

REPORT

SECOND ANNUAL REPORT

CONTRACT NO. AID/ta-C-1337

LDC INDUSTRIAL RESEARCH INSTITUTE EFFECTIVENESS

Submitted to

Office of Science and Technology
Bureau for Technical Assistance
Agency for International Development
U. S. Department of State
Washington, D.C. 20523

Submitted by

Denver Research Institute
University of Denver
Denver, Colorado 80208

1 August 1978

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I. INTRODUCTION

This is the second annual report under contract AID/ta-C-1337. The tasks under this contract, however, are a continuation of the tasks established for prior contracts AID/CM-ta-C-73-20 and AID/CM-ta-C-73-21. The overall objective has been, and continues to be, to assist selected industrial research institutes (IRIs) in LDCs of USAID interest in improving organizational, management, marketing and technical skills so that these IRIs will be more effective in their participation in the industrial growth and economic development of their countries. A secondary objective is to disseminate the results of this program to IRIs on a worldwide basis.

It should be noted that this program is experimental in nature. While there have been many attempts, during the past twenty years, to provide management and technical assistance to IRIs in LDCs, usually these have taken the form of providing individual technical experts to assist in solving specific problems. In the majority of instances, such assistance has been short term in nature, usually with little or no provision for follow-up, which is essential to assure that recommended activities have indeed been implemented or to provide guidance in redesign and/or redirection of suggested improvements in IRI operations, based on solid understanding of the political, economic and societal constraints within which the IRI must operate.

In contrast to the above approach, which has been shown to be largely ineffective, DRI has developed a strategy of providing management and technical assistance on a continuing, long-term basis through the process of establishing "linkages" with IRIs in LDCs. These IRIs have been selected, jointly with the Office of Science and Technology, on the basis of their potential, ability, and willingness to increase their interaction with their contiguous public and private industrial sectors and with international technical assistance organizations.

The concept of the linkage mechanism appears to be valid. During the course of the prior two contracts and the first two years of this current contract, it has become apparent that producing desired changes in the operation of an LDC IRI is a long-term process--longer than

originally visualized. Even though DRI has become thoroughly acquainted with the individual characteristics of its linked IRIs, and the linked IRIs, in turn, have become fully aware of the back-stopping and technical assistance which DRI can provide on a continuing basis, nonetheless delays and limitations have occurred in implementing change. These are due in part to government constraints over which the IRIs have little or no control, but also in part to the rather rigid organizational hierarchy of the IRI itself (civil service or similar structure), frequent changes in senior management, and even--occasionally--overt resistance to change, particularly on the part of senior research staff.

The resistance of IRI senior research staff to active involvement in industrial problem-solving, providing trouble-shooting and technical extension services, conducting analyses and tests, etc., all of which are essential functions, particularly where the IRI is the principal technological institute in its country, is not surprising. Nevertheless, it is disappointing and has caused some frustrations in the otherwise successful functioning of the linkage mechanism. The majority of these senior staff members is untrained in industrial problem-solving and in the identification of industry's problems (in many instances the industries themselves cannot define their own problems) and much prefer to become involved in basic research which may or may not be relevant to the country's development. Furthermore, until recently, there have been little or no incentives available to encourage researchers to engage in industrial problem-solving. Thus, DRI frequently must assume the leadership role in persuading IRI senior staff to do things that they really do not want to do, e.g., to select problem areas for concentration based on country needs and IRI capabilities, to become actively involved in those problems areas, and to design approaches for solving the problem. This is, of course, the purpose behind the linkage mechanism, and it is to be hoped that, with time, the reluctance of the linked IRI staff to become actively involved in industrial problem-solving will be satisfactorily overcome.

Methodologies to Achieve Program Objectives

The DRI strategy for strengthening linkages with selected LDC IRIs includes performing, jointly with the linked IRI, a number of activities or tasks which are designed, depending on the nature and needs of each linked institute, to increase that institute's interaction with its public and private industrial sectors. Each of the three current linked institutes has different needs and each has a different operational mode, so that in each case the strategy of linkage operations varies. In general, however, program activities can be categorized under several task headings, as shown in Figure 1: Hierarchy of Project Goals.

In addition to activities which are specific to the linked IRIs, two phases of the program--management development workshops for IRI directors and the research grant awards--are conducted on a regional or worldwide basis. These activities are designed to stimulate interaction between several LDC IRIs and to serve as a vehicle for disseminating the results gained from experiences with linked IRIs to a larger number of LDC institutes. DRI believes that the management development workshops are particularly successful in transferring the benefits from linkages with a limited number of IRIs to other institutions.

There have also been important but unprogrammed side-effect benefits from this program. These side effects, which will be discussed in Section VI of this report, reflect the interest of more LDC IRIs in participating in the linkage program. In some instances, USAID Country Missions have already provided funds to augment linkage activities; in others, discussions are underway for the creation of linkages. Interest in the program continues to increase, and a serious attempt is underway to create a network of a number of LDC IRIs in Southeast Asia with DRI as the central node. This should make it possible to interchange and transfer a large number of experimental activities specifically designed to improve the ability of all network institutes to work more effectively with their contiguous public and private industrial sectors.

HIERARCHY OF PROJECT-GOALS

AID-OST
Goal

To increase the industrial scientific and technological infrastructure in LDC'S

DRI
Objective

Institution-Building to assist existing industrial research institutes (or similar organizations) in LDC'S in becoming more useful and relevant to their intended clientele (i.e., local industry, particularly to small-scale industrial firms) and thus to their country's economic growth and industrial development

DRI
Strategy

To develop linkages with industrial research institutes in LDC'S and form a network with DRI as its central node

DRI
Programs

Executive Development

Coupling With Industry

Industry-Oriented Grants

DRI
Projects

IRI Directors
in Residence

Staff
Development

Management
Training

Technical
Assistance

Technical
Information

Technical
Services

Worldwide
Solicitation
and Evaluation
of Proposals
Submitted in
Competitive Bid

Grants
Administration

DRI
Actv't's

Linked IRI
Directors to
DRI, one
Month Each

On-The-Job
Training at
DRI or in
Other U.S.
Institutions

Workshops
& Consulta-
tion both
at DRI &
in Linked
Institutes

Feasibility
Studies

Technology
Workshops

Intensive
Technical
Assistance

Guidance
in Project
Design &
Execution

Award of Five
Grants to
Selected LDC
IRI's

Assistance
in Procuring
Equipment

Technical
Assistance
& Project
Advice

Dissemination
of Grants Results
to Other LDC
Institutes

KIS

Patent
Information

IRI
Information
Network

Yellow
Pages
Study

Specific Program Tasks

Referring again to Figure 1, several specific tasks are being undertaken by DRI as a means of fulfilling the program objective.

These are:

- Staff development and management training;
- Technical assistance to linked IRIs;
- Technological outreach systems for small-scale industry;
- Know-how information services;
- Training in operation of information centers;
- Women in the development process;
- Research institute managers workshops; and
- Research grant awards.

As has been stated above, the first five tasks are principally carried out with the linked institutes, while the management development workshops and research grant awards are available to a much larger number of LDC IRIs.

It should be emphasized that there is considerable crossover and overlapping between the individual tasks. For example, staff development and on-the-job training are involved when DRI provides technical assistance to linked IRIs in the form of proposal preparation, developing liaison contacts with potential clients, conducting techno-economic surveys, or offering advice and consultation on a specific technical problem. Similarly, the information and technological outreach or extension tasks are closely interrelated to the others. The above task headings are being utilized principally for internal DRI program management purposes and to assure an appropriate mix of activities suited to the needs of each linked institute.

Special attention is being paid to expanding the participation of women in IRI activities and responsibilities and in helping them to achieve greater professional recognition and advancement. This emphasis cuts across all tasks.

Attention is also being paid to the environmental consequences of projects being undertaken with linked IRIs, as may be seen from requested assistance having to do with pollution control and waste recovery.

II. LINKAGES WITH SELECTED INSTITUTES

Linkages with the Pakistan Council of Scientific and Industrial Research (PCSIR), the Instituto de Investigaciones Tecnologicas (IIT) in Colombia, and the Applied Scientific Research Corporation of Thailand (ASRCT) have been continued and expanded during the past year. Descriptions of the linked institutes and the nature of the linkage with each institute were described in considerable detail in the First Annual Report under Contract No. AID/ta-C-1337, and thus will not be repeated here. Some minor changes have occurred; these will be delineated under Part III--Task Activities.

In order to improve effectiveness of performance of the several tasks involved in each linkage, Mr. Donald Evans was appointed coordinator for all Pakistan activities, Mr. Milan Radovic was named coordinator for Colombia activities and Dr. Ronald Black was assigned coordination responsibility for all linkage activities with ASRCT.

III. TASK ACTIVITIES WITH LINKED INSTITUTES

Staff Development and Management Training

The goals of the management training and staff development activities for personnel of linked institutes are aimed at increasing the effectiveness of administrative performance within their respective institutions. Included in this task are DRI "in-residence" training programs for the directors of the linked institutes, IRI staff training (either at DRI or in some other appropriate U. S. institution), workshops and seminars conducted by DRI in the linked institutes which relate to project management, project cost controls, industrial liaison and client promotion, and use of technical information services. DRI regards assistance provided to linked IRIs in preparation and selling of proposals as an overlapping activity between staff development and technical assistance.

PCSIR

In November of 1977, discussions were held in Karachi with Mohamed Aslam, Member for Technology of the PCSIR and principal intermediary for the PCSIR/DRI linkage, concerning possible new directions and enhanced activities that might be initiated with regard to DRI's assistance program. In addition to the continuation of some ongoing programs, it was concluded to seek the establishment of a thematic approach to the linkage by identifying a specific area of technical emphasis and to concentrate linkage support activities in that particular area. In so doing, it was thought, it would be easier to determine and apply some direct measures of the effectiveness of the linkage arrangement and thus better enable program reviewers to assess the efficacy of the linkage concept --at least insofar as it applies to the PCSIR situation.

Because the number-one priority in the new Pakistan national development plan is the development of natural resources, and because the PCSIR is formally mandated to perform R&D and other activities for the minerals industry sector, it was concluded to concentrate in this subject area. As a consequence, several specific activities were postulated:

1. A planning and technology review tour in the U. S. by the Director of the Peshawar Laboratories, which are at the focus of PCSIR minerals industry-related programs.
2. The presentation of a staff development workshop for upper- and middle-level PCSIR management, which would concern the preparation of feasibility studies and the development and presentation of proposals, especially directed to the minerals industry.
3. The organization and presentation of a symposium, the theme of which would be small- and medium-scale minerals industry development for Pakistan.
4. The development of a concept for a multi-client, minerals industry-based research project which PCSIR would carry out with the involvement of other Pakistan minerals-related organizations, both in the private and public sectors.

This general concept was presented for consideration during the annual review of the DRI programs by the AID Office of Science and Technology, in January of 1978, and was approved. This activity is presently underway with the presence in the U. S. for six weeks of Dr. Riaz Ali Shah, Director of the Peshawar Laboratories. He is involved in an intensive sequence of visits to public and private minerals research and production organizations such as the U. S. Bureau of Mines; the Colorado School of Mines; Hazen Research, Inc., of Golden, Colorado; Monsanto, Inc.; AMAX; Battelle Institute; the National Bureau of Standards; etc. In addition to technical updating for himself, Dr. Shah is developing detailed plans for the Minerals Industry Symposium, presently scheduled for November in Lahore.

A workshop has been planned and is scheduled for late September at a site near Islamabad, which will present an integrated series of discussions and exercises based on the development of proposals and feasibility studies for the minerals industry. It will emphasize statistical analytic methods, linear programming, economic forecasting, and other applied mathematical tools. The detailed rationale and procedure for preparation of complete feasibility studies, especially for consideration by financial institutions, will be presented, involving sample cases. Group analysis and discussion of actual proposals will

be a feature of the proposal preparation phase and will include the development and presentation of proposals by teams of the participants.

The small- and medium-scale industry development symposium will include presentations and discussions of the following principal subjects:

1. Present trends and developments in geo-prospecting, including utilization of earth-sensing satellite data.
2. Mining technology especially applicable to small- and medium-scale operations.
3. Extraction and beneficiation technology especially applicable to Pakistan mineral occurrences.
4. The character, extent, and accessibility of Pakistan mineral resources amenable to development by small- and medium-scale industry.
5. The nature of domestic and international commercial minerals markets as they relate to development and exploitation of Pakistan resources.

It is planned to develop and present at this symposium a proposed program for research and development in some significant aspect of Pakistan mineral resources, seeking sponsorship of the program from those domestic public and private sector entities which would share in and benefit from the project results. This will help introduce the concept of multi-client-sponsored research in Pakistan and will help put the PCSIR in a reproductive and prominent position in the view of the minerals-related industrial sector. Additionally, the symposium will provide good input data for PCSIR's efforts to prepare recommendations for the minerals industry section of the next six-year national development plan, with which they have been asked to assist.

In another instance, DRI has assisted PCSIR in the search for U. S. engineering organizations to participate in joint ventures for making feasibility studies of minerals projects in Pakistan. This program results from an industrial development loan by AID to Pakistan for such purposes and which requires significant participation by U. S. entities in the studies. Although unsuccessful in identifying an adequate range of U. S. interest and capability in the instance of a study of Pakistan gypsum industry development and expansion, DRI was able to

enlist the participation of an outstanding technology source for a study of bauxite industry potentials in the country. This assistance has been in the context of the linkage theme of minerals-related research.

Two middle-management-level workshops were originally scheduled for one week each (September 1976) in Karachi and Lahore on the subject of institute-industry relations. Scheduled topics included: project evaluation and performance measurement, feasibility studies, leadership in management development, industrialization of research results strategies for industrial liaison, industrial cooperative action, and two DRI-developed case studies on ASRCT and KIST. However, the Karachi Director was promoted to a higher post and no replacement was made immediately, so PCSIR requested that these workshops be postponed until March 1977. These were subsequently postponed again due to civil disturbances in Pakistan and finally completed in September and October of 1977. During each workshop, several industries were visited as part of the training exercise in industrial liaison and institute-industry interaction. Thirty-four participants were involved in the Karachi workshops and 38 in the Lahore workshop.

While it was not possible to evaluate the Lahore workshop since the workshop concluded at noon on Saturday, an evaluation was made of the Karachi workshop. The data which follow show that the participants believed that more time was needed for project evaluation, while the usefulness and detail of the industrial liaison presentations require more thorough development of inputs. In the overall, however, the evaluation indicates that the Karachi workshop was more than moderately successful.

This task of the PCSIR Linkage, along with other tasks, has suffered and has been constrained to an appreciable extent by the political situation in Pakistan, by the uncertain relationship between the Government of Pakistan and the United States, both of which have resulted in scheduling delays and other operational problems.

IIT

Dr. Francisco Galliano of IIT is currently involved in environmental control studies of the Magdalena River and the Cartagena Bay, with special attention being devoted to gas chromatography of petrochemicals

Figure 2. Quantitative Evaluation of the Karachi Workshop

26 September to 1 October 1977

Rating scale: 3 = very good

to

0 = not good

Number of voters (participants): 24

	<u>Workshop Topics</u>					
	Industrial Liaison	Commercialization	Feasibility Studies	Leadership and Management Development	Project Evaluation	Quantitative Methods
<u>Evaluation Criteria</u>						
I. Content						
1. Applicability/usefulness	1.88	2.42	2.23	2.26	2.25	2.40
2. Adequacy of depth/detail	1.83	2.17	2.06	2.13	2.11	2.19
II. Presentation						
1. Clarity	2.21	2.35	2.50	2.33	2.18	2.29
2. Conciseness	2.21	2.90	2.29	2.20	2.09	2.29
3. Organization	2.27	2.19	2.38	2.28	2.14	2.29
Average	2.23	2.48	2.39	2.27	2.14	2.29
III. Time Allocation	2.35	2.29	2.37	2.11	1.75	2.28

and pesticides. Dr. Galiano was brought to the U. S. in August 1977, for two weeks of intensive training at the National Enforcement Investigation Center, Environmental Protection Agency, Denver; the U. S. Geological Survey, Water Resources Division, Denver; and the Battelle Northwest Laboratories, Ecosystems Department, Environmental Chemistry Section, Seattle. This training greatly enhanced Dr. Galiano's capability to continue his research into water pollution measurement and control, under a contract to IIT from the Government of Colombia. A copy of his training report is appended.

One phase of the IIT linkage, revised in September 1976, involved development of a low-cost briquetting process for coal which could provide an alternative source of cooking fuel for low-income families in Colombia who now use gasoline for such purposes. Thus, Mr. Camilio Olivera of IIT was invited to attend the Fifteenth Biennial Conference of the Institute for Briquetting and Agglomeration in Montreal during August of 1977. Since the Government of Colombia has contracted with IIT to undertake the development of process for briquetting of coal, the training is expected to have direct impact on the contract activities. Mr. Olivera has gained background in:

- knowledge of general techniques of briquetting of solids,
- criteria for utilization of diverse binders, and
- information from other countries where actual briquetting technology is being practiced.

The conference program and Mr. Olivera's trip report are appended.

A second phase of the IIT linkage involves improvement in the production of panela (brown sugar) by small industry producers in rural areas. COLCIENCIAS has funded IIT to conduct the study, and it is anticipated that future funding support will be obtained from the Government of Colombia. Short-term training in this area was provided to Mr. Arnulfo Jiménez of IIT during the period of 26 September to 19 October 1977. The objectives of the training program were:

- To accomplish additional specialized training in sugar technology.

- To obtain advice necessary to establish the steps to be taken by IIT to study the present situation and to carry out applied research to improve existing techniques for production of panela in Colombia.

The training was provided by F. C. Schaffer and Associates, Baton Rouge, Louisiana; USDA-ARS Crops Utilization Research Laboratory, Weslaco, Texas; and the Plantaciones Azucar y Derivados, Tegucigalpa, Honduras. Mr. Jiménez' trip report is appended.

As a result of two highly successful industry-oriented seminars conducted in September 1976, by DRI-IIT (topics were foundry and packaging; 265 industrialists attended), ANDI, the National Association of Manufacturers, asked that a DRI-IIT-ANDI seminar be conducted in Medellín in March of 1978, on "Quality Control in Food Production with High Nutritional Value and Low Cost." Financial support was provided by COLCIENCIAS and ANDI in addition to USAID funds provided through DRI. Four DRI representatives participated in the seminar, along with 150 participants from 80 organizations in Colombia, both public and private. Two additional DRI-IIT-ANDI seminars are tentatively scheduled for November of 1978, and March of 1979. The topics will be:

- marketing of foods for low-income groups and
- appropriate technology to meet Colombian food industry needs.

The program for the Quality Control Seminar is appended.

On the occasion of the twentieth anniversary of IIT, three DRI staff members presented a five-day middle-management project management workshop in Bogotá in May 1978. Twenty-two section leaders from IIT participated. Topics included in the workshop were: project conception, project cycle, project organization and controls, leadership and motivation, and client liaison.

During the post-evaluation of the workshop by the IIT participants, the following recommendations were made to IIT senior management:

- Prepare in a planned and efficient manner the staff of IIT which has obtained or will obtain administrative functions (of research projects) to train and develop professionally for administration and project management.

- Arrange conferences and periodic meetings relative to administrative techniques for projects that would maintain continuing interest on these subjects by the institute staff.
- Maintain a continual exchange of administrative and project management experience with national and foreign institutes with similar characteristics.

These expressions of interest on the part of IIT staff reflect, in DRI's opinion, a realization by IIT middle management of the need for increased emphasis on project management training in order to improve the efficiency of operations. One or two additional project management workshops are scheduled at IIT in early 1979 in order to respond specifically to the first recommendation above.

In June 1978, Dr. Jaime Ayala, Director of IIT, spent one week at DRI in future planning and coordination of the DRI-IIT linkage and scheduling of activities for the final year of the program. Discussions were also held concerning the possibility of transferring to IIT the explosive forming of metals and packaging technologies which DRI has transferred to IPT in São Paulo, Brazil, during the past five years.

Following his stay at DRI, Dr. Ayala, accompanied by DRI staff, visited the Colorado School of Mines Research Foundation, the Solar Energy Research Institute in Colorado, USAID/OST, ATT, DOE, EPA, OAS, IDB, the World Bank, NSF and the National Academy of Sciences in Washington, and UNDP in New York. The purpose of these visits was to explore the potential for alternative sources of funding to continue and expand IIT projects in alternative energy sources, pollution, etc.

Prior to his return to Colombia, Dr. Ayala participated in the Regional Management Development Workshop for Latin American IRI Directors in Guatemala (19-23 June, 1978).

ASRCT

An ASRCT staff member, who is scheduled to be in charge of institutional planning and evaluation on his return to ASRCT, began a two-year training program leading to an MBA in management in September 1977. During his stay in Denver, the ASRCT staff member is involved one-half

time in academic pursuits and one-half time involved in a variety of DRI management and planning activities.

Part of the DRI linkage with ASRCT involves assistance in undertaking integrated rural development projects by ASRCT with the support of the Thai Government and the USAID Mission to Thailand. This task has involved staff development, training in proposed preparation, and, at a later stage, DRI on-site technical assistance (scheduled for October and December 1978).

In November 1977, two representatives of ASRCT, accompanied by a DRI staff member, spent two weeks in Indonesia and the Philippines studying integrated rural development activities underway in those countries. The report of the study tour is appended. The study tour was beneficial to ASRCT in that it provided background experience and guidance in:

- improving the ongoing ASRCT integrated rural development project to make it more practical and realistic;
- assisting ASRCT in preparation of a proposal on "Prefeasibility Studies Related to Flood Control, River Pollution Problems and Urban Development Projects in Chonburi" (submitted to the Government of Thailand in December 1977, part of which was contracted with ASRCT; DRI will provide technical assistance in October and November 1978);
- assisting ASRCT in preparation of a proposal based on cashew nut plantation and industries to be jointly undertaken by ASRCT and DRI, with possible financial support by USAID;
- assisting ASRCT in preparation of a research proposal on integrated slum development in collaboration with the Building Research Department and to be submitted to the Government of Germany.

The experiences gained from this study tour are expected to further influence ASRCT's ability to increase its activities in integrated rural development, an area in which both the Government of Thailand and the USAID Mission to Thailand are placing considerable emphasis.

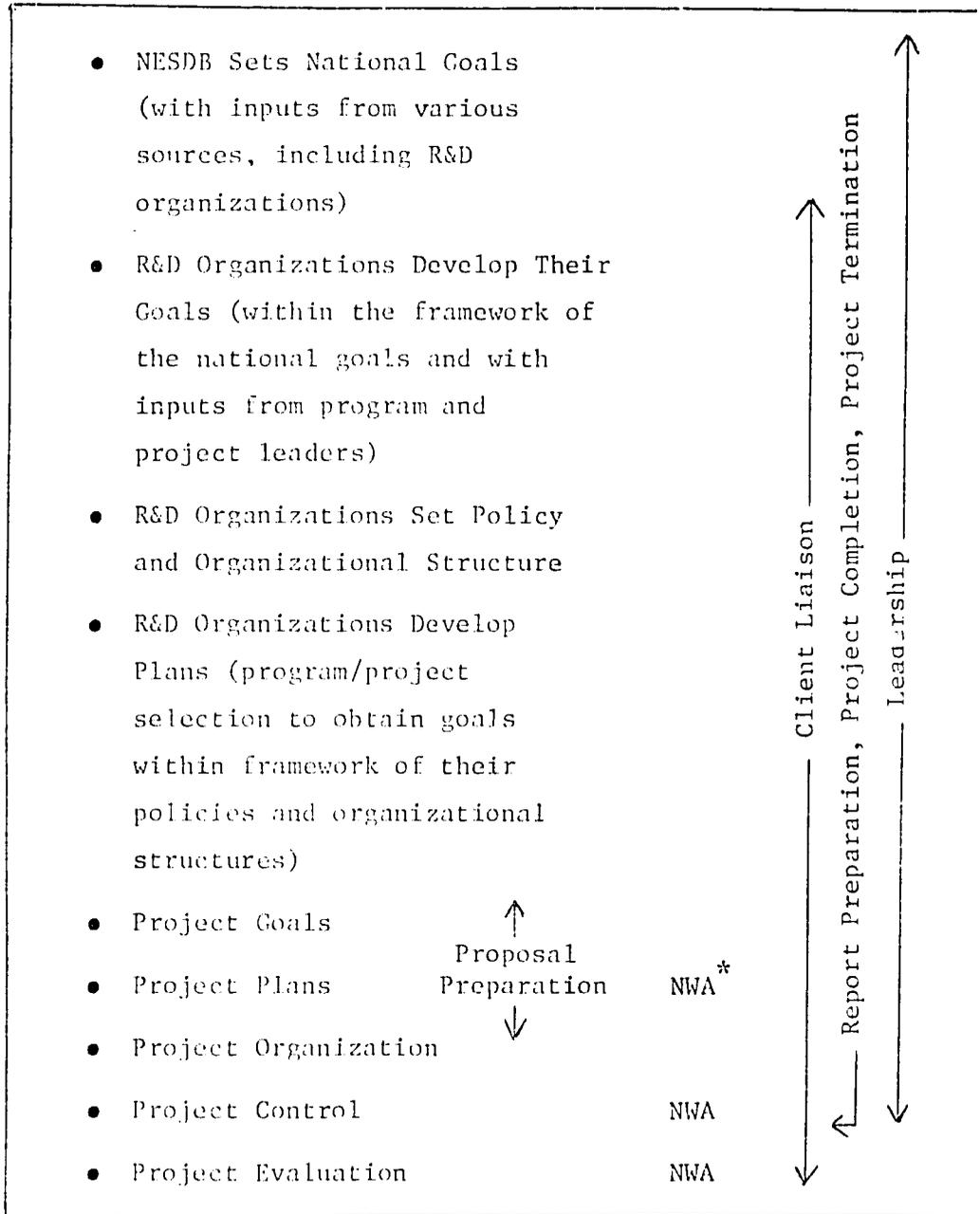
At the request of ASRCT, DRI presented a ten-day R&D Project Management Workshop in Thailand in December 1977. The workshop received financial support from the Thai Government in addition to USAID support through DRI.

The objective of the workshop was to increase the effectiveness of Thai management of R&D. The workshop focused on issues facing the R&D project manager. Participants examined questions of project management from the inception of an idea to the commercialization of the project results. In addition to workshop leaders both from ASRCT and from DKI, 20 participants were involved, representing ASRCT, the Department of Science and the Department of Industrial Promotion of the Ministry of Industry, the Office of the National Economic and Social Development Board, the Military Research and Development Center, Mahidol University, the Office of Land Reform, and the Preserved Food Organization. The hierarchy of workshop activities is shown in Figure 3.

As may be seen, there was a wide representation of agencies and fields of research at the workshop. This was deliberately planned to obtain better synchronization and convergence of R&D efforts to serve national goals and to more effectively cross-sector projects and programs. A corollary workshop effect led to at least discussions and, hopefully, in the near future, to the creation of informal but effective inter-institutional and inter-agency linkages. Plans were made for continued meetings among the workshop participants in order to review applicability of workshop results. In addition, another workshop on the same topic has been scheduled for December 1978.

During the course of the February 1977, OST review of this contract, the decision was made that more emphasis should be given to training and assistance to the linked institutes in obtaining needed technological information themselves, rather than depending on DRI for such services. Thus, a staff member of the Thai National Documentation Center of ASRCT was brought to the U. S. for one month beginning in mid-March 1978, for training in modern techniques in management and operation of information systems in the U. S. The training was conducted at DRI; NTIS; the Library of Congress; the National Library of Medicine; the National Agricultural Library; VITA; Worm World, Inc.; the National Center for

Figure 3. Hierarchy of Workshop Activities



*NWA refers to network analysis.

Atmospheric Research; the Colorado Technical Center; the Solar Energy Research Institute; and Information Handling Services. Following this training, a DRI information specialist spent sometime at ASRCT to assist in reorganization of the Thai National Documentation Center (see section on Information Services) and to plan a workshop on Technological Information Services to be conducted in Thailand in August of 1978.

The Governor of ASRCT, the Director of the ASRCT Industrial Research Institute, and the Deputy Governor of ASRCT were scheduled to spend three weeks at DRI in March 1978, in an institute management training program. However, due to conflicting schedules, the visit was deferred to October 1978.

Technical Assistance to Linked IRIs

Technical assistance activities are defined as those which emanate from specific requests by the Linked institutes to solve a particular problem. Invariably, these involve conduct of technical information searches through DRI's "Know-how Information Service" (KIS) prior to providing the technical assistance. However, during the past year, some of the requests have taken the form of management assistance to improve the IRI's operations in order to interact more effectively with potential public and private sector clients, establish or improve a technical information service in the IRI, or to assist in the design and implementation of a new project. Every attempt has been made to provide assistance which can benefit either medium- or small-scale industry, although experience during the last year has shown that the governments of the three Linked IRIs are putting greater pressure on these to undertake programs of importance to the national planning process. Thus, some requests for technical assistance have related to these increased governmental pressures.

PCSIR

As mentioned earlier, the linkage activities with PCSIR have been constrained by the uncertain political situation in Pakistan during the past year. Thus, more emphasis has been devoted to planning than to actual implementation, which is scheduled to take place, for the most part, during the first half of the third year of the contract.

PCSIR has been asked to contribute significantly to the formulation of the next Pakistan six-year plan with respect to minerals resources development. The plan envisages identifying the potential role of small- and medium-scale industry in this sector, as well as infrastructural and financial aid required for the development of these industries. PCSIR has available approximately two million dollars in foreign exchange to invest in upgrading its minerals extraction and beneficiation laboratories.

During the past year, DRI has provided technical assistance to PCSIR in planning a number of activities related to minerals resources development. These have included:

- six weeks of on-the-job training for the Director of the Peshawar Laboratories of PCSIR in minerals processing (completed--see staff development);
- identification of short-term training in the U. S. of three PCSIR staff members in minerals processing (scheduled for the fall of 1978);
- assistance in the design of new minerals research facilities (scheduled for early 1979);
- technical assistance on process development;
- assistance in organizing and conducting a Pakistan Minerals Development Conference and Group Research Project.

The conference is currently scheduled for November 1978. In consideration of the possibility of the establishment of an Iranian-Turkish-Pakistani regional research institution, to be located in Iran and with Iranian financial support, it is planned to invite appropriate representatives from these neighboring two countries to participate in the conference. They would present overview papers of the minerals development situations in their respective countries and generally contribute from their experience to the discussions in the Pakistan workshop. Other participants from outside of Pakistan will be invited from such organizations as OECD, Colombo Plan Secretariat, Arab Development Institute, UNIDO, USAID, and possibly India. Thus, although the conference is primarily directed to the subject

of Pakistan mineral resources, it would be sufficiently broad to interest minerals-related organizations from regional and developed-world entities. Invitees would also include observers from various large international minerals development firms in the private sector such as Rio Tinto, Japanese Zaibatsu, AMEX, Kaiser Industries, etc.

DRI's assistance in this program consists largely of identifying appropriate individuals and recruiting them to prepare and present papers during the first week of the conference. Principal conference agenda items are posited as follows:

1. Occurrences and characteristics of commercially exploitable mineral resources in Pakistan--by a Pakistani expert.
2. Status of minerals exploration technology, ranging from satellite applications to ground survey techniques, including geo-chemical, by a U. S. expert in this subject area--possibly from the Colorado School of Mines.
3. State-of-the-art discussion of current mining technology, particularly applicable to medium- and small-scale operations in Pakistan.
4. Current development in extraction and beneficiation technology applicable to the Pakistan minerals situation--by a representative of Hazen Research Incorporated of Golden.
5. Overview of the Turkish minerals development situation.
6. Overview of the Iranian minerals development situation.
7. World markets and projections for minerals utilization, with special reference to those occurring in Pakistan--by a representative of the U. S. Bureau of Mines.
8. Pakistan minerals industry development needs and opportunities, including financial resources and the type of government-sponsored investment inducement programs that may exist.
9. Possible presentation of a group research proposal by PCSIR to the attendees, seeking sponsorship for research in some carefully chosen area of common interest.

10. During the second week, a workshop comprising primarily Pakistani participants, which would examine various Pakistan-specific aspects of the subjects discussed during the first week, and the development of recommendations relating to these subject areas for forwarding to the cognizant government ministry for consideration for inclusion in the next Pakistan six-year development plan.

The initiation of a group research project is considered desirable as a means of actually getting PCSIR into a new working relationship with private and public sector minerals industry entities within Pakistan and, if it came to pass, would be a good demonstration of the efficacy of DRI support measured in terms of innovative marketing activity by PCSIR. It is also possible that some technical assistance might be required in connection with such a research project, but this necessarily awaits determination of the subject of the program.

A strong interest has developed between the Industrial Advisory Center of Pakistan (IACP) and PCSIR in establishing an Operations Research Center designed to serve industrial and government clients ranging from the Traffic Control Unit of the City of Karachi to the Port Authority of Karachi to several development banks and larger industries who have inventory and product flow problems. It is anticipated that the Government of Switzerland will contribute part of a \$564,000 grant to Pakistan for support of the activity.

DRI provided the services of an Operations Research expert in June and July of 1978 to assess the needs and opportunities for OR in Pakistan, to develop plans for organizing and training an OR cadre, and to identify related facilities (and the need for these) such as computers.

PCSIR has been given responsibility for planning and organizing three new institutions to be established under GOP auspices: a National Physical Standards Institute, an Engineering Mechanics Institute, and a Solar Energy Research Institute. Significantly large funding has been authorized for establishment of these new entities (including UN and other external sources), and general responsibility for their origination and start-up resides with PCSIR.

However, there is insufficient present knowledge and capability in these subject areas to enable PCSIR to proceed with their establishment, as required. For example, in the area of solar energy, a preliminary proposal for establishing this institution has been developed. However, it is felt that guidance and consultation is needed in this subject area from an experienced individual, on a residency basis, over a nominal two-year period. Similarly, such assistance in organization, management, and planning is considered necessary in the Engineering Mechanics Institute and the Physical Standards organization.

Not only will senior consultants be needed for both brief and extended periods in each instance, but also technical assistance in different subject areas will be required as these functions are organized and get underway.

PCSIR has asked DRI to seek funding support from USAID--most particularly the Islamabad Mission--in providing a broad-based technical assistance capability to PCSIR in its efforts to establish these institutions. Thus, DRI would act as a recruiting source for necessary consulting personnel, would act as a procurement agent for equipment, a source of information in response to requests, to identify sources of expertise and information worldwide as may be needed, identification and provision of specific expertise when the demand for such is perceived, and in the provision of general logistic support to these projects. DRI has also contacted the U. S. Bureau of Standards--which has also been involved in discussions of the Pakistan standards program--with regard to the range of possible support from NBS for training, provision of physical standards, facilities specification and design, etc.

Official permission has been received from the cognizant Pakistan Government Ministry for PCSIR to proceed with two of three proposed research programs prepared for EPA with DRI assistance. These are: treatment of resizing waste water from Karachi textile plants and a study of the pollution characteristics of various levels and types of technology planned to be introduced into Pakistan in the next six-year development plan. EPA has tentatively agreed to support these programs (\$150,000 and \$50,000 PL 480 rupee equivalent, respectively)

upon receipt of revised research proposals. Yet to be approved is the proposed study of mercerizing wastes, but it is believed that this study will be authorized in late 1978. Each of these three studies is crucial to Pakistan, since restricted water supply limits the expansion of this principal foreign exchange-earning industry, and there is great interest in water conservation; currently, the textile industries do not recycle water.

DRI has also assisted PCSLR, in collaboration with Hazen Research, Inc., of Colorado, in the preparation of a proposal for bauxite development and processing in Pakistan, to be funded by the USAID Mission in Pakistan. The contract is expected to be awarded in the fall of 1978.

IIT

Technical assistance is being provided to IIT in the following areas:

- village-level extraction of sugar from cane;
- extrusion of alimentary food pastes from non-wheat cereals;
- briquetting of coal for low-income domestic use;
- packaging.

Technical assistance for extrusion of alimentary food pastes was provided in cooperation with the Korea Institute of Science and Technology (KIST), under the Research Grants Task of the contract. See Section IV of this report.

As mentioned under the Staff Development Task of this contract, IIT has received financial support from COLCIENCIAS to improve the village-level extraction of sugar from cane. This project is also of considerable interest to the USAID Mission to Colombia, even though there is some uncertainty as to USAID's continuing programs in Colombia.

At IIT's request, DRI retained a senior engineer from the Crescent Engineering Company in Denver who has extensive experience in sugar-cane processing. The expert spent one week in June 1978, visiting village-level processing units and discussing alternatives and possible improvements with IIT and USAID officials. His recommendations were based on a two-pronged approach to improving the rural production

of panels: first, implement as soon as possible certain relatively simple modifications in the trepiches such as cane crushing prior to roller squeezing, bagasse pre-drying, chloral reformulation, etc.; second, long-range improvements, by designing and building a pilot trepiche from "scratch" rather than surveying a lot of existing installations and using the best one as a model for improvement. His report is appended.

It should be noted that the second recommendation above has been discarded in the Village-Level Food Processing (VLFP) project being conducted by DRI and PCSIR in Pakistan (see Section VI) in favor of trying to improve quantity and quality of sugar produced from the cane through use of bacteriacides and coagulants rather than trying to materially change the machinery being used.

As a result of this consultation, DRI staff met with USAID officials in Bogota who forwarded to USAID/Washington the following "Action Plan" (Figure 4), the details of which are appended. The Crescent Engineering consultant is scheduled to return to Colombia in September to continue providing technical assistance to IIT in this area.

DRI was unable to provide IIT with the services of an expert on coal briquetting prior to July 1978. IIT staff training was completed, but a number of experts identified were unable to go to Colombia. The services of an expert have been obtained through the assistance of the Office of the Assistant Secretary for International Affairs of DOE, who will go to Colombia in March 1979. In the meantime, DRI obtained a variety of information (drawings, photographs, and operating diagrams for a coal gasification pilot plant from the Pittsburgh Energy Research Center--PERC) which has been forwarded to IIT.

DRI also assisted IIT in the preparation of a proposal on Ethyl Alcohol Effluent Pollution Control, which may be funded by a private industry in Colombia.

Technical assistance in packaging was delayed pending the return of the DRI packaging expert from Brazil but is scheduled for September 1978.

Figure 4. An Action Plan to Improve the Light Capital Technology of Panela (Brown Sugar) Cultivation, Processing and Distribution: A System Approach

I. OBJECTIVE

The objective of the proposed action plan is to review all aspects and phases of the panela production cycle, as outlined in Attachment I; analyze the findings and develop a series of practical recommendations for feasible steps to improve all facets of panela production in Colombia, which could then be extended to other brown sugar-producing areas of the world.

II. BACKGROUND

Colombia is the third largest producer (after India and Pakistan) and has the highest per capita consumption of brown sugar in the world. Panela is an important element in the nutrition of the poorest segment of both the rural and urban population and is their main source of mineral intake.

Sugarcane cultivation intended for panela production is widespread in Colombia and carried out in more than half of the departments. This usually occurs in hill country and is fragmented among small farms with an average size of less than five acres.

Panela is produced in low capacity-light capital-intermediate technology installations called "trapiches," which consist of a roller type cane crusher, a heat-generating furnace, a series of pans for cane juice boiling and thickening, and a grid for molding panela cakes (slabs). There are 40,000 to 50,000 trapiches in rural Colombia. About half are driven by animals, with the remainder run by gasoline and diesel engines or electric motors.

Half of the total sugarcane cultivation is for panela. Cultivation and trapiche operations are labor-intensive and, together with local distribution and marketing, provide employment for close to a million poor Colombian rural and village workers, including women and children.

III. STATEMENT OF PROBLEM

There are considerable problems, inefficiencies, and deficiencies in all aspects of panela production such as: a) cane varieties inappropriate for brown sugar; b) poor planting and harvesting practices; c) lack of fertilization; d) inefficient material-handling methods for cane, juice, and fuel; e) lack of repair and maintenance facilities; f) poor operating procedures for the trapiche equipment; g) poor furnace design with wasteful use of fuel; h) inappropriate or non-use of waste and byproducts; i) lack of quality control; j) use of harmful additives (decolorants); k) rudimentary packing resulting in short shelf life of the finished product; l) inadequate transportation, wholesale and retail distribution; m) considerable price fluctuations; etc.; etc.

Figure 4 (continued)

Several Colombian and international organizations are currently involved in surveying and studying different aspects and phases of the panela system with little cooperation and coordination. This often results in wasted time and duplicated efforts.

Therefore, IT IS RECOMMENDED that a coordinated ACTION PLAN be implemented to achieve the objective stated above.

ASRCT

ASRCT has been asked by the Thai Government to consider the establishment of a packaging research laboratory which would develop standards, establish packaging material-product compatibility, physical and mechanical properties, etc., for food and other industrial products. In order to prepare a proposal for funding of the laboratory, ASRCT requested DRI assistance in identifying packaging problems and assisting in the design of an appropriate packaging laboratory.

The DRI packaging expert spent the month of August 1977, in Thailand working with ASRCT staff members to define the needs and parameters necessary to prepare a laboratory design and to prepare a report, "Technical Assistance Required for the Creation of a Laboratory for Packaging Development, Evaluation and Testing of Food Products at ASRCT." The report was subsequently used by ASRCT to submit a proposal for the establishment of a packaging laboratory, which is expected to be funded in late 1978.

The DRI and ASRCT staff members surveyed 13 companies, four food markets (government operation and privately owned), and six government agencies involved in packaging. General conclusions concerning the need for technical assistance in the creation of a Food Packaging Development and Testing Laboratory are as follows:

1. Domestic packaging of food (processed and natural) varies widely in quality.
2. The degree of sophistication in applying technology commonly found in developed nations is very haphazard.
3. Very good packaging has evolved in particular industries where export markets have been established with developed countries whose quality control standards in processing and packaging have transferred to Thai companies.
4. The most developed packaging technology occurs with companies with the following linkages:
 - Multinational companies who have captive packaging material suppliers who utilize the most recent technical equipment and standards of production.

- Users or suppliers of packaging materials who have technical linkages with foreign machinery suppliers who supply quality control procedures, material specifications, and technical assistance.
5. Quality control in the bulk of local small Thai packaging material suppliers and user industries can be considered nonexistent. It mainly is concerned with visual inspection, and it is assumed that suppliers are responsible.
 6. No private or governmental institution has the capability at present to develop needed expertise in new materials performance or present materials performance or food compatibility studies (package material-product).
 7. Studies by UNIDO and the EEC further support the need for a food packaging development and testing laboratory.
 8. To develop foreign markets for Thai agricultural products particularly in the areas of fresh fruits, produce, and processed agricultural products, extensive work is needed to develop standards of processing and packaging which are acceptable on an international level.

At the request of the Governor of ASRCT, the DRI Assistant Director for Operations, who was participating in the December 1977, workshop on project management and development, made an "Investigation of the Policies and Procedures of the Applied Scientific Research Corporation of Thailand." The report is appended.

The investigation produced three perceived needs with changes in a number of associated administrative procedures if ASRCT is to meet its goals:

- ASRCT wishes, over the long run, to become an autonomous, self-supporting, not-for-profit contract research institute serving the government and private sectors of Thailand. To reach this goal will require not only action on ASRCT's part but also a significant further development in the Thai economy and the government's ability to package and contract for research needs. As this is accomplished, ASRCT needs

to gain a better perception of where it is headed in terms of research areas--particularly among the average staff members. Although the ASRCT Board has set general directions, a detailed operational plan prepared by the ASRCT staff and subsequently communicated to the rest of the staff is needed.

- The long-range goal of ASRCT's relationship to the Thai Government and private sectors needs to be further impressed upon the staff.
- The third perceived need is to create an incentive system that will encourage the staff to strive to achieve ASRCT's goals; this is not believed to exist at present, although some of ASRCT's ideas concerning the use of bonuses are certainly steps in the right direction.

These and other issues concerning ASRCT management and operational procedures are part of a continuing dialogue between DRI and ASRCT.

Also, in conjunction with the December 1977, workshop, the manager of DRI's Office of International Programs Information Service was asked to assist ASRCT in an evaluation and preparation of a development plan for the Thai National Documentation Center (TNDC). The objective was to assist TNDC in obtaining and responding effectively to technological information requests on its own, rather than to continue depending on DRI as a source of information. The assistance resulted in preparation of two reports to ASRCT/TNDC. These were:

1. A Review of Internal Management of TNDC
2. Suggestions for a Development Plan for TNDC and ASRCT.

The suggested goals/programs presented to ASRCT and TNDC are summarized as follows:

1. Create an "information officer" position to act as a liaison with ASRCT. The Liaison would be able to anticipate ASRCT's information needs and to supply exactly what is needed. The information officer would attend all department and division planning meetings, policy meetings, and research meetings, creating a visible information link with ASRCT.

2. Write a document to be used as a persuasion tool for convincing the budget bureau of TNDC's need for additional staff. This concept paper of future activities would include justification for increasing TNDC's staff. (The existing five-year plan is too general and is essentially worthless.)
3. Encourage the integration of TNDC's skills and resources with ASRCT's planning for the rural development programs. TNDC is capable of assuming a major role in the various tasks of an extension program, e.g., repackaging the technical data files, increasing its cooperative exchange program with Kasetsart University (agricultural extension services), the Ministry of Science, and the ASEAN libraries. TNDC, relying on its translating services and its in-house information-gathering skill, could fill the technology transfer gap from spoken skill transfer to rural implementation through many information forms (e.g., newspaper articles, radio education shows, extension newsletters, nutrition information fliers, etc.).
4. Develop a selective dissemination of information service to ASRCT researchers. By compiling profiles on each research (key subject terms) and updating the profile periodically, TNDC could fill all anticipated information need and keep the researcher up to date in his particular area of interest.
5. Conduct technical writing and abstract writing skill courses for ASRCT personnel.
6. Encourage ASRCT to issue a five-year plan or research directions for the next two years so that TNDC can tailor its information acquisition activities to meet ASRCT's needs.
7. Develop the technical data files to reflect the most recent research information. The following steps may be taken:
 - a. Work out SDI--search methods--coordinating all review/scanning activities going on within TNDC at present.
 - b. Expand information exchange with ASEAN association members and appropriate technology centers to gather relevant information.

- c. Send subject list of technical data files to ASRCT researchers on a monthly basis--requesting any new subjects to pursue.
 - d. Index data files to facilitate searching within files.
8. Continue coordinated area acquisitions to avoid purchasing expensive reference materials owned by libraries close by. Convince ASRCT researchers that cooperative buying is the only solution to the lack of adequate acquisition funds.
 9. Encourage staff continuing education programs. These programs/skills acquisitions should reflect technical skills needed for effective response to ASRCT's needs.

The reports are appended.

The Korean food industry is using increasing amounts of high fructose syrup (HFS) as a sugar substitute in the food industries; HFS is currently imported into Korea. KIST has developed a technology for the production of HFS from starch, but there is an insufficient supply of starch produced in Korea to meet future demand for production of HFS.

At the same time, Thailand produces abundant quantities of tapioca, which is a good source of starch, and cassava, also a good source of byproduct starch for use in production of HFS.

Thus, DRI arranged for a cooperative program between ASRCT and KIST, with the objective of transferring the KIST HFS technology into Thailand. The program involved a techno-economic feasibility for the construction of an integrated plant for production of HFS in Thailand, using the KIST technology, the product of which has a potential for importation in Korea. Several Thai manufacturers have expressed interest in financing the commercialization of HFS.

The technical assistance was to be conducted in three stages. In November 1977, two ASRCT staff members visited KIST to obtain information on the KIST technology and to provide data necessary for the feasibility analysis of the technology transfer. In May 1978, three KIST staff members visited ASRCT to survey the status of starch and sugar industries for the feasibility analysis. Upon completion of the feasibility study, a meeting was to be held among potential

clients in Korea and Thailand to provide the opportunity for undertaking commercialization of the process.

The techno-economic feasibility study is still underway but is expected to be completed in September 1978, at which time the potential Korean and Thai clients will meet to make decisions on commercialization of the technology.

DRI's role in this transfer of technology between two developing countries consisted of making arrangements for cooperation between KIST and ASRCT and based on knowledge of both the KIST technology and the Thai potential for producing large quantities of starch. A DRI staff member accompanied both teams in order to continue to coordinate the joint effort. It is reasonable to assume that the program will be successfully concluded. Clearly, it will be a significant example of the importance of joint ventures between two developing countries. A similar experiment was conducted between IIT and KIST under DRI support through a research grant to IIT. See Section IV.

Know-how Information Services (KIS)

The know-how information services provided by DRI to its linked institutes and others differ markedly from the scientific and technical information usually accessed from world data banks. DRI is primarily concerned with obtaining technical information of specific interest to linked institutes who are trying to solve industrial problems--"know-how information" on the state of the art for appropriate processes, sources of components, and equipment specifications and designs which may be required by medium- and small-scale industrial clients. Assistance in accessing computerized scientific information systems is also provided, but the emphasis is on practical information which is immediately useful and needed by the industrial client. This service is used frequently and successfully by the linked institutes and appears to be providing valuable assistance to them.

During the TA/OST informal review of the contract in January 1977, the decision was reached to shift the information program emphasis from responding to information requests as a service to

providing policy guidance and assistance to USAID and the linked IRIs on information issues. While DRI continues to respond to specific information requests as a component of its ongoing or anticipated technical assistance activities, the major information emphasis with the linked IRIs is directed towards the development of information extension capabilities during the remainder of the contract. This approach is expected to strengthen the linked IRIs' ability to provide information services as well as technical assistance to industry, and the results will provide policy guidance to TA/OST on technical information utilization and services.

Thus, DRI has been concentrating its information activities on training in information organization and dissemination of information to end-users. The transition from information supply to training has been gradual, but with each service a model and guide as to how the information was gathered was supplied to facilitate the transition. The residual supply activities are only to support specific technical assistance activities.

The training activities encompass individual training programs, management studies of internal reorganization and training needs, and workshops and seminars for a target group. All these activities lead to the goal of transferring information skills to the information personnel in DRI's linked institutes so they will be able to better utilize the scientific and technical resources that complement and facilitate research within their research center.

The training activities will not be as extensive as had been planned due to monetary limitations, e.g., an ASRCT intern will not come to DRI for training and master's course work, and the information managers' workshop will not take place in Denver.

During the past year, two activities were initiated to complement KIS and to develop resource alternative skills among the linked institute information personnel. The two programs were: network resources development and the selective dissemination of conference information. These two programs were chosen to help make the transition from supply to advice for DRI's linked IRIs.

The networking included the development of an information resource awareness among the linked institutes. DRI requested and disseminated copies of lists of holdings at the various institutes, e.g., technical data files, research reports, etc. The institutes then contacted each other for specific requests as well as DRI's files. The goal of the network was to increase awareness among the information personnel of files and resources of the various research institutes and to create an information exchange pattern.

The selective dissemination of conference information program was initiated to facilitate access to conference papers and to introduce information personnel to alternative sources of information. The program has been a success qualitatively and quantitatively.

ASRCT

Because ASRCT had such an apparent need for technical information assistance, a program to evaluate their internal information system was initiated. In December of 1977, the DRI Information Services manager visited the Thai National Documentation Center (TNDC), which provides technical information to ASRCT. After reviewing the organization structure and interviewing researchers there, two reports were prepared:

1. A Review of Internal Management of TNDC
2. Suggestions for a Development Plan for TNDC and ASRCT.

The result of her visit and subsequent reports have not been evaluated as yet, but the function of the effort was to assist ASRCT and TNDC in becoming effective information sources, ones that could function well without the same degree of assistance from DRI. This activity was described in greater detail under Technical Assistance.

The training of a member of the TNDC staff was also described under Staff Development.

Future activities with ASRCT include an information workshop scheduled for September 1978, which will facilitate communication channels between scientists and information researchers. In particular, group exercises in ameliorating barriers to information, negotiating

the reference question, and communicating research results will be part of this training. The program for this workshop is appended.

DRI's most active information linkage has been with ASRCT. In part, this may be due to the relative "newness" of DRI's relationship with ASRCT and both organizations' enthusiasm to make the linkage work.

The following information was provided to ASRCT during the fiscal year:

- solar and wind sources of energy
- windmills
- cashew nut estates
- fungal protein from agro-waste
- winged bean
- integrated rural development program in Vietnam
- instant rice production
- macadamia nuts
- citronella
- fermenters used in fungal protein for agro-waste
- tetracycline
- small-scale fertilizers
- processing machinery for grease
- herbicides
- rice-grading standards and specifications
- digestive detergents from sugar
- high fructose syrup plant
- freon plan
- cashew nut follow-up
- packaging
- sea salt.

Most of these requests were filled in support of DRI's technical assistance program with ASRCT.

IIT

Information searches/services provided to IIT included:

- coal briquetting
- low-cost extrusion technology
- pasta processing equipment
- gur
- cassava chips and pellets
- standards for starches in baby food
- quality control in food production industry
- organic bleaches for panela
- fermentation of bagasse for potential livestock feed.

All of these information requests directly supported the technical assistance activities DRI has provided IIT. *The information service activities with IIT have shifted from an active to strictly supportive mode. Information training plans for a workshop, individualized training programs, and an evaluation of in-house IIT management have been initiated with Dr. Jaime Ayala and DRI.

Quantitatively, the work for IIT has been very small this year. This was due to various factors, the main one being the internal restructuring at IIT.

IIT was one of the most enthusiastic respondents to the conference information program. They actively used this networking system and supported continuing such a program at IIT. IIT also participated in the resource-sharing program among LDC research centers that DRI set up.

PCSIR

The following information requests were filled for PCSIR during the past year:

- ultramembrane filtration equipment (equipment)
- fruit dryers (patents)
- graphite electrodes (follow-up for licensing).

*Most of the information supplied was follow-up material from previous information requests.

These information requests were filled early in the year, mainly to support the technical assistance and grants programs at PCSIR.

PCSIR also responded to the Conference Papers SDI program, asking for papers from the Essential Oils, Food Technologists, and Solar Energy Conferences.

Very little has evolved for training programs with PCSIR; this is due to poor communications with PCSIR and lack of interest. Hopefully, this can be resolved as more DRI personnel travel to Pakistan.

The Information Handbook

The Information Handbook was suggested at the January 1978, OST review as a final piece to document KIS activities relating to small-scale industry development.

The Handbook is intended to serve as a guide to LDCs in organizing information resources, those of both a formal and informal nature. Once again, components of information-gathering such as negotiating the reference question, utilizing reference tools, and examining case studies of successful reference searches will be the focus.

The tentative outline for the proposed handbook follows:

HOW TO FIND TECHNICAL INFORMATION RELATED TO
SMALL-SCALE INDUSTRY DEVELOPMENT
A Guide to Know-how Information Services (KIS)

I. Introduction

- A. Background of DRI and OTP work completed that led up to production of manual.
- B. Qualification statement on limitations of the manual.
 - 1. Discussion of the audience to which the manual is directed.
 - 2. Discussion of the fact that each request for information is unique and there is no "always applicable model."

3. Discussion of the applicability and non-applicability to certain regional areas of the tools mentioned, plus dependence on telecommunications' infrastructure.
 4. Limitations of the information transfer system and of the manual--what it can and cannot do.
 5. Discussion of the different types of questions and requests to be included.
- C. How to use manual.
1. Directions.
 2. How to combine several types of questions to reach desired answer/outcome.
 3. Discussion of necessity of negotiating the reference question prior to using manual's methods.

II. Types of Questions This System Will Answer and Procedures for Answering the Questions

(Under the following types of questions, a short definition of each type will be included, plus the types of reference tools that have been helpful in answering the questions will be listed and described.)

- A. Process information.
(Process information answers questions on "how to" make a product or "what steps are involved" in a certain technology: this information is tailored to a certain situation.)
- B. Patents--U. S. and foreign.
- C. Product manufacturers--collecting catalogs and finding available supplies and suppliers.
- D. Experts in the field--including universities, research centers, etc.
- E. State of the art--including ongoing research projects, the principal investigators involved, conferences on the subject, current literature, commercialization aspects of the subject, etc.
- F. Proprietary technology (selling licensable technology, private company technical assistance).
- G. Standards and specifications--U. S. and foreign.
- H. Bibliographies (generated manually or electronically).

- I. Market information--including preliminary market analysis for feasibility considerations.

III. Reference Tools

(This section will include a description of categories of tools and specific examples of tools, with the understanding that the specific examples may not be available or applicable in all situations but that the type is universal.)

- A. Library catalog.
- B. Directories.
- C. Conference proceedings.
- D. Encyclopedias/dictionaries.
- E. Textbooks.
- F. Indexes and abstracts.
- G. Handbooks, manuals.
- H. Computer data bases.
- I. Newsletters--emphasis of appropriate technology newsletters and a coupling with a selective dissemination of information system.
- J. Bibliographies.
- K. Guides to information sources.
- L. Government documents.

IV. Information Sources

(Notation that LDCs will not have some tools or have access to some tools.)

- A. Private Research Companies or Information Clearinghouses (will include distinction between profit and nonprofit information sources).
 - 1. VITA
 - 2. IHS
 - 3. TAICH
 - 4. Library of Congress Referral Service

- B. Government agencies.
 - 1. Agricultural Research Service.
 - 2. Lists in the Directory of Federal Information Sources for agencies and information contacts.
- C. Associations.
- D. Trade and professional organizations.
- E. University, foreign industrial research centers, and U. S. research centers.
- F. Standards and specifications.

V. Case Studies

(Included will be examples of five case studies--the methods DRI used in answering each request will be discussed.)

It was intended to initiate preparation of the Handbook during the second year of the contract, subject to the availability of additional funds. Such funds have not become available so that no progress has been made on preparation of the Handbook.

Women in the Development Process

The potential of using women in national development has become a topic of current interest in many governmental agencies, private voluntary organizations, and international organizations. DRI feels that the focus on "Women in Development" (WID) means to encourage the full participation of all human resources, including women, in the social, political, and economic development of their country. The DRI task is to encourage this participation by focusing on women in the linked industrial research institutes (IRIs). Through various programs, DRI's objectives are to:

- enhance the ability of women in the IRIs to perform more effectively in their positions and to
- assist them in promoting the flow of technology from industrial research institutes through existing transfer agents to the rural users.

In particular, DRI has worked to include more women in its existing programs for IRIs as well as to design new programs specifically directed toward them. However, much needs to be done both to increase the level and to improve the quality of participation by women in development-oriented activities. In some cases, the participation of women is highly visible; in others the participation is less visible, but of high quality. In certain cases, an initial improvement in women's roles and potentials has only just begun. In many ways, the understanding of and sensitivity to different cultural and institutional situations is as much a part of DRI's role in assisting "women in development" as is the design of training programs and technical assistance.

The WID activities under the OST contract include:

- information exchange
- management training
- the Development Training Forum.

1. Information Exchange

A number of channels have been used in attempting to initiate and encourage interest in improving women's roles within the IRIs. Information on U. S. projects directed toward women and current research has been collected and disseminated to women in linked institutes according to their research fields and interests. For example, the U. S. WID/AID office sponsored a conference on the "Role of Women in Meeting Basic Food and Nutrition Needs in Developing Countries." A summary of the report and selected papers were forwarded to Ms. Teresa de Buckle at IIT because of her participation in IIT's food and nutrition program. The information provided to the IRI then serves to assist personnel in the IRI in preparing for the Development Training Forum (DTF).

Furthermore, current information on the role and potential of women in the developing country can be made available through the linked institute which assists DRI in preparing for the DTF. Thus, a two-way information exchange serves to strengthen the linkages between DRI and the IRIs for mutual benefit.

2. Management Training

Initially, the DRI management training activities involved few women. There are, of course, several explanations suggested for their low level of participation in certain countries. As in our country, their access to higher education, job opportunity, and job advancement may have only developed in recent history. Thus, they are often not in the higher positions where this training has been concentrated. In some cases, limitation and confinement to certain job areas might still be occurring. In addition, even though there may not be legal or written barriers, attitudes which discourage or simply "do not encourage" women's involvement might prevail. Finally, women's perception of themselves after years of defined roles might be preventing them from participating at the level of which they are capable.

A record of women's participation in the DRI Management Training Program has been made from 1973 through the present to provide useful base line data for analyzing DRI impact. The current tabulations are available in Table I.

As expected, the ratios of female to male are not very good. However, there have been some indications of progress that are not easily identifiable through statistics. It is important to consider the quality of participation in the early stages of these continuing programs. In the first Indonesia Management Workshop, December 1975, there was one female participant. Her role was a difficult one and her participation level understandably low. In the second workshop for mid-level management, December 1976, there were four female participants, all of whom contributed a great deal to the discussions. In the Denver Symposium on Management for Directors, September 1975, the one female participant, Ms. Malee Sundhagul, was one of the most active and productive contributors.

It is important to note that a quantitative assessment of participation by women yields only a partial picture. Therefore, in addition, a questionnaire has been used as a guideline for collecting more detailed information on women's participation, as well as hopefully yielding a better understanding of factors limiting participation. The questionnaire is administered by the workshop director. A qualitative assessment of performance is, by nature, very subjective but should

Table 1

DRI/OIP Management Training Program Workshop
Participation, 1974-1978

(Numbers do not include DRI or AID participants)

<u>Workshop Location</u>	<u>Participants/ Observers</u>	<u>Women</u>
São Paulo	23	3
Bangkok	36	4
Ankara	32	3
Denver for Workshop Directors	7*	1
Karachi	20*	1
Tunis/Gabes	44	0
Bangkok/Phattaya	19*	4
Bandung	31	1
Bandung	30	3
Tugu (1976)	34	3
Tugu (Oct. 1977)	30*	1
Tugu (Nov. 1977)	33*	3
Lahore	17*	0
Karachi (1977)	26*	2
Bangkok (1977)	20*	9
Guatemala (1978)	19*	2*
Bogotá (1978)	<u>25*</u>	<u>8</u>
TOTAL**	415	46

* Participants only.

** Some people and institutional representatives attended more than one workshop; the totals are not the sums of the individual workshops' numbers.

be used to supply an additional dimension. The results of the questionnaire given to eight women participants out of 21 workshop participants at the December 1977, Management Development Workshop have been useful in developing this DTF in Thailand. Similarly, questionnaires are being used to supply additional information on participants in Colombia.

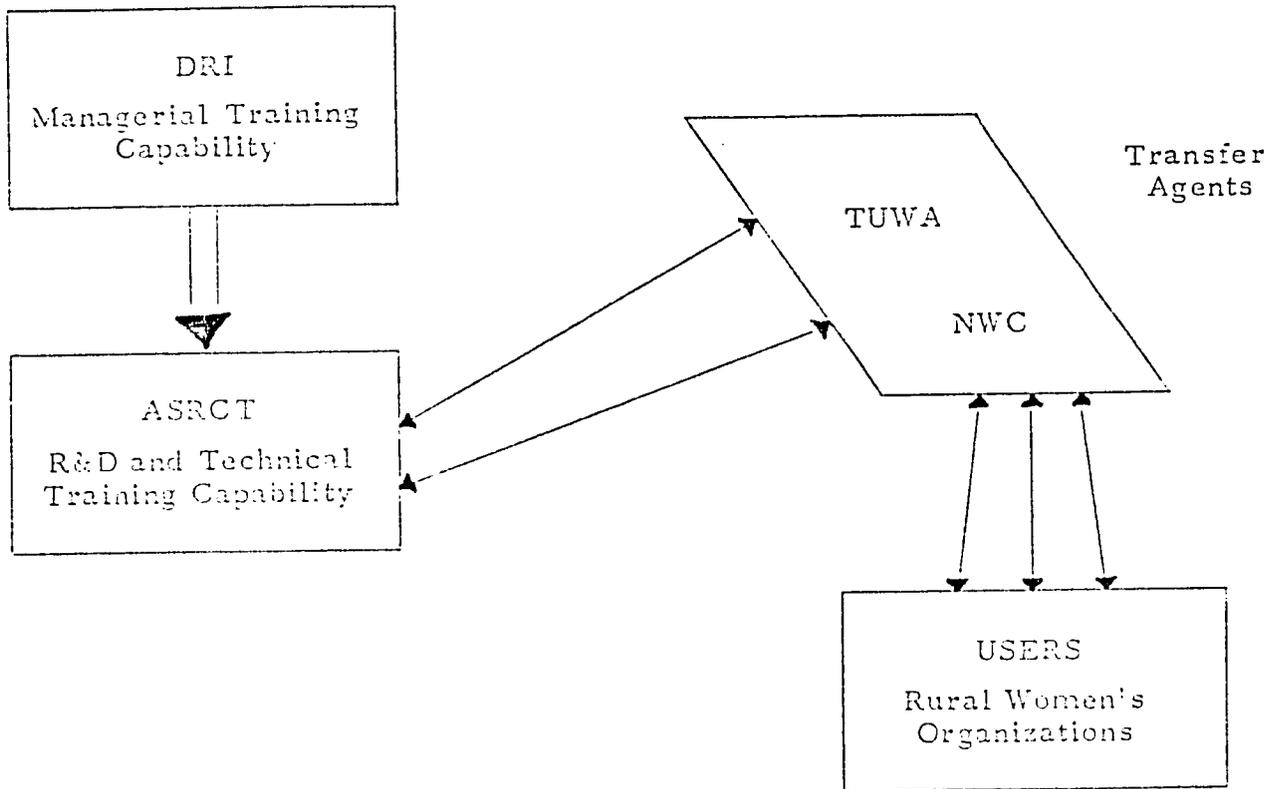
3. Development Training Forum: A New Role

The lack of skills training in most developing countries, particularly for women, is a serious problem. Basic communication skills, planning and organizational skills, and business skills are needed at many levels by various groups, e.g., women's organizations, community groups, and ha. Hroft cooperatives. Project planning, proposal preparation, and management skills are needed at middle and higher levels by industrial research institutes, newly formed government committees, and private volunteer groups. In order to assist in supplying needed skills, DRI is conducting a series of training forums to assist linked IRIs in improving the transfer of R&D in rural technology to rural women's organizations through an established network of transfer agents. The training forums will be conducted in Thailand (26 July through 2 August 1978) with ASRCT and in February 1979, in Colombia with IIT (depending on availability of funds).

Training Forum--Thailand. The objectives of this training forum are for DRI and ASRCT to collaborate in improving the transfer of R&D from ASRCT through transfer institutions to the ultimate user in rural areas. The established network of transfer agents is provided by the Thai University Women's Association (TUWA) and the Thai National Council of Women (NWC). In this way, DRI will assist in increasing ASRCT's ability to interact effectively with the transfer agents and help the transfer agents, in turn, to improve their capability to deliver the services to the rural women's organizations. At the same time, the specific needs of the rural organizations will be fed back through TUWA and NWC to ASRCT to assist in planning more appropriate R&D for rural areas. (See Figure 5 on the following page.)

Training Forum--Colombia. A similar program may be conducted in Colombia through DRI's linked institute, IIT. The focus of this DTF will be the "Role of Women in Food and Nutrition." Transfer agents

Figure 5. Diagram of Objectives



include CENA (a production center that works across many aspects of rural development), Oficina de Integración Popular (OIP provides integrative services to communities, particularly in promoting small business for women), and PAN (National Program on Nutrition).

DRI regards the WID task as an important element of its activities in developing countries. However, even though WID programs appear to be part of the USAID mandate, DRI's experience to date indicates that funds to support such activities are virtually impossible to obtain.

The first workshop of the Development Training Forum focuses on the use of a simple planning methodology to be used to facilitate the flow of technology and knowledge to rural areas in Thailand. A

second workshop will focus on technical skills training. The skills will be determined by the Program Design participants themselves during the first workshop.

IV. RESEARCH INSTITUTE MANAGER WORKSHOPS AND RESEARCH GRANT AWARDS

These tasks, initiated under contracts AID/CM-ta-73-20 and AID/CM-ta-C-73-21, are being conducted on a worldwide basis and include both linked and non-linked institutes. Both tasks afford an opportunity to provide information about DRI's progress and activities with linked IRIs to a much larger spectrum of IRIs in developing countries.

Research Institute Manager Workshops

The objectives of this task continue to be to develop, implement, and assess short-term executive training programs to improve the technical and administrative capabilities of directors, supervisors, and other senior IRI personnel who are responsible for the planning, organizing, supervising, and marketing of the results and services of their institutes.

Sixteen workshops have been conducted by DRI under contract AID/CM-ta-C-73-21 (Sao Paulo, Bangkok, Ankara, Denver, and Karachi), with the support of the Asian Bureau and the USAID Mission to Indonesia (two in Bandung, three in Tugu) and the current contract (Lahore, Bogota, Tunis, Bangkok and Guatemala). The number of participants, IRIs, and countries involved in this series is shown in Table 2. The success of these workshops is indicated by the fact that IRIs or other LDC organizations continue to make requests for similar workshops to be conducted and co-hosted in their institutions. More importantly, 415 participants have had the opportunity to share experiences gained from the operations of other research institutes and have been exposed to a variety of topics ranging from industrial liaison and promotion of technical services to the contributions which an LDC IRI can make to its country's economic growth and industrial development.

Six regional management workshops were to be conducted by DRI under this contract. Of these, three have been completed (Tunis, Bangkok and Guatemala). During the AID informal review of project status in January 1978, it was concluded that the workshops be limited to a total of four, and that the funds obligated for the remaining two workshops be used for more thorough follow-up, etc.

TABLE 2. RESEARCH INSTITUTE MANAGER WORKSHOP PARTICIPATION
(Numbers do not include DRI or AID participants)

Workshop Location	Participants/ Observers	Women	Organizations	Applied Research Institutes	Countries
Sao Paulo	23	3	22	8	4
Bangkok	36	4	24	13	9
Ankara	32	3	17	10	8
Denver (for workshop directors)	7*	1	4	4	4
Karachi	20*	1	6	6	1
Tunis/Gabes	44	1	15	11	10
Bangkok/Phattaya	19*	4	12	9	6
Bandung	31	1	1	23	1
Bandung	30	3	0	11	1
Tugu (1976)	34	3	0	12	1
Tugu (Oct. 1977)	30*	1	0	12	1
Tugu (Nov. 1977)	33*	3	0	12	1
Lahore	17*	0	3	1	1
Karachi (1977)	26*	2	3	1	1
Bangkok (1977)	20*	9	10	9	6
Guatemala (1978)	19*	2	5	14	14
Colombia (1978)	25*	8	0	1	1
TOTAL**	415	46	101	148	59

* Participants only.

** Some people and institutional representatives attended more than one workshop, thus the totals are not the sums of the individual workshops' numbers.

The Guatemala Workshop

The regional management workshop for senior management of 14 Latin American institutes was co-hosted with Instituto Centroamericano de Investigaciones y Tecnología Industrial (ICAITI) in Guatemala City on 19-23 June, 1978. Nineteen participants from the institutes attended the workshop. A different workshop format was used (see program appended) as an experiment to increase participation in discussions and activities by the attendees. In most of the sessions, after introductory comments, participants were assigned to one of four working groups in order to formulate opinions about the topic under discussion. Each group rapporteur presented the conclusions of his group in plenary session, followed by general discussion of the conclusions. It is believed that this approach improved materially the participation of each attendee and drew out comments and observations that would not have otherwise appeared if group discussions only had been used as a workshop format.

Also, two attendees were assigned to each session to collaborate in the preparation of a brief report for that session which summarized the conclusions and the recommendations of the session. The final report, which will be distributed to all participants, has not as yet been received.

Rather than a final evaluation only at the end of the workshop, participants were asked to evaluate each half-day session, as well as to complete a final evaluation. The results of the final evaluation are shown in the following figure. The Program is appended.

Some of the recommendations made by the participants for consideration in future workshop (and similar to those made by participants in other workshops) include sessions on:

- similar workshops for IRI middle-management;
- promotional activities in technological institutes;
- orientation of the workshop to technology and presentation to ministers of Industry, Commerce, Economy, etc;
- research methodology (including budgeting, cost and technical supervision);
- preparation of proposals for contract research;

- review of government (banking and other schemes leading to the promotion of RSD in other countries;
- administrative systems for administrative heads.

These subject topics have been included in nearly all of the workshops conducted in DRI's Linked institutes, but not on a regional basis. The recommendations lead to the conclusion that there exists a need for a new round of regional workshops, directed toward middle-management and project leaders, rather than to IRI directors.

The Indonesian Workshop

The final regional IRI Directors Management Development Workshop under this contract has been scheduled for 11-24 September 1978 in Jakarta, and will include IRI directors and/or senior staff from fifteen IRIs in Southeast Asia. The workshop title will be "Increased Utility and Utilization of Research Institutes through Regional Networking. The Indonesian Ministry of Industry has provided \$50,000 to assist in the preparation and conduct of the workshop, part of which will be used for conduct of a preregional workshop for the Indonesian participants prior to the regional workshop. This contribution on the part of the MOI reflects the strong and continued interest on the part of the Indonesian Government to increase its' IRI management capabilities. The USAID Mission to Indonesia has financed three such workshops for high government officials and IRI staff members over a three year period, beginning in 1976.

The Handbook for Workshop Managers

DRI completed in March 1978 a "Handbook on Management Development Workshops for Applied Research Institutes", which is being distributed to IRIs on a worldwide basis. The handbook is a "how-to-do-it" manual, based on DRI's experiences in conducting the above-referenced workshops, as well as other related information, and includes case studies, role playing and other training aids to be considered, along with guidance on planning and logistics of workshop preparation and presentation.

Research Grants Program

One of the innovations and distinctive features of the DRI program in research institution development under AID sponsorship, has been the research grants program. The basis for this activity lies in the hypothesis that an appropriate and judicious provision of dollar support for carefully selected research projects, can be effective in encouraging the successful completion of these projects and their application to actual commercial problems. This commercial application aspect is considered important because of the observation that many, if not most, LDC research institutions are largely ineffective in gaining practical application of their research efforts, and there is often a tendency for their research to be insensitive to the imperatives of the marketplace. With the provision of selective dollar funding to support well-conceived research proposals from LDC institutions, for research which addresses some clearly perceived industrial need, it is being shown in the DRI program that an appreciable increase in the utility of such R&D can be realized.

This program also recognizes the fact that in too many instances, R&D in the LDCs is unsuccessful due simply to the inability of the research institution to meet the dollar costs of materials, equipment or expert advice, which is required to carry it to completion. Such shortfalls range from the unavailability of some small but important component necessary to keep equipment functioning, to the need for major pilot plant apparatus or the services of a consultant from the developed world.

The third important realization underlying the grants program is that LDC research organizations are often ill-equipped to deal effectively with decision makers in the industrial sector, which remains largely an enigma to the LDC researcher because of his lack of experience with it. This condition decreases the likelihood of gaining effective commercial application of research results.

Although these are three principal reasons for undertaking the grant program, there are a number of others, all of which underlie conditions that result in ineffective R&D utilization in LDCs.

The initial round of research grants were made some four years ago to institutions in the following five countries: Guatemala, Colombia, Nigeria, Thailand and Korea--these have been reported on in previous annual reports and in other documents, so they will not be summarized here. The current round of research grants was initiated with an introductory visit to some

eighteen institutions around the world, in as many countries, giving them the opportunity to submit proposals for grant consideration, if they wished. This resulted ultimately in the submission of seventeen proposals.

These candidate proposals were reviewed in light of formal criteria which had been developed relating to both their technical and commercial feasibility. The technical reviews, by contractual requirement, were conducted by outside organizations, not related to DRI. From the group the following have thus far been funded:

1. Instituto de Investigaciones Tecnologicas (IIT), Colombia. Development of an extrusion cooking apparatus for production of pasta from domestic food grains.
2. Instituto Centroamericano de Investigacion y Tecnologia Industrial (ICAITI), Guatemala. Design and development of a solar-powered crop dryer, suitable for use by small farmers.
3. Council of Scientific and Industrial Research, Ghana. Development and testing of a hand-operated water pump for rural use.
4. Institute of Mining and Metallurgy, Bolivia. Methods for increasing tin yield from domestic ores, and the control of mining wastes.
5. Ceylon Institute of Scientific and Industrial Research, Sri Lanka. Food coloring agents from natural sources.

Additionally, proposals are under consideration from Indonesia for food processing research and development, and from the Dominican Republic for projects on utilization of rum distilling wastes and processing of plantain. Other proposals not funded for various reasons were received from the Dominican Republic, Ecuador, Jordan, Chile and Pakistan.

Those that have been funded have been especially selected on the basis of their considerable probability of commercial impact, if successfully developed. The intent is not in this program to fund a given number of projects, but rather to carefully select from among the proposals, those which have a particularly likely chance of success. This is because it is thought more desirable to have a few good demonstrations of the feasibility of the grant mechanism, than it is to meet any arbitrary geographical or numerical selection criteria. Another objective, readily perceived among the funded proposals, is to support projects which are representative of "appropriate technology" precepts, or the more recently introduced concept

of "light capital technology." Both of these rather similar approaches to development funding emphasize the importance of using the scarce dollar capital resources of the foreign assistance program to make the maximum possible impact for the benefit of the least privileged economic strata of LDC societies. This strongly suggests the restriction of the use of dollar capital to those technologies which result in creation of the greatest number of low-skill jobs in the LDCs, and those which draw primarily upon indigenous factors of production in greatest supply--viz. unskilled labor.

Thus, the instances of grant support of the solar-powered crop dryer, the extraction of food colorants from indigenous plants, the preparation of plantain and tempe, and the development of low-cost hand pumps, are seen as applications of this principle. In the previous round of the grants program, similarly appropriate developments included processes for substitution of barley for imported wheat in flour making (thus increasing utilization of rural labor for grain growing), increasing the edibility of cotton seed cake for domestic livestock (resulting in greater use of domestically grown crops), and production of essential oils from otherwise wasted rubber tree byproducts (thereby, again creating plantation employment for unskilled rural laborers).

One of the observations resulting from the first round of grants was that the LDC research institutions required more direct technical support than had been supposed, and that they were typically quite weak in their preparation of research proposals--irrespective of the basic soundness of their research concepts. Thus, in the second round there has been an increased effort to more carefully prepare proposals, through the provision of more technical assistance by DRI, and the scheduling in several instances (Bolivia, Sri Lanka, Guatemala and Ghana) of "prefeasibility phases" which provide the candidate institutions with the opportunity to prepare better proposals in order that more adequate assessment can be made of them prior to making final funding decisions. Consequently, there have been two study tours to the U.S. carried out (Bolivia and Sri Lanka), one in process (Ghana) and two contemplated (Indonesia and the Dominican Republic).

In an effort to experiment with the concept of "third country technology transfer" in which one LDC supplies technology and information based on its own experience to another IIT in Bogota sent engineers to KIST in Korea to study the KIST extrusion cooker technology to determine its suitability for adaptation in Colombia. Although the decision was eventually made that this

technology did not represent the optimum choice under the circumstances, there was considerable gain from the experience of bringing these two distant Pacific-basin neighbors together to explore technology transfer possibilities. (In the section on the DRI Linkage with the Applied Scientific Research Corporation of Thailand appears a description of another third country transfer effort with KIST which shows greater promise of commercial utilization.)

With the appreciable experience of the past four years of grant program activity in hand, it was concluded to submit an unsolicited proposal to OST for carrying out an enlarged experimental program along these lines, and one that would especially emphasize--and be limited to--support of projects meeting "light capital technology" criteria. Two essential differences resulting from this special emphasis are: increased need to understand and experiment with the "downstream" production and marketing functions which are generally less well-developed in the LDCs, and the increased need for greater DRI interactions due to the greater number of involved entities, and their lower levels of sophistication. No response to this proposal has as yet been received.

V. PROGRAM EVALUATION

During the first year of this contract, DRI established the variables and measures/indicators to be used as a guide in evaluation of the linked institutes (See Table 3). During the past year a continuous effort has been maintained to obtain the required data. PCSIR, IIT, and ASRCT have submitted financial analyses of government subsidies and income from contracts as one measure of increased interaction with external clients. Unfortunately, this data requires additional elaboration in order to be meaningful for evaluation purposes. In subsequent visits to the linked IRIs, DRI staff will attempt to clarify the data and to obtain additional data which has been promised by the IRIs.

DRI is considering making a grant of \$1,000 to each linked institute in order to encourage their full participation in the evaluation. Payment will not be made until the IRIs have complied fully with DRI's requirements. While the IRIs should be equally interested in the results of the evaluation, experience has shown that, in spite of their best intentions, other activities take priority. Thus, the hope is that a "carrot and stick" approach will lead to more useful results.

At the same time, it must be realized that, due to different methods of record keeping and accountability, much of the data will be subjunctive in nature and based on memories of qualitative impressions of what has actually transpired.

There are several crucial assumptions about the time frame in which IRI changes--achievements--are expected to take place which will affect the results of any evaluation. DRI's program involves substantial and fundamental change for the linked institutions--a change from a passive recipient of government funds to a dynamic dependence on their own ability to sell themselves. This change will not be easy--frustrations and failures are expected--and it will take some time. The LDC IRI will be engaged in a process of building up a relationship of trust and confidence with potential local clients in an environment of underdevelopment where many barriers will be present. Therefore, the measures of goal achievement should not be expected to show dramatic improvements in a short time span, and a great deal of qualitative judgment and interpretation must go along with this essentially numerical exercise.

TABLE 3. VARIABLES AND MEASURES/INDICATORS

<u>Variable</u>	<u>Measures/Indicators</u>
<u>Goal</u> --Increased use of LDC IRI by local user community	Volume and percentage of funding from external sources for technical services or contract R&D
--Increased implementation of LDC IRI results by local user community	Volume of investments made by external sources to implement IRI research
<u>Purpose</u> --Improved IRI performance in:	
<ul style="list-style-type: none"> • establishing an operational mechanism to interface with local user community (Technical Extension) 	Existence, level of support, and level of activity of extension/liaison/promotional/utilization, etc., unit or function in IRI
<ul style="list-style-type: none"> • applying and utilizing assistance-related skills in local user community (Technical Assistance) 	Volume of application of assistance-related skills in local user community
<ul style="list-style-type: none"> • demonstrating the internal use of provided information, and providing information as a service to the local user community (Technical Information) 	Use of information provided by DRI in making internal decisions, and the amount of information provided to the local user community as a technical service
<ul style="list-style-type: none"> • project selection, project management, marketing, and other aspects of improved IRI administration (Staff Development) 	Organizational-staffing changes, internal management development programs, increased delegation of authority, number of proposals prepared, cost structure of IRI research and technical services, etc.
--Improved IRI performance in conducting contract research and attracting local industry participation (Research Grants Program)	Successful completion of research contract on schedule and within budget, and extent of local industrial participation in the research and implementation of the results

VI. SIDE EFFECTS

It is important to describe briefly the side effects or spin-offs which are taking place as a result of this and the two prior contracts. These side effects may be categorized as having three main impacts:

- USAID Field Missions and AID Bureaus are becoming more aware and interested in the programs of TA/OST and are beginning to demonstrate a willingness to fund complementary programs;
- Other IRIs are requesting participation in the program, particularly in the form of establishing linkages and receiving structured technical assistance; and
- Linked institutes, through joint proposal preparation and bidding activities with DRI, are not only increasing their capabilities in this area, but are also achieving opportunities to broaden their base of contract support beyond that which would normally be available to them.

Interest on the part of the Field Missions and Bureaus continues. The USAID/Bogota Mission has requested USAID/Washington to provide funds to conduct field applications of improved village-level sugar processing units.

PCSIR and DRI jointly bid and were successful in obtaining a three year contract in December 1977 with the Appropriate Technology Development Organization (ATDO) of Pakistan with funds provided by the USAID Mission to Pakistan. This project is designed to increase the yield of sugarcane juice and edible oil from oilseeds, as well as increase the yield of sugar and improve the quality of the oils.

The Asian Bureau and the Field Mission in Indonesia have funded four complementary management workshops, which are deemed to be of major benefit to Indonesian R&D institutes. The Bureau and the Mission are assisting DRI and the Indonesian National Research Institutes (ITPI) in attempting to establish a long-term working relationship with funding from a USAID technical assistance loan to Indonesia.

As a result of two regional workshops for senior management of applied research institutes, a concept has evolved for a Network of ARIs within the ASEAN region which would share manpower and facilities to conduct R&D on a contractual basis. The objectives of the Network would be to (1) strengthen national institutes capabilities for conducting contract research,

(2) facilitate the formation of ASEAN joint ventures that could compete with advanced economy organizations, and (3) strengthen R&D cooperation and linkages within ASEAN. The Network would conduct research for industries, governments, and international organizations on a contractual basis.

As envisioned, the Network would be comprised of the region's national R&D organizations that are interested in conducting contract research. Represented at the two regional workshops at which this concept evolved were the Applied Scientific Research Corporation of Thailand, a co-host of the two previously mentioned workshops, the Indonesian Ministry of Industry research institutes, which will co-host the third workshop of this series, the National Institute of Science and Technology of the Philippines, the Standards and Industrial Research Institute of Malaysia, and the Singapore Institute of Standards and Industrial Research. The concept, however, is not intended to limit the Network to these institutions. Indeed, a goal of the Network would be to foster national contract research subnetworks within each of ASEAN countries. Both UNIDO and USAID/Washington are giving consideration to partial funding of this network. All of the SEA countries which would be involved have endorsed the network concept and the concept was presented before the ASEAN Committee on Science and Technology in June 1978 with the objective of including the concept in the US-ASEAN dialogue scheduled for the fall of 1978.

An effort has been underway for over one year to form a linkage at the request of the Royal Scientific Society of Jordan (RSS). Since Jordan receives USAID security assistance instead of technical assistance, it appears to be difficult to fund the linkage even though the Mission has endorsed it in principle. This is felt to be an unfortunate situation inasmuch as the RSS recognizes clearly the nature of its needs and wants to get underway. Their experience with assistance from the German and French Governments has been unsatisfactory. They want U.S. assistance.

A memorandum of understanding for a linkage has been agreed to by DRI and the National Research Center (NRC) of Egypt. It is anticipated that funds to support such an activity will come either from the current USAID Grant for Science and Technology to Egypt or from Arab state sources.

As a result of the June 1978 Regional IRI Directors Workshop, the Centro de Investigaciones del Estado para la Produccion Experimental Agroindustrial (CTEPE) has requested formation of a linkage with DRI, for training programs, management workshops and assistance in establishing a packaging technology capability. This linkage is expected to be initiated in September 1978 with funding provided by the Government of Venezuela.

The USAID Mission to the Philippines has requested USAID/Washington for funding to bring two DRI specialists in WTD to the Philippines for a three month period in September 1978 to assist the Mission in identifying the strategic role that women are expected to play in fostering rural development in the Philippines over the next five to ten years. The DRI staff would (1) identify specific rural-oriented five-year plan programs in which women are major participants; (2) assess extent to which their effectiveness could be enhanced through upgrading of skills or their increased participation in rural development activities; (3) identify strategies by which individual AID-assisted projects can be used to promote their increased interaction in rural development activities.

There are, of course, a number of requests for information and specific technical assistance from IRIs in many parts of the world, to which DRI responds within the extent of its ability. These requests routinely come from Algeria, Brazil, Guatemala, Jordan, Korea, Mexico, Peru, Tunisia, Uruguay, and others.

All of the above can be seen to have a multiplying effect and to augment the tasks under this contract. It is clear that more than a casual interest exists on the part of LDC IRIs in the expansion and continuation of the contract objectives and that there is a genuine need for a program of this nature. One of the contract's objectives is to disseminate information about the program to IRIs on a worldwide basis. The above side effects are a positive indication that this objective is being met.

VII. SUMMARY

Activities under this contract have been described in Sections III and IV. As mentioned earlier, several of the tasks have encountered scheduling delays as a result of the civil disturbances in Pakistan (along with a change in PCSIR management), and a change in the management of IIT.

It may be seen that overlap occurs between task activities. In DRI's view, technical assistance to the linked institutes for preparation of specific technical proposals, for example, involves staff development and use of information services in addition to the technical assistance itself. Similarly, the research grant activity cuts across the lines of project management (staff development), technical assistance (indirect in the instance of proposal evaluation, direct where specific technical assistance is needed), and information services (dissemination of research grant results to other IRIs).

The program under this contract is experimental in nature and is intended to improve or strengthen the ability of the IRI to interact with contiguous private and public industrial sectors in the development process. It seems clear that there are desirable multiplying effects from such task overlap:

- Linked IRI staff are thus exposed to a variety of interrelated activities which focus not only on training, but also the application of this training to solution of real problems;
- The Linked IRIs can see and understand the necessity for industrial liaison units working directly with appropriate technical information units to provide technical extension services to small and medium industry;
- There is economy and efficiency in utilization of contract funds while at the same time optimizing program outputs;
- Side effects or spin-offs from program activities strengthen the program itself and assist in broadening the experience base not only of DRI but also of the IRIs associated with the program in either a direct or an indirect way.

TABLE 4. MILESTONE SCHEDULE CONTRACT AID/ta-C-1337

TASK	4/76-6/76	7/76-9/76	10/76-12/76	1/77-3/77	4/77-6/77	7/77-9/77	10/77-12/77	1/78-3/78	4/78-6/78	7/78-9/78	10/78-12/78	1/79-3/79	4/79-6/79
Reg. Workshops		1 2					3			4	5	6	7
Mgmt. Trg. Handbook	8					9	10						
Res. Grants					11	12	14 13					15	16 17
Staff Dev.		18	19	25	22	20 23 21 24	----- -----25---	----- -----	----- -----25---	25-----	-----25--	-----	-----
Tech. Info.						26			26				26
Sm.-scale Ind.						27	27 27			28	28 28		29
Tech. Asst.					30				30				30
Women in Dev.						31			32				
REPORTS					33	10			33				33

The disadvantage from such an approach is that, as in the case of Pakistan, civil disturbances or some similar political constraint can create undesirable delays, which no amount of rescheduling can completely overcome. Also, not all of the linked IRIs view with clarity the opportunities for internal institution-building which are available through such an approach, and thus greater than normal effort must be expended in explaining such interrelationships and their inherent potential.

Some slippage continues to take place in the scheduling of task activities. A concerted effort is being exerted, however, to move these activities forward in the time frame of the contract. Where management workshops have been scheduled which involve participants from several countries, DRI has found that advance planning and preparation often must be initiated four to six months prior to the workshops in order to identify an appropriate participant (rather than a blank invitation to anyone who is temporarily unassigned) and to arrange country clearances, visas, international travel, etc. However, all of the regional workshops will be completed by September of 1978.

The research grant award task appears to be on schedule. During the first grant cycle, however, the grant selection/award phase took longer than anticipated and this experience has been repeated in the second cycle. The first grant cycle also demonstrated that 18 months have not been adequate for the grant recipients to complete scheduled grant activities. More frequent grant monitoring will be required.

While the women in development task was initiated early in the contract, progress to date has been slow. Initiation of the integrated rural development program in Thailand is providing insights into appropriate methodologies for entering into effective women in development activities. Also, finalization of the WID workshop in Thailand, the potential for additional WID workshops in Thailand and Colombia, and the interest of the USAID Mission in the Philippines are increasing the opportunities for increasing WID activities.

It has been particularly difficult to find a way to stimulate interaction between small-scale industry and the linked IRIs. While these profess to have interest in such a relationship, the fact remains that usually the technical problems involved are just not of interest to the IRI technical staff.

Further, small industry management tends to be suspicious of a government-subsidized laboratory which may reveal financial information to the government or process secrets to other industries. Thus, a considerable amount of selling is required, often more than the IRI is willing to do. In DRI's opinion, the best approach to this problem is the establishment of industrial liaison/technical extension units, staffed with engineers interested in short-term problem-solving on site, as contrasted with laboratory research and who can become the translator/interpreter between the small industrialist and the IRI technical staff. Some planning for this is underway in Colombia, but PCSIR and ASRCT have not as yet fully adopted the concept. In addition, both PCSIR and ASRCT are receiving increasing pressure from their governments to undertake large developmental programs, so that interaction with small industry suffers as a consequence.

Evaluation of the program is continuing with participation by the linked IRIs. DRI regards this continuing evaluation as a crucial element of the program even though some of the measurements made will be qualitative in nature. It is believed that by mutual participation in this evaluation, the linked IRIs will become more accustomed to the advantages of self-evaluation and that they will continue use of this mechanism to improve their internal operations and external relationships.

The Project Design Summary/Logical Frame follows (Table 4).

TABLE 5.

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Project Title & Number: LDC Industrial Institute Effectiveness - 931-11-995-097

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Program or Sector Goal: The broader objective to which this project contributes:</p> <p>Strengthen the capabilities of LDC industrial service institutions to assist local industries in selecting, adapting, and using technologies suited to their circumstances, with special attention to support for small-scale industries.</p>	<p>Measures of Goal Achievement:</p> <p>Level of local awareness and utilization of IRI services.</p> <p>Practicality and cost of IRI products/services.</p> <p>Fraction of IRI resources devoted to local assistance.</p>	<p>Project Evaluation Survey</p> <p>Analysis of services rendered</p> <p>IRI annual budgets</p>	<p>Assumptions for achieving goal targets:</p> <p>LDCs are interested in upgrading S&T institutions.</p> <p>Some fraction of senior S&T staff are amenable to change.</p> <p>External assistance can induce change.</p>
<p>Project Purpose:</p> <p>Assist selected LDC industrial research institutions in improving organizational management, marketing and technical skills toward increased participation in country development. To disseminate the results to IRIs worldwide.</p>	<p>Conditions that will indicate purpose has been achieved: End of project status.</p> <p>LDC capability for staff training.</p> <p>Operational IRI systems to interface with user community.</p> <p>Demonstrated IRI performance on development problems.</p> <p>Volume of funded, problem specific R&D.</p>	<p>Number and quality of IRI training courses.</p> <p>Organization and staffing of IRIs.</p> <p>Grant performance evaluation.</p> <p>Increased government and industry commitment to utilization of IRI resources.</p>	<p>Assumptions for achieving purpose:</p> <p>IRIs can be motivated to address user needs.</p> <p>Users will recognize role of appropriate technologies.</p> <p>Assisted IRIs will adapt and adopt U.S. techniques.</p> <p>Cultural and political differences will not seriously limit utility of these techniques.</p>
<p>Outputs:</p> <p>IRI personnel trained in marketing, project selection, techno-economic analysis and project management.</p> <p>Handbooks and training materials for use by LDC institutes.</p> <p>Established linkages with LDC institutes.</p> <p>Appropriate technologies applied to a set of local problems.</p>	<p>Magnitude of Outputs:</p> <p>95 person months of IRI training.</p> <p>1 course syllabus.</p> <p>2-3 linkages.</p> <p>Approx. 25 individual projects.</p>	<p>Contractor Reports</p>	<p>Assumptions for achieving outputs:</p>
<p>Inputs:</p> <p>AID funding.</p> <p>Host country funding and in kind inputs.</p> <p>Contractor services.</p>	<p>Implementation Target (Type and Quantity)</p> <p>\$1,445,000</p> <p>550,000</p> <p>174 person months.</p>	<p>PIO/T</p> <p>Contractor Reports</p>	<p>Assumptions for providing inputs:</p>

APPENDIX

SHORT-TERM TRAINING IN U.S.A.DRI-USAID

Fellow : Francisco Galiano Sedano, Chemist, Dr. Sc.
Instituto de Investigaciones Tecnológicas
Bogotá, D.E., Colombia, S.A.

TRIP REPORT

14 - 18 August, 1977

14 - VIII-77 Travel Bogotá to Denver, Co.

15 to 19 VIII Stay at "National Enforcement Investigation Center. Chemistry Branch, Environmental Protection Agency", Denver Federal Center. I was attended by Dr. Theodore G. Meiggs, Chief of the Chemistry Branch, and by Mr. Mark Carter, Deputy Chief, who explained to me the activities that the Chemistry Branch is actually carrying out.

I had the opportunity of observing the determination of chlorinated pesticides in surface waters, been attended by H.W. Boyle. The method used encompasses the common chlorinated pesticides and polychlorinated biphenyls (PCB's). Individual or combination of the following pesticides can be readily identified by gas chromatography, after the extraction with hexane and cleanup with alumina when is required : lindane, heptachlor, heptachlor epoxide, aldrin, dieldrin, endrin, DDE, DDD, DDT, technical chlordane, gamma y alfa chlordane, methoxychlor, toxaphene and the PCB's Arochlor 1242, 1248, 1254 and 1260.

Dr. Boyle also explained to me the infrared determination of chlorinated insecticides in tissues of contaminated fish, and the use of blood concentration of parathion as a diagnostic tool to detect fish mortality caused by acute exposures to parathion dissolved in water.

Other interesting subject to me was the determination of volatile organics in surface waters especially benzene, toluene and xylene. NEIC method for the determination of volatile organics is applicable to open waters, municipal waste, and drinking waters where volatile component are present at and above 20 microgram/litre.

The volatile components of the sample are purged with helium and trapped on a polymer adsorbant. The components are then desorbed and determined by gas chromatography - mass spectrometry. Dr. Logsdon explained to me the procedure and the equipment used in volatile organics determination and also I could observe the sample extraction and cleanup for the analysis of total organic compounds in water.

Mrs. Carlberg explained to me how to collect the samples for pesticide analysis and the handling and preservation of them.

Dr. Ossinger showed to me the determination of vinyl chloride in air. The vinyl chloride in air is adsorbed in activated charcoal, extracted with carbon disulfide and determined by gas chromatography.

I could talk with Dr. Carter about the determination of ammonia, nitrates, and nitrites in surface waters, by automatic analysis.

20-VIII-77 Free day

21-VIII-77 Traveling Denver-Seattle-Richland, Wa.

22-VIII-77 Visiting "Battelle Northwest Laboratories, Ecosystems Department, Environmental Chemistry Section"

My hostess were William L. Templeton, Associate Manager of the Ecosystems Department, and Roger M. Bean, Senior Research Scientist Environmental Chemistry Section.

Dr. Bean and Dr. Riley explained to me about the environmental program that the section is now carrying out and also about the determination of organic compounds in water. They are using capillary chromatography with flame ionization detector and electron capture detector, liquid chromatography and mass spectrometry for identification of organic compounds in waters, sediment and biological tissues. For the characterization of volatile hydrocarbons in waters they are using the gas partitioning methodology.

24-VIII-77 Traveling Richland - Seattle - Denver.

25 and 26-VIII-77 Visit to "U.S. Geological Survey, Water Resources Division", Arvada, Co.

My host Dr. Marvin W. Skougstad told me about the work they are carrying out in their laboratories.

Dr. Ralph White explained to me the methodology they are using for the analytical determination of chlorinated hydrocarbon pesticides in water and suspended sediment and organophosphorus pesticides in waters. I could observe the analysis of chlorinated insecticides in water (extraction, cleanup and determination by gas chromatography with electron capture detector) and the analysis of organophosphorus pesticides in water (extraction and determination by gas chromatography with flame photometric detector).

For the determination of volatile organic in water I was talking with Dr. Gerry Leenker, who is using macroreticular resins for the classification of organic solutes in water. The recent emphasis on development of the fossil fuel resources to meet the growing need for energy need for better characterization of organic solutes in water; changes in water quality caused by organic residues must be determined.

In the Inorganic Section, Vicent Marti explained to me the determination of phosphorus in waters with the automated method using a Technicon Analyzer equipment.

In all the Center I visited the persons I met gave me written literature about the analytical method that I had opportunity of knowing and observing.

27-VII-77. Traveling Denver-Miami

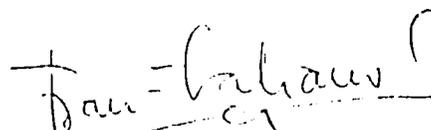
28-VIII-77. Traveling Miami-Bogota.

COMMENTS

The laboratories visited have very good professional staff, equipment, and installations.

The observing of the analytical procedures in which I was interested, the discussion about these procedures, and the technical literature, gave me a very useful information to be applied in my work.

Other important aspect is that if I have difficulties in my future work I know where and who to contact.


FRANCISCO GALLANO S.

THE INSTITUTE FOR BRIQUETTING AND AGGLOMERATION

(THE INTERNATIONAL BRIQUETTING ASSOCIATION)

DAVE JACKSON, President
Phone (403) 267-6111



815 - 6th Street
Calgary, Alberta

FIFTEENTH BIENNIAL CONFERENCE

August 22 - 25, 1977

The Hotel Bonaventure, Montreal, Quebec, Canada

Program Planned by
W. A. Jasulaitis
Consolidation Coal Company

Sunday, August 21

4:00 - 8:00 p.m. Registration - Top of escalator - Hotel Lobby

Monday, August 22

8:00 a.m. - 2:00 p.m. Registration - Bottom of escalator
Convention Floor

12:00 noon - 1:30 p.m. Authors' Complimentary Luncheon
Restaurant to be selected by host session
chairman, W. W. Eichenberger

2:00 p.m. Mt. Royal, Hampstead and Cote St. Luc Rooms
Welcoming Address by David B. Jackson,
President, I.P.A.

2:15 p.m. Chairman, Walter W. Eichenberger, President,
Erie Briquetting Company,
P. O. Box 794,
Erie, PA 16512

Papers:

1. "Update on the Agglomeration of Coal Fines" by Carl A. Holley,
President, Ferro-Tech, Incorporated, 1221 Banksville Road,
Pittsburgh, PA 15216 and Joseph M. Antonetti, Polymer Marketing
Manager, Calgon Corporation - subsidiary of Merck & Co., Inc.,
P. O. Box 1346, Pittsburgh, PA 15230.

Beginning in 1976 there has been a renewed interest in upgrading
of coal fines and a need to agglomerate these fines in order to
more easily market and utilize them.

Bologna Coal, through the efforts of Joe Antonetti, set up a pilot
plant to study various binders and pelletizing methods for the

agglomeration of the production from the floatation plant at Burgettstown. The results of this pilot plant work have been correlated and tabulated and are reported.

Ferro-Tech has studied both pelletizing and briquetting at its research laboratory and reports on successes, failures and problems left to be overcome.

2. "The Olifloc Process for the Dewatering and Cleaning of Ultra-Fine Coal Slurries - 0.1 mm" by Dr.-Ing. B. Bogenschneider, Bergbau-Forschung GfB, 43 Essen 13, Postfach 130140, Germany.

The Olifloc process was developed by the German coal mining industry to separate and recover ultra-fine coal from ash in slurry form by selective agglomeration with oil and subsequent dewatering of said agglomerates. Based on results of operating a 3tph pilot plant, two plants are being installed during 1977 each having a throughput rate of 30tph.

3. "Agglomeration of Coal Fines" by Harold T. Stirling, President, Stirling Processing Company, Box 325, South Heights, PA 15081.

This paper presents a method for treating a coal slurry, which is presently considered to be a waste material, in order to develop a useful fuel product. Examples are cited wherein coal slurries can be significantly upgraded in quality prior to agglomeration in a deep dished pelletizer followed by dewatering to produce an acceptable fuel.

4. "Use of An Improved Continuous Sintering Grate for Lightweight Aggregate Production from Bituminous Coal Refuse" by Jerry C. Rose, Assistant Professor, Department of Civil Engineering, University of Kentucky, Lexington, KY 40506.

The paper describes a pollution-free continuous sintering process utilizing a travelling grate whereby bituminous coal refuse was transformed into a lightweight aggregate product of very low density. Laboratory evaluations have confirmed that this aggregate is satisfactory for structural grade concrete, hollow-core fill, concrete blocks, etc.

5. "Briquetted Cellulosic Waste Material - An Economic Source of Energy" by Fred Hausmann, Fredhausmannag, Harkerstrasse 46, 4005 Basel, Switzerland.

Coal, natural gas, and fuel oil have long been the mainstay of the world's energy needs. Little regard has been given to conservation of these fuels until recently. And now when shortages of these fuels seem apparent, we must look to alternative energy sources. Solar, nuclear and geothermal are alternatives, along with cellulosic materials. This presentation is based on briquetting of cellulosic materials, our only renewable energy source.

6:00 p.m.

Executive Committee Meeting
Salon St. Michel
President David B. Jackson presiding
Dinner will be served.

Tuesday, August 23

- 7:00 a.m. - 8:00 a.m. Authors' Complimentary Breakfast
Restaurant to be selected by host session
chairman, W. H. Engelleitner
- 9:00 a.m. Mt. Royal, Hampstead and Cote St. Luc Fooms

Chairman, W. H. Engelleitner,
Holley, Kenney, Schott, Inc.,
921 Penn Avenue,
Pittsburgh, PA 15222

Papers:

6. "Briquetting of Sponge Iron" by Dr.-Ing. H. Fieschel, Maschinenfabrik, Koppam GmbH & Co. KG, Postfach 320, 4320 Hattingen 1, West Germany

This paper reports on the many facets of briquetting sponge iron using both hot and cold briquetting methods and reviews the various factors which dictate the application of a particular process technique.
7. "Development, Installation, and Operation of a Briquetting System for Sponge Iron Fines" by Dr.-Ing. Wolfgang Pietsch, Director, Agglomeration Systems, Midrex Corp., Charlotte, NC, A Korf Group Company

This paper describes the development and installation of a commercial process for agglomerating by-product fines generated during the direct reduction of iron ores via briquetting.
8. "The Role of Additives in Iron Ore Pelletizing" by J. A. Clum, Assistant Professor, R. W. Heins, Professor, and T. D. Tiemann, Professor and Associate Chairman, Department of Metallurgical and Mineral Engineering, University of Wisconsin-Madison, 1509 University Avenue, Madison, WI 53706.

This paper summarizes the results of a laboratory research program which depicts the important factors to be considered in using pelletizing additives. Those factors also include the interaction of size distribution and chemical makeup of both clay and the ore as well as the chemical characteristics of the pelletizing water.
9. "Wettability and Reactivity of Liquid Primary Slags with Solid Oxides in Reference to Sintering of Iron Ores" by S. K. Gupta, Project Coordinator and T. M. Srinivasan, Hindustan Steel Limited, Research and Development, Ranchi-2 Gram, Ispat, India.

This paper deals with the physical and chemical processes involved in the production of iron sinter as it relates to wettability and reactivity of liquid primary slags with solid oxides.
10. "Continued Growth of the Dwight-Lloyd Travelling Grate" by Harold E. Bowen, Consultant, Dwight-Lloyd Systems, McDowell Wellman Engineering Company, 113 St. Clair Avenue, NE, Cleveland, OH 44114.

A travelling grate machine which is completely liquid sealed to prevent the ingress or egress of clandestine process gases is described. Applications of this equipment beyond the pyro-metallurgical field are described, i.e. continuous coking, compliance upgrading of high sulfur coals, processing of shale oils, etc.

- 12:00 noon - 1:30 p.m. Delegates' Luncheon,
Westmount Room
(Please bring ticket)
- 2:00 p.m. Mt. Royal, Hampstead and Cote St. Luc Rooms
Chairman, V. A. Vellella,
Pittsburgh Pacific Processing Company,
3000 Grand Avenue,
Pittsburgh, PA 15225

Papers:

11. "Smelter Dust Agglomeration with Sodium Silicate" by Foy E. Wright, Philadelphia Quartz Company, 801 Grayson Street, Berkeley, CA 94710.
This paper discusses the chemical and physical properties of sodium silicate and shows how they can be applied to agglomerate dusts from copper reverberatory furnaces, fluorspar for steel mill use, fume silica from electric furnaces and iron ore. Agglomeration of these materials produces a product which can be recycled to storage and/or a furnace without degradation during handling, storage or furnace operation.
12. "Briquetting - An Economic Solution for the Production of Ferro-Chromium in South Africa" by W. D. Winship, Director, Operations, The Southern Cross Steel Company, P. O. Box 133, Middelburg, Tvl. 1050, Republic of South Africa.
A plant for briquetting South African fine chromite ores is described as well as its subsequent utilization in ferro-chromium production in a submerged arc furnace.
13. "A Layman's Introduction to Pelletizing" by Charles R. Harbison, Consulting Engineer, 42 Ewellington Circle, R.D. 3, Valencia, PA 16059.
Proliferation of finely divided materials as an intermediate requirement of a process or as an incidental by-product has given fresh impetus to agglomeration techniques. Pelletizing is one of the simpler and less expensive agglomeration procedures. Pelletizing is not new, but the procedure is new to some industries and some applications and to many people. A brief explanation in lay language will assist the uninitiated to understand and evaluate this very useful technique.
14. "High Speed Agglomeration Systems using Schugi Blender/Granulator" by R. W. Weggel, Manager of Marketing-Industrial Business Sector, Bepax Corporation, 10225 Higgins Road, Rosemont, IL 60018.
A mixing/agglomeration device has been developed that is very compact, requires little energy and utilizes extremely short retention times. Binder mixes, pastes, slurry and agglomerates can be produced in the 2 millimeter size range for dedusting operations, fluid bed drying or increasing the performance of balling devices.

- 7:45 p.m. Social Program

Wednesday, August 24

- 7:00 a.m. - 8:00 a.m. Authors' Complimentary Breakfast
Restaurant to be selected by host session
chairman, W. E. Brayton
- 9:00 a.m. Mt. Foyal, Hampstead and Cote St. Luc Rooms

Chairman, W. E. Brayton,
U. S. Steel Corporation,
Monroeville, PA 15146

Papers:

15. "Binders for Briquetting and Agglomeration" by Henry C. Messman, Consultant, P. O. Box 267, Mamaroneck, NY 10543.
- Although binderless compaction may be employed in some instances, the importance of bonding materials to practical economic briquetting and agglomeration can scarcely be over-emphasized. Pertinent literature affords many excellent references to particular binder systems, other papers at this same conference program being a good example. Few general reviews are to be found, however, and this paper attempts to overview the encyclopedic subject in the allotted time.
16. "Strength Behavior of Briquettes as Determined by Acoustic Emissions" by Dr. Robert M. Koerner, Professor of Civil Engineering, Drexel University, Philadelphia, PA 19104.
- A new technique for determining the strength of briquettes is described using acoustic emissions. The system monitors the sounds that are produced when a material, i.e. charcoal briquettes are stressed and subsequently undergo deformation. An actual demonstration of the equipment and technique will be made.
17. "Agglomeration Clinic" chaired by R. W. Weggel, Rexex Corporation, Rosemont, IL. Panel members: Joseph Schweizer, Bonnet Corp., Kent, OH and W. H. Engelleitner, Holley, Kenney, Schott, Inc., Pittsburgh, PA.
- This panel of experts will serve to answer questions raised from the audience pertaining to the subject of agglomeration.
18. "Agglomeration of Glass Industry Raw Materials" by William H. Engelleitner, Manager, Material Handling Systems, Holley, Kenney, Schott, Inc., 921 Penn Avenue, Pittsburgh, PA 15222.
- Briquetting and pelletizing of glassmaking raw materials (glass batch) have been studied, tested and occasionally applied in production for many years. Although generally an added cost factor in batch preparation, agglomeration has found renewed interest due to its ability to reduce or eliminate furnace emissions, increase production and reduce energy consumption during melting.
- This paper presents a review and update of methods and present developments in glass agglomeration.

1:30 p.m. - 4:30 p.m. Optional Tour
 Sidbec-Dosco Contrecoeur Direct Reduction
 and Steel Making Plant (limited to 45 delegates)
 Bus leaves hotel at 12:15 p.m.

This afternoon is free for delegates and their families to explore some of the many and varied attractions offered by Montreal. Please refer to your registration envelope for descriptive literature and brochures.

6:00 p.m. Social Program

Thursday, August 25

7:00 a.m. - 8:00 a.m. Authors' Complimentary Breakfast
 Restaurant to be selected by host session
 chairman, T. E. Tibbetts

9:00 a.m. Mt. Royal, Hampstead and Cote St. Luc Fooms
 Chairman, T. E. Tibbetts,
 Canada Centre for Mineral & Energy Technology,
 555 Booth Street,
 OTTAWA, Ontario, Canada K1A 0G1

Papers:

19. "Partial-Agglomeration of Coke-Oven Charges" by W. R. Leeder and J. T. Price, Department of Energy, Mines & Resources, CANMET, Energy Research Laboratories, 555 Booth Street, Ottawa, Ontario, Canada, K1A 0G1.

Early investigations into the partial agglomeration of coke-oven charges have recently been renewed at HIL. Evidence from these and other investigations indicates that this method can improve coke quality and can extend the coking coal range to include less expensive coals. This report surveys these investigations and discusses the effects of such influences as briquette preparation and oven bulk density upon coke quality.

20. "Process for the Production of Suitable Blast Furnace Coke from Coal Blends of Lesser Coking Quality" by H. Dungs and Dr. H. Webber, Firma Carl Still, Becklinghausen, West Germany, Dr. H. Schmauch and K. H. Flasche, Stahlwerke Fockling/Burbach, Volklingen, West Germany, and Dr. F. Beckmann, Eschweiler Bergwerksverein, Kohlscheid, West Ger

Following the development of the process for briquetting wet fine ceki coal to increase bulk density, an improved process for compacting coal with inferior coking qualities with a simultaneous increase in the coke-oven throughput has been developed. In this new process the coal is pulverized, preheated, briquetted with binding agents, charged into the oven chamber and coked.

21. "A Formed-Coke Hot-Briquetting Facility" by R. W. Leeder and A.A. Afon Department of Energy, Mines and Resources, CANMET, Energy Research Laboratories, 555 Booth Street, Ottawa, Ontario, Canada K1A 0G1.

A hot-briquetting pilot plant has been developed at CANMET for the evaluation of Canadian and other coals for potential use in form-cokin

Instituto de Investigaciones
Tecnologicas (IIT)
Bogota D. E.
6 October 1977

MEMORANDUM
No. 1267

TO: Mr. Ted Schlie (DRI)
FROM: Camilo E. Olivera
SUBJECT: Report of Activities of the I. B. A. Seminar,
Montreal, Canada, August 22-25, 1977

In accordance with your verbal request, I am sending you the present report of the benefits obtained from the seminar, conducted in Canada, of briquetting and agglomeration. In essence, the following points clearly should be recognized as positive gains for me:

1. Knowledge of general techniques of briquetting of solids.
2. Criteria of utilization of diverse binders.
3. Information from countries where actual technology is being practiced.
4. Exchange of technical information with some of the assistants.
5. Visit to the SIDBEC plant, Contrecoer, Steel.

With relation to the first point, one can point out that the process of briquetting follows a sequence of similar operations independently from the material that is processed. Such operations are:

- a. Drying of materials that are submitted to briquetting (amount of moisture).
- b. Addition of binder.
- c. Elaboration of the briquetting in the respective press.
- d. Drying and warehousing.

Regarding the second point, an ample number of materials exist that can be utilized as binders. As criteria for selection, they should be utilized principally for:

- a. Cost of material.
- b. Availability of material.
- c. Quality of briquetting obtained.

The extent of substances utilized like binders is very ample and their utilization in a determined circumstance cannot be formulated without previous

Ed Schlie
October 1977
Page Two

laboratory assays, of which results could remove the information necessary to effect the respective evaluations, applying the cited criteria.

Making reference to the third point, and in agreement with the information of some of the assistants, the technology of the elaboration of carbon briquettes seems to be well developed in Europe, principally in England and in Germany. Also indicated was that in Japan extensive utilization of the process of briquetting is used to better the quality of the metallurgical coke.

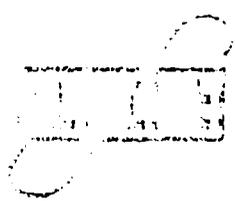
To finalize the relative comments as to the derived benefits of the seminar, from a personal point of view, I should state that the visit to the plant by the SIDBEC group was very illuminating. There, steel is produced following the MIDREX process, which employs reformers of methane gas to produce reducing agents (CO and H_2), and to avoid the business of metallurgical coke. This process seems to be a good alternative for poor countries with cokish carbons, with vast supplies of natural gas and internal markets of relatively small arms.

I acknowledge the patronage received from DRI that permitted my visit to the IBA seminar in Montreal.

Sincerely,

Camilo E. Olivera
Chemical Engineer
Subdirection of Information
Bureau

Translated by Cecelia Garcia
:gy



I. FELLOW

Arnulfo Jiménez Obando, Chemical Engineer.
Instituto de Investigaciones Tecnológicas,
Consulting Department. Bogotá, D.E. Colombia,
S. A.

II. OBJECTIVES

The objectives of this training program were :

1. To accomplish some additional specialized training in the area of sugar technology.
2. To get advise for stablish the steps to be taken by the IIT to study the present conditions and carry out actions-research for improve techniques of the "Panella "(Brown Sugar) industry in Colombia.

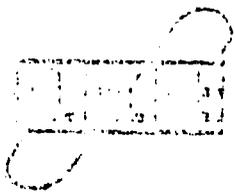
III. SPONSOR

This training was provided by the Denver Research Institute of the University of Denver under the auspices of U. S. AID.

IV. SCHEDULE OF ACTIVITIES DEVELOPED

The training was carried out as follow :

<u>Date</u>	<u>Entity</u>	<u>Activity</u>
26 Sept- 7 Oct.	F.C. Schaffer & Ass. Inc. Baton Rouge, La.	Short Course on Sugar Techno- logy.
Oct. 10 - 12	F.C.Schaffer & Ass.	Panella Industry.



<u>Date</u>	<u>Entity</u>	<u>Activity</u>
Oct. 13-15	USDA-ARS Crops Utilization Research Laboratory. Weslaco, Texas.	Sugar From Sweet Sorghum.
Oct. 15-19	Plantaciones Azucar y Derivados, S.A. de C.V.- Tegucigalpa, Honduras. C.A.	Panela Industry

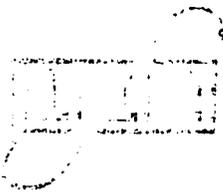
V. DEVELOPMENT OF THE PROGRAM

A. Short Course in Sugar Technology

This course was based on the general refreshment of all sugar technology subjects, jointly with discussions and some detailed study of the main carrying out cane processing problems.

The subjects covered were :

- World Sugar Productive. Consumption and price trends.
- The Economics of sugar
- Raw Sugar Process
- Mills and diffusers, a comparison
- The efficiency of the Steam Generating Plant in the cane sugar factory
- The multiple effect evaporator in the raw sugar factory
- Basic plant design
- Construction Scheduling
- Raw Sugar Factory Instrumentation
- Material and Energy Balance
- The Fuel, Steam an Exhaust Balance
- Calculation of Daily and periodic laboratory and run reports.
- Understanding of the significance of the daily and periodic reports.
- Manufacturing reports. Problem solving
- Basic Factory costs and economics
- Personnel Management in sugar Mills.
- Boilers waste heat recovery
- Environmental considerations
- Cane Harvesting - Manual or Mechanical
- Start-Up Problems & operation trouble shooting.



- Sugar Analysis: Chemical Additives
- Electrical Machinery, power distribution & Control.

B. Meeting About Panela Industry

Once the course was over, three additional days were spent with Schaffers' people, talking about the panela industry.

The purpose of these interviews was to get advise on research procedures on this specific field.

A series of recommendations were made on the methodology to be followed and technology evaluation procedures, both for cane sugar grow and panela production.

C. Sugar From Sweet Sorghum

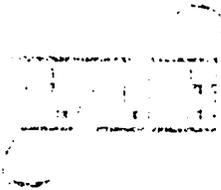
By invitation of F.C. Schaffer, it was the purpose of this visit to get comprehensive view of the technology for sugar production starting from sweet sorghum.

Dr. B.A. Smith, my host in Weslaco, is a very well reputed scientist on the field. He has been responsible of the process and plant design for sugar production from sweet sorghum and holds a quite number of related patents.

There, I visited the pilot plant where sorghum juice and syrup are obtained. Additionally the laboratory facilities for raw sugar analysis was also visited.

Dr. Smith explained the process steps and pointed out the main problems he finds, on the basis of his own experience, to developed this kind of technology, as follow:

- a) Development of Disease-resistant and high sucrose types of sweet sorghum, suitable for commercial sugar production.



- Selection of varieties with desirable characteristics and field performance records for production in the specific place.
- Elimination of the unusual quantities of starch and aconitic acid found in the raw sweet sorghum juice.

Nevertheless, most of these problems have been solved. Milling and processing data have been reported from factory scale tests where sweet sorghum was processed for producing sugar in cane sugar factories.

An additionally visit to W.R. Cowley Sugar House in Santa Rosa, Texas, was performed in order to see some recently design changes on the cane sugar process.

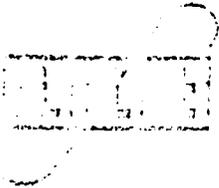
D. Trip to Honduras, Central America

The purpose of this trip was to get a comprehensive view about the development of the panela industry as additional information for our research.

Mr. Felix A. Lloveras, owner of a panela factory, took the whole responsibility of my technical visit to the panela installations in Honduras. Panela factory of Plantaciones Azúcar y Derivados and some small factories in Choluteca were visited.

VI. CONCLUSIONS

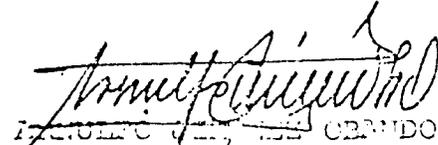
1. The program developed accomplished all the proposed objectives. In fact, the sugar technology course, the sweet sorghum technology survey, the interviews about the panela industry and the trip to Honduras covered all the main aspects about this field.



Short-Term Training on Sugar Technology	Report
	- 5 -

2. The recommendations made about the form that research should be taken to find a solution to the panela industry in Colombia, make expedite a plan implementation to be carry out.
3. The degree of the development of the panela industry is higher in Colombia than in Honduras. In this field we are able to give technical assistance and make technology transfer.

Finally, with the recognition of the very positive contribution of this training program on the technological improvement of the personal knowledge and the IIT background on this matters. I would like to thank to DRI and F.C. Schaffer by which my training was easy and interesting.


ARMANDO CERBUDO
Chemical Engineer

AJO/hrn

Wednesday, March 8

- 8:30 - 10:00 a.m. Panel on the different perspectives and points of view about quality control.
Moderator: Dr. Francisco Piedrahita E.
- 10:15 - 11:30 a.m. General Discussion.
- 12:30 p.m. Lunch: Restaurant La Aguacatala.
- 2:30 - 4:15 p.m. Mechanisms and Implementation of a quality control system
IIT: Dr. Margy Villalobos.
DRI: Amihud Kramer.
- 4:45 - 6:15 p.m. Sampling, recordings and reports.
DRI: Amihud Kramer

Thursday, March 9

- 8:30 - 10:00 a.m. National Plan for Food and Nutrition (PAN).
DNP: Dr. Tomas Uribe.
- 10:30 - 12:00 a.m. Quality control and standards used for new high nutritional value and low cost products.
DNP - PAN: Dr. Sigifredo Serrano
Dr. Teresa Salazar
DRI: Joe Maga; Amihud Kramer.
- 12:30 p.m. Discussion about the subject.
- 2:30 - 4:00 p.m. Panel on the government's role and responsibilities in quality control.
Ministry of Health.
National Health Institute and the Superintendent of Industry and Commerce.
Moderator: Dr. Elmer Escobar.
- 4:30 - 5:30 p.m. Bienestarina Production Program.
Colombian Family Welfare Institute.
Drs. Jaime Maldonado, Jairo Leal, Fernando Maya.
- 5:30 - 6:30 p.m. The American Government's Quality Control Infrastructure Inspection of Imported Products.
DRI: Dr. Stephen Bogyo.

Friday, March 10

- 8:30 - 9:30 a.m. Developed Technologies for High Nutritional Value Low Cost Products.
IIT: Dr. Teresa Salazar de Buckle.

9:30 - 11:00 a.m. Developed Technologies for High Nutritional Value
and Low Cost Products.
DRI: Dr. Amihud Kramer; Joe Maga, Stephen Boygo.

11:30 - 12:30 p.m. Discussion.

2:30 - 4:00 p.m. Investigation Development and Technical Assistance in
Quality Control for Processed Foods.

4:30 - 6:00 p.m. Round Table on the Subject.

6:00 p.m. Closing ceremony .
Closing cocktail party - "Club Campestre" (main room).

:rm

A Brief Report on Study Tour of
Integrated Rural Development Planning Activities
in
Indonesia and the Phillipines

1. Detail of the Study Tour

November 19, 1977: Left Bangkok at 13.00 P.M. by Garuda Air line, arrived Jakarta at 17.00 P.M.
Discussed with Dr. Ronald Black on the study programme (He was an accompany through (along) the trip)

November 20, 1977: Left Jakarta by plane at 11.30 A.M. and arrived Yogjakarta at 13.00 P.M.

November 21, 1977: Indonesia's official holiday, stayed in Yogjakarta

November 22, 1977: In the morning discussed with Mr. Pietoyo Soekarsono, Director of Leather Research Institute on a reforestation project based on cashew trees in integration with the development of cashew-nut industries.

The basic concept of this project was to grow the forest with cashew trees instead of other trees which have low growth rate and have great tendency for being censerapulously exploited. If people could fully and continuously benefit from cashew trees, they would be discouraged to go baen to traditional shifting cultivation practice. In

addition more employment opportunities would be created through integrated development of cashew nut industries such as cashew nut processing, extraction of tannin from barks, extraction of oil from cashew nut shell, production of wine and juice from cashew fruit, and production of desserts and animal feeds from cashew fruit. This project received about 2 million baht grant from the Netherland Government. The project covered an area of about 22,000 rai and was jointly operated by the Local Government of Karangmojo Town, Ministry of Trade, and a private company.

In the afternoon, visited a wine factory at Karangmojo which was on a trial run. The factory would be able to produce about 5,000 litres/day of wine from cashew fruit. A nearby cashew nut processing factory was also visited. The cashew nut was peeled using manually operated machines modified from the Indian design.

November 23, 1977: In the morning, visited Mr. Moh Soekmono, a mechanical engineer and an instructor at Institute of Yogyakarta Technology. Mr. Soekmono was the designer of the cashew nut peeling machine and the wine factory. He participated in the cashew nut industrial project on a personal basis.

November 24, 1977: In the morning, visited Mr. Kartahardga, Director of Building Research Institute and other officials to discuss on an integrated slum development project

which received about 20 million baht grant from UNEP. This project commenced in the middle of this year. The basic concept of this project was to improve living conditions in slums by involving participation from slum dwellers as much as possible. Beside the improvement of basic physical structures such as roads and houses, this project also covered social improvement such as job opportunities, social organization for production purposes, public health, etc. After that joined an official of the Building Research Institute to visit slums in Bandung City and the Building Research and Material Building Laboratory. In the afternoon, joined the official of the Building Research Institute to visit another slum in Bandung City. This slum was also in the Integrated Slum Development Project.

November 25, 1977: In the morning, discussed with Dr. Harahap, Director of Development Technology Centre, Bandung Institute of Technology on his concept and work plan in appropriate technology research.

Left Bandung at 14.00 P.M. by train and arrived Jakarta at 17.30 P.M.

November 26, 1977: Week-end holiday, stayed in Jakarta.

November 27, 1977: Left Jakarta at 8.30 A.M. by plane and arrived Manila at 18.30 P.M.

November 28, 1977: In the morning, left Manila at 9.30 A.M. by plane and arrived Naga at 11.00 A.M. Visited the officials of the Office of Bicol River Development Programme which

was funded by USAID. This project was the first integrated rural development project in the Phillippines which was divided into many pilot projects. The officials briefed on the history of this project and the administrative system which facilitated cooperation and coordination among many concerned governmental agencies such as Department of Land Reform, Land Development Department, Department of Agricultural Extension, Irrigation Department, Office of the National Economic and Social Development Board etc.

In the afternoon, visited a Land Consolidation Project. In this project scattering plots of land owned by many people were combined and redistributed for conveniences in irrigation and commuting to work. The villagers were resettled in a new village to enable full accessibility to public services. The project had not been completed.

November 29, 1977: The whole day was spent on visiting a land drainage and irrigation project at Liberman. In this project a drainage system and irrigation canals were constructed to solve flood problem in low lying paddy fields.

This project was also an integrated rural development project jointly carried out by various agencies. The project had a field research station to conduct problem oriented research concerning rice productivity in the project area. The project

officials explained the basic concept of the project and the work plan. This project had not been finished. This project had not been finished.

November 30, 1977: Left Naga at 10.00 A.M. by plane and arrived Manila at 11.30 A.M.

December 1, 1977: In the morning, discussed with Mr.Aferbic Deputy chairman of the National Science Development Board, on the possibility of setting up a net work of research institutes in the ASEAN region. The concept was proposed by DRI to USAID with full support from ASRCT.

In the afternoon, discussed with Dr.Harahap and Mr.Aferbic, on the same project.

Left Manila at 17.00 P.M. and arrived Bangkok at 20.30 P.M.

2. Conclusions

The following conclusions may be drawn from this study tour;

1. This study tour did not emphasize only on integrated rural development but it did include other interesting issues of integrated development such as integrated slum improvement.
2. Integrated rural development in Indonesia and the Phillippines was still at the initial stage. Consequently, there was no opportunity to learn practical experiences from the existing projects except for the concepts and planned strategies for development.
3. Had an opportunity to discuss with Dr.Black on many aspects of integrated development. This would be very useful in planning research projects for the Environmental and Ecological Research Department in cooperation with DRI and other departments in ASRCT.

4. Had an opportunity to see terrace farming practices in Indonesia which would be appropriate for mountainous areas in Thailand.
5. Obtained some information which helped to broaden the concept for integrated research.

3. Consequences

Information and experience gained from this study tour would be very useful in initiating new research projects or improving the existing research projects in these areas:

1. Preparation of a research proposal on integrated rural development based on cashew nut industries and plantation, in conjunction with DRI and other ASRCT's departments. The proposal may be submitted to Office of Appropriate Technology, USAID.
2. Preparation of a research proposal on Integrated Slum Improvement in collaboration with the Building Research Department, for submission to an appropriate research funding agency in Germany.
3. Improvement of the ongoing Integrated Rural Development Project to make it more practical and realistic.

I. Cane Production	II. Material Handling	III. Trapiche Mech. Eqp't.	IV. Trapiche Heat
1. Cane types/varieties	1. Transport of cane to trapiche <ul style="list-style-type: none"> • By chutes • By travolta • By cart • By cable line 	1. Existing eqpt. in Colombia and elsewhere (i.e., Pakistan, India, Haiti, Mexico) comparative survey	1. Heat balance
2. Planting locations (i.e., hills vs. plains)	2. Some of above could also transport fertilizer to cane fields, and other material and supplies.	2. Equipment improvement study <ul style="list-style-type: none"> • Redesign of existing • New design (i.e., roller size, two pre-crushing rollers, etc.) 	2. Furnace design <ul style="list-style-type: none"> • Configuration • Chimneys • Construction • Firing and
3. Planting methods	3. Trapiche location <ul style="list-style-type: none"> • Downhill from cane fields • Hill/valley bottom 	3. Hill propulsion study <ul style="list-style-type: none"> • Animal • Gasoline engine • Diesel motor • Electric motor • New energy sources (wind, solar) • Steam engine • Water mill 	3. Fuel study efficiency and <ul style="list-style-type: none"> • Bagasse • Local wood • Coal • Briquettes
4. Fertilizing	4. Trapiches consolidation	4. Equipment repair and maintenance study	4. Bagasse prep <ul style="list-style-type: none"> • Pre-drying • Bunking/s
5. Harvesting practices (i.e., cutting methods: <ul style="list-style-type: none"> • Double cutting • Machete cutting vs. other [semi-mechanized]) 	5. Cane loading to hill <ul style="list-style-type: none"> • By chute, hopper, slide 	5. Hygiene improvement	5. Cooking vessel <ul style="list-style-type: none"> • No. requir • Pot-off • "Y" shape • Line of stu • Vessel des
6. other crops parallel or alternate planting	6. Trapiche material flow study <ul style="list-style-type: none"> • Take advantage of gravity with hillside location 	6. Tire and motion, and methods and stds. study	6. Juice filter purification
7. Other steps <ul style="list-style-type: none"> • To increase yield • To facilitate work • To reduce labor • To improve safety 	7. Tire and motion, and methods and stds. study	7. Equipment layout study	7. Balancing out crusher capac
	8. Equipment layout study	8. Safety study	8. Waste/accession <ul style="list-style-type: none"> • For mech. sion • Other fact
	9. Safety study	9. Human factors study	
	10. Human factors study		

VI. Panola Mktg. & Distrib.	VII. By- & Waste Products Utiliz.	VIII. Org. Study	IX. C/S & Other An
1. Establishing cooperative <ul style="list-style-type: none"> • Socio economic study 	1. Uses of bagasse <ul style="list-style-type: none"> • As trapiche fuel • As animal feed • For briquettes • Furfural • Animal bedding (litter) • Other 	1. Colombian organization <ul style="list-style-type: none"> • III current and future/planned projects • I.C.A. planned projects • SEMA planned projects • "Cafeteros" • ANDI • IBAMA • CPNI-CANA • OISA - Min. Agr. • Others 	1. Economics of c <ul style="list-style-type: none"> • sub-systems, &
2. Government controls <ul style="list-style-type: none"> • Pricing policies 	2. Juice boil-off scum as animal feed, raw or mixed, fermented with bagasse	2. Foreign/International <ul style="list-style-type: none"> • USAID • FAO • UNIDO • INDP • OAS, IICA, I.A. Bank • Exts Andino • FerH Bank • CANE • Others 	2. Socioeconomic
3. Advertising	3. Panola rejects (i.e., not meeting stds.)		3. Govt. policies (i.e., white v sugar vs. coff
4. Transportation and distribution <ul style="list-style-type: none"> • Local • National 	4. Ashes		
5. Export potential	VII. a. Animal feeds <ul style="list-style-type: none"> • For pigs • For beef 		
6. Sugar substitution study	1. Establish nutritional value of: <ul style="list-style-type: none"> • Bagasse • Juice boil-off scum ("cachaza") • Sugar cane tops 		
7. Use as confectionary ingredient	2. Develop feeding system model (daily rations equipment and materials controlled grazing, minerals addition)		

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AN ACTION PLAN TO IMPROVE THE RUST CAPITAL TECHNOLOGY OF PANAMA (BROWN SUGAR)
 CULTIVATION, PROCESSING AND DISTRI. TECH. A SYSTEM APPROACH

	III. Tropical Farm. Eqpt.	IV. Tropical Farm. & Equip. Eqpt.	V. (Continued)	VI. Panels, Q.C. & Stds.
Tube	1. Relating eqpt. in Colombia and elsewhere (Guat., Bolivia, India, Haiti, Mexico) comparative survey	1. Heat balance study	9. Bagasse improvement	1. Process quality control
trans- folds, plicas.	2. Equipment improvement study • Redesign of collection • Saw design (i.e., roller size, two pre-crushing rollers, etc.)	2. Furnace design study • Configuration • Chimneys and dampers • Construction materials • Firing and fuel feed	10. Time and motion, and methods and stds. study	2. Elimination of harmful additives (Gulfine & classed)
Ms	3. Mill propulsion study • Animal • Gasoline engine • Diesel motor • Electric motor • New energy sources (wind, solar) • Steam engine • Water mill	3. Fuel study comparative efficiency and costs • Bagasse • Local wood • Coal • Briquettes	11. Equipment layout study	3. Use of coagulants
ody ty		4. Bagasse preparation • Pre-ferm • Bundling/conditioning	12. Safety study	4. Ph factor control
da	4. Equipment repair and maintenance study	5. Cooking vessels study • Gov. required • Potassium process • "Y" shape layout • Line of sight status • Vessel design/condition	13. Human factors study	5. Use of vegetable (carrots), or artificial, but harmless, or even beneficial bleaching (whitening) colorants
	5. Bagasse improvement	6. Juice filtration and purification		6. Standardization: • Size • Weight • Additives • Packaging
	6. Time and motion, and methods and stds. study	7. Balancing output with cane crusher capacity		
	7. Equipment layout study	8. Waste/effluent heat utilization • For mach. eqpt. or other use • Other future use		
	8. Safety study			
	9. Human factors study			

VIII. Org. Study	IX. C.R. & Other Analyses	X. Proposal Outline
1. Colombian organization • III current and future/planned projects • I.C.A. planned projects • S.E.A. planned projects • "Infateros" • ASDF • IDSA • CENI-CANA • OLSA - Min. Agr. • Others	1. Economics of each subsystem, & overall 2. Socioeconomic aspects 3. Govt. policies & plans (sugar, white vs. brown sugar vs. coffee, etc.)	1. Proposal preparation participants: • III (Guzala, Flechas, Hmenez, Muñoz, Díaz, de Bacile) • DEI (Blackley, de, Pederson, Edwards, Radovic) • Consultants (Cawkins, Benzjak, Hyatt) 2. Proposed proposal and eventually project leader: G. Flechas, or J. W. Hawkins, or M. Radovic 3. Proposal preparation schedule: • Forwarding proposal outline to all participants by 15 June • Developing proposal 15 June - 31 July • Finalizing proposal 1 - 15 August • Submitting proposal about 15 August 4. Project duration 2 years 5. Project costs: • Colombia 5 \$/yrs. professionals • U.S. 2 \$/yrs. professionals
2. Foreign/International • USAD • FID • UNIDO • UNDP • OAS, IICA, I.A. Bank • Ecu. Andino • SIDA Bank • CARE • Others		

HILAN RADOVIC
 4 June 1976
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July 18, 1978

Mr. Milan Radovic
International Programs
University of Denver
Denver Research Institute
University Park
Denver, Colorado 80210

Subject: Panela Production in Colombia
Trip report, observations and
suggestions.

In accordance with the Consulting Agreement, DRI file 5420, I went to Colombia to assist the IIT in improving the efficiency of panela production.

During my stay, I met with Drs. J. Ayala, G. Flechas, A. Muñoz and A. Jimenez from IIT and Messrs. W. Hawkins and D. Shaer from AID, Bogota. Most of my time was spent with Messrs. Jimenez, Muñoz and Hawkins, who were extremely helpful and cooperative.

The problem of panela production is low efficiency of some 50,000 small panela installations and consequently low sugar yield and inferior product quality.

As I see it, the problem has to be attacked from two sides - first, try to improve the performance of existing installations by applying sound engineering principles and, second, develop all new, improved technology for panela production, design, build and operate a model panela plant which will incorporate the best engineering solutions and produce optimum results.

The appropriate technology for the pilot plant could be similar to the following:

- Milling of cane using a two-roller crusher and a three roller mill.
- Straining the juice through a small, self-cleaning strainer of the DSM type or similar.
- Continuous addition of clarification chemicals, fast heating and scum removal.
- Evaporation to cca. 70⁰Bx and reuse of generated vapors.

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- Final concentration and forming of panela.

New furnace has to be designed for high thermal efficiency and the bagasse should be predried. With the improved fuel efficiency and partial recovery of the latent heat of evaporation it will be possible to even have an excess bagasse instead of a shortage. The excess bagasse means more water could be evaporated which in turn might lead to addition of some water (condensate!) to the mills in order to improve the extraction of sugar.

Once the pilot plant is built and operating, it would be a good example, guide and a demonstration/training center for panela producers in Colombia.

However, the pilot plant design, construction, etc. will take some time, maybe up to two years, but the need for improvement in the panela industry already exists. It would, therefore, be advisable to initiate a wide base technical education program for panela producers right now. There are many things, such as predrying of the bagasse, control of combustion air, use of proper clarification agents, which are known to be better than existing practices and which could significantly improve the efficiency of installations without capital expenditures. The program could be started by printing and distribution of simple, illustrated pamphlets/leaflets showing the right and the wrong way of doing something, like for example, feeding the bagasse to the furnace, keeping the port closed, etc.

I think the project is very interesting and challenging and I will be glad to provide the technical assistance and help for as long as required.

Sincerely yours,

CRESCENT ENGINEERING COMPANY


Miloyan Bosnjak
Senior Process Engineer

/csc

encl.

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PANELA PRODUCTION IN COLOMBIA

Observations and Comments

1) Bagasse Predrying

- a) Higher calorific value:
If moisture decreased from 50% to 30%, bagasse consumption could be reduced for 10% or more.
- b) Higher furnace temperatures and consequently better heat transfer and furnace efficiency.
- 1a) Bagasse predrying could be effected by storing the bagasse on a kind of an inclined grate/platform which would permit natural circulation of air through the bed of bagasse and also help in transporting the bagasse from the mill to the furnace.
It has to be covered (roof) and should hold enough bagasse for one day's operation.

2) Furnace, Construction and Operation

Existing furnaces could not be changed easily because of expenses involved. To improve the results, few things could be done:

- a) Use of low moisture bagasse, predried.
- b) Better control of combustion through the control of air flow.
- c) Increased heat absorption surfaces.
- d) Preheating of the juice with waste heat.

Predrying (a) has been discussed already.

- (b) A correct addition and distribution of air for combustion would result in decreased fuel consumption and increased furnace efficiency. First, all the air has to be admitted from underneath the grate and has to be controlled. It could be done by closing the bagasse feed port and by installing a sliding gate arrangement over the lower (ash pit) furnace opening.
The port should be made so it would automatically remain closed at all times except when bagasse is pushed into the furnace. By limiting and controlling the combustion air quantity, one could raise the combustion temperature, decrease heat loss through the chimney and improve the efficiency of the furnace.
- (c) Increased heat absorption surface means better designed cooking pans with larger surfaces exposed to direct furnace radiation. That would improve the heat transfer and decrease the temperature of gasses leaving the furnace.

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(d) Preheating of the cold juice could be done by using flue gasses or by using vapors generated during the cooking process. I would prefer using vapors for the following reasons:

- Juice is boiling at the atmospheric pressure and the vapor temperature is close to 100°C (depending on the local altitude). Using that vapor for preheating the resulting juice temperature would be always less than 100°C. The resulting juice temperature would be just right for the clarification process and could be kept constant without any complicated automatic controls.
- By capturing the latent heat of vapors and preheating the juice about 10% of the fuel fed to the furnace could be saved.
- Condensing the vapors certain amount of clean, hot water will be generated and it could find various uses around trapiches.
- Controlled condensation of vapors would improve working conditions within the installation and provide for better drying of the bagasse by lowering of the relative humidity.

2a) New furnace design should provide for a good bagasse feeding and distribution, combustion air regulation and distribution, high combustion temperature, sufficient volume/height for complete combustion, good heat absorption and minimum flue gas temperature.

3) Juice Extraction and Processing

a) It has been proven that better designed rollers and addition of a crusher could improve the extraction. So the way to go would be to standardize trapiches as follows:

- Two roll crusher, followed by a
- Three roller mill

all properly designed and made of good quality materials.

b) The juice clarification has been studied extensively by IIT and an effective system using the mono-calcium-phosphate and pH adjustment with lime has been demonstrated.

Bad points of using Clarol and aniline are well known and in order to replace them with the phosphatation technique an intensive education program (and maybe a ban of Clarol) and time would be required.

As far as the equipment is concerned, I believe something could be done to improve present practices:

First, the juice after the mill should be brought to the

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proper pH and temperature as quickly as possible in order to decrease the inversion, color formation and sugar loss through microbiological actions. Chemicals, lime and phosphate could be introduced immediately following the mill, possibly through a proportionating feeder connected with the mill. Heating and the scum removal could be done in a shallow pan, having a large heating surface and vapor heated. From that clarification pan, preheated, clean juice could be transferred to the evaporation vessel via an overflow stand pipe. The process would be essentially continuous and would eliminate manual transfer of juice from one pan to another.

- c) The evaporation as is does not seem to be very efficient and requires a lot of manual juice handling/transfer. The entire evaporation process can be done in one single vessel, there is no valid reason whatsoever for having five, six or more evaporation pans. The new pan should be designed following few basic principles; large heating surface exposed to direct furnace radiation (a square pan with corrugated bottom, for example), limited juice depth, proper baffling to eliminate short circuiting.

It would be possible to concentrate the juice to the final consistency in that one pan. However, it might be better to use the evaporation pan to evaporate juice to about 70% Bx only and then transfer it to a finishing pan, concentrate to whatever the final consistency might be, pour it into molds, etc. That separation into evaporation and final concentration might be advantageous for it would provide better control of the quantity and consistency of the final product.

By B. Boyer

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INVESTIGATION OF THE POLICIES AND PROCEDURES OF THE APPLIED SCIENTIFIC RESEARCH CORPORATION OF THAILAND (ASRCT) DURING DECEMBER 1977

By H. Wagner

INTRODUCTION

From the period of 6 December 1977 through 19 December 1977, a team from the Denver Research Institute, led by Dr. Ronald Black, conducted a workshop at ASRCT. This workshop on Project Management and Development was the prime activity of the author, however, during periods when the workshop and other activities not planned were not in session, the policies of ASRCT were reviewed.

PROCEDURE

The ASRCT Administrative Manual was made available and was briefly reviewed. This manual was prepared in 1965 and had been only lightly revised since that date and apparently, while it did provide basic administrative guidelines for the corporation, was not utilized as a document for day-to-day operations. For this reason, and since the time was short, no audit was made of this manual. Preliminary and follow-up discussions were made with several operational personnel in attempting to determine their operational problems and discuss potential methods of solving these problems, as well as to form general recommendations for consideration for revised operational procedures and techniques. Discussions were held with the following people in addition to general conversations with Dr. Malee Sundhagul and Mr. Nitasaa Pichitakul:

- Mr. Chalut Patamothai, Chief, Office of Planning and Project
- Mrs. Poapun Ratasirayakorn, Chief, Budget Section
- Mr. Taweesakdi Rohitsukh, Chief, Business Management
- Dr. Pradit Cheuyjit, Deputy Governor for Administration

- Ms. Nares Phalavasu
- Mr. Nipon Phanomkarn

In addition to the above noted meetings and conversations, a review of the Rubber Seed Oil Project held by Dr. Black and Mr. Evans with the ASRCT project personnel was attended.

RESULTS AND CONCLUSIONS

The following are highlights from the discussions and are summarized in general categories.

Indirect Costs

The accounting system identifies the costs of the Corporation's operations. However, the calculations of these costs, and relation to those costs which are specifically indirect, to the direct project activities is not done. An artificial level of 2.5 times the salary baht is utilized to establish indirect costs when projects are quoted for full cost recovery.

Percent of Contract Research

Although the ASRCT personnel felt that the objective of the Corporation was to conduct research on a contract basis, this policy was not clearly defined to all levels of the organization. The relationship of the Thai Government to the future organizational structure was also clouded.

Project Selection

During the process of developing the ASRCT budget for submittal to the Thai Government, the projects that have been defined by the various operational elements and divisions of the Corporation are considered by the Project Planning Committee. Those projects approved are included in the ASRCT budget. It was not apparent that there is a method for eliminating weaker or unsuccessful projects at a later date and allocating available funding to stronger areas.

Incentive for Outside Contracting

The budgeting process appears to encompass the activities of the entire Corporation. This provides for a personnel budget that is covered by existing funding. Little or no incentive is left for researchers to establish contracts with separate and outside funding sources, nor does time exist separate from available projects identified in the budget. Since additional personnel are not available, existing personnel must essentially do these extra projects as extra tasks. The capability to subcontract, as well as hire additional personnel for

these outside contracted projects appears to be limited--although ASRCT appears to be, at present, attempting to develop the former capability.

Project Accounting

Data available to the project supervisor concerning the financial progress of his budget are available on a periodic basis in the area of supplies and expenses. However, one major project cost, salaries, is not made available for two reasons. One, the salaries are already placed in the annual Corporation budget submissions to the Thai Government, and two; if people from other departments work on the project, these salaries are not identified and included in the project costs. This leaves little realism in the total cost of a project. This, plus the fact that true indirect costs are not available, means that true project costs are not available.

Expenditure Authorizations

The basic budget prepared for the Budget Bureau (which is an excellent document) provides the basis for budget expenditures. An area of some concern is that revisions to the authorizations are extremely difficult to obtain. The budget is prepared as much as two years in advance of the expenditures, providing a fairly rigid, and often subsequently unrealistic, position.

Capital Amortization

The accounting system contains data that could be used to develop amortization for buildings and equipment and allocation of these costs to the projects as an indirect cost. This, however, is not currently being accomplished. The indirect costs of capital are, therefore, not available to be charged to clients on an actual basis.

Accounts Receivable

There appeared to be some difficulties in the collection of amounts due from commercial sponsors in contract work, as well as for royalty agreements. Advance payment and/or progress payments were discussed as measures that might prove to be of some benefit.

Marketing

Techniques for establishing contact with potential sponsors in the private sector seemed limited. It did appear that more contacts are being made than in the past; however, more incentives for researchers, as well as sponsors would be beneficial.

Subcontracts

The Business Management section is developing the capability to initiate subcontracts, as needed, and is developing contacts with personnel within universities so that the capabilities of the Corporation can be expended.

Project Control

While there seems to be good scientific work being done on projects, the project objectives and in-process control is weak. The control instruments necessary to determine the progress of a project or when a project is complete are not readily available. This does not lead to a capability which can define and propose follow-on efforts or to properly close out an unsuccessful project and reallocate resources to new efforts.

Personnel

While in many cases, there were frustrations with the process of getting the day-to-day business accomplished, a general feeling of support to the organization and a high degree of loyalty was evident in all personnel.

RECOMMENDATIONS

It is recommended that the accounting system be revised to include methods of indirect cost accounting so that total cost of research can be identified with total direct as well as indirect costs. With this tool, projects can be proposed on a basis that will pay all costs, and the Corporation can expand to handle additional work from industrial as well as from Government and other sponsors as it develops. Incentive for research personnel will exist in this mode of operation since the salaries and tasks will not be pre-budgeted. Salaries can also gradually reach levels competitive with industry.

Government agencies could provide promotion incentives to selected segments of industry as well. By knowing total project costs, the Government could share in the cost of research, and the development of appropriate technologies by subsidizing promoted industries at varying predetermined rates on a project basis.

It is important that the project planning, control, and evaluation process be tightened, since in the final phase of ASRCT's development toward an autonomous not-for-profit organization, it will allow effort to be concentrated on a project (or service center, such as TSDC) basis. The desired institutional autonomy could be reached by applying these same management techniques to the Corporation as a

whole--an integrated research management approach is needed. Budgeting would be done at ASRCT on a short turn-around flexible basis instead of the current practice of being bound by the Government budget cycle.

A project review process should be instituted to eliminate the weaker of projects currently carried without adequate resources to properly complete them. The process should include consideration of social and economic factors as well as technical and should be oriented to Thailand and ASRCT goals and objectives which should be clearly communicated to the ASRCT staff.

In order to compete effectively in the research marketplace on a commercial basis, it is important that the potential market be fully considered. Marketing policies should be established. ASRCT capabilities should be tailored to national needs through coordination with the National Economic and Social Development Board, the Board of Investment, the National Research Council and other Governmental agencies. Marketing training for key personnel, including potential project investigators, should be considered.

While some policy definition yet needs to be made, it is understood that this is an ASRCT goal.

HW:ct

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Review of Internal Management
of the Thai National Documentation Center
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The internal management of the Thai National Documentation Center (TNDC) was studied by the Denver Research Institute (DRI) in December 1977. The following recommendations, ideas and observations regarding TNDC are intended as suggestions that may improve or facilitate the internal management operations. These observations cover the broad areas of 1) definition of mission of TNDC, 2) staff relations, and 3) future plans. DRI offers this management study not as a mandate for change, but as a tool that TNDC could use to facilitate change if it wishes.

The DRI observers were very impressed with the volume of work TNDC handles and with the accuracy, efficiency and competency of the staff. TNDC acts as an information and documentation center for the scientific and technological literature for Thailand and as an information center for the Applied Scientific Research Corporation of Thailand; this dual role and responsibility places TNDC in a very demanding situation. It has to remain a dynamic information source for two audiences: the researchers of ASRCT and the scientific and technological community of Thailand. TNDC is handling the dual responsibilities very well.

I. Issue of Dual Role

As mentioned in the introduction, TNDC's work encompasses two areas: 1) the documentation of scientific and technical literature for Thailand, and 2) the provision of technical information services for ASRCT. Both areas of work are assumed by DRI to be equally important to TNDC and ASRCT. However, because TNDC is charged with two distinct responsibilities, problems arise regarding the internal management.

Very few libraries in the U. S. act as a national center for U. S. literature plus serve a select user group simultaneously. The Library of Congress (LC) operates under this type of dual capacity and has problems because of it. The Library of Congress is what its name implies--a library for the U. S. Congress. However, it also operates as an unofficial national documentation and information center for the United States. Because the Library of Congress is both a special library and a national library, questions arise regarding whether proposed expansion of national library services should be encouraged and whether the special services (e. g., Congressional Research Services) should be available

to the public or reserved exclusively for Congressional members. Constantly the LC staff must reconcile the services they offer in the light of two audiences.

TNDC also has constantly to assess its services with two audiences in mind: the researchers of ASRCT and the scientific and technological community of Thailand. Consequently, most researchers at ASRCT do not seem to fully understand the role of TNDC and often question the expansion of services as legitimate TNDC actions. To alleviate these problems, the two following recommendations are made:

- 1) TNDC should clearly define in a written document its role vis-à-vis TNDC as a documentation center for scientific and technical literature for the nation and as an information center for ASRCT;
- 2) The Responsive Service Unit, serving ASRCT, should be renamed to reflect its specialized role (e.g., Technical Information Services Unit for ASRCT, or something similar).

A written statement, mission of purpose, would serve a dual function: 1) it would guide the staff when goals and objectives for TNDC are decided, and 2) it would clarify for the public who and how TNDC serves. A clearly stated mission would serve as a backbone and framework from which more specific goals could be planned, and from which expansion of services could be justified. Such a document should be an integral part of any organization. Because TNDC does not appear to have clearly defined goals for its work with ASRCT or its work as a national center, confusion arises from the staff of TNDC and ASRCT as to exactly what TNDC's role is.

A change of name within an organization should not only be a formality or a cosmetic change, but should reflect a more effective and efficient means of reaching goals. Names and images of organization or sections within them are very closely aligned. It is often difficult for the public to distinguish between the two. The image of TNDC held by ASRCT researchers is very closely connected to the name, Thai Documentation Center. ASRCT researchers also connect expectations to that image. DRI observed ASRCT putting limitations on TNDC's abilities and capacities as an information center, possibly because of what "TNDC" reflected in their mind, when in reality TNDC could do much more for ASRCT than it is called upon to do. TNDC could and should project to the rest of ASRCT an image of being a vital link to the success of ASRCT projects

as well as another ASRCT department aimed at serving national needs. The name change will remind ASRCT and the scientific community that TNDC is a national library as well as a special library.

II. Staff Relations

DRI observed a very capable, qualified and congenial staff at TNDC. The staff appeared to manage an incredible amount of work plus remaining very cooperative among themselves and with ASRCT researchers. DRI was very impressed with the output of the staff, who work under a tight budget and staff constraints.

The first observation and suggestion regarding the TNDC staff encompasses the overqualifications of several staff members for the jobs they are performing. The Information Services Unit, and the Responsive Services Unit in particular, appeared to have staff members concerning themselves with responsibilities that were less than they were capable of managing. Thus, an assessment of staff capabilities and a clarification of job responsibilities are first recommended steps to rectify this situation.

Effective management is based on sound forecasting of personnel capabilities and organizational needs. Adequate manpower forecasting will accomplish two goals: 1) provide a rationale for the department to negotiate with top management for expansion of services, and 2) guard against personnel being underutilized or overburdened. When negotiating with top management, effective tools are always needed and cannot be emphasized enough as valuable support documents for plans of expansion or maintenance of services and subsequent budgetary increases.

A preliminary step to manpower forecasting is the development of job descriptions. Job descriptions define the responsibilities and scope of work each job includes. They also encourage managers to analyze the type of skills and experience required for each position, and allow for the acquisition of personnel with varied skill qualifications. Unless a job description is written for each position, both the employee and the manager may be unclear about exactly what the responsibilities of the job include.

TNDC, with these two staff-related documents--manpower forecasting and current, up-to-date job descriptions--would be better able to serve in its

dual role as 1) a national center and 2) as a specialized information source for ASRCT. Also, they would provide a further basis for requests for increases in staff and budget.

There are various current management theories of how personnel are motivated and how managers can facilitate greater staff outputs. Most of the theories are built around incentive systems which use money, positive reinforcement, and participation. Because there are usually external limits on the amount of salary increases managers can give, the emphasis shifts to positive reinforcement and participation.

DRI suggests that two procedures be initiated at TNDC that may increase performance and morale of the staff: 1) monthly staff meetings between the division heads and the director, and 2) periodic evaluations of progress toward meeting objectives agreed to between the director and division heads.

The monthly staff meetings would serve several purposes within TNDC. They would provide a vehicle for good staff communication plus would provide an opportunity for the division heads and the director to discuss the direction and focus of TNDC's activities--current and future. DRI observed very casual, informal communication between the division heads and a somewhat more formal communication pattern between the director and the division heads. The routine work plus the heavy work load carried by TNDC staff members tends to psychologically affect the personnel. The long-range objectives are lost in the details of day-to-day routines. Therefore, a monthly meeting where problems could be shared and mutual solutions could be sought would give the division heads a feeling of greater participation in the operations of TNDC.

Participatory decision-making and further delegation of authority are likely to be effective where people want to take more responsibility. Like most techniques, increased participation is not always easy to achieve. It involves some managers giving up more control and power than they wish and other having to take more responsibility than they wish. But the long-range effects are usually very positive. More than half of the TNDC staff expressed a desire to know more about the background of the work that they were doing and to have more responsibility in the operations of TNDC. Monthly meetings could provide the division heads a greater feeling of participation as well as a forum for assessing the solutions to problems.

The second previously suggested procedure, periodic evaluation of progress toward meeting objectives agreed to between the director and division heads, could be easily integrated into TNDC's internal management system. This integration, though time-consuming to initiate, should have positive outcomes in terms of increased employee morale and performance. Also, as mentioned previously, there are only a few motivational techniques available to managers, positive reinforcement being one.

A periodic evaluation would provide a situation for positive reinforcement from director to division heads and from division heads to support staff. Plus the periodic reviews would give managers time to evaluate progress towards the goals and objectives of TNDC--to see if the procedures to accomplish these goals are effective and to check whether the times allowed for completion of the objectives were reasonable. If they were not, renegotiation of the time allotments could be made. The evaluation would also give the employees a chance to freely discuss problems and proposed solutions with their manager in a relaxed environment. By making time for a periodic evaluation, managers would reap the benefits of 1) positive employee feelings resulting from participatory management, 2) an awareness of problems anticipated by the staff, and 3) proposed solutions to anticipated problems.

The suggestions for a move to participatory management of TNDC recognizes that many of TNDC's operations do not lend themselves to this management style. Some tasks require a more leader-centered style of management, whereas others, we believe, could be accomplished more effectively under an individual-centered or free rein style of management. Several tasks lend themselves to a group-centered style of management, one that uses the dynamics of group input to solve problems or complete tasks. Because of the need for flexibility in styles of management, various TNDC tasks for achieving objectives should be analyzed and the appropriate style of leadership chosen to best fit the task. By integrating leader-centered, group-centered and individual-centered styles of leadership, managers should be able to create an environment that would respond adequately to the varied challenges and demands of an information center.

III. Proposed Activities

This section recommends certain actions for TNDC that DRI believes will assist it in serving ASRCT and the nation. These suggestions are not believed to be radical changes or overly time-consuming tasks.

A. Planning Documents

TNDC needs a persuasive document for presentation to the Governor, listing the staff needs forecast, the budgetary needs, and a rationale for expanding services for ASRCT. The existing TNDC five-year plan seems to DRI to be too general to accomplish this objective.

Before such a document could be drawn up, the director of TNDC would have to know ASRCT's mission, goals and objectives to make valid assumptions, determine realistic alternative courses of action, and finally to select the ones that would best serve the needs of ASRCT researchers and the nation. As it is not clear that ASRCT goals are well known, this may require the director of TNDC to spend time with the Governor to clearly work these out as they relate to TNDC. DRI would propose that the planning document be coordinated by TNDC's director and written by the division heads. The document would serve as an overall profile of TNDC activities, present and proposed. Included would be TNDC's goals and objectives, personnel forecasts based on the goals and objectives, and budget forecasts based on the goals and objectives.

To accomplish this, TNDC would first have to:

- 1) define its mission and objectives vis-à-vis the rest of ASRCT and the nation;
- 2) establish planning assumptions;
- 3) determine alternative courses of action to achieve the objectives;
- 4) evaluate the courses; and
- 5) select a course of action.

These preliminary steps would serve also as an internal planning guide, resulting in a document valuable for persuasion of ASRCT's top management, and as a guide for the TNDC division managers in setting division goals and objectives.

B. A New Position: Information Officer

The second recommended activity would facilitate future TNDC services for ASRCT. It is recommended that TNDC create the position of Information Officer, who would work out of the Responsive Services Unit. This position would serve as a liaison with ASRCT. The liaison, by increasing TNDC's presence at ASRCT, would be able to anticipate ASRCT's needs; thus TNDC would be better able to respond to these needs.

The Information Officer position would incorporate the following responsibilities:

- 1) attend all ASRCT department and division-level project planning meetings, thus creating a visible information link with ASRCT;
- 2) develop a "selective dissemination of scientific information service" (SDI) to ASRCT researchers; an SDI service includes a coordinated program of searching current literature for articles, announcements of report publications, etc., with a specific researcher's interests in mind. The identified documents are disseminated to the researcher for reading, thus anticipating needs, not just responding to requests.
- 3) coordinate TNDC document acquisition activities, thereby conserving limited funds by purchasing only materials not available in nearby libraries, and convincing ASRCT researchers of the benefits of such an acquisition program.

The Information Officer would serve as a liaison for translating the services and capabilities of TNDC to other ASRCT management. This spokesperson would not only transfer information between other parts of ASRCT and TNDC, but would facilitate the maximization of both TNDC's and ASRCT's potential.

C. Promotion of TNDC and ASRCT

Staff time should be budgeted for the promotion of TNDC in particular and ASRCT in general to organizations outside ASRCT. Promotion is a legitimate activity for which time should be budgeted and a program planned. Maximization of staff productivity requires a successful promotion program.

This program would seek to achieve the following objectives:

- 1) to publicize TNDC's position as a national center for scientific and technical literature;
- 2) to promote TNDC's services and capabilities as a scientific and technical information center; and
- 3) to inform all users that TNDC has the technical and research departments of ASRCT to backstop and to supplement the secondary data within the center's collection.

The program, by promoting TNDC, would also be promoting, advertising, and generally informing organizations and potential clients of ASRCT. ASRCT would benefit from wider exposure. The greater the number of people who know about TNDC, the greater the number of people who will know about ASRCT.

D. Further Development of the Technical Data Files

The Technical Data Files are special collections of documents on various subjects, housed in vertical files in the Responsive Service Unit of TNDC. These files contain reports, articles, bibliographies, etc., on a certain subject and are added to by various TNDC staff members. The Technical Data Files are very useful when appropriate technology questions need to be answered because they usually contain research reports that discuss solutions to technical problems as well as names of people or organizations currently doing research on that subject. The files are also useful to ASRCT researchers when they need to find out what applied research has been done concerning a technology or who is a knowledgeable person with whom to correspond on the subject. DRI believes the potential benefits to be derived from these files warrant their further development to reflect the most recent research information and to provide information to a greater number of user demands. An expansion of the depth and number of Technical Data Files should include the following steps:

- 1) Plan a search method for acquiring documents that would coordinate all the current review and scanning activities of the TNDC staff. As documents came into TNDC, through subscriptions to periodicals, as gifts and exchanges from libraries all over the world, or through normal acquisition work, they would be reviewed and fed into the Technical Data Files or they would be cited on cards which would be put into the files to allow for future retrieval of the relevant document.
- 2) Expand the information exchange activities currently undertaken by TNDC with libraries in ASEAN countries and with appropriate technology centers worldwide to gather relevant information for the files. TNDC currently receives thousands of documents free of charge from libraries all over the world. These documents are received as a result of a well-planned exchange program. An expansion of this program should produce additional relevant information for the Technical Data Files, increasing even further the opportunity to use these subject files for various audiences.
- 3) Send a subject list of the Technical Data Files to ASRCT researchers on a monthly or other appropriate periodic basis. This periodic list would serve two purposes: 1) it would keep ASRCT researchers aware of what subjects TNDC had current collections on, and 2) it

would stimulate a two-way communication flow between TNDC and ASRCT. The increased communication flow would provide an opportunity for ASRCT to suggest other subject files that should be included in the Technical Data Files, and for TNDC to find out what subjects ASRCT researchers were interested in. The document acquisition process that builds a comprehensive subject file requires a long lead time. Therefore, the earlier TNDC can anticipate research directions, the better a position it will be in to build subject files useful to ASRCT.

- 4) Index technical data files to facilitate searching within files. Additional staff should be budgeted for this task. It should not just be added to existing workloads.

E. A Continuing Education Program

TNDC should encourage continuing education programs for all staff members. These programs would allow the TNDC staff to prepare themselves with technical skills needed to remain a valuable asset to ASRCT's needs. In order to coordinate such a continuing education program, the anticipated research areas of ASRCT should be identified and relevant technical information skill courses sought. Thus TNDC would become an even more valuable resource for ASRCT, plus would put itself in a position of becoming a more dynamic information center.

F. Technical Writing Short Courses

Because TNDC has in-house expertise in the subjects of technical and abstract writing, courses should be taught on a regular basis for ASRCT personnel. DRI has been told by various ASRCT researchers that they need guidance and instruction in how to write technical reports. TNDC, because it has this knowledge in-house, should offer these courses to ASRCT. The courses should be taught to all interested ASRCT personnel. The courses should be coordinated by the director of TNDC and taught by various TNDC staff members.

G. A Part-Time Student Work Program

A large portion of information and documentation center work is routine clerical work. This is due to the nature of documentation work and is a reality in every library around the world. This presents managers with a difficult

personnel problem. How can one motivate employees to perform dull, routine tasks day after day? Efficiency decreases the longer employees perform such tasks, and variety must be built into these jobs.

DRI suggests that TNDC initiate a part-time student work program that will remove some of the full-time employees' boredom with routine tasks. The use of part-time student workers (Kasetsart University students should be a good source) would offer such advantages to TNDC as:

- they could be easily trained to perform the routine tasks;
- they would require no fringe benefits, i. e., medical insurance, vacations, etc.;
- they would work on an "as needed" basis;
- they would relieve the boredom of TNDC employees currently performing the routine tasks;
- they would provide low-level TNDC employees with the chance to supervise, thus increasing their feelings of participation in the overall TNDC management; and
- they could be hired cheaply, but could perform necessary tasks for the overall operation of the information center.

H. An Index for the Exchange Documents File

TNDC should create an index to the documents acquired as gifts or through the exchange program. TNDC, as part of the Library Unit's activities, acquires a large number of documents by exchanging TNDC publications for publications from various research libraries around the world. These documents are either put into the TNDC classified collection, into the Technical Data Files or are filed by organization name. The documents that are filed by institution name are usually not retrieved again, for no subject index or key word index exists for these documents. In essence, the documents are "lost." In order to anticipate some future use of these documents that may not be apparent at the time TNDC receives the document, an index should be created.

Additional staff should be budgeted for this task. It should not be added to existing workloads.

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SUGGESTIONS FOR A DEVELOPMENT PLAN FOR THE
THAI NATIONAL DOCUMENTATION CENTER,
APPLIED SCIENTIFIC RESEARCH CORPORATION OF THAILAND

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I. INTRODUCTION

The Denver Research Institute offers the following planning suggestions for the Thai National Documentation Center (TNDC) after studying its management structure and interviewing the director and division heads during December 1977. DRI believes that forecasting, planning, and preparation are extremely valuable for planned growth and expansion of services. The following document raises some issues and offers some suggestions aimed at facilitating TNDC's growth and development. The suggestions for avenues of growth are stated with both short- and long-term goals in mind.

The DRI observers are very impressed with the capabilities and programs of TNDC and believe TNDC is in an excellent position to capitalize on its strengths to become an even more dynamic documentation and information center. Controlled growth depends on current, effective planning by the management of any organization. The planning process takes time, precious time that most managers have too little of. However, the long-term benefits from spending time at the beginning of a growth period well outweigh the time spent for the planning. A document outlining where an organization wants to be at some future date and what clientele it wants to serve provides one a useful tool for convincing top management of the need for growth. Hopefully, this document will provide TNDC with the groundwork for a five-year growth and expansion plan.

Issues

The Thai National Documentation Center is charged with a dual role. It serves two areas of work: 1) the documentation of scientific and technical literature for Thailand and 2) the provision of technical information services for the rest of the Applied Scientific Research Corporation of Thailand (ASRCT). Thus, TNDC operates as a national scientific and technical library and as a specialized applied research institute's information center. Because of the dual nature of TNDC's mission, questions arise as to what is the appropriate role and thrust of TNDC's activities. By not concentrating efforts in one direction or another, i.e., becoming an active national center or increasing its role in the management structure of ASRCT, TNDC stays in a status quo position vis-a-vis both of these audiences.

Prior to determining in which direction TNDC will grow, it must know the development plans of both Thailand and ASRCT. TNDC's growth is dependent on the mission and objectives of these user groups. After obtaining the goals and objectives of Thailand and of ASRCT, TNDC can adapt its mission to their directions. Without such guidelines, plans for future growth will not reflect the needs of TNDC users. The proposed planning would provide TNDC with the background to promote its skills and expertise more vigorously to ASRCT management and to the scientific and technical community of Thailand.

In the United States there are few libraries or documentation centers that serve in a dual audience capacity. The Library of Congress is one such organization; it serves the U. S. Congress and acts as a national library for the U. S. However, this status, even though it is a reality, is unofficial. The Library of Congress (LC) has specialized services available to Congressmen only and has other services that benefit the U. S. public more than the Congress. Constantly, the LC has to define its services in light of Congressional approval. Because TNDC serves two users, a distinction, reflected in management structure, should be made between specialized technical information services and national documentation services. This distinction would clear up confusion as to what TNDC's role should be with regard to ASRCT on the one hand and Thailand on the other--thus facilitating an active, prominent role in the development process.

What is Needed

TNDC needs a planning document that encompasses ASRCT and national objectives and concomitant information needs of its two user communities, including the services, staff, and funds needed to meet these needs.

The planning document should put forth reasonable time period estimations for accomplishing a change or for instituting a new program. Because DRI is not familiar with exactly how long it would take to initiate and to complete the suggested programs, the time estimates listed in this report should be modified by TNDC to reflect the accurate time allowance. Also, the suggestions for growth and development encompass both areas of TNDC responsibility--as a national documentation center for scientific and technical literature of Thailand and as an information center for ASRCT. DRI sees both of these roles as having equal importance. The combining of suggested programs was done because DRI sees a link between both of TNDC's roles. What TNDC does as a documentation

center will benefit ASRCT; the services TNDC acquires and the promotion of TNDC all will reflect favorably on ASRCT. Also, the larger the number of organizations and people who know about TNDC, the greater the number who will know about ASRCT.

A planning document clearly outlining how TNDC, as a department within ASRCT, could support overall ASRCT goals and objectives would also facilitate a stronger service position with regard to ASRCT and a better awareness of how TNDC skills could interface with ASRCT needs. Another benefit would be the resolution of whether income revenue-gathering activities should be pursued by TNDC and where such activities fit into the overall services performed.

II. PROCEDURE FOR PREPARING PLANNING DOCUMENT

The planning document, DRI believes, should include new staff capabilities, thus reflecting true capabilities rather than observed or assumed staff capabilities. The first step would be to develop a staff development training program.

Staff Development Program

TNDC should undertake the planning of a staff development program that will reflect the future research programs of ASRCT and the nation and the concomitant future information needs of these researchers. This staff development program would incorporate present skill levels of TNDC personnel and ideal skill levels for five years from now. The needed skills, once identified, could be actively acquired through various training programs. This skill forecasting must be linked to current and future activities. (Specific examples of skills that may need to be developed are discussed in the following sections.

The staff development program would be based on the assumption that TNDC would know the objectives of ASRCT and Thailand. Undoubtedly, TNDC will be required to make some assumptions about these. Without a profile of these directions, however, TNDC will be thrust necessarily into the role of solely being a responsive unit--not being able to take an active, dynamic approach to user needs. The short-range activities would include:

- taking a survey of current TNDC skills and special capabilities
- compiling profiles of needed TNDC capabilities to serve user groups as a result of the directions they will be taking to meet their objectives

- identifying discrepancies between ASRCT interests and TNDC capabilities
- identifying training programs that TNDC personnel could participate in which will alleviate the discrepancies before they arise
- projecting the funds necessary to complete the training programs
- acquiring the funds for the programs
- participating in the training programs.

New or Enhanced Services That DRI Believes Should be Included in the Docu

TNDC should capitalize on its flexibility to repackage information to meet specific client needs.

Abstracting and Bibliographic Activities

An area ready for development and expansion is the abstracting and bibliographic activities of TNDC. Currently, TNDC publishes the Thai Abstracts, LIST (Scientific and Technical Literature Relating to Thailand) bibliographic series of documents, and abstracts of M.A. theses (relating to or about Thailand, gathered from all over the world). These irregularly published documents reflect in-depth research and considerable time on the part of TNDC members. They are excellent potential revenue-generating documents for a select audience.

Before such documents can be revenue-generating, standardization of format and regularity of issuance must be guaranteed. Short-range activities would include setting up guidelines for insuring regularity and investigating different publishers for price comparisons. (DRI was informed that the ASRCT print shop took two years to publish Thai Abstracts.) The long-range activities would include building up additional staff members to insure regularity of publication and the acquiring of initial money for publicizing the different documents. Once these steps were taken, TNDC publications could be promoted to all interested clients--e.g., industrial firms, libraries, and associations

Information to Industry

TNDC could initiate an information-to-industry program that would be an extension of the Bibliography Compilation Service already offered by TNDC. This service, for which a fee could be charged, would be directed toward industry--capitalizing on the need for technical literature by all businessmen

The current bibliography service consists of compiling a list of references to the published literature on any specific scientific problem defined by the user. This service is strictly an "upon-request" type of program, consisting of bibliographic citations only. The information-to-industry program would expand this bibliographic service to include annotated bibliographies, state-of-the-art reports, and detailed analyses of a subject.

The above-described program was initiated very successfully at the Minneapolis Public Library in Minneapolis, Minnesota. Minneapolis, the business center for the state, found that many of the patrons of their library were interested in more in-depth service from the library. However, the library believed it could not devote such a large part of its librarians' time to a few specific requests, and yet it discovered that the patrons were willing to pay for the service. So, a bibliography and report service upon request was initiated. The fee scales reflected the level of time for each product. This program was very successful and is still in existence.

TNDC initially would have to survey the scientific and technical community and science-related businesses to see if there would be an interest in Thailand for such a service. This survey work could be done during the next year, with recommendations made at the end of 1979. The following two years could concentrate on publicity and promotion of this service, with the reference staff handling the work. Provision for hiring additional reference staff members as the work increased would be an essential part of the initial recommendation document.

Another program that would encourage industry's use of TNDC's information would be for the Center to pursue a public relations program aimed at educating industry concerning TNDC's capabilities and resources. This could be accomplished through "TNDC capability" lectures at various professional association meetings, well-placed public service notices on radio, in newspapers, in trade journals, etc., with the mention that additional technical and analytical expertise is available from TNDC's parent organization, ASRCT.

Information Repackaging and Dissemination Program for Use with ASRCT

TNDC has the skills in-house for becoming an integral part of ASRCT's activities for disseminating research results to the public. TNDC has already initiated several activities that include gathering various research reports on a certain subject, synthesizing the suggested solutions into one document,

and publishing the document for a specific audience. This skill, combined with TNDC's translating services and the graphic art abilities of some ASRCT employees, could produce a valuable product, useful for many ASRCT clients.

Repackaging Scientific and Technical Information for Various Audiences

Within TNDC's collection are reports and research results that can be repackaged, i.e., written for a different audience than was originally intended to serve various scientific and technical audiences throughout Thailand. This type of repackaging synthesizing of material, is not original or new. In the United States, the National Academy of Science publishes small monograph on a certain subject that are directed to a specific audience. These monograph reflect the work of researchers who gathered information from various sources and repackaged it into a book that is readable and understandable by several groups of users. TNDC has initiated this type of activity with the publication of "Study on the Verification and Definition of the Most Suitable Rice Bran Stabilizing Technology and Specification of its Technical Parameters." Through the efforts of the Director of TNDC, this repackaging program was started, and DRI believes that support should be given to TNDC so this type of activity can continue and be expanded.

Even though repackaging activities are very time-consuming and tedious, the potential benefits to TNDC and ASRCT are great. TNDC will no doubt rely on the technical expertise of ASRCT researchers when reports are being analyzed and TNDC could also incorporate ASRCT research results, reports, etc., into publications, thus "advertising" ASRCT's accomplishments. As repackaging plans are made, TNDC would work closely with ASRCT researchers in determining what subjects should be covered or what subjects would have broad appeal, or which would be most useful to the people of Thailand. Repackaging information is an effective type of information access, something DRI has found to be particularly effective in serving its clients.

The short-term activities for a repackaging program would include:
1) developing a program plan for initial publications; 2) forecasting staff and budget needs to accomplish an initial plan; 3) beginning preliminary meetings with ASRCT to discuss possible subject areas; and 4) beginning a planning strategy for document distribution.

The long-term activities would include: 1) an ongoing TNDC promotion program to convince ASRCT of the valuable nature of this type of work; 2) development of a long-term repackaging program, incorporating ASRCT interest in various subjects in the program design; 3) staff development and training for the repackaging program; and 4) marketing this capability.

One ASRCT program, the rural development activities, would be a good starting place for TNDC to try its document repackaging and dissemination program. A basic component of rural development activities is the dissemination of information, which includes 1) new research results and 2) present solutions to solve identified problems. TNDC could pursue a very active information role in the rural development process by using its translating services and information repackaging abilities, which would allow for information to be tailored to a specific audience or client.

Also, through its International Federation for Documentation/Commission for Asia (FID/CAO) membership, TNDC is in a network which includes the Agricultural Information Bank of Asia, the International Association of Agricultural Librarians, and the Agricultural Information Society. All of these members could provide resources to rural development projects. TNDC also has an excellent working relationship with TECHNUNET/ASIA that has the potential to grow into a good source of appropriate technology information. In addition, information from the Technical Data Files could be utilized effectively and combined with documents from a cooperative exchange information program with Kasetsart University (agricultural extension services), the Department of Science, and libraries within ASEAN countries. TNDC, relying on its translating services and its in-house information-gathering skill, could fill the technology transfer gap from spoken skill transfer to rural implementation through many information forms (e.g., newspaper articles, radio education shows, extension newsletters, nutrition information fliers, etc.).

TNDC could immediately capitalize on its existing skills and resources by participating as a major component of an ASRCT rural development program. The short-range activities would include also the education of ASRCT researchers by TNDC management of the existence of such skills and how they could be of benefit to ASRCT. Longer-range activities could include promotion of TNDC's information packaging capabilities to organizations throughout Thailand via public service articles and professional meetings.

Appropriate Technology Activities

TNDC's collection contains the type of materials used in appropriate technology information dissemination programs, plus has the technical back-up (ASRCT's research departments) to analyze, synthesize, and repackage information to fit most situations and needs. DRI recommends that TNDC expand its role as an appropriate technology information source in the ASEAN library consortium and with TECHNUNET.

Appropriate technology activities could include organizing and collecting information for a specific group or target population. The identification of these groups could be done through working with various Thai organizations and at the same time familiarizing these organizations about TNDC's capabilities. There would be positive implications for ASRCT, i.e., ASRCT's capabilities as an applied research center would be appropriate for many situations where testing of various technologies would be required. Also, TNDC could develop an appropriate technology referral service, much like TECHNUNET/Thailand, but for more technical types of questions, questions that would require the expertise of ASRCT researchers. As part of the referral services, an appropriate technology newsletter could be published. TNDC already has an extensive information exchange system for technical report gathering that could be utilized very effectively for such an appropriate technology organ. (Technical reports are gathered from all over the world through an exchange of documents program conducted by the Library Unit. This unit also disseminates ASRCT reports worldwide.) The newsletter could act also as a current awareness service, a publicity tool for TNDC and ASRCT services, and as a directory to scientific and technical institutes, thus facilitating the ASEAN networking program growth. Also, by increasing and continuing activities with TECHNUNET/ASIA and TECHNUNET/THAILAND, TNDC would have increased visibility with these organizations and possibly a better chance for participation in rural development programs. The promotion of TNDC capabilities would be an ongoing process with these organizations.

Microfilming Program

Another potential revenue-generating activity that would benefit TNDC in several ways is a microfilming program. Such a program would reduce storage space requirements of rarely used journals, books, etc.; plus, the program could be offered to area libraries for a fee.

TNDC has started already the initial planning for such a program, with 1979 as a target date for offering the services to area libraries. However, the program does not seem to be progressing on schedule.

The microfilming program would allow TNDC to conserve space and to make room for more documents to be added to the collection. Space in libraries is a critical component to overhead costs; thus, any economic utilization of space should be of top priority.

The short-range activities would include a feasibility study of the project market, scope, and costs. The latter element would require a survey of the microfilm equipment manufacturers and their products. Also, a list of documents to be filmed would be made and initial user orientation to the project would begin. Included in the scope study would be manpower and budget requirements. The long-range activities would include the purchase of equipment, the hiring of additional help, the filming of TNDC documents, and marketing microfilming services to Thai libraries and documents service.

Technology Transfer Center

DRI observed much discussion as to where the location of the Thai National Center for Technology Transfer would be. Because no firm decision has been made regarding its location, it would appear beneficial to TNDC and ASRCT if a capabilities statement and a rationale for encouraging the location of the center at TNDC were submitted to the delegated authority.

DRI doubts that there would be much conflict of interest for TNDC establishing the technology transfer center within its organization, for TNDC would act as a broker of information for all of Thailand, matching requests with information and known capabilities, representing all areas of technical information. The capabilities of ASRCT would represent one potential element of this transfer process and could serve as a technical resource for questions outside TNDC's range of technical expertise.

Much of the type of information that will be gathered for a technology transfer center and the type of staff capabilities that will be sought for the establishment of the center exist already at TNDC. The infrastructure of a technology transfer center is the same as TNDC's organization. Plus, TNDC is in a unique position of having a scientific research institute available for analytical and technical services. Therefore, TNDC, with the help of

ASRCT if necessary, should encourage the decision-making body to locate the technology transfer center at TNDC.

The short-range activities would be to prepare a document--a concept paper--and promote the idea to the decision-making body. The long-range activities would hinge on the success of the promotion work. However, whoever initiates the promotion work should spearhead the follow-up, organizational activities.

Computer Searching Capabilities

Most U. S. research libraries have on-line computer data base searching capabilities to enhance the resource collection from which the resource staff draws. It is important that TNDC acquire this searching expertise for it to adequately respond to future demands. The on-line searching capability would not only enhance staff effectiveness but also would be an excellent qualification for ASRCT to publicize when attracting new clients.

The short-range activities for acquiring on-line searching capabilities would include the exploration of the possibilities of locating a National Technical Information Service (NTIS) magnetic tape searching program at TNDC. Since TNDC has been the NTIS agent for Thailand, serving 72 clients very well, it is in a good political position to convince NTIS to initiate such a program in Thailand. Also, a TNDC staff member was trained by NTIS in Washington, D. C., thus increasing TNDC's advantage. Also, the possibility of using computers at the National Statistical Office in Bangkok or the Asian Institute of Technology for searching the tapes should be explored. It may not be necessary for ASRCT to have a computer. Admittedly, having a computer would be ideal, but it is not necessary. TNDC could still be in a bargaining position with NTIS without a computer.

The short-range activities also would include promotion of TNDC to NTIS followed by investigating sources of money for sending TNDC staff personnel to training programs for on-line searching. Once funding sources had been identified and training programs chosen, a staff member should be chosen to participate. The staff member should also have the desire to promote TNDC to NTIS, thus linking training with future implementation.

III. CONCLUSION

TNDC is a national asset and an asset to ASRCT. To facilitate growth and expansion, a planning document should be prepared to reflect adequately this belief. At the same time, new or enhanced services and capabilities that will exemplify this position should be acquired. TNDC, a department of ASRCT, should integrate its skills and services with the other divisions so a cohesive feeling of unity will develop, as well as a good symbiotic working relationship.

SSE:lw

THE DENVER RESEARCH INSTITUTE (DRI)
IN COOPERATION WITH
APPLIED SCIENTIFIC RESEARCH CORPORATION OF THAILAND (ASRCT)
Presents
THE INFORMATION WORKSHOP
4-8 September, 1978
SCHEDULE OF EVENTS

PREWORKSHOP

Preworkshop Analysis of the Current Status of the Use of Information by Thai Researchers

A questionnaire, prepared by DRI, was sent to workshop participants at the beginning of July. This questionnaire aggregated the information expectations and desires of scientific researchers as envisioned by the scientists themselves, as well as by the researchers who assist them. More specifically, the questionnaire helped to determine the types of information scientists require, what format is utilized, how they use it, when they need it, etc.

The results of this exercise enabled the workshop leaders to have a better idea of the nature of participants' needs and therefore lectures were modified to fit such needs.

WORKSHOP

Monday, 4 September

9:00 a.m.-9:30 a.m.	<u>Introduction to Participants and Faculty.</u> Each Participant will be asked to give basic information as to their areas of expertise and interests.	Laurie Adler
9:30 a.m.-10:00 a.m.	<u>Preworkshop Questionnaire.</u> A description of the questionnaire and how it relates to overall organization of the workshop and a description of food technology as subject area emphasis will be discussed.	Laurie Adler
10:00 a.m.-10:30 a.m.	<u>The Use of Information in the Various Stages of a Research Project.</u> a. Various stages of the research projects will be detailed.	Suellen Edwards
10:30 a.m.-10:45 a.m.	Break	
10:45 a.m.-11:30 a.m.	<u>Use of Information in Various Stages of a Research Project, (con't.)</u> b. How information fits within the various stages of a research project, utilizing a food technology "question" as an example. This exercise will offer an overview of the importance of information and how it interrelates within each aspect of the research chain.	Suellen Edwards

Monday, 4 September, con't.

- 11:30 a.m.-12:00 p.m. How Guidelines Can be Set Up within a Research Institute to Anticipate Future Research Needs. This discussion will encompass an overview of institute goals, use of technical data files, selected dissemination of information (SDI), generating bibliographies, making contacts, etc. Group
- 12:00 p.m.-1:30 p.m. Lunch
- 1:30p.m.-3:00 p.m. Formal and Informal Information Sources, their Interrelationship and Effect within the Communication Chain. Carole Ganz
- 3:00 p.m.-3:15 p.m. Break
- 3:15 p.m.-4:30 p.m. Negotiating the Reference Question. We will divide into 4 or 5 small groups, headed by workshop leaders, to participate in an exercise in "negotiating the reference question". Several questions will be designed relating to food technology; scientists and researchers will be asked to interact and set up effective communication channels for answering these questions. Groups
- 4:30 p.m. Pass out articles of general nature to be read during the week.

Tuesday, 5 September

- 9:00 a.m.-10:15 a.m. The Changing Role of Information Centers and Libraries in Designing More Effective Information Services. This lecture will deal with information transfer from traditionally passive to more active modes of communication. Specific examples relating to food technology will show how changes in the demand of information have warranted subsequent changes in its supply, i.e., more sophisticated modes of information transfer now exist. Introduction of CAI, on-line searching, satellites, and the future of information gathering will be discussed. Patty Absher
- 10:15 a.m.-10:30 a.m. Break
- 10:30 a.m.-11:15 a.m. Reference Tools Related to Food Technology. Discussion of traditional library resources, as well as informal information sources and how they interrelate. A workbook and bibliography of appropriate tools will be generated. Laurie Adler

Tuesday, 5 September, con't.

11:15 a.m.-12:00 p.m.	<u>NTIS Services and How they Can be Effectively Utilized in LDCs.</u>	Ratchanee Kanchanomai Patty Absher
12:00 p.m.- 1:30 p.m.	Lunch	
1:30 p.m.- 4:30 p.m.	<u>Field Trip to a Food Technology Laboratory.</u> We will visit the Institute of Food Research and Product Development and the Food Laboratory at ASRCT to review, firsthand, the process scientists undergo in determining information needs. How scientists prioritize research experiments and rank information needs also to be determined.	Group

Wednesday, 6 September

9:00 a.m.-10:00 a.m.	<u>Barriers to the Flow of Information.</u> A theoretical examination of how information channels and communications are most often disrupted and suggested solutions to reducing static between senders and receivers.	Carole Ganz
10:00 a.m.-11:00 a.m.	<u>Group Discussion of Information Barriers.</u> We will divide into groups once again to discuss actual information barriers that are experienced among scientists and researchers utilizing suggested solutions from prior discussions. Groups will determine methodology for lessening barriers to information flow.	Group
11:00 a.m.-11:15 a.m.	Break	
11:15 a.m.-12:00 p.m.	<u>Role of the Research Director in Facilitating the Flow of Information.</u> Discussion of goals, objectives and opportunities for sharing and exchanging ideas will be explored.	Chalermvarn Choosup
12:00 p.m.-1:30 p.m.	Lunch	
1:30 p.m.-3:00 p.m.	<u>On-line Searching.</u> Comparative analysis of on-line searching costs, drawbacks, etc. Their aspects will be explored utilizing an already initiated search dealing with food technology. A basic explanation of creating a search strategy and use of Boolean modifiers will be discussed.	Laurie Adler
3:00 p.m.-3:15 p.m.	Break	

Wednesday, 6 September, con't.

3:15 p.m.-4:30 p.m.	<u>Information Utilization and the Cost of Information.</u> How international information sources, such as, USIS, UNIDO, NTIS, can best be utilized. The various costs of choosing and utilizing information sources will also be explained.	Earl Lawrence
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Thursday, 7 September

9:00 a.m.-10:15 a.m.	<u>Film Relating to Food Technology.</u> The film is entitled "Science of Survival" by Virginia Polytechnic Institute.	Suellen Edwards
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10:15 a.m.-10:30 a.m.	Break	
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10:30 a.m.-11:30 a.m.	<u>Food Technologist to Discuss Industry Innovations and Future Areas of Research.</u>	Ubolsri Cheosakul
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11:30 a.m.-12:00 p.m.	Explanation of afternoon library research exercise	Laurie Adler
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12:00 p.m.-1:00 p.m.	Lunch (note shorter lunch hour)	
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1:00 p.m.- 4:30 p.m.	<u>In-Library Reference Search.</u> We will divide into groups and visit library to enable scientists and information researchers to work together on answering reference questions. All questions to be related to food technology.	Groups
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Friday, 8 September

9:00 a.m.-10:15 a.m.	<u>Review.</u> Review of Thursday's research exercise and discussion of various alternatives to answering questions and comparison of results.	Group
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10:15 a.m.-10:30 a.m.	Break	
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10:30 a.m.-12:00 p.m.	<u>How Information Specialists and Scientific Researchers can Communicate and Implement Research Results More Effectively</u>	Suellen Edwards Carole Ganz
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12:00 p.m.- 1:30 p.m.	Lunch	
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1:30 p.m.- 4:30 p.m.	<u>Loose Ends.</u> Open discussions of areas not covered, questions, etc. Evaluation of workshop via questionnaire and informal feedback. Issue of Certificates	Everyone
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ICAITI - DRI Workshop
on
MANAGEMENT AND DEVELOPMENT OF CONTRACTUAL RESEARCH

June 19 to 23, 1978
Guatemala City

Contract Research: Development and Management

Modern management is as important to a technological research institute as to any other organization. A useful statement of the sense of modern management is provided by the French author-journalist-businessman-politician Jean Jacques Servan-Schreiber in his book THE AMERICAN CHALLENGE when he describes the weapons of that challenge,

"Its weapons are the employment and the systematic refinement of all the instruments of reason, not only in the field of science, which knows no other tools, but also in that of organization, that of management, where the Europeans are accustomed to the reign of the irrational: the fetichism of precepts passed on from father to son, the weight of routine, the divine right of authority, the abusive priority of 'flair' over human reason is supple, light, mobile."

This Workshop will focus on a particular area of concern to technological research institutes--contract management, its development and management. It will deal with modern management concepts and practices in this context. Among the key questions to be addressed in the Workshop:

- What are the pros and cons of developing contract research?
- What are some of the major management problems involved in doing so, and how can they be effectively overcome?
- What is an appropriate strategy for each participating institute to follow in developing contract research?

The answers to these and other questions will be developed in the course of the Workshop through exercises and case study analyses on an individual, small group and plenary basis, and discussion of the results of these as well as of readings and mini-lectures. The answers will be based on our consideration of management principles and theory in the context of the wide range of experience represented--and shared--by the participants and the Denver Research Institute specialists who will join in the organization and presentation of the Workshop.

ICAITI - DRI Workshop
on
MANAGEMENT AND DEVELOPMENT OF CONTRACTUAL RESEARCH

June 19 to 23, 1978
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Tentative Program

MONDAY - morning
Contract Research: Pros and Cons

What are the arguments for and against contract research, as seen by top management and by research staff?

There is often resistance to contract research within research institutes and lack of understanding of it outside of them. The fundamental sources of such resistance and misunderstanding must be identified if they are to be overcome.

Purpose: To bring the pros and cons into the open and to have the participants explicitly recognize them and jointly develop the reasoning that supports expansion of contract research, as well as an awareness of any "costs" of doing so.

Method: Small groups of participants, each taking the role of an organization that might be represented on an institute's Board of Directors will analyze a "staff memo" objecting to expansion of contract research, with results of the group sessions debated in plenary session.

MONDAY - afternoon
Leadership, Motivation and Change

Top management must gain and keep staff support for increased contract research. What approaches do experience and/or management theory suggest?

Purpose: To expose participants to theory on the subject, compare this to their experience and that of others, and to thus give them a basis on which to evaluate their own approaches.

Method: Readings, film, and case study analysis in small groups and plenary session; discussion relating these to participant experience.

TUESDAY - morning
External Relations: General

The directions in which a research institute can and does evolve are influenced, in some cases very considerably, by outside organizations and groups of organizations (e.g., ministries, industry, etc.). Their perceptions of what the institute is and of what it should be can create constraints or opportunities for management. What are these organizations? How do they perceive the institute? How are they important to it? How does one best cope with each type of organization or group of them in developing contract research?

Purpose: To develop an awareness of the different outside groups that can influence the fate of a research institute and management efforts to expand contract research, and to identify ways of ensuring that this influence is as supportive as possible.

Method: Panel presentation by representatives of organizations or groups thereof that influence the evolution of ICAITI, followed by discussion of the views they present and the relation of these to experience of other research institutes represented at the Workshop.

TUESDAY - afternoon
External Relations: Contact and Communications with Potential Clients

Knowledge and understanding of the characteristics and the problems of "the market" and a way to communicate research capabilities and research results are essential. How can one meet this need effectively?

Purpose: To identify the extent of the problem and approaches to it that have and that have not worked, as well as the circumstances under which they have been applied.

Method: Readings, case presentations, discussion and group analysis of approaches.

WEDNESDAY - morning
Putting Research Results to Work

Not all research is ever likely to be on a contract basis. It is appropriate in looking at relations with industrial and other markets to consider a major problem that arises with non-contract research, that of getting results out of the laboratory and into use, for example in a production process. How to resolve this problem?

Purpose: To assess the scale of the problem for the participating institutes and to consider ways of coping with it.

Method: Case study presentation and discussion of it and other possible options.

WEDNESDAY - afternoon

Free

THURSDAY - morning
Organizing for Research

Experience has shown that some structures fit research organizations better than do others. Many management problems can often be traced to structures that do not fit the characteristics of the tasks involved in meeting the organization's objectives. What are these characteristics in the case of a research institute and what are their organizational implications?

Purpose: Identify organizational factors that are likely to facilitate or impede the effective development and management of contract research projects, and assess alternative ways of coping with those that are impediments.

Method: Small group and plenary analysis of case study followed by discussion relating this to participant experience.

THURSDAY - afternoon
Organizing Contract Research

A contract research project has a definable beginning and end and limited objectives. These characteristics make managing such a project different from managing an organization. What are the differences, what are their implications and how does one cope with them?

Purpose: Identification of the key characteristics and principles of project management in the research field. Introduction (on a necessarily general level) of project management tools and techniques.

Method: Case study, readings, lecture and discussion.

FRIDAY - morning
Strategic Analysis

An organization, like an individual, will move most purposefully and successfully toward its destination if that destination is defined, alternate routes to it are identified, the tasks that must be accomplished to reach it are known, and the organization's ability to accomplish these tasks--its strengths and weaknesses--are recognized. . . and if this information is used. What are the questions to ask? What answers do we find for our individual institutes?

Purpose: To develop familiarity with the management tool of strategic analysis, and to discover its utility through application.

Method: Readings, mini-lecture and discussion plus exercises with each participant doing a strategic analysis of his (or her) own institute.

FRIDAY - afternoon

Strategic Planning

The information resulting from the strategic analysis enables us to identify the most promising route to our objectives, the route that best fits our organization, our environment and the individual preferences of those who must direct the process. It also helps us identify the actions that will be required along the way. The strategic plan that results maximizes the chances of attaining our objectives by helping us stay on a rationally defined path and ensuring that any departure from it is made knowingly and in pursuit of those same objectives.

Purpose: To develop for each participating institute a strategic plan, a set of rationally conceived guidelines that are neither inflexible nor immutable but that can help top management move its institute in an informed, purposeful way toward the objectives it has established.

Method: Readings, mini-lecture, class and group exercises, the latter involving development of strategic plans for participating institutes.