Private Voluntary Organizations and Appropriate Technology

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PREFACE

This report has been prepared by PASITAM -- the Program of Advanced Studies in Institution-Building and Technical Assistance Methodology. PASITAM is a component of MUCIA -- the Midwest Universities Consortium for International Activities.

PASITAM was created with significant financial assistance from the U.S. Agency for International Development, to help link academic experts and practical planners and managers in identifying, and analyzing certain key problems of developmental assistance -- essentially the problems of designing effective systems of practical action in such fields as agriculture, rural development, health, and others.

A generic concern of PASITAM is the effective use of organization and management in developmental efforts. Private voluntary organizations represent one broad and certainly diverse category of organizations. A number of them play interesting roles in development. "Appropriate technology" is the current catchphrase for a set of important and interesting concerns, which require sound analysis and effective organization, if these concerns are to be transformed into practical realities. This limited study identifies basic opportunities for enhancing the exploitation of appropriate technology by PVOs. It also identifies certain questions which lie outside the scope of this report, but which are germane to the broad issue at hand.

Wm. J. Siffin
Director

CONTENTS

Summary 1

Purpose and Design 1

I Definition and General Implications 3

II General PWD Operating Characteristics 6

Need Identification 6

PWD Responses to AT Needs 7

Testing, Assessment, Dissemination 15

III Problems and Opportunities 18

IV Conclusions 22

Appendix - Organizations Surveyed

SUMMARY

This study examines the role which Private Voluntary Agencies (PVOs) play in the development of appropriate technology (AT). More than 30 PVOs involved in AT-related activities have contributed to this study.

The study is not comprehensive nor can it be considered definitive. It does, however, provide a set of informed answers to a set of questions posed as the basis for this report.

(1) What are the PVO experiences and contributions to generating and disseminating AT?

'Appropriate technology' in essence means 'good' technology -- technology which both works and serves desirable social and economic aims. PVOs are usually action oriented groups concentrating in extensive field programs. This field experience presents them with unique opportunities to identify and respond to local needs, including needs for AT.

Each PVO works differently in identifying project needs and opportunities. Some develop extensive, long term programs which require considerable external technical assistance. Most PVOs, however, rely heavily on project-by-project approaches using local voluntary technical expertise and their own staff.

After identifying a need PVOs may respond in one of three ways: They may improvise in the field, conduct in-house research and development efforts to find or devise a promising solution, or conduct local and international searches for solutions involving the application of technology.

Considerable technological adaptation and innovation occurs through improvisation, especially in small-scale resource-short projects. Relatively few PVOs have the technical resources to conduct in-house R & D PVOs generally obtain technological information through local and international searches. International agricultural institutes are commonly used; other institutes are used infrequently.

Few PVOs can undertake projects primarily for testing. Most lack resources to establish specialized evaluation units. Most PVOs disseminate limited project information in newsletters or similar brief reports. There is little dissemination into more formal channels.

(2) What weaknesses or limitations can be isolated from PVO experiences in AT?

PVOs often lack the necessary financial and human resources to properly assess technical components in either project design or implementation. Only a few technology centers currently offer adequate technical consultancy services. PVOs need better backstopping and stronger linkages to sources of R & D.

PVOs are also weak in testing, assessment, and dissemination of their AT experience. Few PVO-AT projects are extensively documented, and even fewer have been systematically analyzed. The operational modes of these agencies are generally action oriented, with minimum emphasis upon studies and analysis.

(3) What kinds of support and assistance would best promote effective PVO involvement in generating and disseminating AT?

If PVOs are to play a larger role in AT activities, stronger linkages

are required between technology sources and opportunities for PVO technology applications.

- Technology institutes and clearinghouses could provide on-site technical consultancy services in needs identification, engineering, and impact assessment.
- Catalogs of simple technical ideas like VITA's Village Technology Handbook could be more widely distributed to field-based PVOs.

Most PVOs do not have the resources to extract and disseminate lessons from their practical experience. To facilitate such dissemination:

- AT testing and monitoring could be underwritten, in arrangements involving those employing and using the technology.
- Backstopping capability might be further developed in such organizations as World Education, World Neighbors, the Education Development Center, and similar PVOs to assist field based PVOs in monitoring, testing, evaluating, and disseminating AT.
- AT institutes and clearinghouses could produce and disseminate manuals on PVO-developed "hard" and "soft" technology projects.

AT field delivery could also be improved. Local indigenous extension services which provide "soft" technologies and identify potential technology manufacturers might be a promising delivery system in certain circumstances.

Indigenous capacity building, through technical and management training and creating linkages with outside resources, is essential for AT to have

a lasting development impact.

(4) What specific types of assistance should AID undertake to best improve PVO use of AT?

As a group, PVOs are weaxest in back-up assistance in identifying and shaping appropriate technological responses to field-situation needs, and in documenting and disseminating the results of their own experience. USAID could provide assistance in these areas.

The Agency for International Development might enhance the effectiveness of PVOs in identifying, assessing, adapting, applying and assessing AT in several ways: by funding the establishment or expansion of technical consultancy services available for field assistance to PVOs (and possibly not limited to them); by underwriting one or more arrangements for enhancing the documentation and analysis function as it applies to PVO field experience with appropriate technology; and by undertaking or underwriting the dissemination of selected and tested materials on appropriate technology among PVOs likely to find it of use. Means might range from field-oriented conferences and seminars to a publications program.

PURPOSE AND DESIGN OF THE STUDY

This study examines the role which Appropriate Technology (AT) plays in the development activities of Private Voluntary Organizations (PVOs). The first section of the study defines the term 'appropriate technology' and discusses the general implications of AT activities for PVOs. The second section describes the field operating characteristics of PVOs and cites cases illustrating how they design, adapt, assess and disseminate AT. The third section analyzes the problems currently facing PVOs and identifies potentially rich areas for the expansion and strengthening of AT activities. The fourth section offers recommendations on what kinds of support and assistance would best promote effective PVO involvement in generating and disseminating AT.

There are two basic assumptions underlying the design of this study: (a) that there are actually and potentially practical ways to identify, develop, test, apply, and disseminate forms of technology which are distinctively appropriate to development aims and (b) that PVOs are in several ways important parties to these activities. By learning from PVO experience, we may be able to expand the development and use of appropriate technologies and to enhance the contributions of PVOs.

With these assumptions in mind, eighty-three organizations involved in substantial AT-related activities were selected for study. A questionnaire was sent to these organizations. Twenty-seven responded with letters and materials, and several telephoned their responses. In

addition, interviews ranging from one to six hours were held with the staffs of twenty organizations (see Appendix).

It should be apparent that this study cannot be considered comprehensive or in any way definitive. The PVOs examined in this study do reflect a wide range of AT activities. Any comprehensive study would require a much larger survey of organizations and a greater number of in-depth interviews.*

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*The Technical Assistance Information Clearing House provides brief descriptions of 418 voluntary agencies, missions, and foundations in U.S. Non-Profit Organizations in Development Assistance Abroad (1971).

I DEFINITION AND GENERAL IMPLICATIONS

'Appropriate technology' is the shorthand label for efforts to develop, apply, evaluate, and disseminate knowledge about technologies which are distinctively useful to the conditions of poor countries and to the needs of poor people within those countries. Implicit in the use of the term is the assumption that there are some technologies which are inappropriate to a particular development situation. The appropriateness of a certain technology is determined by two criteria.

First, the potential technology must be applicable to the particular environment. Among the factors important in determining applicability are relative sophistication and availability of human resources necessary to apply the technology, suitability of the technology to the situation, and compatibility with the customs and social institutions of the local environment.

The introduction of inappropriate technology can, all too often, occur, and the inappropriateness need not be great to have a disastrous effect on a project. Recently a well designed, two-handed oxendrawn plow was introduced into an area where a one-handed plow had been the custom. The one-handed plow allowed the driver to use the other hand to guide the oxen. The introduction of a two-handed plow would require the use of an extra person to guide the oxen or a retraining of the oxen. After a short trial period many of the farmers abandoned their new plows and returned to the old one-handed plow.

The second criterion for determining the appropriateness of a technology is the relevance of the social goals which will be served by the

technology to the aims of the promotors. Readily transferable technology may be inappropriate to development needs in the target society. For instance, a particular project may have as its goal the lowering of labor costs in a certain native industry through the introduction of labor-saving technology. Such a project would be appropriate in an area deficient in labor resources, but in an overpopulated area, a labor intensive technology might be more appropriate.

It should also be noted that the term 'technology' refers not merely to 'hard' machinery and technical skills. It also encompasses training programs, organizations, management and other 'soft' technology. Technology is not and cannot be abstracted from the situation in which it is to be used; it is the direct link connecting needs to organized and rationalized means of satisfying those needs. Appropriate Technology considers the local, natural, and human resources and encourages indigenous initiation and innovation.

There remains considerable disagreement about the import of the idea of AT, but it is generally agreed that the basic determination of appropriateness must come from the field. Moreover, the potential technology must be tested in the field, in its intended use area. Finally, it is acknowledged that PVOs play important roles in developing, testing, applying and disseminating technologies.

PVOs are of distinctive importance because of their heavy involvement in field programs. PVOs are usually action oriented groups concentrating upon field operations. Their orientation and their experience give them

unique opportunities to develop, test, apply, and disseminate applications of technology. By examining the PVO experience with AT activities much can be learned about the nature of AT and about how best to expand the PVO's role in AT activities.

II GENERAL PVO OPERATING CHARACTERISTICS

PVOs may be roughly categorized into three groups:

1) A small number of PVOs operate field projects and have internal technical backup personnel (e.g., project analysis, engineering, organizational training). Representative agencies include Catholic Relief Services, CARE, the American Friends Service Committee, and Technoserve.

2) The largest number of PVOs are field action-oriented and have thin internal backup capability. Representative agencies include Foster Parents Plan, the Paul Carlson Foundation, Community Development Foundation, Partnership for Productivity, and the Mennonite Central Committee.

3) A small number of PVOs usually do not operate direct field projects but do provide specialized assistance (e.g., information services, personnel) to other organizations. Representative agencies include Volunteers in Technical Assistance (VITA), World Education, World Neighbors, Heifer Project International, and Credit Unions of North America (CUNA).

Identifying Needs

Crucial to the proper function of all three types of PVOs is the identification and specification of the technological needs and opportunities of the local environment. Beside the accurate assessment of technical needs, good project identification requires a careful assessment of the

social criteria which an appropriate technology must meet.

Each PVO works differently in identifying project opportunities. CARE, one of the largest PVOs, establishes five-year country plans in cooperation with counterparts, government agencies, communities, and indigenous PVOs. These plans include project goals which may require external technical assistance and material. Technology needs are integral to project design, and CARE uses outside technical consultants and its own staff to specify the required technologies. Other organizations rely heavily on project-by-project programming, using local voluntary technical expertise and their own staff.

PVO Responses to AT Needs

PVOs can pursue three modes of action when they identify technical needs and specifications:

1) They may improvise in the field;
2) They may conduct in-house research and development; or
3) They may conduct local or international searches.

Field Improvisation

Considerable technology adaptation and innovation occurs through improvisation in the field. One respondent stated, "We live on the edge of virtual non-survival most of the time. Maybe that is one reason why we improvise and come up with answers; we just have to survive." While managing a small hospital and an associated agricultural program, his organization identified fourteen examples of local innovation and

adaptation ranging from rebuilding a dental X-Ray for chest and pelvic examinations to designing and constructing a bicycle ambulance.

One PVO made a placental extract for an anabolic in a local hospital, adapted an autoclave for charcoal, and built a waterwheel from local materials.

To build local tools or introduce new processes, field workers often proceed from a drawing or newsletter description. There are numerous catalogs of simple ideas similar to VITA's Village Technology Handbook available to draw information from. Many of these catalogs present simple, provocative technical ideas.

It is not surprising that small-scale resource-short projects produce technological innovations that are consistent with local materials, skill levels and customs. The innovators are familiar with the social setting and this combined with ingenuity and local materials produces many useful implements.

In-house R & D

Several PVOs have developed and adapted relatively sophisticated technologies. ACCION Internacional Tecnica, and Meals for Millions are developing high protein soybean food for production and consumption in Central America. CARE, assisted by outside experts and an AID grant, has developed and is testing plastic-treated jute to provide typhoon-resistant material in Bangladesh.

The Community Development Foundation uses local volunteer consultants in agriculture, credit, health, and nutrition to provide technical

assistance and AT development. Church World Services is cooperating with John Deere in Africa to develop a locally adapted plow.

World Neighbors, International Planned Parenthood, and the Community Development Foundation have developed innovative techniques in family planning, rabbit breeding, community organization, construction, sanitation, and cooperative organization. These technologies have been developed through cooperation among field representatives, local organizations, and national and international experts. World Neighbors, for example, assisted in the production of a multi-lingual filmstrip on rabbit farming with SEDA (Service de Developpement Agricole) in Zaire.

Information Searches

Information on most technologies is obtained through local and international searches. Many PVO searches begin in an informal network at the field level. Failing there, a PVO search often extends to more distant technology centers via the PVO headquarters, VITA or other clearinghouses.

Searches begin with a specific need and a rough idea similar to the "product development stage of a manufacturing process. Searches may occur during project design or during project implementation.

Field Level Searches. A typical informal search begins locally and, depending upon individual contacts and the nature and scale of the problem, may end quickly and successfully. ACCION uses indigenous talent and financial resources in its small commercial and industrial promotion projects in Central and South America. It draws heavily on the private

sector and regional organizations like IICA for technical advice. Other smaller PVOs also use this approach.

Localized searches permit personal interchange in which needs and proposed technologies can be specified over a short time period. Yet project managers often miss locally available resources because of a lack of information. For example, one respondent was looking for high-lysine corn suitable for his project. At a large U.S. agricultural school, he learned that a locally adapted high-lysine corn was being tested 80 miles from his project site.

The Christian Relief and Development Association (CRDA) in Addis Ababa, Ethiopia provides search services to any Ethiopian organization needing technical assistance. There are similar units in other LDCs. This more formal approach appears to plug gaps in the informal networks.

PVOs have their closest field working relationships with AT centers when planning and implementing projects. These relationships are not often maintained on an on-going basis because PVOs collaborate on the basis of needs related to projects, not simply to maintain contacts for their own sake.

Many PVOs stress their reliance on local technology and expertise sources. Most report that field personnel or counterpart organizations make every effort to resolve technical problems in the field before calling for external assistance. PVOs recommend that local technical assistance sources like corporations, universities, applied research centers, local clearinghouses, and government research and extension services be strengthened as prospective AT sources.

When AT-associated projects are beyond local technical and information resources, a wider search is conducted for technical assistance. These searches are usually initiated in the field but are conducted by an intermediary who channels the requests to AT sources.

Field-based international searches reach technology sources directly. Their success depends on a knowledge of sources and the requestor's ability to specify appropriate criteria. A technology search is difficult even for those familiar with worlwide sources. Dr. W.H. Boshoff of Makere University had many such problems while designing the Mak V tractor.

> In the U.K.[Boshoff] had a direct connection with an agricultural college which is cooperating on the project but even then he experienced difficulties in finding out who the potential suppliers were. In the ... United States, he initially only had catalogues which listed perhaps 20-30 suppliers for a particular part, with no detailed specifications or other information.... This necessitated a laborious and time-consuming correspondence with all suppliers in order to determine which two or three of them might actually be able to supply what he needed. Finally, the Rockefeller Foundation sent him to the U.S. so he could be there to choose parts suppliers, ... Dr. Boshoff would be in favor of some kind of clearinghouse for technological information transfer to developing countries.*

Headquarters-based international searches are done by organizations with highly technical needs. To be successful searches must match field technical specification of need skills with headquarter knowledge of technology sources.

Technologies must sometimes be sought in unlikely places. Technoserve

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*Theodore W. Schlie, "Appropriate Technology: Some Concepts, Some Ideas, and Some Recent Experiences in Africa, (Mimeographed Program of Research on the Management of Research and Development, Department of Industrial Engineering and Management Sciences, Northwestern University), p. 21.

and local groups working on the re-development of the Corozo nut industry in La Caba lacked a high-pressure cracker for the exceptionally hard nut. A headquarters-based search led from VITA to the California walnut industry to ITDG in London. Commercial nut-growers gave them more detailed specifications of what machinery would be needed. Simultaneously, ITDG learned that Unilever had absorbed two companies that had been part of the earlier Corozo-nut industry at the turn of the century. Technoserve found that the corporations and their technologies had literally vanished in corporate mergers. However, the required machinery specifications were clear enough to suggest a search of coal crushing technology. The search began anew in Thompson's Registry of Industrial Suppliers and ended with a small firm in Ohio which manufactured coal crushing machinery.

While this seems to be an idiosyncratic case, many other technology searches are as complex. The difficulties of this search process include:

1) International searches require considerable skilled manpower.
2) They often require long lead times which can disrupt project schedules.
3) Linkages between AT sources and PVOs are often poor. PVOs are hesitant to approach them for a variety of reasons including simply not knowing whom to approach. Linkages are primarily initiated through intermediaries.
4) PVO field and headquarters linkages are occassionally insufficient to adequately identify technical specifications.

Headquarters-based searches often ignore LDC technology sources. Some PVO-AT projects require access to American or western technologies, but

LDC technologies do exist in various fields.

LDC technology development research is increasing as a result of development efforts, and their technical capacities are increasing.* Information on LDC technology sources are being disseminated through units like WAITRO. Yet, LDC advances in information dissemination and R & D capacity will lack some of their potential impact if PVOs do not exploit them.**

Information Clearinghouses assist PVOs and other organizations by locating technologies or providing technical consultants. VITA, ITDG, TOOL and a growing number of other organizations also conduct R & D and publish manuals on widely applicable technologies like solar cookers and windmills. These organizations are multi-sectoral. Other organizations concentrate on specific technology areas.

The number of clearinghouses and AT centers has expanded to include:

- Intermediate Technology Development Group Ltd. (London);
- Brace Research Institute (Ste Anne de Bellevue, Canada);
- Appropriate Technology Cell (New Delhi);
- Planning Research and Action Division (Lucknow, India);
- Appropriate Technology Development Unit (Varanasi, India);
- Industrial Development Division, Engineering Experiment Station (Atlanta, United States);
- Volunteers in Technical Assistance (Mt. Rainier, United States);
- Division of Microprojects (Eindhoven, Netherlands);
- Appropriate Technology Centre (Islamabad, Pakistan);
- Technology Consultancy Centre, University of Science and Technology (Kumasi, Ghana);
- Agricultural Engineering Department, the International Rice Research Institute (Manila, Philippines);
- Earth Resources Development Research Institute (Washington, D.C.);
- Technonet Asia (Singapore);

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*AID's Office of Science and Technology has fostered the growth of industrial research institutes. The Industrial Research Institute of Central America (ICAITI) in Guatemala and others have begun active programs. UNIDO, through the World Association of Industrial and Technological Research Organizations (WAITRO), supplied members assistance in applied research capacities. In 1970 the OAS began technical assistance programs in technology development areas.

**James Utterback, "The Role of Applied Research Institutes in the Transfer of Technology to Latin America." Discussion paper (Bloomington: Indiana University School of Business and PASITAM, 1974).

- Small Industries Development Network (Georgia, U.S.A.);
- East West Technology and Development Institute (Hawaii, U.S.A.);
- TOOL (Holland);
- Intermediate Technology (Menlo Park, California, U.S.A.)

Many PVOs are aware of VITA and use its services. A significant number use ITDG. Only a few use the other clearinghouses or centers.

Technonet Asia, a consortium of Asian engineering groups, responds to small industry and private agency problems. Anti-Poverty, Ltd. (UK) uses LDC and PVO's problems for student work in vocational education classes.

Some technology institutes disseminate soft technology training materials. ITDG, Cooperative League of the USA, and the University of Wisconsin's Cooperative Center have developed training packages, which might be more widely disseminated.

Not all PVOs need to use and be in close touch with technology centers. Information network organizations like ITDG, Technonet Asia (supported by IDRC-Canada) and the Small Industry Development Network at the Georgia Institute of Technology provide descriptive information on existing agricultural and applied-industrial institutes.

Yet, several PVOs, including some with multi-purpose objectives like the Community Development Foundation, Catholic Relief Services, and the Near East Foundation, are closely linked with applied research organizations. These centers provide significant resources for field adaptation of seed varieties and farm implements in conjunction with the FAO and such international crop-specific networks as International Rice Research Institute (IRRI), International Maize and Wheat Improvement Center (CIMMYT),

and CIAT (International Center of Tropical Agriculture).*

The Near East Foundation, collaborating with CIMMYT, supports an adaptation field station in Morocco. In Bangladesh, the MCC uses seed provided by the IRRI (Philippines) and furnishes them with the results of field testing. Only a few PVOs use the services and material of agricultural institutes.

There are several applied-industrial institutes, such as the Philippines Institute for Small-Scale Industries and the Technology Consultancy Center in Kumasi, Ghana. Our data indicate little cooperation between these groups and PVOs in the adaptation of small industry technologies.

Testing, Assessing, Disseminating

Once a technology is located, it must be field tested, monitored, assessed, and the results disseminated. Beyond a basic agreement that these steps are necessary, PVOs have varied views on how to do them.

PVOs face several barriers to testing technologies. Many cannot provide adequate funding for feasibility exploration and pilot testing of alternative technologies. They are reluctant to divert funding from operational projects to experimental or even pilot projects having significant research costs.** They rarely have adequate staffing to monitor experimental programs.

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*These and nine other organizations provide training and are responsible for genetic research and field adaptation through an extensive network of experiment stations.

**Several PVOs do conduct detailed evaluations, e.g., AFSCs Barpali (India) after ten years and FPP's Socio-Economic Study of Foster Parents Plan of Bolivia. Others can be expected to do so with Development Program Grant monies.

Few PVOs could or would use their projects primarily for testing if the testing was not clearly consistent with local needs and desires. However, a significant number of cases reveal a convergence of technology and receptive local conditions for testing. For example, MCC's development of sun-protective nets for covering vegetables in Botswana and CARE's impregnated jute roofing in Bangladesh involve on-site testing. CARE is also currently testing nutrition techniques in three countries. The experimental design is carefully controlled and should enhance the knowledge of alternative methodologies. The Mennonite Central Committee (MCC) maintains experimental plots and field tests new seed varieties with international research organizations like CIAT.

Francis Method of the Education Development Center describes the testing process followed in that organization: "Though most project initiative now rests in the countries themselves, EDC often identifies potential projects through interactions with academic specialists and R & D groups outside EDC. EDC provides a means of testing the applicability of innovative suggestions with specialists in other countries and international agencies who may be interested. Where there is interest, EDC can complement the specialized expertise with its capacities for situational knowledge, program design, implementation and administration."

The quality of PVO project assessment varies greatly. PVOs generally agree however, that they do not want to establish specialized evaluation units; PVOs would prefer to obtain evaluation assistance from other specialized PVOs like World Education, World Neighbors, and the Educational Development Center.

World Education, among its many services, provides evaluation assistance. Its approach views technology as a component of larger efforts and overall program effects. World Education and VITA have recently proposed a joint project to evaluate the suitability and usefulness of AT manuals to the small farmers and rural villagers.

Most PVOs disseminate limited project information through newsletters or similar formats. There is very little dissemination into more formal documentation channels.

One organization reports the progress of its projects in quarterly reports. However, no program effectiveness evaluations are carried out. A staff member says, "We have a vehicle for spreading the word within the family. That is, each field director writes a Quarterly Report which is duplicated and a complete set goes to each program country. That Quarterly Report contains a program statistical section which enables us to trace program progress, but it will not tell us a thing about program effectiveness and this is precisely where we want help and know that we must devise an evaluation mechanism. We also have means of spreading the word to our constituents, but we have no time for professional writing for publication."

This statement summarizes difficulties faced by most PVOs.

III PROBLEMS AND OPPORTUNITIES

PVOs in general are action-oriented organizations. Most PVOs have only limited technical backstopping capability. This is reflected in PVO project planning procedures.

For AT needs and opportunities to be adequately assessed, a detailed feasibility study and design process is often necessary. Otherwise, examination of the project environment is apt to be shallow, and only standard technologies are likely to be considered. One PVO respondent believes each project should have a pre-investment impact statement. The statement should assess:

1. The technology itself,
2. The influence of the project's structure, scale, and operating style on possible technical choices; and,
3. The project's interaction with other sectors and projects.

Catholic Relief Services (CRS) provides a technical assessment fund of $10,000-15,000 per project to conduct counterpart project feasibility studies. CRS uses in-country and regional consultants to provide technical assistance at the project initiation stage.

AT needs may emerge during project implementation when there is little time for a technology search to determine specifications. These needs, not easily pre-specified during the project design stage, must be resolved quickly or a project may fail.

Thus, staff members or consultants with a technical background are necessary to properly assess a project's technical soundness. Those PVOs with

technical staffs in agriculture, health or small industry can best identify a locality's characteristics affecting the specifications of technical issues. For example, the Mennonite Central Committee and the Farmer's Brigade needed a detailed assessment of soil conditions, rainfall and manufacture costs to design a multi-purpose agricultural tool in Botswana.

However, as noted above, most PVOs do not have the necessary financial or manpower resources to properly assess the technical components in either project design or implementation stages. They are interested in "doing" projects, not developing prototypes. This is partially a result of limited financial resources, but primarily because of organizational philosophy.

VITA has responded to this problem by developing a 'mail order' approach to technical information requests. This approach works poorly. VITA receives over one hundred technical requests per month. Many are general inquiries containing inadequate technical and contextual data. VITA encourages the requestors to better specify the problem context. However, PVO technical capability limits the degree to which the problem context can be specified.

When the problem context is not adequately specified, problems occur. Windmill pumps failed in Guinea Bissau because seasonal and daily wind velocity was not measured and maintenance requirements were not thoroughly explored. Supplemental pump systems caused additional problems and expense.

In addition, some technology problems are so complex that they can only be personally communicated to or directly perceived by a technical expert.

This severely limits the utility of sending problems to R & D centers and clearinghouses for a mail response.

Thus, the linkages between field-based PVOs and sources of information and R & D are weak in many cases. The field-based PVOs operate in complicated environments. They are confronted by a wide array of applied technology centers which specialize in various fields of technology. For them to effectively assist PVOs adequate technical specifications are necessary.

Only a few technology centers offer technical consultancy services. Yet PVOs often need flexible consulting assistance in technical matters, including marketing problems and adaptation of technologies to local human and natural resource requirements. This requires capabilities beyond the abilities of local PVO staff, i.e., local personnel training in the use of a particular technology.

Thus, a major PVO weakness is in technology need identification and searches. There appears to be a need for better backstopping and a strengthening of network linkages.

A second PVO-AT process weakness is in the testing, assessment, and dissemination of AT experience. Few PVO-AT projects have been extensively documented, and even fewer have been systematically monitored or analyzed. Yet it is necessary for technology centers and clearinghouses to have access to proper documentation of PVO-AT experiences, if information is to be built from experience and disseminated effectively.

PVOs in general should not be expected to extensively test, evaluate, and disseminate technologies. Their resources are limited and their operational modes are action oriented.

Several PVOs stated that a significant bottleneck in technology center utilization is that the centers often treat only the "hard" technologies. They do not treat the small farmer's or businessman's problems as systems requiring comprehensive approaches. Organization-building, economics, cultural considerations and management are inseparable from the "hard" technologies of machines and equipment. Indeed, an overall development weakness is that the "softer" technologies are often ignored or dealt with inadequately in project design and implementation. The "soft" technologies need to be better monitored, assessed, documented and disseminated. This requires exapnsion of the scope of backstopping and information network linkages.

While PVOs have their weaknesses they also exhibit certain strengths which other development entities lack. For example, PVOs have far more flexibility than do government and bureaucratic entities. They can experiment more easily with new projects, without excessive bureaucratic justification and political and foreign policy implications. They demonstrate a history of working in rural areas with the poorest majority and have built up a good reservoir of experience. In fostering efforts to develop and use AT, it would certainly be worthwhile to tap that reservoir of knowledge. Better backstopping linkages and dissemination would serve this aim.

IV CONCLUSIONS

A. General

Examining the relationships of "appropriate technology" and "private voluntary organizations" is a bit like considering the possible association between "good recipes" and "people who live in houses."

Appropriate technology in essence means "good" technology -- technology which both works and serves desirable social and economic aims. It thus covers a vast and varied terrain. Private voluntary organizations are indeed a heterogenous group of entities. They are of several different types when classified by aims, forms, and methods. They do different kinds of things. They work in different places. Many of them are concerned more with humanitarian assistance than with the development, identification, assessment, application, and dissemination of technology.

Yet there is an important (though not exclusive) nexus of these two things -- appropriate technology and PVOs as vehicles for promoting and applying it. In this report we try to examine aspects of that nexus.

PVO experience shows once more that technology is always instrumental. The word is the label for a certain kind of response to a need or problem -- a response whose most distinctive quality is determinateness.

By definition, a technology is a recipe whose ingredients and processes are well-specified, and whose effects can be predicted with

assurance. Thus the crucial issue of appropriate technology is to find or devise and to apply the right kind of technology, when the factors which determine rightness are not completely contained within the technological recipe.

PVOs are distinctively interesting as vehicles of appropriate technology because they include many organizations with earthy and intimate field experience involving the compelling objects of current development concerns, the poorest of the poor. Thus these organizations offer special promise of good judgment in defining concrete problems, in helping assess the potentials of technology as a source of auspicious response to those problems, and in helping deliver such technology.

Appropriate technology is not the exclusive province of PVOs, nor are PVOs exclusively concerned with this subject. But they do play a part in harnessing and promoting appropriate technology, and there are ways in which that general role might be ennanced. The aims of this report have been to sketch the nature of the involvement of these organizations in what we have labelled "the process of appropriate technology," and on that basis to outline some needs and opportunities.

Our most general conclusion is quite simple: "Appropriate technology" is certainly not the panacea envisioned by some experts. The term itself is an invitation to debate. Yet it does contain, or can be given, worthy substance. And there is a fruitful relationship between the ideas associated with "appropriate technology" and capabilities and potentials within the domain of the private voluntary organizations.

B. Some Specific Findings and Suggestions

The major findings of this survey identify needs for buttressing the supporting resources available to PVOs, and for extracting and disseminating lessons from their experience with the development and use of appropriate technology.

A few additional findings and conclusions are worth noting here: One set concerns possible needs for additional information:

1. Are certain promising fields or topics of appropriate technology being neglected? Does the field experience of PVOs offer guidance identifying such fields or topics?

From this limited study we are unable to answer this question. The matter could, however, be addressed as one aspect of the dissemination function discussed earlier in this report.

2. It would be useful to further examine the potentials of AT sources within LDCs. A number of PVOs have expressed the opinion that LDC sources of technological expertise should be nurtured and used as much as possible, for three reasons.

   a) LDC institutions presumably have a greater knowledge of their environments than outside organizations. Therefore they are likely to provide relevant and workable technological inputs.

   b) Reliance upon LDC sources of AT can help build indigenous developmental capacity, which is certainly a desirable objective.

c) LDC sources of AT are less costly than the alternatives.

The first of these assumptions is, at this point in our studies, problematic. It would be useful to have more information on PVO experience with LDC sources of technology, and additional insights into the possibilities for selectively building and using LDC sources of AT. Inasmuch as appropriate technology is not the label for a clearly bounded set of artifacts or recipes, it would be necessary to determine, through practical inquiry, what concrete AT needs and opportunities might be best served through LDC sources, and how this might be done in ways involving PVOs.

As part of our conclusions we would stress another point: technology is not just a synonym for engineering. Appropriate technology encompasses the idea of "soft" technologies, such as ways of organizing and operating processes, as well as the more conventional "hard" technologies. Appropriate technologies may also be rooted in customs and traditions. Certainly, as noted earlier in this report, the vital conventions of particular societies and communities can have large effects upon the appropriateness of a technology -- e.g., the two-handed plow -- which may appear to be superior to the existing state of the art, but which may be at a given time quite inappropriate for non-technological reasons. In general, there is a large potential role for applied social science in the broad effort to promote appropriate technology as a means of development. This role is not limited to assessing the suitability of technical artifacts; it includes contributions to the design of appropriate ways

and means for enacting and disseminating various kinds of technology.

Finally, we turn once more to the topic of indigenous capacity-building. There are many ways of serving this aim. "That is not to suggest for a moment that institution building in developing countries is easily achieved. Nevertheless, we have always been of the conviction that unless we can transfer to a given developing country a capability which will eventually belong to and be controlled by local people, in the long term we have accomplished very little."

Organizations working in enterprise development offer interesting insights into capacity building. Three were interviewed in depth. They included ACCION, Partnership for Productivity (PFP) and Technoserve. Each works with indigenous organizations. ACCION primarily provides technical assistance in planning, organizational development, and training. PFP is training small business extension agents in Kenya. Technoserve's Alenfam cane-sugar processing project, initiated by a Ghanaian, identified not only the need for adapted technology but also for training local unskilled labor and introducing marketing research and development skills for Alenfam managers.

All three groups believe "appropriate management" is necessary to complement "hard" technologies. "The key question is not how to develop a particular process or piece of equipment. It is to find ways whereby Africans on their own can and will adopt and adapt such developments in the interest of their own society. Furthermore, this means that these developments should be capable of becoming economically useful and viable

when they are no longer the subject of being introduced by Western technicians... "

The importance of indigenous capacity building, and the significance of social, organizational, and economic issues, demonstrate once more that the crux of a concern with appropriate technology is not, and cannot wisely be, upon engineering. In practice concerns with appropriate technology must be molded and blended into concerns with astute problem analysis, practical project design, and effective implementation and assessment.

APPENDIX ORGANIZATION SURVEYED

ORGANIZATION	RESPONSE TO MAILED QUESTIONNAIRE	VISITED FOR IN-DEPTH INTERVIEWS
Accion International		X
The African-American Institute		
Africare		X
Agricultural Coop Dev Intl		
Agricultural Dev Council, Inc	X	
Agricultural Missions, Inc		
American Dentists for Foreign Service	X	
American Foundation for Overseas Blind, Inc.		
American Friends Service Comm	X	X
The American Lutheran Church		
American Ort Federation, Inc.	X	
The Asia Foundation		
Board of Intl Ministries		
CARE, Inc		X
Catholic Relief Services		X
Christian Children's Fund, Inc		
Christian Church		
Christian Reformed World		
Church World Service		X
Codel, Inc	X	X
Columban Fathers		
Community Development Fund, Inc		X
Coop League of the USA	X	X
Direct Relief Foundation	X	

APPENDIX

ORGANIZATION	RESPONSE TO MAILED QUESTIONNAIRE	VISITED FOR IN-DEPTH INTERVIEWS
Education Development Center	X	
Episcopal Church of the US		
Family Planning International	X	
FCH Services Inc		
Foster Parents Plan		X
General Conference Mennonite Church		
Goodwill Industry of America	X	
Heifer Project International	X	
IDEAS, Inc		X
Institute of International Education		
Interchurch Medical Assistance		
International Association for the Exchange of Students for Technical Experience/US	X	
International Development Fund, Inc		
International Educational Development, Inc		
International Institute of Rural Reconstruction		
International Road Fund	X	
International Voluntary Services, Inc		X
IRI Research Institute, Inc		
WK Kellogg Foundation		
Laubach Literacy, Inc		
Lutheran Church of America		
Lutheran World Fund		
Maryknoll Fathers		
Maryknoll Sisters Center		
Meals for Million Fund		

APPENDIX

ORGANIZATION	RESPONSE TO MAILED QUESTIONNAIRE	VISITED FOR IN-DEPTH INTERVIEWS
Medical Assistance Programs, Inc	X	
Medical and Surgical Relief Commission	X	
Mennonite Board of Missions & Charities		
Mennonite Central Committee	X	X
Mennonite Economic Development Association, Inc		X
National Association of the Partners of the Alliance, Inc	X	
National 4-H Club Foundation of America, Inc		
National Rural Electric Coop Association		
Near East Foundation	X	
New Eyes for the Needy	X	
Operation Crossroads Africa		
Oxfam-America		X
Pan American Development Foundation		X
Partnership for Productivity Foundation USA, Inc	X	X
The Pathfinder Fund		
The Paul Carlson Medical Program, Inc	X	
The People-to-People Health Foundation, Inc.-Project Hope		
Planned Parenthood Foundation of America, International Division of Family Planning	X	
Private Agencies Collaborating Together, Inc	X	
Project Concern, Inc		
Project Endeavor		
Research Corporation		
Sudan Interior Mission		
Technoserve, Inc	X	X