun. The trip appears to have been for other purposes and not financed by the Project. He subsequently provided 14 varieties of sugar-beet seeds for Project use. An aborted attempt was made to arrange for travel to Egypt in February 1986 by two U.S. sugar-beet specialists. Contact since then has apparently been limited to desultory correspondence (mentioned but not found in the files) of marginal value to the linkage.

It is not clear to this Assessment to what degree failure to establish

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10 It could also reduce sugar imports if it is determined that investing in new beet processing capacity is economically justified.

useful U.S. collaboration was due to financial constraints imposed on ULP and this grant or due to procrastination in establishing a dollar budget and contractual U.S. commitments. In any event, current team members express regret at the lack of U.S. cooperation.

RESEARCH PROGRESS

The sugar-beet growing season in Egypt extends from September to June with harvesting taking place approximately 210 days after planting. Farmers must sequence their plantings from September into November in order to provide a more or less continuous input to the processing plant during the April-June harvest period. Research field trials must, of necessity, follow the same schedules.

March 1985 was the formal starting date for the Project. A survey of 756 sugar-beet plots was carried out during the 1985 harvest season. The sample population was taken from three delta governorates and covered the cultivar planted, plant density, weed characteristics, harvest yield and sugar content. A notable characteristic of the analyzed survey results was the wide variability in agronomic practice and in the yields therefrom.

A wide variety of sugar-beet cultivars was obtained from Europe and the U.S. in the summer of 1985. These were planted in a designed structure of field test experiments during the September-November period. Two locations were involved, Kafr El-Sheikh and El-Hamool representing good soil and reclaimed, alkaline, saline soil respectively. The experimental design tested plant population density, thinning stages, fertilization rates, planting time and crop duration period. Research on local seed production has also begun.

Total sugar per feddan for some of the newer cultivators was as much as 25 percent higher than current average practice. It was also possible to draw conclusions on the best timing for and economically advantageous amounts of nitrogen fertilizer. However, yield results from the poorer soils were not uniformly encouraging.

Funding constraints delayed the chemical analyses of important processing variables such as impurities, storage life and solids content. The scope of 1988/87 field trials was also restricted by funding. To date, no set or sets of "best" cultivar/agronomic package are available although measurable progress has been made toward this goal. Grant funding which includes substantial government inputs is slightly less than one half of the original budget.

Soils and irrigation research has just been initiated with samples from some test plots having been analyzed. The relation to sugar-beet growth and yield must await correlation through one or more growing seasons. Studies of mechanization and by-product utilization are being held in abeyance.

A small research building has been constructed on Cairo University

grounds. With the benefit of hindsight, this was probably premature. Some analytical equipment has been purchased but is judged by the Research Team to be very inadequate. A master's thesis and a Ph.D. thesis, based upon aspects of the research, are in progress. Thirty five or forty graduate assistants have been employed over time and thus exposed to applied research.

ASSESSMENT SUMMARY

The sugar-beet maxi-linkage No. 842080 falls in the category of potentially useful projects. The government five-year-plan is said to include a second beet processing plant underlining a belief in the economic importance of increased sugar production to Egypt. It would be desirable to include an economic evaluation of the research results -- particularly of those to be obtained on new, marginal lands -- in the linkage, before a final decision on this investment is made. User involvement in this linkage bodes well for acceptance of positive research results were they to be forthcoming. Major emphasis should be placed upon the problems of sugar-beet production in poorer soils outside the current growing area.

The linkage has been adversely affected by the larger problems of ULP itself. However, the Assessment Team wonders whether better resource allocation might have reduced the impact of funding shortages. Uninterrupted research for several more growing seasons will be needed if the major goals of this linkage are to have a good chance for achievement.

Were ULP to be extended, the sugar-beet linkage should be considered for continuation. But a careful review of proposed plans with special attention to the merits of mechanization studies and of extensive equipment acquisition would be in order before proceeding with a continuation.

PRODUCTION OF PREMIUM QUALITY NURSERY FRUIT TREES

BASIC DATA

Project No. 842082
Principal Investigator: Professor Dr. S. Z. El-Naggar, Dept. of Horticulture, Menufiya University
U.S. Counterpart: Dr. O. J. Dickerson, Professor Plant Pathology, Clemson University

Expenditures

Note: Because of a last minute processing request, these data were not obtained. There is no reason to believe that they are not available in the same form as for the other projects sampled.

Reports	Period Covered	Delivered
Same.		

Research Team (Principal Investigator plus:)

Dr. M. M. Fouad, Crop Activities Coordinator, Professor, Cairo University
Dr. A. A. Gaafar, Tropical & Sub-tropical Fruit Professor, Cairo University
Dr. M. A. Fayek, Stone Fruits, Professor, Cairo University
Dr. S. A. Ahmed, Stone Fruits, Menufiya University
Dr. M. F. Mansour, Pome Fruit, Menufiya University
Dr. M. R. M. Rabeh, Tissue Culture, Menufiya University
Dr. A. S. Atalla, Citrus Fruit, Menufiya University

Equipment Purchase (Main Items Only)

	US $
Production Green House	10150
Production Benches	4734
Sewing Boxes	2566
Tractor-Hoeing Machine	11245
Sprayer	2567
Xerox Machine	7230
Aluminum Inters. for Tissue Culture	9457

PRODUCTION OF PREMIUM QUALITY NURSERY FRUIT TREES

OBJECTIVES AND SETTING

The seven objectives set out in the proposal and in subsequent reports are:

- Production of true-to-type, pathogen-free trees;
- Characterize (fruit types, number of seedlings and horticultural practices) local nurseries;
- Transfer of new nursery techniques;
- Establish a modern nursery;
- Specification of standard nursery fruit trees;
- Use standard nursery trees as mothers in mass production; and
- Train scientific personnel, extension officers and nurserymen.

Nursery trees (seedlings) are sold at free market prices which may range from LE 0.5 to 1.5 or more (anecdotal information). Nursery owners may also be fruit growers and their nurseries vary in size from a few thousand seedlings to upwards of fifty thousand plants. The average of a sample of 265 nurseries was 8500 seedlings per nursery.

There were 534 registered private nurseries in Egypt in 1983/84. An unsupported estimate places the total number of nurseries as three times larger. Assuming that 1500 nurseries is a reasonable estimate of the total number, that average annual production per nursery is 8000 seedlings, and that the average price per seedling is LE 1.00 leads to a gross annual product of the order of LE 12 million for fruit tree nurseries, the direct users of the Project results.

No comparable estimates were found for the value of fruit grown in Egypt. Fruit growers are, of course, the ultimate beneficiaries of improved nursery stock. Present stocks are known to be generally of low-quality. Government nurseries exist but there is not a certification program for nursery stocks nor a local source for virile, high yielding fruit tree seedlings.

Two other anecdotal bits of information support the conclusion that this project is targeted at an objective perceived as economically important by the primary and secondary users. Several new nurseries have been established in the western desert utilizing cultivars imported from the U.S. and Europe and are employing very good horticultural practices. A significant level of investment is implied. It has also been said that increasingly farmers are devoting a portion of their land to fruit production because of the profitability thereof even though government penalties may be imposed for shifting away from so-called government crops (cotton, wheat, rice).

USER INVOLVEMENT

A survey of nurseries was initiated at the beginning of this Project. The information obtained was type of fruit, basic root stock and number of seedlings. The aims of the Project were conveyed to nursery owners as part of the survey. More than 265 nurseries in four growing areas were contacted.

Suggestions from the U.S. Counterpart led to an expansion of the survey questionnaire to include a number of key horticultural practices. The revised questionnaire was employed in the latter stages of the survey and those nurseries responding to the first version of the survey are being revisited. The regional Office of the Ministry of Agriculture, Menoufiya Governorate, has assisted in the conduct of the survey.

The Ministry of Agriculture has a Department of Horticulture which contains a pomology division and a plant division. The Ministry also maintains a small number of nurseries having fruit tree stocks. These nurseries do not appear to be a significant factor in the marketplace; thus the Ministry of Agriculture is believed to be a tertiary beneficiary of this maxi-linkage.

Training for extension activities has not yet begun. Improved root stocks, high-yield scions, better horticultural practices, etc., are just now reaching a reasonable level of confidence for some fruits. However, informal transfers of some growing practices have already taken place and a few requests for some of the new cultivars are being received by the University of Menoufiya.

This linkage has made innovative use of the survey to establish user contact and to disseminate information on the purpose and progress of the research. The various activities are beginning to yield results and extension activities should begin fairly soon. The Project staff agreed. However, no detailed plans for the training of extension agents and nurserymen were provided.

U.S. COUNTERPARTS

The interaction between this project and the selected U.S. institutions is at a significantly higher level than either of the two other maxi-linkages currently being assessed.

Dr. Danasoury, the original Principal Investigator (since retired), traveled to the U.S. in October 1984 together with a member of FRCU and another University of Menoufiya Faculty member specifically to arrange a contractual agreement with counterpart institutions. This travel appears to have been the very first project activity. The basis for the choice of institutions visited (University of Maryland, Clemson University and University of Florida) is not documented but seems to have been their published research activities on fruit crops of interest to Egypt.

Financial differences with the University of Maryland led to a contract negotiated with Clemson University including a sub-contract to the University of Florida and later extended to cover a second sub-contract with a Professor at the University of Illinois. These contractual arrangements remain in force today despite some continued administrative (financial) problems.

U.S. cooperation has provided short-term training for six Egyptian team members. Topics include plant pathology, plant propagation, methodology and tissue culture. These Egyptian researchers plus other members of the project have made visits to selected research nurseries as well as to commercial nurseries in the U.S. to discuss advances in horticultural practices, new varieties and production techniques.

The Clemson group has provided quarterly reports to the Project covering thorough outlines of research procedures in nematology, tissue culture and virology. Detailed recommendations for the purchase of laboratory equipment and supplies have been made. The reports also contain comments on the prior quarterly report prepared by the research team, observations resulting from visits to the U.S. or to Egypt and references to current literature of particular interest to the Project.

The counterparts have also provided direct support to the purchase and importation of both equipment and new varieties of plant materials. Visits to Egypt are mae on the average of twice annually and serve to examine research progress as well as to discuss problems that may have arisen.

There has been turnover in the U.S. scientists associated with this linkage requiring repeated indoctrination of new persons. The Clemson Principal Investigator for this project as well as the two sub-contracted professors have remained unchanged, however.

The U.S. cooperation in this maxi-linkage has been highly effective without being intrusive. Further, based upon expenditures to date, this involvement is assessed as being cost effective.

The early contact with U.S. institutions, completion of formal contract arrangements between institutions, regular exchange of reports and regular travel exchanges are key elements of this successful experience.

RESEARCH PROGRESS

Fruit types under investigation are citrus, plum, peach, apricot, apple, pear, mango, pecan and grapes. Experiments for each of these fruits have or will include trials of different root stocks, studies on the influence of soil types and irrigation schedules, the effect of composition and scheduling of plant nutrients, varietal pathogen resistance, seedling spacing and so on.

A research nursery to carry out such experiments has been established. Screened areas are available for bench grafting, for the production of

special plants used in bioassay for viral infection, for mist spraying of certain seed propagation experiments, etc. Plastic greenhouses are in use for the growing of selected cultivars as are open plots for randomized, replicate studies of varietal differences and of horticultural practices. Sufficient land area is available for the production of premium stock once a specific cultivar system has been selected. Ground water is now available from a high capacity pump recently installed. This will ensure water for the nursery throughout the year -- essential to research during the entire growing season.

Studies of root stock varieties, propagation techniques for scions and related horticultural practice have been underway since 1985. Nematode resistant root stocks (Nemagard and Marianna) suitable for citrus and plum grafting have been evaluated and found suitable for Egyptian conditions. A new variety of apple (Anna) and of peach (Florida Sun) have been successfully grown. Soil sterilization methods, seedling growth media and plant spacing have also been tested. Thus the beginnings of some premium fruit tree "packages" are at hand. Research on other fruit continues in an organized manner.

Supporting research in tissue culture, pathogen identification and assay techniques and chemical analysis has just begun. Laboratories for these activities have been refurbished and are now equipped with instrumentation purchased by the project which arrived a short time ago. The linkage laboratories are complemented by an adjacent plant genetics facility endowed by the Federal Republic of Germany. Inputs to the linkage objectives from the supporting research should begin during 1989.

ASSESSMENT SUMMARY

Maxi-linkage No. 842080, Production of Premium Quality Fruit Trees, is a potentially useful project. There is a significant and growing market for higher quality fruit tree seedlings. While the private nurseries (relatively small in size but large in number) which would be the primary users of project outputs seem not to have been involved in the Project selection and initial design, they were contacted in a continuing survey started at the beginning of the Project.

The organization and conduct of the research has been good. Effective and continued collaboration with U.S. counterparts has been quite useful and should help to ensure practical Project outputs. An active, organized program of extension training is needed if the Project is to achieve its stated goals.

The University of Menoufiya is much better equipped, trained and motivated to conduct pomology research than it was prior to ULP. One student has begun research on plant tissue culture as a Ph.D. topic. Increased contact and information exchange with the USAID sponsored Agricultural Development System (ADS) Project at the University of Cairo is advisable. This ADS activity includes horticultural research of interest to the linkage.

APPLIED RESEARCH, DEMONSTRATION & TRAINING IN DESERT DEVELOPMENT

BASIC DATA

Project No. 842083
Principal Investigator: Professor Dr. Abdel Kador R. Abou Akada, Vice President, Alexandria University
U.S. Counterpart: Professor Dr. Adli M. Bishay, Director, Desert Development Center, American University at Cairo.

Expenditures	AID $	AID L E	Govt. L E	Total US $
1984	--	151370		
1985	4876	232933		
1986	82152	6059		
1987	118821	7907	255000	
1988	802	140222	300000	
1989	--	30000		
Total US$ Equiv.	206651	685032	668675	
Bills outstanding for services already provided		$ 397590		
	206651	1082622	66875	1957948

Reports	Period Covered	Delivered
Year I		
4 Progress Rep.	1/9/84 - 31/8/85	1/1/85 - 8/8/85
1 Annual Rep.	1/9/84 - 31/8/85	3/10/85
Year II		
4 Progress Rep.	1/9/85 - 30/8/85	12/2/86 - 2/10/86
1 Annual Rep.	1/9/85 - 31/8/86	10/3/87
Year III		
4 Progress Rep.	1/9/86 - 31/8/87	5/5/87 - 16/12/88
Year IV		
4 Progress Rep.	1/9/87 - 31/8/88	21/6/88 - 30/1/89

Project No. 842083 Basic Data - continued

Research Team (Principal Investigator plus:)

Dr. Ahmed Fathy, Water Management,
Alexandria University
Dr. Ahmed Mohamed Youssef, Dairy Processing,
Alexandria University
Dr. Gaber Ibrahim Fegla, Plant Protection,
Alexandria University
Dr. Hassan El Shimi, Soils Testing,
Alexandria University
Dr. Mohamed El Sayed Sabbah, Agri. Engineering,
Alexandria University
Dr. Mohsen Adam Omar, Field Crops,
Alexandria University
Dr. Nabila Bakry, Plant Protection,
Alexandria University
Dr. Samir El Dib, Plant Protection,
Alexandria University
Dr. Adli Bishay, Co-Principal Investigator,
American University in Cairo
Dr. Amir Abdel Hamid, Machanical Engineering,
American University in Cairo
Dr. Fadel Assabghy, Electronics/Renewable Energy,
American University in Cairo
Dr. Hosny El Lakany, Forestry,
American University in Cairo
Eng. Ikram Noshy, Architecture,
American University in Cairo
Eng. Magda Ebeid, Architecture,
Ministry of Reconstruction
Dr. Abdel Hamid Torabeya, Plant Protection,
Alexandria University
Dr. Abdel Meuid M. Gad, Medicinal Plants,
Alexandria University
Dr. Amin Mobarak, Wind Energy,
Cairo University
Dr. Anhar Hegazy, Solar Engineering,
Ministry of Electricity
Dr. Mammdouh Nasr, Agricultural Economics,
Ain Shams
Dr. Mohamed Hamed, Biogas Technology,
National Research Center
Dr. Bahgate El Sayed Aly, Biogas Technology,
Agricultural Research
Dr. Said Mahmoud, Animal Husbandry,
Tanta
Dr. Seif Atalah Seif, Fodder Crops,
Zagazig

APPLIED RESEARCH, DEMONSTRATIONS AND TRAINING IN DESERT DEVELOPMENT

OBJECTIVES AND SETTING

The proposal states the aims and goals of this maxi-linkage as follows:

"This proposal aims at providing alternative approaches to integrated desert development. Its ultimate goal is to develop a training program and demonstrate alternative patterns of desert agriculture and development for replication in different areas of the Egyptian desert."

Four major activities were cited as necessary for goal achievement:

- Applied research on desert agriculture;
- Applied research on renewable energy resources;
- Research and demonstrate desert community development strategies; and
- Develop a training/demonstration program for the private and public sectors.

Agriculturally productive land in the delta region and in the Nile Valley are roughly five percent of Egypt's total land area. The remaining 95 percent is largely arid or semi-arid desert lands currently not in productive use. Government projects to reclaim some of these lands were begun in 1952 through public companies created for this purpose. Reclamation efforts between 1952 and 1970 have been estimated to have involved more than 100,000 feddans with, however, 30 percent or more of these lands never becoming even marginally productive.

Government policy has been altered to attract private sector participation in the reclamation and utilization of desert lands. Public companies may now rent or sell part of their land to individuals or private firms. The government will sell land (not held by public companies) and also has a program of granting reclaimable land, together with a concessional start-up loan, to recent university graduates wishing to settle in the desert areas. These "land grants" have been from 10 to 20 feddans in size but may be reduced to 5 feddans in the future.

The number of small to medium size private, agro-business ventures established on reclaimed lands is growing despite increasing land costs and land rehabilitation costs. Some of these firms have publicly stated that they were achieving financial success albeit hard won. No information was readily available on the success or failure of small farmers cultivating reclaimed desert lands.

In 1979 the American University in Cairo (AUC) began a self-financed project in desert development. The startup was assisted by the Ministry of Land Reclamation through a 30 years allocation of 200 feddans of virgin land

in South Tahrir and by the provision of land on the edge of Sadat City by the Ministry of Housing, Development and New Communities. The project attracted, over time, research funding and/or equipment from private sources, Near East Foundation, the International Development Research Center, Ford Foundation, FINN AID and others.

A mini-linkage proposal was submitted to FRCU in 1981. The Research Applications of Renewable Energy Technologies for Desert Development, was approved and funded from January 1982 through December 1984. The University of Alexandria provided the Principal Investigator and the U.S. Counterpart was AUC. The maxi-linkage proposal along related but expanded lines was submitted in early 1984 and approved in September 1984. The Land Development Priority Committee was subsequently expanded in scope to become the Land Development and Desert Technology Committee with review and oversight responsibility for this maxi-linkage.

USER INVOLVEMENT

Desert development and the integrated approach being pursued by the linkage ultimately requires the involvement of and close coordination between a number of ministries; land reclamation, agriculture, irrigation, electricity and energy, and housing, development and new communities. The details of this coordination will depend in part on the location of sites where replication is attempted, on the exact nature of the preferred reclamation "package" to be introduced and on the governmental inputs or assistance required.

None of the relevant ministries were present at the meeting of the Assessment Team with the Land Development and Desert Technology Priority Committee.

Some improved agronomy, irrigation, animal husbandry or nutrient film techniques might be transferred to existing farms on reclaimed land through demonstrations at project sites or through on-farm demonstrations. The scope, extent and total economic impact of this approach would appear to be limited, however, for small land holders. Agro-businesses may represent a more significant economic target.

Neither the proposal nor the periodic reports to date address the problems of implementing one or more of the complete desert farming models on a significant scale. This may be beyond the resources and intent of the linkage. If so, it would be useful to consider how else the ensemble of information and practices developed by the linkage can be further tested under real-life conditions and replicated. Training by itself seems unlikely to lead to the necessary ministry involvement and support required for replication trials.

U.S. COUNTERPARTS

AUC has been designated as the U.S. Counterpart to the University of Alexandria, the primary grantee. Undoubtedly, this was a procedural artifice to permit the major involvement of an Egyptian based, American institution which could bring to bear relevant resources.

Other U.S. expertise from commercial firms and universities was invoked to assist with some specific problems such as photo voltaic cell performance, water pumps and passive solar architecture. However, in-depth continued collaboration with a U.S. institution(s) expert in all aspects of desert development appears to have been limited.

RESEARCH PROGRESS

Studies of desert agriculture have been carried out at four model farms in South Tahrir and at test plots located at Sadat City. Three of the model farms are 20 feddans in extent. These units have been used to test three differing models; forage crop and animal production only, forage crops with other cash crops and limited animal production, and finally, diversified cash cropping. Crop-rotation, irrigation regimes, plant protection and crop choices have been studied at each of these farms within the context of the basic model being employed.

Substantial progress has been made and the relative financial return of the three models has been assessed with the forage crop/animal production appearing to yield the greatest return. However, the diversified cash cropping model has not been fully implemented to date. These model farms have been research units rather than quasi-operational farms. No economic analyses of the total farm unit including investments, repair and maintenance, depreciation, etc. have been made. It is therefore difficult to assess the applicability of research findings.

A fourth farm unit has 100 feddans devoted to forage crops, animal production and dairy products as an agro-business unit. All facets of this farm are in operation on a research basis. Parasitic infection problems with the cattle and sheep have been overcome. Feeding trials with differing fodder types and mixtures continue as do studies of varied grazing patterns. Again, no attempts to analyze the operation as an economic unit were found.

Fifteen feddans located at Sadat City are now being developed as three, co-located "farms" of five feddans each. The intent is to investigate the potential and problems of sharing the operation of a combined tract among three "owners." The linkage finds it difficult to operate any of its model farms on a basis which truly simulates private ownership. Destruction of Project property by a tenant and the grant stricture not permitting any full time remuneration (for a tenant in this case) are major considerations among a number of constraints. These are valid concerns, but continuation of the "test plot" methodology involving only researchers raises questions about the

social and economic validity of conclusions reached and about the utilization of the proposed housing investment at this site.

The energy component of the research program includes: soilless, protected agriculture, renewable energy generation (solar, wind and biogas) and energy efficient architecture. The initial results from soilless agriculture studies were not economically satisfactory. Innovative approaches now under investigation may lead to the significant improvement needed.

The photovoltaic generation of electricity has reached reasonably routine performance after extended difficulties with ancillary equipment and pumps. The merging of wind power and solar power will extend the period in which electric power is available from renewable resources. The primary rationale for an autonomous energy source, renewable or otherwise, is reliable water supplies from canal and/or underground sources. The individual and combined systems are technically complex when viewed in the context of the average farmer. The systems are also capital intensive. A paucity of cost information and economic analysis make difficult a conclusion on the practicality and "water insurance" worth of these renewable energy units.

Biogas generation and utilization has yet to be truly implemented which is somewhat surprising given the extensive experience elsewhere in the world. Even when the unit now nearing completion is operational, the lack of extended trial in a family setting will leave open questions of social acceptability in Egypt.

The passive architectural design blending traditional features with modern innovations appears quite successful. Further changes being incorporated in a two family unit now under construction are expected to improve the natural cooling/heating performance. Again it must be said that extensive temperature monitoring, while informative, is no substitute for continuous occupation by a real farm family under year-round living and working conditions.

ASSESSMENT SUMMARY

The desert development maxi-linkage No. 842083 addresses a complex and controversial subject of importance to Egypt. Reclamation of desert lands has taken place and continues to be fostered by the Government with emphasis now on private investment. Debate on the economics of land reclamation also continues. Clearly, in this setting, additional information on new or altered agronomic practices, on techniques reducing water consumption, on improved animal husbandry and on better energy utilization are of value. In this context, and given the progress to date, the Assessment Team believes this maxi-linkage to be potentially useful.

This having been said, the Assessment Team has several comments about

the organization of the research and the structure of any second phase, were one to be considered.

The interaction between studies of power generation from renewable resources and the rest of the linkage activities was marginal at best. Indeed, conventional power (diesel and electric grid) were ultimately invoked to ensure reliable water inputs for research activities. In retrospect, the renewable power generation might have been carried out separately were there compelling reasons to do so. Research on renewable power generation appears to be rapidly approaching a point of diminishing returns. A searching cost benefit analysis is overdue and should be a pre-condition to any Phase 2 Project design.

Energy efficient architectural design seems to have achieved success but further improvements are likely to have only marginal impact. Moreover, if it is accepted that live-in demonstrations of farm models by other than researchers is not possible, the utility of further housing investment is called into question.

The entire question of training, demonstration, replication and "technology" transfer merits further discussion and review with attention to other success and failures in the adoption of new farm methods in Egypt. Improved economic analysis addressing the economic and financial returns from the linkage approaches to land reclamation could be useful in attracting attention and support from ministries.

The maxi-linkage has been conducted in parallel with related research funded from previously mentioned sources other than AID. During the Assessment there was not sufficient time to examine the interaction between the linkage and these other activities in any detail. There were some observed benefits from external projects such as field trials of improved fruit trees which can be used on model farms and the development of acacia trees for combined use as windbreaks and a source of forage material. Parallel programs are not part of the Assessment and it is difficult to determine the degree to which the financial and physical identities of the linkage and the parallel programs could be preserved.

MINI-LINKAGE PROJECTS

Agriculture

IMPROVING PRODUCTION AND QUALITY OF LENTILS IN UPPER EGYPT

BASIC DATA

Project No. 81001
Principal Investigator: Dr. El-Sayed M. M. Shalaby, Professor, Fac. of Agric. (Dept. of Agronomy), Assiut University
U.S. Counterpart: Dr. Fred Muelbauer, Dept. of Agronomy, Washington State University

Expenditures	AID $	AID L E	Govt. L E	Total US $
1982	--	5640	--	
1983	--	35012	--	
1984	--	63465	--	
1985	--	44236	--	
1986	3547	--	--	
1987	--	19250	--	
1988	--	175	--	
Total US$ Equiv.	3547	202172	--	205719

Reports	Period Covered	Delivered
Progress Rep. 1	1/2/82 - 30/4/82	20/1/83
Progress Rep. 2	1/5/82 - 30/7/82	13/11/83
Progress Rep. 3	1/8/82 - 5/4/83	5/4/83
Progress Rep. 4	1/11/82 - 31/1/83	28/5/83
Progress Rep. 5	1/2/83 - 30/4/83	18/10/83
Progress Rep. 6	1/5/83 - 30/7/83	n.a.
Progress Rep. 7	1/8/83 - 30/10/83	8/3/84
Progress Rep. 8	1/11/83 - 31/1/84	2/16/84
Progress Rep. 9	1/2/84 - 30/4/84	18/7/84
Progress Rep. 10	1/5/84 - 3/7/84	6/12/84
Progress Rep. 11	1/8/84 - 31/10/84	10/12/84
Progress Rep. 12	1/11/84 - 31/1/34	14/4/85
Progress Rep. 13	1/2/85 - 30/4/85	13/6/85
Progress Rep. 14	1/5/85 - 31/7/85	26/9/85
Progress Rep. 15	1/8/85 - 31/10/85	24/10/85
Final Report		24/5/88

Project No. 81001 Basic Data - Continued

Research Team (Principal Investigator plus:)

Dr. F. H. Abdalla, Professor,
Faculty of Agriculture, Assiut University
Dr. H. G. Hassanein, Professor,
Faculty of Agriculture, Assiut University
Dr. K. A. Abdel Rahman, Professor,
Faculty of Agriculture, Assiut University
Dr. M. A. El-Morshidy, Professor,
Faculty of Agriculture, Assiut University
Dr. E. A. Hassaballah, Professor,
Faculty of Agriculture, Assiut University
Dr. M. A. Khalifa, Professor,
Faculty of Agriculture, Assiut University
Dr. H. M. Abd El-Rahim, Professor,
Faculty of Agriculture, Assiut University
Dr. M. M. Abdallah, Professor,
Faculty of Agriculture, Assiut University
Dr.E. E. Mahdy, Professor,
Faculty of Agriculture, Assiut University

Equipment Purchased (Main Items Only

	US $
Tractor	7531
Drawing Loader	3254
Rotary Hoe	1627
Seed Drill Machine	n.a.
Portable Sprinkler	n.a.
Irrigation Unit	n.a.
Sprayer	n.a.
Thresher for Small Plots	n.a.
Front Loader	n.a.

IMPROVING PRODUCTION AND QUALITY OF LENTILS IN UPPER EGYPT

The Project, begun at the initiative of the Principal Investigator, was originally conceived to cover several pulses and legumes, but was scaled down before approval, apparently by decision of the Priority Committee because other FRCU supported research already covered some of the same products.

Its objectives were:

- to collect indigenous lentil germ plasm;
- to increase and then screen and evaluate lentil plasm for productivity, nutritive value, root rot and watering requirements;
- to experiment with various cultivation and plant protection techniques so as to develop recommended cultivation practices that could be passed on to farmers.

These objectives were accomplished. Forty-eight cultivars were evaluated, including entries from the U.S., Egypt and a number of other countries. The effects of changing the dates and frequency of various practices (planting, fertilization, irrigation, etc.) were observed and an optimum (area specific) package was developed which more than tripled seed yields. At the same time, a reduction of the seeding rate from 90Kg to 40Kg per acre was achieved.

The US Counterpart was helpful in providing germ-plasm, in providing relevant literature and, most importantly, in meeting with the Research Team before the experiments started, for detailed discussions of the Project design.

The Principal Investigator considers that, if funds are available, it would be useful to carry on further experimentation on mechanization and on sprinkler irrigation. The former is said to be justified by labor shortages/high cost in rural areas, and the latter is said to economize water even more than the new package has already achieved.

Further work, in his view, should also be done on the seeding rate, which seems to affect straw yields significantly, and on the farm management aspects of the new package.

He has made some efforts to contribute to the diffusion of his results. A farmers' field day was organized, which the Ministry of Agriculture attended.

But the outlook for a major impact of the Project is, nevertheless, murky. It will depend on the vigor with which the Extension Service of the Ministry of Agriculture takes over the results and makes them part of its program.

Since, apparently the Agricultural Research Center has no lentils program,[11] it is difficult to see how Subject Matter Specialists can be trained, which would be required to support the Extension Agents.

In summary, the Project was successful in accomplishing its immediate research aims but whether the ultimate objective -- that stated in the title -- will be achieved cannot be predicted with confidence. This ultimate objective is important, for lentils are an important staple food in Egypt. But while the Principal Investigator may be correct in his estimate that the country would gain LE 60,000,000 if all lentils in Egypt were to be produced on the basis of his recommendations, this is a purely hypothetical calculation.

The number of lentil farmers is apparently not known, but some 80,000 acres are said to be devoted to its production. Given average farm size, this suggests that the number may well be somewhere between 40,000 and 60,000; thus only the Government could possibly reach a significant proportion of them. And there is no knowledge whether it is preparing to do so.

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11 Information of Principal Investigator. Not checked.

DEVELOPMENT OF BANANA PRODUCTION IN EGYPT

BASIC DATA

Project No. 81005
Principal Investigator: Dr. Salah Mahmoud Elnabawy, Professor, Faculty of Agric. (Dept. of Horticulture), Ain Shams University
U.S. Counterpart: Dr. R. I. Fox, Professor, School of Agric. (Soils Dept), Univ. of Hawaii

Expenditures	AID $	AID L E	Govt. L E	Total US $
1982	--	21549	--	
1983	--	31760	--	
1984	3780	8088	--	
1985	60	33672	--	
1986	--	--	--	
1987	--	2500	11725	
1988	--	3332	--	
Total US$ Equiv.	3840	121586	14127	139553

Reports	Period Covered	Delivered
Year I		
4 Progress Rep.	8/4/82 - 7/4/83	n.a.
Year II		
4 Progress Rep.	8/7/83 - 7/7/84	n.a.
Year III		
4 Progress Rep.	8/7/84 - 1/7/85	n.a. - 2/12/85
Year IV		
3 Progress Rep.	7/7/85 - 7/4/86	11/10/86 - 8/10/86

Project No. 81005 Basic Data - Continued

Research Team (Principal Investigator plus:)

Dr. Ibrahim Shawky, Professor,
College of Agriculture, Ain Shams University
Dr. A. El Hammady, Professor,
College of Agriculture, Ain Shams University
Dr. I. El Decouky, Professor,
College of Agriculture, Ain Shams University
Dr. Z. El Behairy, Assistant Professor,
College of Agriculture, Ain Shams University
Dr. S. El Afifi, Assistant Professor,
College of Agriculture, Ain Shams University
Dr. A. Montasser, Assistant Professor,
College of Agriculture, Ain Shams University

Equipment Purchased (Main Items Only

	(US $ equi.)
Projector and Slides	265
Electrical Balance	2049
Sprayer Units	759
Sampling Plant Mill	2530
Moisture Meter	1567
Air Conditioner for Ripening	872
Thermo-hydrograph	458
Water Distiller	611
Micro Ky El Ohl Unit	904
Portable Conductivity Meter	563
Drip Irrigation Set	904
Irrometers	299

Publications by Team Members

Effect of Some Commercial Fertilizers on Leaf Mineral Content and Yields of Bananas, by I. Shawky, S. El Shazly and A. El Gazzar, Proceedings of the 1st Horticultural Science Conference, Tanta University, Sept. 1986.

Evaluation of the Flood Irrigation System in Banana Plantation at Menoufia Governorate, by Z. Behairy and M. A. Rawash (Undated).

Removal of Leaves of Banana Suckers, by M. Riad, I. Shawky, and I. El Desouky (Undated).

Project No. 81005 Basic Data - Continued

Effect of Pruning Hindi Banana Bunch and Coverage with Polyethelene Bags Before Maturity and Its Effects on Yield and Quality at Harvest, by A. El Hammady, A. Montasser, M. Riad and A. Khalifa (Undated).

Physiological Studies in Banana Cold Hardiness, by I. Shawky, I. El Opsouky and M. Riad (Undated).

DEVELOPMENT OF BANANA PRODUCTION IN EGYPT

The Project was one of two parallel, banana-related projects; its location was in marginal and desert lands in lower Egypt while its companion project (not part of this Assessment) took place in Upper Egypt. Its aim was to deal with the (undocumented) rapid decline in quality and yields of banana production in Egypt by means of:

(a) trials of new local and imported varieties, more resistant to Egypt's climatic conditions, diseases and pests;

(b) investigations of kind and levels of fertilization, irrigation and other cultivation practices;

(c) adoption of proper post-harvest practices (handling, artificial ripening, etc.).

These aims were largely accomplished and the results seem to be gratifying, all the more so as they seem to be applicable to desert land, provided groundwater is available. A private agri-business is using the new methods with good success on a 60-acre plot in the desert; good water was found at 40m.

Bananas seem to be a very profitable crop; acreage in recent years is said to have risen from 10,000 to 30,000. Quality, however, is far below export grade; it is significant that the imports that are being substituted are of Somali bananas which needed a special Protocol in the original Treaty of Rome to protect their European market access in spite of their low quality.

The US Counterpart apparently played a useful role by making available some of the results of his own experiments with fertilization and, most importantly, by advising on experimental design and sampling methods.

The Project is exceptional in one respect: in spite of the completion of the Project, the experiments are to be continued by the University. It could not be established what the source of funds for this was.

The role of the Ministry of Agriculture is dual. It was represented on the Research Team by the Vice Minister, who is himself a partner of the above-mentioned agri-business and who seems to have been an important contributor to the Project's success. He is also responsible for extension of the Project's results, but there is no evidence that this is being done on a substantial scale. Rather, information may be spreading by word of mouth.

In summary, the Project seems to have been moderately successful, including in helping to stimulate some private investment and in identifying some possible use for some desert lands. But as far as making its benefits available rapidly and systematically to large numbers of farmers is concerned, there is no evidence of major effort.

IMPROVEMENT OF FIG PRODUCTION IN THE NORTHERN-WESTERN COAST

BASIC DATA

Project No. 81019
Principal Investigator: Dr. A. R. Dania, Professor of Economic Entomology, University of Alexandria.
U.S. Counterpart: Dr. Julian C. Crane, Professor, University of California at Davis.

Expenditures

Note: Because of a communications problem, these data were not transcribed. There is no reason to believe that they are not available in the same form asfor the other projects sampled.

Reports

Same.

Research Team (Principal Investigator plus:)

Dr. M. A. Taha, Professor of Pomology,
Faculty of Agric., University of Alexandria.
Dr. A. F. Shaheen, Professor of Pomotogy,
Faculty of Agric., University of Alexandria.
Dr. A. Zeid Attalla, Assistant Professor,
Faculty of Agric., University of Alexandria.
Dr. M. S. Salah, Assistant Professor,
Faculty of Agric., University of Alexandria.
Dr. M. Shaaban, Graduate Student,
Faculty of Agric., University of Alexandria.

Equipment Purchased (Main Items Only

Incubators
Heaters
Balance

IMPROVEMENT OF FIG PRODUCTION IN THE NORTHERN-WESTERN COAST

The Project originated from a staff initiative in the Faculty of Agriculture. It consisted in an attempt to improve the very low yields and quality of the fig production in the north western coastal zone.[12] This is in the hands of some 5000 quite primitive semi-nomadic farmers (excluding families), whose previous exposure to modern agricultural practices was limited to the fertilizer information supplied by the local Ministry of Agriculture Office.

The required authorization to work in the area was obtained from that office which then participated in subsequent field work.

Work concentrated on experimental plots on fertilization, pruning (not previously practiced) and plant protection; some work was also done on irrigation but, as well owners were only willing to sell limited amounts of water, the latter work was limited.

Yields on the experimental plots rose from some 3 tons per acre to about 7. No economic calculation was made, but since an important part of the improvement came from better practices not requiring purchased inputs (pruning, regularity of watering intervals, etc.), the above noted 133 per cent increase in yields may even be below the corresponding increase in income.

There are no quantitative data on the degree to which the package that was developed has been adopted in the six villages in which the project worked. Qualitatively, the Principal Investigator knows that a certain number of farmers did adopt it because contact with the villages has been maintained subsequent to the completion of the Project (periodic visits by members of the Research Team to the area). The local Ministry of Agriculture Office is said to be trying to spread the adoption of the package to other villages along the Mediterranean coast, but the Principal Investigator has no information on the intensity or success of these efforts.

There were, during the execution of the Project, persistent negative reports from one of the Follow-up Committee members about the validity of some of the research methods chosen and, hence, about the reliability of the findings. There are no written records (in English at least) of responses by the Research Team, be they rebuttals or acceptance and remedial measures, but a Seminar is said to have been held at one time at which the issues were discussed and a consensus was reached.

The US Counterpart, because of his advanced age, could not visit Egypt

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12 A parallel project to do the same thing in Upper Egypt was not covered in this Assessment.

but was instead visited in California by several members of the Research Team. His role has been described as extremely helpful. He did a literature survey, helped to plan the experiments, reviewed and commented on all reports and introduced team members to the experimental work at the University of California. He was selected on the strength of his reputation.

In summary, the project was a modest attempt to do some useful crop improvement work at a fairly low level of sophistication, appropriate to the remoteness and ruggedness of an area of exceptionally limited natural resources and to the backwardness of the beneficiaries. Since the Ministry of Agriculture was represented locally, and it was not necessary to deal with the Main Office as intermediary, user involvement was not much of a problem. Indications are that some use is being made of the results, but the extent of this has not been established.

EVALUATION OF SOME MAIN DAIRY PRODUCTS CONSUMED IN EGYPT

BASIC DATA

Project No. 842003

Principal Investigator: Dr. Mahmoud Kamal Eldin Ibrahim, Professor, Faculty of Agriculture (Dept. of Food Industries), Cairo University

U.S. Counterpart: Dr. W. F. Shipe, Professor, Dept. of Food & Dairy Ind., Cornell Univ.

Expenditures	AID $	AID L E	Govt. L E	Total US $
1984	--	15678	--	
1985	--	9785	--	
1986	3851	--	--	
1987	--	--	10077	
1988	--	5000	9109	
Total US$ Equiv.	3851	36707	23118	63676

Reports	Period Covered	Delivered
Progress Rep. 1	1/6/84 - 30/8/84	20/11/84
Progress Rep. 2	1/9/84 - 30/11/84	27/3/85
Progress Rep. 3	1/12/84 - 28/2/85	20/8/85
Progress Rep. 4	1/3/85 - 1/5/85	23/4/86
Progress Rep. 5	1/6/85 - 31/8/85	29/12/87
Progress Rep. 6	1/9/85 - 30/11/85	7/4/88
Progress Rep. 7	1/12/85 - 1/2/86	31/1/89

Project N. 842003 Basic Data - Continued

Research Team (Principal Investigator plus:)

Dr. Maneir M. El Abd, Professor,
College of Agriculture, Cairo University
Dr. Elein S. Girgis, Professor,
College of Agriculture, Cairo University
Dr. M. M. Kandil, Professor,
College of Agriculture, Cairo University
Dr. M. A. El-Batay, Lecturer,
College of Agriculture, Cairo University

EVALUATION OF SOME MAIN DAIRY PRODUCTS CONSUMED IN EGYPT

The Project arose from the concern of the Principal Investigator -- a dairy specialist -- about the repeated reports of food poisoning in Egypt, allegedly as a result of toxic dairy products. He proposed to investigate the chemical, nutritional and bacteriological content of the main dairy products consumed in Egypt and to identify the presence of undesirable micro-organisms or pathogens. Further, it was proposed to reach conclusions regarding acceptable storage and transportation practices and regarding shelf life.

There was no involvement of the presumptive final user, i.e. the Ministry of Public Health, and since the work, in fact, reveals apparent grave inadequacies in the performance of the latter, this is as unsurprising as it is regrettable. The Final Report is still in preparation -- it is expected shortly -- but the main thrust is already clear (from Progress Reports and from discussion with the Principal Investigator): most cheese and virtually all yoghurt (an important item of popular consumption) produced outside the few (9) modern dairy plants are found to be produced under deplorable sanitary conditions and thus to be seriously unsafe for the consumer. Butter oil is mixed with lard on a large scale and butter is often stored without refrigeration. It is noteworthy that the legal standards regarding the nutritional standards are largely met or exceeded. A clear weakness in the analysis is that the amounts produced in the modern, safer, plants are not quantified as a proportion of total output; thus the statement that "most" dairy products -- rather than "many" -- are unsafe is still impressionistic.

The Report will make positive recommendations in three major areas: some regulatory changes, the production of pamphlets in laymen's language to instruct the small -- often rural -- dairy plants regarding safe practices, and the creation of a Dairy Research/Extension Center in which the Ministries of Agriculture, Industry and Public Health as well as the Faculty of Agriculture of the University of Cairo might participate.

It is impossible to be optimistic about the impact of the work. This is a great pity, for clearly it has made a potentially major contribution by identifying and documenting convincingly -- at least to the laymen -- conditions that would seem to pose an important public policy issue.

But the Principal Investigator intends, upon completion of the Final Report, to have it sent, for information, to the respective Ministries and to have no further involvement with it. While one cannot exclude an active response from the authorities, one cannot assume it either. And the public at large -- which might press for some action -- may remain ignorant of its contents, in spite of the FRCU's frequent practice to hold conferences on completed reports.

The involvement of the US Counterpart was nil, for when he was willing to visit Egypt, there were no funds available, and correspondence with him was minimal.

In summary, the Project made an important potential contribution which quite possibly will not be utilized. In this the Principal Investigator and the FRCU may have been too passive, but this is a judgment which outsiders, ignorant of the full political complexities involved, must be diffident about making. It is not the scientific or technological contribution that makes the Project important, since it consisted of the application of standard laboratory tests and analyses that are well known in the literature. Rather it was that by doing them, the Principal Investigator made it possible to identify a serious problem and to address it. But in the absence of a strategy to induce such utilization, the importance may remain potential rather than actual.

DEVELOPMENT OF FIRST YEAR COURSES, FACULTY OF AGRICULTURE AT FAYOUM, CAIRO UNIVERSITY

BASIC DATA

Project No. 842100
Principal Investigator: Dr. Zaher A. Mohamed, Associate Professor, Cairo University
U.S. Counterpart: Dr. Mary H. Shann, Associate Dean for Res. & Dev., Boston University

Expenditures	AID $	AID L E	Govt. L E	Total US $
1985	--	7500	--	
1986	--	--	--	
1987	1473	--	1459	
1988	2100	--	7000	
Total US$ Equiv.	3573	9038	10193	22804

Reports	Period Covered	Delivered
Progress Rep. 1	1/5/85 - 31/7/85	26/11/85
Progress Rep. 2	1/8/85 - 30/10/85	23/10/86
Progress Rep. 3	1/11/85 - 31/1/86	29/10/86
Progress Rep. 4	1/2/86 - 30/4/86	26/11/86
Progress Rep. 5	1/1/87 - 31/31/87	14/4/87
Progress Rep. 6	1/4/87 - 30/6/87	2/17/87
Progress Rep. 7	1/7/87 - 30/9/87	5/10/87
Progress Rep. 8	1/10/87 - 31/12/87	26/1/88
Final Report		10/8/88

Research Team (Principal Investigator plus:)

Dr. Hosny G. El Din, Professor, Faculty of Agriculture, Fayoum Univrsity
Dr. Ibrahim M. Ghazzi, Professor, Faculty of Agriculture, Fayoum University

DEVELOPMENT OF FIRST YEAR COURSES, FACULTY OF AGRICULTURE AT FAYOUM, CAIRO UNIVERSITY

The Project was the somewhat fortuitous result of the earlier participation of two of the subsequent Team members in the Cairo University-IDA Third Education Project (one component of which involved faculty development of all "Faculties" [Departments] of Cairo University, with Technical Assistance provided by the Boston University School of Education) and of the simultaneous training in Educational Techniques by another eventual Team member, at Dundee University. All were agricultural scientists, teaching at the Agricultural Faculty of Cairo University at Fayoum, and the ideas and approaches acquired in these two training programs concerned with teaching methods, inspired them to develop the Project.

It consisted in developing in one year (1986) and using in the next, comprehensive integrated and sequenced curriculum packages for the academic programs of the Faculty of Agriculture at Fayoum, beginning with the first year course offerings. Thus the Project referred only to the first year courses, but the underlying concept, of course, was to extend the approach, eventually, to all five years.

While initially all ten courses of the first year were to be included, three (Physics, Rural Sociology and Zoology) eventually dropped out for various reasons. Thus the Project developed the planned curriculum packages for the first year courses in Botany, General Chemistry, Organic Chemistry, Genetics, Soil Science, Entomology and General Microbiology. The three other courses continued to be taught in the traditional manner.

Modules were developed in which specific learning objectives were itemized (e.g., desired student competencies were specified item by item) and educational materials (overhead transparencies, lecture notes, slide film sequences, study guides for students, for instructors) were prepared for each module. To accomplish this, intensive training of the participating teaching staff preceded the course plan development which included the analysis of the status quo of each course.

The packages were used and evaluated for the first time in 1987, as planned. The results were generally gratifying. Examination performance improved and student reaction -- obtained through questionnaires -- was largely positive.

While there is no reason to doubt the qualitative judgment that the courses are now taught much better than before, the quantitative evaluation seems technically far less sophisticated -- or even reliable -- than the program design and execution themselves. Two points stand out:

(a) part of the modules was the development of better focussed examinations, including the introduction of some "objective" (non-essay, computer gradable) tests. This makes the comparison of examination performance

suspect or invalid;

(b) the data in the Report show that in most of the courses in which test scores improved, even greater improvements had occurred in the preceding year (i.e. the year before the new teaching methods were introduced). Other unidentified factors thus apparently were at work.

The role of the US Counterpart seems to have been important in the early stages of the Project. She had been a leader of the earlier, Cairo University-IDA Third Education Project's faculty improvement component and thus was able to help apply the concepts taught there. Her participation seems to have been most active in leading several seminars to train those participating faculty members of Fayoum who had not gone through the Boston University Program. Towards the end of the Project, the shortage of travel funds made her presence depend on the exigencies of other programs in Egypt in which she was also involved and/or on her willingness to use her own funds, clearly an undesirable situation. Whether it accounts for her failure to prevent the methodological mistakes in the Evaluation cannot be established.

In summary, the Project must be judged as an educational, not an agricultural applied research effort.[13] As such, it constitutes a valuable attempt to apply recognized modern pedagogic methods to university teaching in Egypt. While it is somewhat stretching the concept of "research," it is certainly "applied" and it does not seem inconsistent with the basic objectives of ULP. It is regrettable that it had to stop at the first year level; there would be good reasons for sticking to the original concept and having follow-up projects to extend the approach to the full five year cycle. The Research Team would, apparently, be quite willing to do so, if money were to be available.

It can properly be asked why the University itself does not take over the responsibility for financing the extension of such a promising program. The answer seems to lie in two fields: on the one hand the extreme tightness of "uncommitted" (non-salary) funds in the institution.[14] The other is that the kind of resistance that the Research Team had to overcome to persuade

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13 Given the purpose of this Impact Assessment, this did not seem to constitute a valid reason for dropping the project from the sample once this became clear. If anything, to have done so might be viewed as letting the format determine the sample unduly, i.e., as introducing a new bias.

14 The Faculty of Agriculture at Fayoum has a total non-salary budget of LE 140,000 (i.e. less than US $58,000) in 1989. Of this, about 21 per cent is allocated to Research. In a US university this would barely suffice to pay for one Graduate Research Assistant or for the computer time of one moderately active researcher (and insufficient to pay for both).

their colleagues to analyze and improve their own teaching methods is likely to be magnified at the level of the Academic Authorities. But if the approach is extended in the Faculty of Agriculture at Fayoum, more satisfied faculty and students may eventually cause it to spread further through one mechanism or another.

MINI-LINKAGE PROJECTS

Industry

EXTRACTION OF ALUMINUM OXIDE FROM EGYPTIAN ORES

BASIC DATA

Project No. 81017
Principal Investigator: Dr. Farouk Omar El-Kashif, Associate Professor, Faculty of Eng. (Dept. of Metallurgy), Cairo Univer.
U.S. Counterpart: Dr. G. M. Warren, Professor, Carnegie Mellon University

Expenditures	AID $	AID L E	Govt. L E	Total US $
1982	--	13060	--	
1983	--	19140	--	
1984	5100	32589	--	
Total US$ Equiv.	5100	78070	--	83170

Reports	Period Covered	Delivered
Year I		
4 Progress Rep.	1/4/82 - 1/4/83	1/8/82 - 1/9/83
Year II		
4 Progress Rep.	1/4/83 - 1/4/84	7/11/83 - 1/11/84
Final Report		1/11/84

Research Team (Principal Investigator plus:)

M. F. Mekkawy, Professor,
Faculty of Engineering, Cairo University
A. A. Abdel Bar, Professor,
Faculty of Engineering, Cairo University
A. M. El-Sheich, Assistant Professor,
Faculty of Engineering, Cairo University
F. El-Refay, Assistant Professor,
Faculty of Engineering, Cairo University

Project No. 81017 Basic Data - Continued

Equipment purchased (Main items only)

	US $
Jab. Muffle	4277
Jab. Muffle Furnace	2049
Strip Chart R.	639
P.H. Meter	1085
P.H. Electrocycle	422

EXTRACTION OF ALUMINUM OXIDE FROM EGYPTIAN ORES

The Project seems to have arisen out of the scientific curiosity of the Principal Investigator. It consisted in exploring the technical feasibility of extracting alumina from the low-grade clays and nepheline cyanite available in Egypt. At present Egypt depends entirely on imported alumina, mainly from Australia.

The Project was to investigate the applicability to Egyptian raw material of two processes: a Russian Lime process consisting in calcining the mineral with limestone and sodium at high (1300 C°) temperatures, and another one in which alumina is leached out through mineral acidic media. Costs and practical difficulties permitted experimentation only with the latter.

The results were not impressive. Although alumina could be so extracted, its quality was, according to the potential user -- the state-owned Egyptian Aluminium Company -- not acceptable for industrial use.

This user in the very initial phases of the Project was, apparently, positively disposed towards it, since the availability of domestic metal would have freed him from depending on the approval of the foreign exchange authorities for his purchases of raw material. He was not, however, in any way participating in the Project; he was being kept informed through the transmittal of the quarterly reports.

Very soon his comments became rather negative, which may have been related to his lack of participation as well as to the fact that if the processes under development were adopted, he might have to buy expensive domestic alumina instead of cheap imports. Since Egypt exports part of its output of aluminum, this would have created a serious problem.

His distance from Project execution may also explain why -- at least according to the English language documentary record -- it was only near completion of the Project that he spelled out what he considered minimum acceptable quality standards regarding physical and chemical characteristics.

It is noteworthy that no concern with costs or competitiveness appears either in the Project Proposal or in the subsequent work. It is the Principal Investigator's position that as a scientist/technician it is his responsibility to show, first, what can be done and then let others worry about whether it should be done, if they wish. This view was shared by some -- not all -- members of the Priority Committee.

The US Counterpart, chosen on the basis of a recommendation of a personal acquaintance in the Faculty of Engineering, seems to have contributed modestly through a literature survey and one visit to the Project laboratory.

In summary, this Project was not successful. The lack of adequate user involvement and of concern with costs and quality standards seem to have contributed to this result. But one must ask whether the oversight process of the Priority Committee was not also defective in this case since all these factors were plainly visible from the beginning.

A STUDY FOR MEASURING AND IMPROVING PRODUCTIVITY IN A BASIC INDUSTRIAL SECTOR

BASIC DATA

Project No. 81019
Principal Investigator: Dr. Mohmed Fahmy Hassan, Professor, Faculty of Engineering, Cairo University
U.S. Counterpart: Dr. G. M. Ghare, Director, Productivity Evaluation Center, Virginia Polytechnic Institute & State Univ. (Blacksburg, Va.)

Expenditures	AID $	AID L E	Govt. L E	Total US $
1982	--	3568	--	
1983	7970	11412	--	
1984	6004	29774	--	
1985	--	2100	--	
1986	--	1000	--	
Total US$ Equiv.	13974	57664	--	71638

Reports	Period Covered	Delivered
Year I		
4 Progress Rep.	1/5/82 - 1/5/83	8/8/82 - 3/7/83
Year II		
4 Progress Rep.	1/5/83 - 1/5/84	27/9/83 - 1/8/84
Year III		
2 Progress Rep.	1/5/84 - 1/11/84	1/11/84 - 1/4/85
Final Report		1/4/85

Research Team (Principal Investigator plus:)

Dr. Mohamod Adel Hussin, Cairo University
Dr. Mohamod El-Sayed Osman, Helwan University
Dr. Ali El-Shafei Ahmed, Cairo University
Dr. Mohamed Hussin Hassan, Helwan University
Dr. Ismail Moawad, Helwan University

A STUDY FOR MEASURING AND IMPROVING PRODUCTIVITY IN A BASIC INDUSTRIAL SECTOR

The origin and purpose of this Project is less than totally clear. It seems to have been an initiative of the Principal Investigator -- rather than a perceived need by the user(s), and the Project Proposal already reflected the problems of focus and central purpose:

> "The main interest of the project is to investigate and improve productivity in a chosen industrial sector. A preliminary study will be conducted to evaluate productivity in the basic industries. Productivity data will be collected and analyzed in each case. In light of the results of this analysis a particular industrial sector will be chosen for further study. It is expected that the textile industry will be our field of investigation. In such investigation a sample of factories will be selected for the applied study. Necessary improvements for improving productivity will be submitted to the concerned factories. . . ."

The Priority Committee approved the Project in spite of the doubts of some of its members.[15]

The actual work accomplished was more limited than the Proposal. A lengthy and technically defective discussion of various productivity concepts which would have benefitted from the help of a professional economist,[16] settled on labor productivity -- as against total factor productivity -- in the choice of what would be studied and what firms should maximize.[17]

Although it was intended to study ". . . a sample of factories," in fact only one firm -- textile -- proved to be seriously interested. That firm's

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15 Two related criticisms were:
1. An important element in productivity is technology. But this requires industry-specific expertise;
2. Why does a researcher all of whose experience is in metallurgical industries, study textiles?

The P.I.'s response -- to the Assessment Team -- was that he was an Industrial Engineer and his discipline was equally applicable to all industries. This is not convincing.

16 This was not accepted by the P.I.

17 This, of course, can lead to absurd recommendations, since it ignores the cost of capital. Firms want to maximize profits, not labor productivity and the country wants to economize on capital, which is its scarcest factor of production, not on labor which needs employment.

main problems seemed to derive not from low labor productivity but from several other factors.

One was losses caused by price controls. These differed on different products and the Principal Investigator proposed to construct a linear programming model that would meet the Government's production requirements while ensuring a product mix that would minimize losses.

The other one derived from old equipment that led to excessive losses of materials in the handling process. Thus it was the materials input/output relation rather than labor productivity that needed addressing.

Other major problems of the firm related to high interest rates, wages and incentive problems, and liquidity problems.

The linear programming model was, indeed, constructed and the Principal Investigator believes that its application converted, in one quarter, a LE 32,000 loss to a LE 96,000 profit.

The company, nevertheless, is not using the model any more. According to the Principal Investigator this is the result of changes in management. But actually continued use would be surprising, because the model was set to give only one product mix answer. If demand changes made a different mix necessary, only the Research Team, not the company staff would be able to ". . . change the model." The Principal Investigator reports that after completion of the Project, he applied for a new FRCU grant to train company personnel but was refused because ". . . teaching was not within FRCU's scope." This probably was just as well; a model that has to be changed every time demand fluctuates -- rather than have demand patterns as explicit variables -- seems of little use.

The role of the US Counterpart was, apparently, marginal.

In summary, other than providing some practical experience to the Research Team, there is little that can be claimed for the Project. A large producer of preserves, Kaha, is said now to want to try to apply similar methods -- with the help of the Principal Investigator -- but unless a textile firm and a jam producer have similar production problems, it is difficult to see how this can work.[18] Neither in terms of genuine user involvement, nor in terms of the technical adequacy of the design and of the worker can the Project be considered a success.

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18 The product mix/price structure problem of course may be similar.

DEVELOPMENT OF THE IRON AND STEEL INDUSTRY USING PROCESS COMPUTER CONTROL

BASIC DATA

Project No. 82020

Principal Investigator: Professor Dr. M. F. Saker, Faculty of Engineering, Cairo University

U.S. Counterpart: Dr. Irwin Lefkowitz, Professor, Case Western Reserve University
Dr. Mark Buchner, Professor, Case Western Reserve University

Expenditures	AID $	AID L E	Govt. L E	Total US $
1983	2659	22778	--	
1984	14868	21853	--	
1985	4177	25329	--	
1986	2227	816	--	
1987	19456	--	--	
Total US$ Equiv.	43387	85282	--	128669

Reports	Period Covered	Delivered
Year I		
4 Progress Rep.	1/1/83 - 1/1/84	1/4/83 - 25/12/83
Year II		
4 Progress Rep.	1/1/84 - 1/1/85	25/3/84 - 30/12/84
Year III		
4 Progress Rep.	1/1/85 - 30/6/87	2/4/85 - 12/7/87
Final Report		12/7/87

Project No. 82020 Basic Data - continued

Research Team (Principal Investigator plus:)

Dr. A. Hanafy, Professor, Cairo University
Dr. H. T. Dorrah, Professor, Cairo University
Dr. Ahmad Bahgat, Professor, Cairo University
Dr. M. M. F. Sakr, Professor, Cairo University
Dr. S. Mokhtar, El-tabin Mot. Institute
Eng. M. Abdel Latif, Egyptian Iron & Steel Company
Eng. A. Hamdy, Egyptian Iron & Steel Company
Eng. Y. A. Abdel Gawad, Egyptian Iron & Steel Company
Eng. S. Solam, Egyptian Iron & Steel Company
Chem. Y. Asher, Egyptian Iron & Steel Company

DEVELOPMENT OF THE IRON AND STEEL INDUSTRY USING PROCESS COMPUTER CONTROL

Although the full genesis of the Project could not be established with precision, the fortunate coincidence of two factors seems to have been at work. One was the awakening of interest by the Principal Investigator in the course of plant visits with students, and, subsequently, of the company, to attempt to improve the performance of the antiquainted, Russian built plant of the Egyptian Iron and Steel Company by applying computerized process control technology. The other was the willingness of UNIDO to finance a US $200,000 computer.

While the long term concept is to apply such techniques to the whole plant, it was decided -- after Project approval -- to begin with the steel making shop. The stated objectives were:

1. To obtain savings in the use of oxygen and, consequently, in the ferro-alloy additions.

2. To fine-tune and adjust the lime additions to avoid:
   (a) excess oxygen blowing;
   (b) fluctuations of basicity;
   (c) excessive loading of the kiln furnace.

3. Temperature adjustments in coordination with carbon control.

4. Adjusting the ... additions in coordination with the variations of the heat loss.

5. Decreasing blowing time.

   Reducing the lining wear.

7. Achieving the required steel grade.

A computer program, in short, was to be developed which initially would give running instructions to manual operators (the "static" model) on how to maintain the process constantly optimizing input costs, output levels and output quality. For a second phase, with appropriate instrumentation, the computer itself would have these commands carried out directly, dispensing with the manual operators (the "dynamic" model).

The Research Team worked in intimate cooperation with the plant engineers, and were successful in designing and applying the static model. While a full cost benefit calculation has not been made, the company maintains that the quality improvements alone have sufficed to raise the

average price[19] of the product by E 20 (US $8.00). This, at the current production level of 800,000 to 900,000 metric tons,[20] would yield an annual benefit of some L 17 million (US $6.8 million).[21] A further benefit, for which no money values were obtained by the Assessment, was a 10% decrease in the oxygen consumed. It should be noted that, if accurate, these benefits suffice to yield a handsome 30% return to the Egyptian economy on the whole ULP program, for there are virtually no offsetting costs.

The end of the Project has not signified the end of the work. The dynamic model has already been largely designed and UNIDO has agreed to contribute US $400,000 to the cost of the more powerful computer that will be needed for it. Installation is expected in the course of 1989. The Company is putting up the same amount (plus LE 100,000) out of their own resources. It has, moreover applied for 5 more FRCU projects -- through different Principal Investigators -- and has signed a protocol with FRCU committing itself to a contribution of LE 20,000 per project if these are approved. In short, it is clearly enthusiastic about the results achieved and is sold on the ULP.

It should be noted that the decision to develop the static program in-house, as against buying it abroad, was made with open eyes. The company feels that, while it took longer, they -- University and plant -- built up a technical team which not only can handle the model but can build on it. Certainly the company engineers seem dedicated and knowledgeable.

The role of the two US Counterparts seems to have been important technically throughout. They visited several times and seem to have advised in more detail than most. They are highly thought of.

In summary, in this Project a number of favorable circumstances combined to produce a success story. The UNIDO grants were crucial and so was, apparently the technical assistance -- also UNIDO financed -- that went with

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19 Given the administered domestic price structure, this may seem a rather notional estimate. But Egypt exports part of its steel, and the calculation is said to be based on these transactions.

20 Rated capacity is 1.2 - 1.3 million tons. The reason for actual output being so much lower could not be ascertained, but was said to be ". . . not market constraints." A layman's impression of the plant is first that layout is bad, and second that upkeep and maintenance are inadequate.

21 The quality improvement, in addition to its revenue enhancing facet, also produces a cost saving benefit. The "internal rejection rate" has gone down from about 20% to 5%, even though standards, allegedly, have toughened. Since rejected steel has to be re-processed as scrap, the cost savings are considerable. The company attributes part of this improvement to the better process controls.

it.

The Principal Investigator and the Company approached the Project with considerable vision. They went on record, from the beginning, that the real pay-off would not be the improvement of the Helwan plant -- important as that might be -- but the building up of a domestic capability to modernize the technical performance of the whole Egyptian iron and steel industry.

The process is still in its incipient stages. There may be a danger that the success in this field may lead to the neglect of the industry's many other serious problems. But that is a concern for the future and not one that diminishes the satisfactory results of the ULP in this case.

ANALYSIS AND MODELING OF ALUMINUM REDUCTION CELLS AT NAG-HAMMADY

BASIC DATA

Project No. 84214
Principal Investigator: Dr. M. G. Magrabi, Professor, Faculty of Engineering, Cairo University
U.S. Counterpart: Professor J. W. Evans, University of California (Berkeley)

Expenditures	AID $	AID L E	Govt. L E	Total US $
1984	--	17180	--	
1985	1575	23978	--	
1986	3009	969	--	
1987	7638	--	20138	
1988	4796	2959	43907	
Total US$ Equiv.	17018	54327	77168	1485'3

Reports	Period Covered	Delivered
Year I		
4 Progress Rep.	1/7/84 - 1/7/85	30/9/84 - 10/7/85
Year II		
4 Progress Rep.	1/7/85 - 1/7/86	13/10/85 - 23/7/86
Year III		
4 Progress Rep.	1/7/87 - 1/1/88	2/5/87 - 29/2/88
Year IV		
3 Progress Rep.	1/1/88 - 30/9/88	30/5/88 - 27/11/88

Project No. 84214 Basic Data - Continued

Research Team (Principal Investigator plus:)

Dr. S. ' El-Raghy, Vice-Dean & Professor, Cairo Univer.
Dr. E. E. Khalil, Professor, Cairo Univer.
Dr. F. A. El-Refai, Professor, Cairo Univer.
Dr. M. F. El-Demerdash, Professor, Cairo Univer.
Dr. K. F. Ali, Professor, Cairo Univer.
Dr. H. A. Ahmed, Professor, Cairo Univer.

Publications by Team Members:

Papers presented:
2 at Arabal Conference, Cairo 1985
1 at 10th Symposium on Turbulence, Missouri, 1986
1 at ICED Meeting, Atlanta, 1988

ANALYSIS AND MODELING OF ALUMINUM REDUCTION CELLS AT NAG-HAMMADY

The Project resulted from a prior survey by Research Team from the Faculty of Engineering at Cairo University, which, with the acquiescence of the Aluminium Company of Egypt, had surveyed the latter's plant at Nag Hammady. They had concluded that there was room for improvements in performance through parameters primarily determined by reduction cell design, construction and operating conditions.

The Project was designed to follow this lead. To this end, first the internal working of the cells, of Russian design and about which little was known, would have to be measured and modelled. Once the model proved trustworthy -- i.e., provided good predictions of the cell's actual behavior -- improvements in the energy consumption and in the output of the cell could be designed and, eventually, tested.

The main issue was to understand the magnetic fields that form inside the cell and which interfere with its energy efficiency. Few studies of this seem to exist. Given the importance of electricity as a cost item in aluminum production -- in the early 'eighties the smelter consumed 15 per cent of all electricity produced in Egypt -- the incentive to economize on its use was considerable.

The measuring and modelling part of the project has been completed and the results are considered so satisfactory in terms of its predictive power, that the characteristics of an improved cell have been specified and the USSR has been asked to produce a basic engineering design. However, the Russian technicians have not been given access to the model, which the Company intends to use to check the Russian design.[22]

Once the Russian design is approved, it is intended to build six pilot cells -- to be installed next year -- and to test them for about 2 years before deciding whether to replace the remaining ones.

The new cells are expected to raise electrical efficiency from 86 to 92 per cent, to reduce material consumption and to save energy. Company personnel cites a figure of LE 60 million as the total value of the savings expected, but were not able to specify either the breakdown or the number of years.

In any event, the Company's expectations are high. It has entered a separate LE 65,000 contract with the Faculty of Engineering of Cairo University and has expressed its willingness to contribute to further FRCU projects.

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22 This, apparently, refers to the software needed to run the model.

The contribution of the US Counterpart was useful; he is one of the most recognized authorities in the field. He commented extensviely on Progress Reports, visited the plant once and discussed the work-program. But he feels that even without his participation, good results would have been obtained, albeit, possibly more slowly.

In summary, although the ultimate benefits from the Project have not been garnered yet, there is every reason to believe that they will be, and that they will be considerable. The science involved, in the judgment of the U.S. Counterpart, is more advanced than in most FRCU projects, and may constitute a real technical/scientific contribution. More importantly, as in the Iron and Steel project, the seed sown by ULP has germinated and the Company now looks to the University to help solve important technical problems.

DEVELOPMENT AND DESIGN OPTIMIZATION OF WELDING TRANSFORMERS PRODUCED BY ELMACO COMPANY

BASIC DATA

Project No. 830603
Principal Investigator: Professor Sayed Ahmed Hassan, Menoufia University
U.S. Counterpart: Professor N. A. Demerdash, Clarkson College of Technology, Potsdam, N.Y.

Expenditures	AID $	AID L E	Govt. L E	Total US $
1983	--	11807	--	
1984	8036	24004	--	
1985	6	34810	--	
1986	15065	1315	--	
1987	3008	2990	6157	
Total US$ Equiv.	26115	90285	7419	123819

Reports	Period Covered	Delivered
Year I		
4 Progress Rep.	1/6/83 - 1/6/84	13/9/83 - 10/6/84
Year II		
4 Progress Rep.	1/6/84 - 1/6/85	10/10/84 - 2/6/85
Year III		
4 Progress Rep.	1/6/85 - 1/5/86	14/10/85 - 12/3/87
Final Report		12/3/87

Research Team (Principal Investigator plus:)

F. E. Abdel Kader, Professor, Menoufia University
E. M. Diab, Lecturer, Menoufia University
A. M. El-Khatib, Lecturer, Menoufia University
K. A. Abou Ahmed, Engineer, Menoufia University
A. El-Gondy, Engineer, Menoufia University
F. A. Ghoneen, ELMACO Company
F. El-Maghram, Professor, Cairo University
H. I. Attra, ELMACO Company

Project No. 830603 Basic Data - Continued

Publication by Team Members

Performance Analysis of Moving Limb Welding Transformers, in Electrical Machines and Power Systems (USA), Vol. 12, No. 4, 1987.

DEVELOPMENT AND DESIGN OPTIMIZATION OF WELDING TRANSFORMERS PRODUCED BY ELMACO COMPANY

Like the Iron and Steel Company Project, this Project originated in the course of routine teaching/demonstration visits by the Principal Investigator and some colleagues with their students to the plant. It was in the course of discussions with plant engineers about the unimpressive performance characteristics of the 400 amp. welding transformers produced by the Company under license from a 20 year old Siemens design, that the possibility of a re-designed transformer arose. The Company agreed to devoting some of its engineers to work collaboratively with the University team.

Transformers, capacitors and similar electrical equipment are the principal products of this company which was nationalized after the 1954 revolution. It is the only significant producer of this type of equipment in Egypt. At present it employs some 500 people and has very substantial excess capacity (50-100 per cent) in machinery as well as in labor.

The stated objectives of the project were:

(a) to provide an improved design and performance characteristics for the Company's 400 amp. welding transformer and

(b) to design other types of welding transformers with different ratings.

These objectives were achieved. A prototype of the redesigned 400 amp. transformer was built, tested and improved further. Several prototypes of improved 100 and 200 amp. transformers -- for which the market is much smaller -- were also built and they performed more or less according to the calculations.

The results were highly positive. The new 400 amp. transformer is now the only one of that strength that the Company produces. It has reduced the amount of materials used by one third, is consequently much lighter and has better performance characteristics. It is somewhat more expensive than imported transformers from Eastern Block countries which, however, have lower performance. The reverse is true with respect to imports from the West; the ELMACO transformer is cheaper but performs less well. The Company, on its own, is now working on meeting the performance standards of all imports.

Its cost, in constant prices, has been reduced from LE 550 (old design) to LE 300. This, at the current level of output of some 740 transformers per year represents an annual saving of LE 185,000 (US $76,500) which, compared to the US $124,000 cost of the program[23] is a more than satisfactory return

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23 A slight under-estimate as the salaries of the Company's engineers participating in the research are not included.

on investment. As the market expands over time, the actual savings should be even greater, but the Company is surprisingly ignorant about the size of the total market (it does not know how much is imported), or about its growth.

The Company appreciates the contribution which the academic researchers have made and has signed a letter of intent to FRCU committing itself to contribute LE 10,000 over two years to the cost of a new project presently under consideration by FRCU (to improve capacitors.).

The role of the US Counterpart in the success of the project is not very clear. He was recommended by one of the senior members of the Faculty of Engineering as an authority in the field and his expertise was said to have been helpful but not crucial.

In summary, the project had well defined reasonably modest aims, was more technological than scientific in nature, had a clearly identified user/beneficiary involved from the beginning and produced sizable benefits to the economy which were garnered by a state enterprise and by its customers.

COMPUTERIZED PROCESS MANAGEMENT SYSTEMS FOR EGYPTIAN TEXTILE COMPANIES

BASIC DATA

Project No. 842016
Principal Investigator: Professor Hassed T. Dorrah, Faculty of Engineering, Cairo University
U.S. Counterpart: Professor Irving Lefkowitz, Case Western Reserve University

Expenditures	AID $	AID L E	Govt. L E	Total US $
1984	1237	27520	--	
1985	3040	3237	--	
1986	11500	2670	--	
1987	8646	--	12027	
1988	1252	1942	25500	
Total US$ Equiv.	25675	77603	45220	148498

Reports	Period Covered	Delivered
Year I		
4 Progress Rep.	1/5/84 - 1/5/85	1/8/84 - 24/4/85
Year II		
4 Progress Rep.	1/5/85 - 1/5/86	1/8/85 - 1/5/86
Year III		
4 Progress Rep.	1/12/86 - 30/4/88	31/7/87 - 21/7/88
Final Report		21/7/88

Research Team (Principal Investigator plus:)

Mohamed F. Sakr, Professor, Cairo University
Adel A. Hanafy, Professor, Cairo University
Ahmet Baghat, Professor, Cairo University
Ismail El-Awamy, Professor, Ain Shams University
Mohamet Zaki, Professor, El-Azhar University
Eng. Beshra Yousef, ESCO Textile Company
Eng. Ramzy Amin, ESCO Textile Company
Ahmed Hamed Solim, ESCO Textile Company

Project No. 842016 Basic Data - Continued

Poblications by Team Members

Papers presented at:

(a) German/Egyptian Symposium on Information, Cairo, April 1985.
(b) IEE Systems and Cybernetics, USA, Oct. 1987.
(c) International Conference on Science and Technology, Cairo, Jan. 1988.
(d) Arabic Symposium on Information Systems, Alexandria, April 1988.

COMPUTERIZED PROCESS MANAGEMENT SYSTEMS FOR EGYPTIAN TEXTILE COMPANIES

The Project seems to have been the result, in part, of the success of the Iron and Steel Project and in part of the desire of the Principal Investigator to show that Operations Research techniques could be applied almost anywhere. He managed to get the acquiescence of the Management of ESCO, a major state owned textile firm, but one gets the impression that the agendas of the two parties may never have been identical.

There was no central theme to the research other than the methodological one. In discussion it was decided that the OR tools could be used profitably on several disparate problems. One was labor transportation; the Company operated 45 buses for its 11 plants and a classical optimum routing and scheduling problem seemed to exist. Another was an inventory purchasing problem for spare parts, another common linear programming subject. The most ambitious was a computer based process management system for decision making.

It was not possible to encounter the ESCO management that agreed to work with the researchers; management is said to have changed five times since then, and the present team has no knowledge of the program. Only the Company's former Planning Director -- now with a different firm -- met with the Assessment Team.

The impression one gets is that the then responsible Chairman was interested in bringing the managers of the firm's eleven plants, who had been operating quite independently, under the discipline of the central headquarters and that for a while he had hopes that the new tools would help him in this. Subsequent Chairmen, less interested in centralization and less impressed with computerized decision making, distanced themselves from the operation and it petered out.

To explain the lack of success -- so different from the Steel Project -- it has also been argued that the quantifiable benefits to ESCO were:

(a) much smaller. From the bus rescheduling there may have been a 10% saving in the annual L 10 million cost, i.e. US $400,000. The inventory cost savings were said to be 2%; but at the 18% interest rate on a L 6,000,000 inventory this is less than US $9000 per year.

(b) much less visible, because the bus cost savings were diffuse (11 plants) while the steel revenues were clearly identifiable.

It is noteworthy that the US Counterpart was the same as in the Iron and Steel Project. His technical competence was thus not in doubt but the problems clearly were of a non-technical nature.

In summary, in this case an experience that is also quite common in research projects in developed countries can be observed. Technique driven projects -- sometimes described as ". . . have model, will travel" projects -- are far less likely to yield something interesting and useful than problem driven projects.

MINI-LINKAGE PROJECTS

Energy

UTILIZATION OF THE HYDRO-ENERGY OF SMALL IRRIGATION STRUCTURES IN EGYPT

BASIC DATA

Project No. 81013
Principal Investigator: Dr. Sami Mikhail, Professor, Faculty of Engineering, Cairo University
U.S. Counterpart: Dr. Amr Baz, Associate Professor, Catholic University (Wash. D.C.)

Expenditures	AID $	AID L E	Govt. L E	Total US $
1982	3300	14097	--	
1983	4360	7769	--	
1984	5902	19632	--	
1985	2408	16536	--	
1986	3600	--	--	
Total US$ Equiv.	19375	69930		89305

Reports	Period Covered	Delivered
Year I		
4 Progress Rep.	1/3/82 - 28/2/83	3/5/82 - 2/4/83
Year II		
4 Progress Rep.	1/10/83 - 1/2/85	8/1/84 - 2/6/85
Final Report		1/2/86

Research Team (Principal Investigator plus:)

Dr. Samy M. Morcos, Cairo University
Dr. Amin H. Baghdadi, Cairo University
Dr. Amin Mobarak, Cairo University

UTILIZATION OF THE HYDRO-ENERGY OF SMALL IRRIGATION STRUCTURES IN EGYPT

The Project arose from the research interests of the Principal Investigator, with no indication of interest from either the Ministry of Irrigation or the Ministry of Energy.

The Project conception was based on the correct premise that Egypt has an unusually large number of low-head waterways (including irrigation canals) controlled by many regulators (dams, barrages, etc.) and that in principle some electricity could be generated from any one of these. The aim thus was to calculate this potential, assess its character, determine the location of suitable sites, determine the most suitable technology for their development and appraise their economic feasibility.

Regarding the first three objectives he cites seven Nile barrages for medium to large scale power projects, and 24 head and intake regulators on main canals and tributaries for small and mini-projects (100-1500 KW).[24] Since for the 10,000 or so hydraulic structures on irrigation and drainage canals there are no hydrological data, he took measurements on one and concluded that its potential was 50 KW. A national estimate thus was precluded by the nature of the data.

It soon became apparent that the main justification of power in such locations was lifting water for irrigation and consumption, and that there were alternate ways of using the available head directly (i.e., without generating electricity) for this purpose. He explored three of these: for micro-projects the water wheel and for mini-projects a turbine-pump unit and a ram-pump. For all of these he performed calculations and tests which favored the first and the second.

Unfortunately the conclusions are vitiated by a totally invalid economic analysis -- in which he pits the turbine-pump against a diesel alternative -- which makes the optimum technology depend on the rate of inflation (!); the higher it is, the more capital intensive should be the choice.

The role of the US Counterpart was distorted, since the original Principal Investigator, after Project approval, emigrated to the US and immediately was named US Counterpart.

In summary, the Project is an oddity. It started out as an electric power project and became an irrigation project without any record in the file suggesting that the Follow-Up Committee had taken note of this change; it produced some possibly interesting calculations about the potential of certain pump designs and about the mechanics of the millenia-old Egyptian water wheel, and it evaluated all this in a manner so totally devoid of

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24 Including one with 3000 KW estimated potential.

economic meaning that even the non-economics-oriented Priority Committee seems to have noticed.[25] The Project must be considered a failure of the oversight function as well as in its own right.

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[25] One comment was that the research was so original that the economics hardly mattered.

ENERGY CONSERVATION IN OIL REFINERIES IN EGYPT

BASIC DATA

Project No. 830201
Principal Investigator: Professor S.A.Farag, Faculty of Engineering (Dept. of Mech. Power), Cairo University
US Counterpart: Professor L. Douglas Smoot, Brigham Young University

Expenditures	AID $	AID L E	Govt. L E	Total US $
1983	--	6650	--	
1984	4688	53330	--	
1985	2850	157	--	
1986	600	--	--	
Total US$ Equiv.	8138	72869	--	81007

Reports	Period Covered	Delivered
Year I		
4 Progress Rep.	1/5/83 - 31/7/84	31/7/83 - 12/7/84
Year II		
4 Progress Rep.	1/8/84 - 28/2/86	7/11/84 - 3/8/86
Final Report		3/8/86

Research Team (Principal Investigator plus:)

Dr. Saher Kousa, Professor, Faculty of Engineering, Cairo University
Dr. Abdel-Wahed El-Dib, Assistant Professor, Faculty of Engineering, Cairo University
Dr. Abdel Mouem Attya, Lecturer, Faculty of Engineering, Cairo University
Dr. Abdallah Hanafi, Lecturer, Faculty of Engineering, Cairo University
Dr. El Sayad Shabana, Assistant Lecturer, Faculty of Engineering, Cairo University
Dr. Galal Mostafa, Assistant Lecturer, Faculty of Engineering, Cairo University
Mohamed Nour El-Din, Assistant Engineer, El Nasr Oil Company

Research Team

Khalil El-Khodery, Engineer, El Nasr Oil Company
Mahmoud Hassan, Engineer, Suez Oil Processing Company
Mohamed Abdel Nabi, Engineer, Suez Oil Processing Co.

Equipment Purchased (Main Items Only)

	US $
Experimental Furnace	3615
Experimental Comb. Ch.	1200
P.C.	12050
Various Measuring Equipments	6025

Publications by Team Members

Paper at 2nd Egyptian Congress of Chemical Engineers, Cairo, 1983
Simulation of Shell and Tube Heat Exchangers for Oil Refineries
(Proceedings of 4th International Conference on Numerical Methods in Thermal Problems, Swansea, U.K., 1985).

ENERGY CONSERVATION IN OIL REFINERIES IN EGYPT

The Project was an initiative of the Principal Investigator who considered the improvement of the energy efficiency of Egypt's oil refineries an important and interesting professional challenge. He was acquainted with the literature describing Exxon's success in raising fuel efficiency by 20 per cent between 1972 and 1980 in its US refineries and thought that similar or even greater -- because of a lower starting point -- results could be achieved in Egypt.

While the Proposal, as approved, was exceedingly general -- to indicate areas having a potential for considerable conservation, to recommend methods appropriate for application, to predict and assess the results of these methods and to demonstrate practically the benefits of application of one or more of these methods -- the work was soon narrowed down. Most of it was carried out in the Suez Oil Processing Co., a state enterprise which owns Egypt's oldest refinery. It was found that lack of instruments had precluded the refinery from measuring the energy consumption of individual units, so estimates had to be made. It was concluded that the reformers offered particularly great opportunities for economizing on the inputs that it received from 7 fired heaters and 5 steam heaters. Two sets of recommendations emerged:

(a) major ones, relating to the amount of oxygen used and

(b) "housekeeping" ones, relating to the introduction of a list of individually minor measures -- e.g. insulation, layout -- of considerable aggregate significance.

The former, alone, yields savings which the company and the Principal Investigator valued at US $600,000 annually. Since the price of oil was assumed to be US $30 per barrel, at today's prices this figure should be reduced to about US $400,000. The impact of the housekeeping measures was not quantified.

A more theoretical total energy saving program for the refinery was also sketched and valued at annual savings of US $26 million, but this seems a rather notional figure since it is said to be close to the maximum possible thermo-dynamically. But important work seems to have been done on the heat exchangers, and an apparently convincing case for the use of pre-heaters emerged.

Work -- less ambitious -- was also done on the EL NASR refinery (NOC) and effective recommendations -- on the use of baffles and dampers controlling the amount of air entering a furnace -- resulted. Both companies are said to have adopted the major recommendations.

The role of the US Counterpart seems to have been minor; the first one resigned in mid-project because of lack of time to devote to it and because

of illness. A successor was eventually found but it may have been too late for him to have much of an impact.

The position of the users is ambiguous. The Suez Oil Processing Company on the one hand expresses itself as delighted with the results of the work. But on the other hand it apparently would not contribute financially to similar work in future ". . . because we have no budget for it."[26] The Ministry of Petroleum is said to be "interested" in the results but apparently has made no concerted effort to extend them to the other state-owned refineries.[27]

In summary, the Project seems to have been a substantial success, even though its full potential was not exploited. The work done seems very solid and it is still possible that in time the remaining refineries may also benefit from it.

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26 This may be the result of the official interviewed feeling without authority to commit the Chairman.

27 There was no time to pursue this through additional interviews.

ENERGY POLICY FOR LIQUID FUEL TRANSPORTATION

BASIC DATA

Project No. 830212
Principal Investigator: Professor Abdel Razek A. F. Ibrahim, Faculty of Engineering, Helwan University
U.S. Counterpart: Dr. William Mirsky, University of Michigan

Expenditures	AID $	AID L E	Govt. L E	Total US $
1984	4143	23828	--	
1985	5700	19804	--	
1986	3816	658	--	
1987	1235	14	4190	
1988	1235	--	--	
Total US$ Equiv.	16129	53388	5049	74566

Reports	Period Covered	Delivered
Year I		
4 Progress Rep.	1/11/83 - 3/1/85	13/1/84 - 27/1/85
Year II		
4 Progress Rep.	1/2/85 - 30/4/87	14/5/85 - 25/3/87
Final Report		25/3/87

Research Team (Principal Investigator plus:)

M. Sedrak, Assistant Professor, Helwan University
A. Sharara, Assistant Professor, Helwan University
El S. Ellaimony, Lecturer, Helwan University
M. Ramadam, Lecturer, Helwan University

This Project was pursued by ill fortune all the way through. The first Principal Investigator died and, although a Consultant to the Research Team was asked to complete it, it was terminated after two years. The US Counterpart did not visit Egypt because he was deterred by a spate of aircraft hijackings and there were interminable delays in the procurement of imported road testing equipment.

But there were also serious problems of design. It was proposed to

> ". . . find the most favorable means of transportation . . . [and] the most favorable loading centers . . . [and] an optimal solution and the best design for the transportation [of Egypt's liquid fuel, i.e. field to refineries, refineries to loading centers, loading centers to consuming centers]."

Unfortunately the only criterion of optimality was energy consumption; investment costs and non-energy related recurrent costs were ignored. For this and other reasons the original project design addressed a relatively trivial question -- how best to transport liquid fuel given no new investment in transport at all -- and it did it incorrectly by minimizing energy rather than total costs. At the same time it failed to ask important questions, such as those pertaining to the advantages of new pipeline construction versus investing in other modes of transport.

One gets the impression that the second Principal Inves-tigator made intelligent efforts to redirect the Project, so as to make it yield something useful. A series of highly original field measurements were performed to establish the actual fuel consumption, per unit of fuel transported, not only of barges, railroads and trucks, but of some 12 different truck models.

The data so assembled are interesting and have real scarcity value.[28] But their interpretation reflects the "physical" bias of the Research Team; it is recommended to buy only the most fuel-economizing brands of trucks, without any reference to price.

In summary, the Project was a case of both bad luck and bad conception. Moreover, although the Ministry of Transport endorsed the Project, being one of the external referees, there is no evidence of a proprietary interest in it. This may not be surprising: responsibility for fuel transport in Egypt is split between this Ministry (barges and railroads) and the Ministry of Petroleum (pipelines and roads). Any optimal solution would require the agreement of both, and no attempt was made, apparently, to deal with the implications of this. For this reason alone, perhaps, failure was almost

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28 Most such data depend on drivers' fuel purchase records and thus are greatly distorted. The same applies to barges.

inevitable. But given the fact that the conceptual framework was such as to lead, probably, to wrong conclusions, this may, in the end, be no misfortune.

SOLAR PONDS FOR HEAT AND POWER GENERATION

BASIC DATA

Project No. 830217
Principal Investigator: Dr. Eng. Mohamed Nabil Metwally, Lecturer, Helwan University
U.S. Counterpart: Dr. M. H. Cobble, Professor, New Mexico State University

Expenditures	AID $	AID L E	Govt. L E	Total US $
1984	4900	23971	--	
1985	3765	24068	--	
1986	1479	5500	--	
1987	410	--	17460	
1988	40	15027	23897	
Total US$ Equiv.	10594	82622	49835	143051

Reports	Period Covered	Delivered
Year I		
4 Progress Rep.	1/11/83 - 30/10/84	1/2/84 - 1/3/85
Year II		
4 Progress Rep.	1/11/84 - 31/1/86	1/8/85 - 17/2/88
Year III		
2 Progress Rep.	1/2/86 - 31/7/86	10/10/88 - 21/2/89
Final Report		17/2/89

Research Team (Principal Investigator plus:)

Dr. Hazem A. M. Heikal, Professor & Dept. Head,
Faculty of Eng. at Mattaria, Helwan University
Dr. Ahmed R. Abouhabsa, Lecturer,
Faculty of Eng. at Mattaria, Helwan University
Dr. Mohsen S. Radwan, Assistant Professor,
Faculty of Eng. at Mattaria, Helwan University
Eng. Mohamed F. Ahmed, Demonstrator,
Faculty of Eng. at Mattaria, Helwan University

Equipment purchased (Main items only)

	US $
P.C.	7230
Salinity Motor	3012
Digital Temperature Motor	2410
Switches for Temps.	1205
AID Pulse Transmitter	1205
Pyranometers	1807
Wind Speed Anemometrix	2410
Pld. Points Box (48 pts.)	1205
Workshop Machines	2410

Publications by Team Members

Computer Simulation of an Internal Heat Extracting System for Salt Gradient Solar Ponds (ISES International Congress, Hamburg, 1987)

Thermal Performance of Small Scale Experimental Salt Gradient Solar Pond in Cairo/Egypt (ISES International Congress, Hamburg, 1987)

Performance Analysis of One Year Experimental Salt Gradient Solar Pond Storage and Heat Extraction in Cairo/Egypt (Cairo Symposium on Renewable Energy Sources, Egypt, 1988)

Performance Estimation of Cairo Experimental Large Scale Salt Gradient Solar Pond (CELSP) and Initial Construction Procedure (ILLEC 85, Miami, 1985)

Optimum Working Fluids for Organic Ranging Cycles Used for Salt Gradient Solar Ponds Power Generation (Engineering Research Bulletin, 1988)

SOLAR PONDS FOR HEAT AND POWER GENERATION

The Project, to find the optimum method of building a usable solar pond under Egyptian conditions, arose from the research interests of the Principal Investigator and did not involve -- or even engage the attention of -- the Ministry of Electricity. The latter has a program of its own and is reported to be building its own large scale pond. This lack of a Ministry presence in the Project is all the more regrettable as the Project is one of three solar pond projects sponsored by FRUC; the other two involve mathematical and heat transfer aspects. There thus would seem to exist the elements for a coordinated program, but apparently this opportunity was not exploited.

The Project achieved part of its aims. A computer model was prepared and its predictions were compared with experimental results from a small pond at the Faculty of Engineering at Mattaria, Cairo. The results were said to be very close, confirming that the physics of such ponds were well understood and were correctly embodied in the mathematical model.

On the other hand the large scale experimental pond that had been intended, could not be built because of cost inflation and site problems; the land involved belonged to the Petroleum Institute which insisted on ownership rights over the installations.

The US Counterpart's most important help was reported to be with the purchase of equipment. He had been expected to be particularly helpful on the generating aspects. Since the large pond was not built this expertise could not be used!

In summary, the Project produced some better understanding of solar ponds on the part of the investigators. But its isolation from the Ministry's parallel program minimizes its impact; the results were communicated to the Ministry in 1986 but have yet to be acknowledged.

APPENDICES

NARP PROGRESS REPORT
An Example

Progress Repot No. 1 Period: July - Dec., 88

I. **Project Basic Information**

Activity No. RIR 067 P

Title: Improved production, quality and economic returns of sweet sorghum under stress environments.

Coordinator: A.H. Nour

Principal Investigator: A.I. Allam

Duration: 6 months (one growing season) renewable as deemed appropriate.

Date of Commencement: May 1988

II. Research Activities

1. Objectives

a. To introduce and select suitable varieties for different agronomic zones,

b. To assess the productivity under stress environments,

c. To determine their economic returns,

d. To determine their chemical composition and feed value, and

e. To establish agroindustrial uses of sweet sorghum.

2. Experimental Work

Five experiments were implemented under this research activity. They are:

a. Varietal Trial: 35 varieties in 4 Reps. in CRBD.

b. Sowing Dates and Varieties: Varieties (2) X sowing dates (4) in a 2 X 4 factorial experiment with 4 replications.

c. Varieties and Plant Densities: 2 varieties X 4 plant densities (design and ANOVA as for Exp. b).

d. Sowing Dates, Harvesting Dates and Varieties: 2 varieties X 4 sowing dates X 4 harvesting dates with 4 replications in a 2 X 4 X 4 factorial exp. in RCB design.

e. Fertilizers and Varieties: 3 varieties X 6 N-levels and 3 P_2O_5 levels with 4 replications in a 3 X 6 factorial in a split plot design.

f. Sowing Dates: For Giza: May 26, June 6, 16 and 26.
For Nubaria: June 1, 10, 20 and 30.
For Mallawi: May 19.

g. Harvesting Dates: At age of 90, 100, 110 and 120 days after planting.

h. Cultivars: SS 301 and SS 405 + 35 more varieties.

2. Results

Tables 1, 2, and 3 show the data for the 37 varieties of sweet sorghum grown at Mallawi. Data were recorded and analyzed for the 4 other experiments.

3. Conclusions

a. * 12 varieties are considered as early flowering; they start flowering during August;

* and 20 varieties as medium, they flower during September;

* and 3 varieties as late, flowering during October.

b. Juice quantity per stalk varied from 130 to 660 gm.

c. Total soluble solids (TSS) ranged between 13.5 to 18.0% and sucrose% ranged between 6.2 - 15.0. The reducing sugars varied between 1.95 to 6.50%.

4. Recommendations

Data were subjected to statistical analysis and a combined analysis will be attempted for the two seasons 1988 and 1989 to study the variety X year effect.

III. Constraints

1. Technical

Bird attack and slow data processing.

2. Finance

Lack of finance at the proper time.

3. Administrative

a. Lack of communication among staff.

b. Problems concerning traveling to and from the experimental sites; and

c. Lack of decision making among the research team.

IV. Proposed Work for the Next Stage

1. Carry on the statistical analysis and prepare the manuscripts.

2. Report the experiments for one more season.

V. Remarks

1. The work progressed according to plan.

2. A technical paper entitled "Some resistance characteristics of two sweet sorghum hybrids (Sorghum bicolor L.) to seedling blight disease" was published in the Egypt J. Appl. Sci., 3 (1) 1988, pages 28-37, as a side activity of this sweet sorghum program.

VI Funds Status

	L.E.
1. Amount Received	.....
2. Submitted Receipts	.....
3. Balance	.....

LIST OF PERSONS INTERVIEWED[1]

I. FRCU

S. H. Hassanien	(Secretary General) Supreme Council of Universities
M. M. El-Kotb	(Executive Director, FRCU) Supreme Council of Universities

II. Desert Development

Adli Bishay	(Director, Desert Devel. Center) AUC
M. A. Sabbah	(Ag. Eng.) University of Alexandria
A. M. Youssef	(Dairying) University of Alexandria
S. T. El-Deeb	(Plant Protection) University of Alexandria
A. M. Tarabeih	(Plant Pathology) University of Alexandria
A. M. Fadhi	(Soilt & Water Sc.) University of Alexandria
A. M. Gad	(Crop Science) University of Alexandria
Mohsen Adain Omer	(Crop Science) University of Alexandria
Gaber Ibrahim Fegla	(Plant Pathology) University of Alexandria
Mostafa H. Hilal	(Soils & Water Utilization) Nat'l Research Center, Doki, Cairo
Said Mahmoud	(Animal Production) Tanta University
Raouf Khouzan	(Economist)
Seif A. Sef	(Forage Agronomist)
Hany M. Gado	(Ruminant Nutrition) Ain Shams University
Hassan El-Sheemy	

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1 The following list is incomplete because of occasional problems of interpretation. Any omissions are unintentional and are regretted. Titles are omitted throughout because they are known for only some of the persons named. It is presumed that virtually all academic personnel are Ph.D.'s. The P.I.'s are listed in Chapter II; all were interviewed.

III. Fruit Trees

Salah El-Khali	(Dean, Agricultural College) Menoufiya University
Saad El-Naggar	(Horticulture) Menoufiya University
El-Shawalty Mousa	(Plant Pathology) Menoufiya University
M. M. Fouad	(Coordinator) Menoufiya University
M. R. M. Rabeh	(Tissue Culture) Menoufiya University
M. Z. Abdel-Bar	(Asst. Coordinator) Menoufiya University
Amn Abo-Elghar	(Virology) Menoufiya University
O. J. Dickerson	(Plant Pathology) Clemson University
J. Daniels	(Dean) Clemson University
D. Lineberger	(Horticulture) Clemson University
J. Ridley	(Horticulture Extension) Clemson University

IV. Sugar Beets

M. Khairy Morsi	(Food Technology) Cairo University
Abd El-Waha I. Allam	Ag. Res. Center (Min. of Ag.)
El-Sayed Abdel Aziz	Cairo University
A. M. Alian	(Food Science) Cairo University
S. Elnagar	(Economic Entomology) Cairo University
A. Mostaghar	(Dean, Fac. of Agric.) Cairo University
Abou El-Rouy	(Soil Science) Cairo University

V. Agricultural Priority Committee

Mahmoud Imam Nasr	(Genetics) Menoufiya University
Abdel-Mangy Abou Aziz	(Vice President) Acad. Sci. Research & Tech.
Ahmed M. Alian	(Food Science) Cairo University
Ahmed Shawky	Zagazig University

Mamdouh Abd El-Bakr	(Food Science) Suez Canal University
M. A. El-Ashry	(Animal Production) Ain Shams University
M. S. Danasoury	(Animal Production) Tanta University
M. S. Hanafy	(Animal Production) Zagazig University
S. M. El-Sherif	(Soil Science) Ain Shams University
Hassan Hamdi	(Soil Science, Emeritus) Ain Shams University
Abdel Halim El-Damaty	(Soil Science) Ain Shams University

VI. Industry Priority Committee

El-Salamoni	(Mechanical Engineering) Cairo University
El-Sabbagh	(Mechanical Engineering) Ain Shams University
Ashraf Hamdi	(Electronics) Electronics Industry
Y. Mazhar	(First Undersecretary) Ministry of Industry
M. Sabry	(Electrical Engineering) Ministry of Engineering
I. Sharkas	(Textiles) Ministry of Industry
S. El Raghy	(Metallurgy) Cairo University
A. Baghat	(Electrical Engineering) Cairo University
M. Haykal	(Mechanical Engineering) Helwan University
S. Hassan	(Electrical Engineering) El-Menoufiya University
A. Abdel-Wahab	(Mechanical Engineering) El-Menoufiya University

VII. Energy Priority Committee

Aly El-Sawah	KOLDAIR
Amin Mobark	
Taher Sabry	
Mostafa Kanel	
Kamal El-Din Hassan	
Faiyk Farid Faragall	

Mokhtal El-Halwagy	
Salah El-Sobky	
Monier Holal	
Essam Eldin Khalil	(Technical Secretary)
Abdul Razek	(Chairman)
Nasief Rafat	
M. M. El-Kotb	
Mohamed Fahmy	Diesel Helwan
Mehy Selim	
Samir Abdel Ghany	
Emad Elsharkawy	(Vice-Minister of Electricity)
M. Elsenary	(Chief) Aircraft Engine Factory
M. Elseawah	(Chief) Airconditioning Factory

VIII. Others

Abdel Razak Fatah	(Former President) Helwan University
Saad Awad Farag	(Prof. Mech. Ang.) Cairo University
Galal M. M. Kamel	(Head of Pot Lines) Aluminium Company of Egypt
Abd Elfattah A. Mohamed	Aluminium Company of Egypt
Mohamed Shawky El-Boltagy	(Vice Chairman) ELMACO
Fathy M. Ghoneim	(Chief, Mech. Design) ELMACO
Saad E. Atwa	(Testing Engineer) ELMACO
Saliwa Suleiman	(Chairman, Economics Dept.) Cairo University
Mark Buchner	(Chairman, Syst. Eng. Dept.) Case Western Reserve University
James W. Evans	(Prof. Material Sc. Eng.) Univ. of California (Berkeley)
Mohamed Abd El Nabi	(Process Planning Dept. Mngr.) Suez Oil Processing Co.
Mahmoud Abu El-Hassan	(Prof. Eng.) Cairo University
Mohamed K. E. Ibrahim	(Prof. Fac. of Agric.) Cairo University
Monir Mahmoud El Abd	(Prof. Fac. of Agric.) Cairo University
Elein Saleib Girgig	(Prof. Fac. of Agric.) Cairo University
Ahmed M. Ahain	(Prof. Fac. of Agric.) Cairo University
Zeinab H. behairy	(Prof. Fac. of Agric.) Ain Shams University

Salah Elnahawy (Prof. Fac. of Agric.)
Ain Shams University

Ibrahim Mohamed (Ministry of Agr.)
Agric. Res. Center

I. Shawky
Ain Shams University

Irving Lefkowitz (Professor)
Case Western Reserve University