RESEARCH UTILIZATION AND INFORMATION MANAGEMENT*

AID is, and prides itself on being, an action Agency. Research accounts for a very small part of the total budget of the Agency. However, a catalytic role is envisioned for this research investment in "strengthening the innovative thrust of AID programs." It should not only provide answers to particularly sticky development problems, but, in a more positive vein, should also show the way to development breakthroughs in priority areas. The mandate is to identify problems and then to define research projects with specific objectives and a detailed work plan in order to produce useful answers in the shortest possible time. This in no way eliminates research of a highly technical nature; it does insist that the research be goal-specific.

The philosophical basis of the centrally funded research program is found in the fact that many kinds of knowledge are not site-specific. Most knowledge is not even nation-specific. The same kinds of soils occur in many countries throughout the tropics. Land tenure problems and those of obtaining greater participation in democratic processes have similarities among all underdeveloped regions. Credit programs for small farmers and efforts to improve health, nutrition and small industry, encounter similar obstacles in many underdeveloped nations. For these reasons, it is not necessary to repeat the same research in fifty or

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seventy countries around the world. If the research is carefully phrased, using adequate categories or an adequate taxonomy it will usually have application over a large number of countries. The extent of generalizability will depend greatly on the subject matter, the rigor of problem definition and the usefulness of the categories.

PART I. A UTILIZATION FOCUS ON RESEARCH MANAGEMENT

The measures taken during the past two years to improve utilization have been prescribed in part by the fact that all AID-funded research is carried out under contract or under participating Agency agreements. Consequently any measures to improve the rapidity or probability of producing utilizable results of necessity had to be focused on: (1) improving the internal AID management of research or (2) establishing a better consensus with the contractors in terms of the desired goals.

Let me recount briefly how we arrived at our present approach to utilization. Our first approach was to review all completed projects and search for utilizable results that should be given broader dissemination. Unfortunately the documentation available gave little indication of the significant results, or the presentation made it difficult to identify the significant and operationally useful results. Consequently our first measure was the formulation of guidelines for the preparation of the project annual reports. These guidelines were issued to all contractors in January 1972. The main new requirements were greater attention to interpretation of data in terms of utilizable results and reporting on the dissemination and utilization that had occurred.
The results of these guidelines are now beginning to appear in terms of annual research reports that do a much better job of highlighting results and reporting utilization.

We soon realized, however, that we still did not have an adequate tool for strengthening ongoing research projects and thereby the probability of producing utilizable results. Although annual reviews were held they were not structured so that hard questions had to be asked about progress towards producing utilizable results. Consequently, after considerable discussion, in September 1972, TAP issued revised instructions and guidelines for the annual evaluations of centrally funded research projects requiring a yearly utilization review of each research project. This manual order, M.O. 1026.2, is included as TAB N in the present RAC book. The responsibilities for conducting these reviews is left with the project managers in each of the technical offices. RUR in turn advises the Assistant Administrator on the adequacy of the project appraisal reports (PARs) which must be produced as a result of each of the reviews.

The Project Appraisal Report produced as a result of a review must do three things: 1) report utilization and impact of the project in the LDCs, 2) provide a utilization plan for the future, and 3) assess its potential for producing results that can be utilized in the LDCs. The first of these reviews have been held and the first PARs are due now. Our office will provide AA/TA with a monthly report on the progress of
these reviews. We expect to also report to RAC at a later date on the success of this approach and, of course, expect it will have an influence on revised projects that will be brought forward in the future for RAC review.

Finally, in recent months we have moved back even one step further in the management process to look carefully at the formulation of the research statement which defines the original project and is revised when the project comes up for extension. When a problem for research has been identified, the first step is to define a project which may discover the solution. To improve the probabilities of success, AID has a corps of subject matter specialists to elaborate projects and locate capable contractors. In addition projects are reviewed by an internal review committee made up of representatives of the various bureaus (RIGC) and finally the Research Advisory Committee, (RAC), made up of scientists from outside of AID. The point where we felt that significant improvement could be made in this overall process was in the research project statement prepared by the technical office to go forward to the review committees. For this reason, revised guidelines for the project statement have been prepared and are now being reviewed by the technical offices.

As you can see, our first thought was to approach utilization as a follow-up of research. Later we found it desirable to move back to the earlier steps of the research management process to increase the probabilities of producing utilizable results. We feel that this was in keeping with our multiple and inter-related objective of planning,
analysis and utilization. In this case utilization is the cutting edge, much of the analysis is in relation to utilization, and this directly influences research planning.

PART II. SPECIAL UTILIZATION ACTIVITIES

Obviously a research program cannot carry the knowledge produced all the way through to ultimate use in all of the LDCs. On the other hand it is not enough to conduct the research and store the results. It is our feeling that the research program should make some initial distribution of results and stimulation of utilization activity which might then be taken up by others. In some cases it will be possible for the research contractor to conduct the utilization activity without additional funding, through close cooperation with national governments, regional bureaus and cooperating research personnel in the LDCs. This has been the case, for example, with the vampire bats project which is now at a stage where demonstration programs are underway in a number of cooperating countries in Latin America.

In order to obtain a more unified approach to utilization activities, Dr. Bernstein instructed this past year that special utilization activities in TAB be brought together under an evaluation and utilization project managed jointly by the TA program office and the Planning, Analysis and Utilization Division of RUR. The activities funded in this way up to May 1973, include the following: 1) a pilot study to determine acceptance of high lysine corn by farm families in Brazil, 2) the development and testing of a handbook on educational cost reduction for LDCs,
3) A high lysine maize seminar at CIMMYT to promote more systematic research on high protein corn, and (4) a review by outside experts of research and development efforts in the AID/TA office of Science and Technology to plan future work and greater utilization of results. Other activities are being encouraged but plans are still not at a stage where funds have been obligated. During the coming year, the utilization reviews of all projects should greatly accelerate the identification of needed activities.

Dr. James Hoath has a major responsibility for this activity.

PART III. INFORMATION MANAGEMENT

Our work in information management consists of two parts: a) management of reports produced under AID contracts and grants, and b) reporting on the AID research and 211(d) programs. The distinction will become clearer as we proceed.

A. Management of Reports Produced Under AID Contracts

In the eleven years from January 1962 to January 1973 the Agency has sponsored over 115 million dollars worth of research through the centrally funded research program. The results of these projects have been recorded in the form of reports, articles, books and miscellaneous papers. However, as we began to look into the management of this information, we found that for various historical reasons much of it was not readily available to potential users. Bits and pieces were available at various points -- in RUR files, in the AID Reference Center, in the various technical offices -- but at no point was there available a complete collection of the publications that had been generated, nor
even a modestly complete list. We felt that a number one priority in public accountability was to bring together a bibliography of all of the reports that had been generated with this multi-million dollar investment and to insure that all of the reports were readily available to those involved in development. Mike Rohla of our staff is directing this part of the work and is utilizing Agency resources to the greatest degree possible to keep costs moderate.

The cornerstone of the procedure for obtaining permanent and ready availability of already published documents is a joint effort with the AID Reference Center (ARC) and with The National Technical Information Service (NTIS) of the Department of Commerce. After compiling a bibliography based on publications listed in annual reports and through personal contact with contracting institutions we checked this list against our own holdings and against those of the ARC in order to enlarge the list and to determine the availability of the publication. Up to now we have located 1,050 documents, copies of which have been placed into the ARC and into the NTIS where copies can be purchased at a nominal fee. At the same time, we are issuing a published bibliography of this material which is scheduled to appear about July 31. This task is now more than half completed and should be finished within about three months. In the process we have worked out new systems for obtaining publications coming out of research projects and placing them into the system so that lists can be published regularly and the documents will be permanently available. This has been a long difficult process, complicated by an infinite assortment of budgetary and manpower limita-
tions and we are pleased that it appears to be moving to successful completion.

AID Research Abstracts

While carrying out the above task we were also designing a reports management system for present and future research. Such a system will be able to respond quickly to inquiries about the results of any research project. But it should go a step beyond that to provide for prompt and broad distribution of new results emanating from the research program. Of special concern on this score were the institutions and persons in the LDCs who should be the prime users of the research results.

As we began to look into this problem we found that each of our AID offices was making a small distribution of the publications coming out of its research projects. In many cases this consisted of 150 to 200 copies sent mostly to AID Missions and a select list of cooperators. It was felt that if these research results had importance they should be given a broader dissemination especially to the technical staffs of LDC institutions. In order to cope with this problem the following activities are currently underway in cooperation with the Data Management Office of the SER Bureau. Jointly we are developing a mailing list of some 5,000 addresses in LDC institutions which will cover the main areas of emphasis of AID research. Using Data Management facilities, this list will be computerized so that mailings can be made to all or any part of the list according to subject matter interest. The first mailing will be the new quarterly AID Research Abstracts each number of which will contain about 100 research reports appearing during the previous quarter. The annotation will give sufficient information about the publication so that
those who receive the list will be able to make an intelligent decision as to whether it will be of use to them. The LDC scientist can then request the publication directly from the contractor or make an arrangement for inter-change of publications. At the same time the document will be placed in the AID Reference Center, and in the National Technical Information Service so that when the contractor's supply runs out, it will be permanently available at the ARC or may be purchased at a nominal fee from the NTIS. A first draft of this mailing list is scheduled for completion by July 31 when the first mailing of the AID Research Abstracts will be made. This is clearly experimental at this stage but we feel that it may potentially be a very useful means for getting the results of AID research into the LDCs and into the hands of those for whom they are intended.

Science Information Exchange

In addition to the management of published material we cooperate with the Science Information Exchange of the Smithsonian Institution in providing information about the scope and objectives of each of the ongoing research projects funded by TAB. This is then included in the computerized national registry of research in progress operated by SIE so that anyone querying the SIE system about research in any particular field will also receive information about the AID funded research in that particular area.

B. Reporting to the Public on AID Research and 211(d) Programs

For internal management reasons every research organization needs good intelligence on the significant results being produced and their potential impact. This kind of knowledge is essential for internal program funding decisions, for responding to the frequent inquiries by supervisory
bodies and for informing the public and other development agencies in summarized form of progress made.

**Biennial Research Report**

One well-established tool of public accountability is the periodic progress report. After careful study, we concluded that such an instrument would have equal value for the AID research program.
A basis for such reporting had already been established with the publication in March 1971 of "The AID Research Program, 1962-1971". The report now being written, and scheduled to appear in August, will go into greater depth in reporting the significant results and explaining actual and potential impact. It will place AID research in the context of the overall technical assistance program and show how the combination of research projects in each of the subject matter areas fits into an overall action program focused on LDC needs. The content will draw heavily on the improved annual reports from research contractors.

The preparation of the biennial report constitutes part of the discipline we are imposing on ourselves and our project managers to be able to explain, analyze and defend each research project. There is no easy way to obtain complete, nor even adequate, knowledge about the impact of a research project. Research results are disseminated broadly through publications and word-of-mouth. They may have impact at distant points without the investigator being aware of it. On the other hand it would be extremely costly to set up an evaluation program that could identify all of the impacts of a research project. For this reason we feel that we must rely heavily on feedback from research contractors and AID staff to identify utilization of the research. Impact, of course, is the measure of success of a research program and we accept the responsibility for collecting information and reporting on it.

The technical articles and reports coming out of research projects tend to be technical in nature and of most value to specialists.
Additional presentations are needed to reach other audiences. There are a broad range of policy-makers involved in development who need to learn the results of research but may be confused by specialized jargon and terminology. Consequently we worked out arrangements with AID's Office of Public Affairs for the preparing of reports on selected research projects that have reached the point where there are significant results that should be reported and disseminated broadly. Several of these are being published in the magazine, War on Hunger, which has a monthly distribution of 12,500 copies on a worldwide basis. Each of the research articles is also reprinted immediately to make it available for broader distribution by technical offices and regional bureaus among persons especially interested in the subject field. The first ones in this series are: "AID Finds Ways to Control Vampire Bats", June 1972; "Sulfur-coated Urea, a Time Pill for Plants", January 1973, and "What Kills Weeds" the story of the University of Nebraska breakthrough, May 1973.

These same materials are serving as a basis for broader dissemination to technical and semi-technical publications in the U.S. and for USIA usage abroad. The leadership for these reporting activities is provided by H. C. Ladenheim in our office.

PART IV. A NETWORK APPROACH TO INFORMATION MANAGEMENT

As we in AID have begun to experiment with the network approach we see more and more possibilities for extending the network concept into all fields of research. The essential element is a network of collaborating scientists from LDCs and developed countries who are working together
to find answers to some key problem of development which is pertinent in all of the countries involved. Usually such a network will involve one or more nerve centers which have special funding for research activities, plant and equipment, information resources, and for outstanding expertise in the field. The nature of the network, however, is basically collaboration among equals to work toward commonly defined goals in ways that are mutually agreed upon. The network also implies a problem which cuts across national boundaries in many LDC's, that there be local scientists interested in cooperative work to produce and test knowledge, and that there be a strong desire to move rapidly to generalizable, and utilizable, results. Because of the cooperative activity, the results are insinuated directly into ongoing national research systems. The potential power and efficiency of this approach is clear.

Obviously the network approach to research and development also implies a new approach to information management. In fact a network approach to research is an information management system. And it is this information system that I want to explore with you.

If a/network is to be soundly conceived, the first information role is to assist in defining the objectives of the network. In the past, much research has faltered at this crucial first step. Projects have been launched without an adequate review of past experience to determine the level of existing knowledge. My own feeling is that the network approach will be most effective when the potential cooperators participate
in some way in identifying the knowledge gaps and choosing those of highest priority for the initial effort. This means that the Members of the network must have access to existing information systems and competent persons to use them in order to do an adequate review of the present state-of-the-art. During a period of research, the information system must keep members of the system informed of results that are key to research and to action programs.

If the initial review of literature and experience shows that knowledge is already advanced far beyond current application it may indicate that the first need is for innovative measures to gain application of existing knowledge. This is another role of information management -- to make key pieces of existing knowledge broadly available to those in the LDC's who should be using it. In almost all cases, a careful review will also reveal certain critical areas where research could have an enormous pay-off and could thus provide the cutting edge for action programs.

It is in this general context that we have begun to look at the question of the kind of information management program that AID should encourage for its research and 211(d) effort and more broadly for the AID technical assistance program. It seems to me now that the most functional approach for AID is an integrated de-centralized information system. The institutions chosen for 211(d) support and research contracts in a particular subject matter area, for example, would be an information nerve center or module, doing research and building up a strong library-documentation center that could be kept current and attuned to
the needs of the LDCs in particular areas of knowledge. Consequently, AID would build upon elements of the present research and GTS projects and 211(d) grants to begin the structuring of an integrated decentralized information system.

An initial effort could be made to build such a system in the field of agriculture where AID has contractors and grantees with substantial experience in at least a dozen areas including: tropical soils management, fertilizer design and testing, water management, aquaculture, pulses, wheat breeding, corn breeding, sorghum breeding, weed control, insect control, vertebrate pests, livestock management and diseases and agricultural economics. The institutions involved in these subject areas already have components of viable information modules. Over the years each has developed a good library and has kept up to date through continuing recommendations of staff members actively involved in research and instruction. The institutions have attracted worldwide interest in their subject areas because of the instruction provided for scholars from many countries who interact with each other and with the institution's professional staff. In other words these centers or modules are not only store rooms of information but serve a catalytic role in fermenting and testing new ideas. They also have the analytic capabilities to determine what information is applicable to a particular problem.

With this in mind, our plan of work is to look carefully at a number of these "modules", 1) those headed by a single institution such
as the Land Tenure Center at Wisconsin, the aquaculture work at Auburn University, and the weed control work at Oregon State, and 2) those with a multiple direction in the form of a consortium such as the work at five universities in agricultural economics, the water management work at three universities and the tropical soils work at five universities. Our objectives will be: 1) to assess present activities and estimate the potential for leadership in selecting and disseminating knowledge to LDCs, and 2) to begin to obtain a better appreciation of the dimensions of the problem. Once we have this basic information we think that we will be able to make use of expert help on specific problems under consultancy and contractual arrangements. Appendix A provides some preliminary observations in regard to the tropical soils network where AID has five 211(d) grants and two research contracts.

Collaboration with other Development Agencies

Other development agencies are also interested in information management. For example, AID has made a $15,000 grant to FAO for a pilot effort in West Africa to develop a Computerized Agricultural Research Information System (CARIS). We are looking closely at the de-centralized Educational Resources Information System (ERIC) of the Office of Education, both as a possible model for some of our work and as a system that could possibly be expanded to meet needs of educational planners in LDCs. The MEDLAR system in Health offers possibilities for expansion to cover LDC needs. We are also looking at specialized and regional libraries such as the National Agricultural Library at Beltsville and the Library of the Interamerican Institute of Agricultural
Sciences at Turrialba. In respect to search capabilities we are aware of the facilities of the University of Georgia which has arrangements for scanning magnetic tape versions of Biological Abstracts, Chemical Abstracts, Engineering Index and the National Agricultural Library Catalog. We also have access to the Institute for Scientific Information which can do current and retrospective searches covering all fields of research in some 6,000 journals.

To sum up, we are still in the early stages of information management activities related to the research networks. Within the coming months we hope to work with all of the research project managers in the Technical Assistance Bureau to identify and describe the parts and pieces of existing information systems. Other ideas will be explored through the TAB liaison officers with regional bureaus. In doing so we will be looking for gaps or weak points where small but well-placed injections of resources could yield large returns, in terms of improved research or practice in LDCs.
APPENDIX A.

SOME PRELIMINARY OBSERVATIONS AS A BASIS FOR DISCUSSION OF THE PROBLEM OF INFORMATION MANAGEMENT IN THE FIELD OF TROPICAL SOILS

During the past month three RUR staff members visited Cornell and North Carolina State—the two universities that have both research and 211(d) grant in tropical soils. We asked ourselves and their scientists, what should be the role of AID contractors and grantees in managing printed and recorded information? What could be their most productive role in a network approach? How much initiative could they take to screen information, or serve as analysis points to determine which information would be relevant to scientists and others in which LDCs? What would be the advantages of a broadly distributed awareness system versus a pre-screening system to eliminate some of the irrelevant material? Should a research network screen and distribute information, or should it take the lead in seeing to it that pertinent information gets into other existing systems and that researchers and policymakers in LDCs have ready access to both the awareness service and availability of documents. What specific actions could yield a high pay-off? Although we are just getting underway on this, let me share some of our first impressions.

A basic impression is that there may be high priority things to do to improve the information system within the confines of the several 211(d) and contracting institutions. However, the information task regarding soils management is so great that we need to look beyond our AID assisted institutions for other high pay-off opportunities. For example, there are several services by which researchers are informed about the research of others.
A few widely read journals such as Soils Science are key links in keeping leading researchers up to date on the results of studies in the field. The leading journals, however, tend to give main emphasis to soils of the temperate areas where the journals are published. The results of tropical research are published in a scattering of publications so that there is a problem for the LDC researcher to obtain access to all of the literature. To do so he or his library must subscribe to an abstracting service. Some of these services provide only "awareness" of existing documents; others will also provide the document. Some provide only a list of titles; others also include a descriptive or informative abstract. These services are expensive but there are several excellent ones available. Chemical Abstracts, published in the U. S. does a good job of covering the journal literature in soils. Tropical Abstracts, published by the Tropical Agriculture Institute at Amsterdam is very good. The Annotated Bibliographies published by the Commonwealth Agricultural Bureaux at Farnham, Bucks, England are widely respected. One obtains the impression that if these abstracts could be made widely available to soils researchers in the LDCs, that this would provide adequate awareness of the relevant literature.

The availability of the document itself is another problem. On a worldwide basis the private Institute for Scientific Information (ISI) at Philadelphia is one of the few organizations that also gives attention to this aspect. There may be others, but this is the most important one that has come to our attention. The ISI buys copies of each of the 6,000 journals that it covers monthly in its Current Contents (lists of titles and authors) and will supply tear sheets at a nominal price. By subscribing to Current Contents
it is possible to monitor the leading journals in any field without carrying subscriptions to large numbers of individual journals. This service is still not widely used overseas, largely because of the cost. However, a similar service set up at the East African Agriculture and Forestry Organization at Muguga, Kenya, appears to be highly successful and may offer a model for other regional efforts. This East African Scientific Literature Service was initiated in 1967 at an already operating library with modest additional support from the Rockefeller Foundation for staff, purchase of additional journal subscriptions and rental of a copying machine. More than 100 research stations receive this service which covers about 900 journals monthly.

We have now accepted as a guiding principle, largely because of cost considerations, that whenever possible we should build upon the parts of an information system that are already in place. This still leaves us with some alternatives.

One approach would be an AID investment in information management through the several institutions that comprise the tropical soils consortium. Such an arrangement raises several questions. What information should it manage? Should it process information produced only by its own and cooperating institutions? Should it make a pre-selection of literature that would appear to be especially important? Should it try to cover all information on tropical soils? How could it have the greatest impact on the quality of research and the level of soil management technology being used in the LDCs? How could it avoid duplicating the work of established journals and abstracting services?
A second approach, with considerable merit, is to call on the expertise of the "nerve center" institutions and others to advise on strengthening and expanding regional services such as that at EAAFRO which does not specialize in soils but takes all of tropical agriculture as its unit, or to advise on opportune investments to link LDC institutions into other existing information sources. This would give the broad coverage of tropical soils needed by LDC researchers. It would also give special attention to the language problems of the area. In addition to providing advice on this development, the consortium would take the leadership in establishing "networks" to work on specific soils, or soil problems that are identified as requiring special research attention. In relation to these specific problems, it would conduct literature reviews, hold annual progress reviews, compare and analyze data and publish results on the particular soils problems of which it focuses.

Obviously these are not mutually exclusive approaches. The first approach places all of the focus on doing soils information management through the AID "network". The second says that the large part of the tropical soils information management must be done by library and documentation centers outside of the consortium into which we could probably also make an investment that would yield a high return at the margin. However, the AID encouraged networks themselves would focus on sharply defined sub-areas within the field of tropical soils where well planned collaborative research effort may yield high returns.

As we discussed the nature of a good information system we found that our discussions could not be separated from the question of what would be a good soils research and development network. Soil science in the LDCs is far behind that in Europe and the U.S. and any successful
network effort would require some critical mass applied to a critical problem over a sustained period of time. It seems to us that the networking approach might be most effective on rather specific and high priority problem areas. We already have an example of this in the International Testing Network for Winter Wheats. A similar case in soils would be the problem of aluminum toxicity which occurs on similar soils in a dozen different countries. Another would be the management of soils previously operated under shifting cultivation. Certain problems of volcanic soils could benefit greatly by two or three scientists working together in a dozen different countries to jointly plan and conduct their research. A very careful and complete literature review prior to the initiation of the research would be an essential first step. Yearly meetings of all researchers to present the results, compare problems and experiences and revise plans for the following year would be another key aspect of the network.

Leading scientists in the nerve center institutions would be key elements because they would act as catalysts in stimulating the discussion, planning and execution of the research program, and establishing and maintaining the information system. As the research proceeds and meaningful categories are sharpened it will be possible to arrive at specific recommendations for specific combinations of conditions. At that point it will also be possible to think more in terms of researcher to end-user systems.