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FINAL EVALUATION
OF THE
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The findings and recommendations in this report reflect only its authors and do not necessarily represent official positions of the United States Agency for International Development nor of the Government of Honduras.

Executive Summary

0.1. Purpose of the Evaluation

This evaluation has four objectives: to summarize implementation over the life of the project; to evaluate project impacts from social, economic, technical, and institutional perspectives; to assess project implementation strategies; and to provide recommendations for future projects of this kind.

From the standpoint of the Government of Honduras, the evaluation will influence its decisions regarding project continuation--whether the project will be continued, and if so, what form that continuation might take. Aside from satisfying USAID end-of-project requirements, the evaluation serves both USAID and GOH by summarizing and assessing the experiences of nearly a decade of efforts to provide economically and socially deprived sectors--households, small farms, and small enterprises--of rural Honduras with improved technologies designed to raise the standard of living.

Of great importance to USAID and GOH are lessons that can be gleaned from these experiences as well as recommendations that the experiences suggest. These lessons and recommendations, which are detailed in this Executive Summary, should serve as guidelines for future technology generation and transfer efforts.

0.2. Project Objectives

According to the 1979 Project Paper, the project would improve the well-being of the rural poor. It would:

(1) Increase the incomes of small farmers through the introduction of light capital farm implements to enhance land and labor usage;

(2) Increase the incomes of rural entrepreneurs through the introduction of improved production and management practices and the establishment of new enterprises;

(3) Improve the quality of life of rural households through the introduction of low-cost appropriate technologies.

The project would address the following groups: farmers with from 1 to 30 hectares (2.5 to 74 acres) of land (with emphasis on farmers with less than 5 manzanas (2.86 hectares, or 7.1 acres); small rural enterprises of less than 30,000 Lempiras (US$15,000) in value (excluding land and buildings); and rural households with incomes less than 600 (US$300) Lempiras per year.

0.3. Evaluation Methodology

Four persons conducted the evaluation, each in charge of one of four functional areas: economics and credit; institutions; technology-beneficiary interface; and private voluntary organizations.

The credit component was evaluated by examining loan data from PTR files and by interviewing PTR Credit Department personnel, NGO/PVO administrators, PTR technicians, and credit beneficiaries. Evaluation of the technology component involved a careful review of project documents and numerical data, often reorganizing them to make them more useful. The technologies specialist elected to visit two project zones, Central and South, after consultations with informed persons suggested that the widest range of technologies and enterprises could be visited in the least time in these zones. Also, UDA is located in the Central Zone.

Much information on technologies was gathered through individual and group interviews with adopters and non-adopters of both sexes. Further information was collected through interviews with Post-Cosecha, PROMECH, PTR, NGO/PVO, UDA, and USAID personnel.

To evaluate the NGO/PVO component, PTR records, field reports, and interim evaluations were examined in order to understand PTR-NGO contracts and amendments. Then open-ended interviews were conducted with project beneficiaries, PTR staff, and NGO/PVO administrative and field personnel.

The institutional component was evaluated by gathering information from project documents and through loosely structured interviews with persons either now or formerly associated with the project. These included persons within the Ministries of Natural Resources, Economics, and Finance; and persons within SECPLAN and USAID.

0.4. Historical Summary

The Rural Technologies Project began in late 1979, designed as a cooperative effort between the Industrial Development Center (CDI) of the Ministry of Economy, and the Development and Adaptation Unit (UDA) of the Ministry of Natural Resources. UDA had been organized under USAID's Small Farmer Technology Project (522-0123) begun in 1976; that project was folded into PTR in 1979. Several other institutions were also structured into the project at the time. These were charged mainly with training, documentation, and dissemination of information on technologies.

Small-entrepreneur credit, to be managed directly by CDI, was experimental and was not to be available until the third year of implementation, when it would be needed as production expanded. Also experimental--and novel--at this time was the use of NGOs to promote improved household technologies.

By the end of the first year, the project was experiencing several problems. GOH could not adequately staff UDA with experienced extensionists and was not providing the required counterpart funding. This and the difficulties of coordinating the large number of project implementing agencies were creating serious delays in implementation.

The project was streamlined in 1982; the number of coequal implementing agencies was reduced from six to two: CDI and UDA. All project functions except the generation and testing of agricultural production technologies, which remained with UDA, were placed under CDI. A special project implementation unit--PTR--was created within CDI, and greater emphasis was placed on NGOs to disseminate project technologies. A year later, in 1983, two more zones were added to the geographic coverage of the project, bringing the total number of zones to six.

An external project evaluation in 1983 cited the strengths and achievements of CDI in working with rural entrepreneurs, but remarked the lack of credit as an obstacle to further achievements with this group. The evaluation also cited the general weakness of the agricultural technology program and recommended that the project enlarge its scope to include technologies and technical assistance to improve cultivation practices. It further recommended that production credits be made available to small farmers, that the project increase its training efforts, with special emphasis on agricultural staff, and that marketing issues be made a project concern.

The project was strengthening its focus on agricultural technologies when it was extended in 1984. The four-year extension, which added $4 million to the original $5 million and increased the number of beneficiaries accordingly, did not change the original project goals and purposes. The extension did, however, direct the project to focus on disseminating only proven cost-effective technologies and to slow the development of new agricultural technologies. The extension further directed that credit (from ESF) be made available to all three project components, and that project dissemination efforts concentrate on selected village areas in order to make the best use of limited resources.

In late 1984, the project adopted the Farming Systems approach (FSR/E) to technology generation, validation, testing,

and extension. Under the former "top-down" approach, project technical personnel had unilaterally decided what technologies were best for clients, and thus should be promoted. Under the new "bottom up" approach, technologies were to be developed as project staff gained an understanding (through surveys and feedback from testing) of client circumstances, both socioeconomic and agroecological. In this way, new technologies would respond to client-felt needs rather than technician-felt ones.

The new approach was a radical departure from the former one since it incorporated beneficiaries into the technology generation and extension process at all stages. It required a new way of thinking and a retraining of project staff. The number of technologies disseminated declined during the early months following the introduction of FSR/E, but later rose substantially. The new approach ultimately enabled the project to focus its efforts on real recipient needs, thereby facilitating dissemination. Much of the project's success from 1986 forward, when efforts have been devoted largely to dissemination, is attributable to FSR/E efforts during 1985.

USAID/Honduras contracted with Winrock International to evaluate the project again in early 1986, after an unfavorable review by the USAID Regional Inspector General. The Winrock evaluation cited the high turnover of managers and key technical staff as a weakness, and also the excessive number of technologies that the project worked with. The evaluation team saw the newly instituted FSR/E approach as a solution to the latter problem and recommended that the approach be strengthened through training as well as be extended to UDA and to participating NGOs/PVOs. The evaluation further recommended that the project set new operating goals in terms of number of beneficiaries and levels of benefits for each rather than continue with the unrealistic practice of setting goals in terms of numbers of specific technologies.

Unrelated to the Winrock evaluation has been the subsequent creation of a Public Relations Unit within PTR by the head of CDI. Also, because of internal political feuding, the administrative structure of the project changed significantly in May of this year (1988), when the Minister of Economy made PTR directly dependent on the Ministry rather than on CDI. Such political intervention has had adverse consequences for the project since its inception.

0.5. Final Project Status

0.5.1. Beneficiaries and Technologies

Across the life of the project, 23,932 families and 447 enterprises have directly benefited from PTR activities. It is significant that the preponderance of both family (76 percent) and enterprise (92 percent) beneficiaries are found in the 1986-88 period, after the project was dynamized by adoption of an FSR/E approach coupled with the institution of credit mechanisms.

PTR did not achieve the total number of family (50,000) and enterprise (1,500) beneficiaries targeted in the original PP. However, a 1984 PP Supplement sets revised goals of reaching 12,000 families during the remainder of the project (January 1984-September 1988) and establishing or assisting 110 small rural industries by end-of-project. PTR far outstripped these revised goals, with figures of 21,044 and 447, respectively. With regard to jobs, 822 full-time and 9,137 part-time jobs were generated by PTR assistance to small rural enterprises and service industries.

If one takes the average rural family size of 6.6 persons and assumes that family members not directly participating in the project are indirect beneficiaries, then the project has reached a total of 157,951 beneficiaries--about 6 percent of the population of rural Honduras, according to preliminary 1988 Census figures. Given migration patterns, more than half of these would have been female.

Depending on how one defines "a" technology, PTR has worked with approximately 191 types of household, farm, and/or small enterprise technologies and techniques during the life of the project. A total of 28,753 instances of technology dissemination took place over the period--70 percent more than the 17,000 targeted. If one assumes a diffusion rate of 5 percent, the figure increases to 30,191.

The most successful technologies, in the order indicated below, have been (number of disseminations in parentheses):

1. Veterinary services (8,694).

2. Domestic stoves (4,888).

3. A variety of soil and water conservation techniques (3,536) and, closely related, new earth-working agricultural implements (plows, tool bars, harrows--888).

4. Metal silos (3,281).

5. Corn shellers (3,048).

6. Innovations in cropping systems and cultivars (2,698).

0.5.2. Credit

PTR began to extend credit to small farmers in September 1985. During 1985 and 1986, only 96 loans were given to farmers; between January of 1987 and September 30, 1988, however, PTR gave and supervised 4,797 loans to small farmers and small enterprises. For a relatively modest institution in the rural sector, this rate of growth is truly remarkable--especially since PTR is not, and was not intended to be, a financial institution. In only three years, PTR went from base zero to a portfolio of L 7,529,063, distributed among 4,659 farmers and 447 entrepreneurs. A total of 23,932 families were assisted by PTR in the process.

In order to distribute credit funds more widely, and also to save on the cost of supervision, PTR has signed several agreements with two private banks and with several other private organizations (NGOs) working in rural areas. The agreements provide these intermediaries with funds that can be lent on the same terms that PTR uses, letting them keep a portion of the earned interest. Thus, of the 16 percentage points charged by PTR, an intermediary may keep between 2 and 6 points, depending on the amount of supervision called for in the agreement. In general, cooperatives and nonprofit NGOs keep 6 percentage points and banks keep about 2.

PTR's lending is fairly equally divided between small farmers and small rural enterprises. However, the average amount borrowed by farmers is L 721, which is about 7 percent of the size of the average loan to small entrepreneurs. A third component of PTR's loan portfolio is household lending, which allows rural families to finance technologies to improve their quality of life, for example, the Lorena stove and the dry latrine. The amount lent for household technologies, however, accounts for only 2 percent of the total portfolio.

Despite PTR's brief experience with rural finance, the project has recovered more than 90 percent of its scheduled payments. The total amount in arrears as of October 1988 was L 750,628, or 9.96 percent of the total credit portfolio. Although too high to make the credit component self-sustaining, this default rate still compares very favorably with that for rural lending in Honduras generally.

0.5.3. Training

One of the more crucial elements in the shift of PTR field methodology to FSR/E (enfoque de sistemas) has been training. Training in FSR/E began with contacts made through visits by ICTA (Guatemala) staff in 1985 and was initiated in a formal sense in the same year through in-country training provided by AGRIDEC, a Miami-based 8-A consulting firm, to some 18 coordinators and key office personnel. In addition, the same individuals made field trips to Guatemala to observe the workings of FSR/E methodology there.

In September 1986, PTR initiated in-house training courses. In all, 18 courses, lasting from 25 to 50 hours each, were given in a total of 31 separate seminars throughout the country. The last course, held in October 1987, was to be followed up by international training for selected staff members. At least 102 PTR staff participated in at least one course, along with 18 NGO/PVO personnel and 20 CDI representatives. Total participation can be measured at 604 person courses (566 for PTR personnel and 38 for non-PTR).

These figures do not include additional and follow-up training. While organized FSR/E training has not been offered since 1985, all PTR field staff (estimated at 72 individuals) have received training in the use and dissemination of specific technologies. PTR staff, in turn, instruct members of NGO/PVO agencies in the use of the technologies (NGO/PVO field staff also interact directly with UDA).

0.6. Project Impact: Findings and Conclusions

0.6.1. Beneficiary Profile

The evidence is that PTR has been reaching its intended target groups, defined above under Project Objectives. A precise profile of beneficiaries by gender is not possible since PTR records--credit records excepted--are not disaggregated by sex. Twenty percent of credit recipients are women. Evaluation interviews, however, suggest the percentage of direct female beneficiaries for the project as a whole to be much higher. When the project began, it emphasized household technologies, which favor women.

The sample drawn by the Winrock evaluation in 1986 suggests the range of social characteristics of beneficiaries. Their average age was 41. The size of families averaged 6.6, and 81 percent of sample respondents were married, whether by civil, church, or common law. Average schooling per beneficiary was 3.2 years, and 82 percent of interviewees said they were literate. The Winrock study offers no data on religious conviction or

ethnicity. It was clear from this evaluation team's fieldwork, however, that both Protestants and Catholics are well represented among post-1986 beneficiaries. PTR serves both mestizos and, in certain coastal areas, blacks.

0.6.2. Social and Economic Impact

Project social impacts have never been recorded or systematically studied. The project has had no expertise to do this. Evidence for such impacts gathered by the evaluation team is necessarily anecdotal; it is included in the body of the report.

One area, however, deserves mention. The accelerating pace of destruction of Honduran forest is cause for alarm. By one estimate, 80,000 hectares of forest are lost every year; the demands for fuelwood and agricultural land are major contributory factors. Many PTR technologies are designed to combat this frightening trend. Energy-oriented technologies address the problem directly by permitting savings on fuelwood. These technologies include improved stoves; lime, brick, and ceramics kilns; sugarcane cookers, and improved charcoal and bakery ovens; solar desalinization and pasteurization techniques; new bellows designs for blacksmiths; methane biodigestors for home, farm, and enterprise; full or finish solar drying of fruits, grains, fish, cacao, and coffee; and fuel-efficient toasters (e.g., for cashews, peanuts) and combustion dryers (e.g., for spices, peppers).

On the economic side, between 1980 and 1985 the average gain from PTR technologies was about L 202. Between 1986 and 1988, when PTR "took off," the average gain increased to L 230. The total discounted benefits without diffusion from 1980 to 1989 sum to L 23.5 million, whereas the discounted costs add up to L 16.8 million, thus yielding a benefit/cost ratio of 1.39. If one allows for a modest 5 percent diffusion rate--meaning that for every 100 beneficiaries, 5 new beneficiaries would acquire a technology spontaneously--then the benefit/cost ratio increases to 1.81. These figures suggest that in economic terms the project has been very successful.

It is important here to emphasize the composition of PTR's technology portfolio. Most of the technologies promoted by PTR, and the bulk of their benefits, accrue to a large number of very small farmers. This has important distributional implications since it means that the added income due to technical change will most likely generate the consumption of goods a high proportion of which is domestically produced. Large, export-oriented projects, on the other hand, tend to benefit fewer persons, usually of greater economic means. Given the society and culture of Honduras, a substantial portion of such added income is spent on imported luxury items. Small farmers, by contrast, tend to

spend their income on clothing, food, medical care, and liquor, all of which are largely produced locally.

0.6.3. Politics and Institutions

The project has had little impact on GOH institutions, nor, it seems, was one ever intended; PTR was not designed to build public institutions. Both PTR and UDA were created under USAID-supported projects; neither is an indigenous institution. For PTR to have had an impact it would have had to be "embedded" in an institution--in MOE or MRN, say--and to employ that institution's line personnel and agencies rather than be appended to an institution as it has been to CDI. PTR seems not to have changed CDI or MRN in any remarkable way.

The linkage between MOE and MRN has been fragile and tension prone. The link is UDA, an entity created in the 1970s under the USAID-supported Small Farmer Development Project (522-0123). UDA has been administratively dependent on MRN, but financially dependent (for more than half of its funds) on PTR. UDA has consequently suffered from a sort of schizophrenia; there have been conflicts between UDA and PTR managements with regard to UDA's program agenda and its use of funds. And since UDA represents agriculture and CDI represents industry, UDA has never fully identified with PTR. This lack of identification has been a significant institutional problem of the project and represents a flaw in its original design.

PTR's attachment to a semiautonomous institution has given it only limited shelter from disruptive political interventions. To think that there was such shelter, as project framers seemingly did, was in retrospect naive. At the same time, however, much evidence suggests that the alternative of "embedding" the project (rather than "appending" it to CDI) in a public institution would have encountered even greater problems.

This political intervention has contributed to high project staff turnover at all levels. The project has had seven managers over the course of nine years. A lack of managerial stability has sometimes compromised program continuity: a new manager has often brought a new agenda to the project. Furthermore, management has too often been subjected to political pressures from above or below--from above to replace competent technical staff with the politically favored, from below to ignore malfeasance among politically connected subordinates.

Several informed and well-placed persons commented to the evaluation team on the harm done the project by the political milieu through personnel stress and anxiety related to job insecurity. Even personnel not directly removed by the political process are affected indirectly: insecurity leads them to leave

the project for something more secure when opportunity avails itself. The high staff turnover was stemmed to a degree in 1985, when the term of PTR employee contracts was extended from three months to a year, the maximum length permitted under Honduran law for non-permanent personnel. This extension was achieved through efforts of the AID project manager, who also initiated a system of yearly personnel proficiency reviews.

A bit of historical reflection suggests that the current institutional state of affairs is approaching that obtaining on the eve of PTR inception nearly a decade ago. The project cast off several institutions within its first two years, and UDA returned to its MRN berth only recently. Moreover, it is rumored that PTR will be reduced to support for industrial and service enterprises only--which is what CDI (or its predecessor) has always done. In the institutional sense, things have come full circle since 1979. The project's impacts--which are otherwise considerable, one must recall--are confined to its achievements in the countryside.

0.6.4. Technology Generation and Extension

The FSR/E approach to technology generation and extension, initiated by PTR in late 1984, has enabled the project better to focus its efforts--to develop and promote truly needed technologies, to know what existing technologies to promote and in which geographical zones, and to know what previous technologies to discard altogether. True, there was an initial decline in technologies promoted and beneficiaries reached when FSR/E was initiated. This happened because of the need to retrain staff as well as to conduct sondeos and test technologies, and thus arrive at something viable to promote. But the numbers of beneficiaries later rose markedly in response to the new approach (and also to the recent credit availability, which FSR/E facilitated).

PTR is now harvesting the results of the FSR/E approach instituted in 1985; the project is in an extension phase. It will not be able to continue in the FSR/E mode without further training of staff and without shelter for them from the Honduran political-bureaucratic milieu, which creates personnel anxiety and instability.

0.6.5. NGOs/PVOs

The participation of NGOs/PVOs in PTR has been fruitful. Their role has been confined largely to the dissemination of technologies already tested and approved by PTR. They have enabled PTR to extend its coverage, at least indirectly, to include rural inhabitants who otherwise would be excluded from

the project, and they have permitted the project to reduce operating costs related to extending credit.

PTR has worked with a wide variety of PVOs/NGOs over the past decade, and they vary considerably in their capacity to diffuse rural technologies. With regard to the eleven PVOs/NGOs with which the project has worked over the past two years, that capacity seems to turn on six factors:

1. The relationship between the overall goals, objectives, activities, priorities, and methodologies of NGOs/PVOs and those of PTR.

2. NGO/PVO experience and ability in formal planning, administrative, and field techniques.

3. The degree and kind of PTR oversight and supervision.

4. The size and kind of NGO/PVO field staff in relation to its target populations.

5. The kind and amount of professional training and experience of NGO/PVO field staff.

6. Initial PTR inexperience in relating to NGOs/PVOs, particularly in the area of credit management.

PVOs/NGOs tend to overestimate their own capacity to disseminate technologies. Of the fourteen contracts signed with NGOs/PVOs between mid-1986 and 1988, ten have required amendments--sometimes as many as four--to allow for changes in the original agreements. Nonetheless, the contribution of NGOs/PVOs to project impact has been significant. From 1986 through 1988, for example, NGO/PVO efforts accounted for 9.9 percent of PTR beneficiaries and 15.1 percent of PTR technologies transferred. Figures further suggest that PVOs/NGOs have had only a modest impact on the creation of rural enterprises; their real strength seems to lie in the areas of household and agricultural technologies--improving production and sustainability through the promotion of soil-conservation measures, for example.

0.6.6. Credit

PTR has delivered credit in two ways: directly by PTR itself, and indirectly through private banks and NGOs/PVOs. Beneficiaries receiving credit directly from PTR have most closely resembled beneficiaries intended in the original project design; beneficiaries receiving credit through intermediaries--private banks and NGOs--have tended toward the profiles established by those institutions for their clients.

Private banks in developing countries have tended to avoid loans to small farmers on grounds that such loans are too small and too risky to be profitable. This serves to underscore the achievements of PTR in involving private banks. The incentives of these banks to participate in the program have been mainly financial. First, the 16 percent interest charged on PTR loans is competitive and above subsidy levels, even though it is 2 percentage points lower than the banks' own rates. Second, the burden of credit supervision falls on PTR since holders of agricultural credit (whether for production or for buying technology) still receive supervisory visits by PTR personnel. Third, small enterprise loans are larger than agricultural loans and closely approximate loans to the banks' usual clientele. It is clear that PTR help has enabled many small farmers, who otherwise would not have had access to credit, to receive loans from private banks.

Although the total number of loans by private banks is quite small when compared to the number extended directly by PTR, the results are encouraging, as they are based exclusively on the banks' willingness to serve as intermediaries for PTR funds. Again, this voluntary participation of private banks in small farm and small enterprise lending is rare. In consequence, the experience of these banks needs to be monitored closely so it can be transferred to other projects in Honduras.

PTR experience with NGOs/PVOs as financial intermediaries has been mixed. Of ten NGOs that PTR has worked with over the past two years, it currently has active loan agreements with seven; it has had administrative and default problems with the remaining three. Of these, PTR has had to renegotiate the debt with two and initiate legal proceedings against the third.

There are at least two problems with using NGOs to deliver credit. First, their geographical coverage is limited; many communities are not served by cooperatives or church groups. And second, NGOs often lack the capacity serve as credit intermediaries. They tend to be lax in the areas of administration and record-keeping. As a consequence, it is often not possible to allocate all of the capital stipulated in a PTR-NGO credit agreement, and it is difficult to maintain a low default rate. For example, as of August 1988, only 52 percent of the funds set aside in credit agreements with NGOs had been lent. A large proportion of the funds thus remained idle. Furthermore, 41 percent of the NGO funds disbursed as of the same date were in arrears. However, the NGO portfolio showed substantial improvement by mid-October of 1988, after pressure from PTR to improve performance.

A notable exception to the quality of NGOs with regard to credit management is the Cooperative Corquin, in the Department

of Copan. This cooperative is run so well that it should serve as a model for training other NGOs and PTR personnel.

PTR's experience over the past two years indicates two important trends with regard to the viability of different categories of loans. First, small loans without collateral (less than L 200) and/or loans that could be considered "consumer loans" show a high rate of default. Second, loans for agricultural production tend to be more risky than loans destined for the purchase of technology. Loans for agricultural production (i.e., hiring labor, buying inputs, etc.), for example, show arrears that are approximately 20 percent of the amount disbursed for that category. Loans used to acquire capital goods (i.e., PTR technologies), by contrast, show a default rate of only 8 percent.

PTR has been unusually flexible in extending and managing credit--as if there were virtually no bounds. On the one hand, this has enabled the credit program to respond to user demands and needs. On the other hand, it has endangered the identity of PTR as a technology generation-dissemination operation. Many farmers, for example, have received credit for agricultural production (i.e., supplies), even though loans of this kind clearly lie outside PTR's technological mandate. In the case of small enterprises, loans have been used overwhelmingly for the purchase of supplies--any technological change among this target group seems only incidental. In the case of both small farmers and entrepreneurs, therefore, loans have been divorced from the adoption of PTR technologies. This identity problem is further aggravated by the fact that PTR technology extension agents also double as credit monitors and collectors--a most undesirable state of affairs.

PTR's experience with credit has been very positive in terms of the number of persons served. Setting the program in motion has been expensive, however. Approximately 32 percent of PTR's operating budget during the last two years (1987 and 1988) has been spent in administering and supervising credit. In per-capita terms, this represents L 548 per credit user. The amount of interest due or received from loans for the entire portfolio, by contrast, is L 221 per capita. This hardly suggests sustainability. In fairness, however, setting up the program was expected to be a deficit operation.

0.7. Lessons Learned

0.7.1. Institutions and Management

* In the political-bureaucratic climate of Honduras, the number of key public institutions/agencies structured into a project should be as few as possible in order to avoid problems

of coordination and of destructive political interventions. In a sense, the history of PTR over the past nine years has been one of either eliminating public institutions from the project, or of moving project functions away from them and toward private ones.

* Project components, or activities, should be kept to a manageable number, and those components should be mutually reinforcing, mutually logical. PTR has had three major components concerned with validating and extending a wide variety of technologies to rural households, to rural enterprises, and to small farms. The project has sought further to develop and strengthen the organization of rural industries and commercial enterprises. This mix of activities has been unwieldy to manage. A narrower and more calculated focus on technologies that are mutually reinforcing--technologies for the production of agricultural products integrated with those to process the same products, for example--would have been desirable. This lesson is related to the one above, for to address rural technologies on such a broad front leads inevitably to the involvement of more institutions.

* Care should be exercised not to divorce financial from administrative authority. This admonition is stronger when the two authorities belong to institutions of widely differing mandates. UDA has been administratively dependent on MRN (and to a degree financially), but financially dependent on PTR. Consequently, the head of UDA has often been in an allegiance bind, and UDA has experienced competing program demands from the two authorities. MRN is legally charged with agricultural research and extension in Honduras, yet PTR, an appendage of CDI, an institution charged with industrial development, has engaged in agricultural technology adaptation (a form of research) and extension. This arrangement has created tensions between MRN and PTR, with the result that UDA has never fully identified with the project.

* In order for a project to have program continuity and to maintain competent staff, it must be sheltered from harmful political intervention. The management especially must be sheltered. PTR has had seven managers in nine years, and its program has often changed dramatically with a change of managers. Such political intervention has also contributed to a high turnover of project technical personnel.

Furthermore, attaching a project to a semiautonomous agency (such as CDI) does not of itself necessarily provide such shelter nor make the project semiautonomous (as it should be). The PTR manager is appointed by the director of CDI and is thus a political appointee. In May 1988, amid internal political conflict, the Minister of Economy removed PTR from CDI and made it directly dependent on the Ministry. Such actions (and actions

that may beget them) reduce the project to a pawn in a destructive political game.

* An effective technology adaptation and extension project must have at least semiautonomous status if it is to be lodged in the public sector. It must have timely access to operating funds (through a revolving fund, perhaps) because its work requires highly mobile technical teams whose effectiveness depends upon frequent visits to rural beneficiaries. Bureaucratic delays in funding can adversely affect the critical technician-beneficiary relationship. In addition, such projects must be able to control the composition and quality of their staffs.

0.7.2. Credit

* It is possible to link credit and technical change effectively. There have been many projects that promote credit and technical change among small farmers in Honduras. Most have failed. What sets PTR apart from other projects is its use of farming systems methods. This allows farmers to have a voice in the design of technologies and, to a large extent, in the design of the credit program. In addition, the use of sondeos has helped identify potential users of credit and technology. Although PTR is not, and will not be, a financial institution, it has set an example of how to reach a potential clientele effectively. Moreover, without knowing it, PTR has shown how farming system methods can be applied to credit.

* Financial intermediation for small farmers and entrepreneurs is possible, but it has a rough road ahead. The experience with banks has been good but too recent to know if it will last. The basis for a good relationship with banks is the use of profitable, but reasonable, interest rates, and the canvassing of potential credit users by PTR field staff.

* Credit supervision does count. The moral climate established by PTR has been much better than could be expected for the rural sector in Honduras. Past experiences with development banks and other assistance projects working in rural finance have been disastrous. However, PTR's overall portfolio has survived two rough years (which witnessed climatic disasters in several regions of Honduras), with an approximate repayment rate of 90 percent.

0.7.3. Technologies

* Across the LOP, the breadth of PTR vision in considering new technologies has been impressive (although some might say "scattershot"). Without losing this questing, open-minded approach to new technologies, however, any future project should

try to focus sooner on the most realistic options--before, say, five to eight prototypes are designed only to find that the technology does not suit the real and felt needs or the pocketbooks of the recommendation domain.

* In recent years, PTR has done a fair job of tracking quantitative indicators of its technology generation successes. But qualitative monitoring and reporting of both successes and failures to find out why a given item worked or did not (because of what socio-organizational, socioeconomic, and other parameters) has been extremely limited. This has had two predictable outcomes. First, many larger "lessons learned" in the DDD process are lost to new staff, to other development groups like NGOs/PVOs, or to future projects. This means that fresh initiatives run the risk of "reinventing the wheel"--a costly proposition. Second, this inattention to field-level follow-up, analysis, and formal and public-information reporting of long-term impacts and social benefits may have caused the project to underrepresent its real success and indirect outreach. This has hurt.

* PTR's work with certain "household" technologies has been important in at least three critical respects. First, it has provided a relatively easy entree into rural families and communities, which smoothes the way for later, larger technology transfer efforts. Second, it has tackled important problems in energy demands and natural resource depletion. Third, it has benefited far more women than a project without this component would have.

* Related to the foregoing, an overview of PRT work testifies to the complex agro-sylvo-pastoral linkages in rural milieux. Changes in any one of these areas may have surprisingly positive (or negative) implications for the others. A focus on only one part of this equation could lead to very disappointing results in future projects.

* In designing technology for rural enterprises, in many instances PTR/UDA have wisely chosen to begin with indigenous practice and equipment, working toward modest modifications of familiar, time-tested designs that use locally available materials. Examples include: modified traditional kilns and ovens; putting salt-making infrastructure to work raising shrimp; and somewhat less successful, improved hand-planters. Likewise, in disseminating technology among rural producers, the project has built upon existing models of socioeconomic organization in Honduras--Clubs de Amas de Casa, Comités Agrícolas, cooperatives. Among rural enterprises, it has respected (or re-adapted) traditional individual or multifamily patterns of cooperation and existing land tenure. In other words, PTR has been cognizant of the dangers of over-innovation along certain fronts--perhaps a lesson learned from some of its less successful DDD initiatives.

* Reviewing the six top-ranked technologies disseminated by PTR, several key characteristics emerge.

-- Most are fairly affordable: in 1988, materials and labor for an improved stove cost approximately L 80; a manual corn sheller sold for L 35, the popular combined PROMECH plow for 175, and an 18 qq silo for 160.

-- A number enhance life quality--by decreasing drudgery (shelling corn, gathering wood daily) or by improving the quality and quantity of foodstuffs (silos, new garden crops, higher yields from healthier livestock).

-- Many reduce risks from natural and climatic vagaries--e.g., veterinary services, soil and water conservation, silos.

-- They are easy to understand and use or access.

-- A number generate cash earnings, either directly or indirectly.

-- Most fit comfortably into present systems of farming combined with migration.

-- Results of all the top-ranked technologies are readily and fairly quickly visible: even in the case of soil conservation, farmers remark notable increases in production in the space of one cropping season.

* The confused ending (at least of USAID funding) and the uncertain future of PTR point to the need for effective forward-planning for such projects. The exponentially growing impetus built up by PTR across the last several years has been halted. Good staff have been lost and many of those remaining are demoralized. More important, PTR credibility with its client audience has been damaged. Many beneficiaries are deeply worried about the future of their new undertakings without PTR follow-through on training and marketing assistance.

0.7.4. NGOs/PVOs

* NGOs/PVOs have participated effectively in the technology transfer process, and indications are that they could play a greater role than they have to date. PTR has already achieved some of its technology transfer goals by working with a handful of NGOs/PVOs, and there are dozens of others with which the project could establish working relationships. The chief advantage to this approach has been that many NGOs/PVOs have established close ties with rural inhabitants and are working in

a wide variety of development activities. In addition, PTR operating expenses are reduced to the extent that areas not covered directly by PTR are covered by NGOs/PVOs. PTR has had relatively good success in inserting rural technology transfer into such projects. Nevertheless, the administrative and field operations of NGOs/PVOs vary widely in terms of quality, so they must be closely monitored and supervised in order to assure strict adherence to agreed-upon requirements and procedures.

* NGO/PVO efforts were particularly significant in the small farm and rural household components of PTR, principally because those components fit most closely into their ongoing activities and corresponded to their areas of greatest expertise. Nevertheless, because of the integrated nature of rural socioeconomic systems, NGOs/PVOs have also tried to incorporate the rural enterprise component into their projects.

* NGO/PVO administrative and field staff are generally highly motivated and in some cases have been highly effective. Personnel standards vary widely, however, and PTR contracts have not stipulated minimum requirements for educational level, professional background, or experience. Since good results have been achieved in some cases with paraprofessionals, high levels of formal education need not be uniformly required of all NGO/PVO field personnel. Nevertheless, contracts that leave this area unspecified, and which permit PTR no part in NGO/PVO staff selection and approval, have the effect of inviting uneven results in the long run.

* NGOs/PVOs vary in the quality of in-service training that is offered to administrative and field staff, and they use a variety of operational methodologies; none currently employ the FSR/E approach. Standardization of training and operational methodologies along the lines of FSR/E would be a relatively difficult process, but it is an innovation that would be likely to have substantial long-term benefits.

0.7.5. Technology Generation and Extension

Several lessons are associated with the adoption by the project of the systems approach (FSR/E) in late 1984.

* The goals for technology adaptation and extension projects that follow the systems approach (i.e., FSR/E) should be set with much care. As the Winrock evaluation suggested, goals should be set not in terms of number of technologies developed or disseminated, but rather in terms of number of families benefited and of income increases. However, the lesson here may be an even deeper one. The systems approach requires an initial diagnosis of client needs and practices (i.e., the <u>sondeo</u>), followed by a period of testing, client feedback, and adaptation. This

process, which may take from one to three years before certain technologies are ready for dissemination to the masses, conflicts with conventional USAID practices of setting numerical goals that must be achieved in yearly steps over the usual project interval of five years.

Technical personnel working on such projects face much pressure to meet yearly quotas and often pursue them with blind and reckless desperation--as happened at different times in the life of PTR. Without this pressure, personnel could be engaged in understanding current client practices and needs more fully, and in developing more appropriate technologies to respond to them. Once developed, such technologies, which are designed for a large homogeneous target group, will spread quickly and without much extension effort. The returns to the systems approach are low over the short term, but they rise dramatically over the long term (beyond about three years, say).

* The systems approach should have been adopted earlier, at the beginning of the project.

* Beneficiaries must participate in the technology adaptation process. Another way of saying this is that PTR should work on the basis of needs felt by rural beneficiaries. It should not, as it did in the early years, work on the basis of what project technical staff think beneficiaries need.

* Esprit de corps among the technical field staff is valuable. The systems approach involves intense interaction of the different technical disciplines at the field level (zone and area levels) in order collectively to diagnose and address beneficiary needs. The interaction entails periodic meetings of the members of an area team, of that team and members of the zonal team, and of members of different zonal teams to exchange ideas and address common problems. This intense interaction creates a <u>mística</u>, which was remarked by several informed persons as something new and valuable for PTR. Job insecurity and high personnel turnover, it should be said, work against this <u>mística</u>.

* It is essential that technical personnel be based in the rural milieu, as they came to be in 1985, with the initiation of the systems approach. Each zone has three or four areas; each area has a technical team based locally. (It was only in 1984 that zonal coordinators were assigned to their zones; earlier, they were based in Tegucigalpa and commuted, drawing per diems.)

* PTR cannot work effectively without a well-defined methodology. The systems approach, beginning with diagnosis and moving through the stages of testing, adaptation, and dissemination, provides such a methodology.

* There is a close relationship between effective technology generation and extension and the kind and amount of training received by field personnel. Relevant and systematic in-service training is particularly important in this regard.

* It is crucial to monitor and evaluate project implementation on a regular basis. In addition, it is necessary to set long-term goals based on the sustainability of the technology transfer process. At present, the measure of success is based on largely short-term goals, namely, numbers of technologies introduced and families involved in the process. A better measure of the strengthening of rural institutions--small farms, rural households, and rural enterprises--would consider the proper use of technologies after their introduction.

0.8. Recommendations

0.8.1. Institutions and Management

* That the entire PTR structure be buffered against political intervention. The positions of manager and assistant manager of PTR should be nonpolitical; the candidates for these positions should meet specified technical criteria suitable for the jobs, and the positions should carry tenure guarantees. This is not to say that the several persons occupying these positions have in all cases been unqualified; to the contrary, some have been well qualified. But even when they were so qualified, they often were removed from office for political reasons, in the same way that political influence put them there. Such frequent changes are disruptive to the program. Job insecurity at all levels has created morale problems. The Government of Honduras should, therefore, take steps to buffer the PTR structure and stabilize project personnel.

In the future, USAID funding of projects such as PTR should be contingent upon the GOH's prior fulfillment of certain conditions. These conditions might include the following: a detailed plan prepared by GOH for USAID approval and specifying just how the project is to be made autonomous, or at least buffered against capricious political-bureaucratic intrusions. At the very least, the plan should provide for the hiring of an independent (i.e., politically unaffiliated) manager and assistant manager; these persons should be hired on the basis of technical qualifications for the jobs and should be given long-term (three years, say) contracts. The same applies to zonal coordinators, in order to assure continuity of high-quality activity at the field level.

Furthermore, the GOH plan should provide guarantees of job security for technical personnel throughout the project structure and should establish (or provide for the establishment of)

technical criteria for hiring those personnel. Also, the plan should stipulate that the hiring and dismissal of project personnel be approved by a project-oversight committee (the Cómite Ejecutivo, in the case of PTR) on which USAID is fully represented (i.e., with voice and vote).

* That PTR/GOH creatively consider ways to continue PTR. Such a continuation would preclude the loss of much valuable experience gained at high cost over nearly ten years--a cost that should not be incurred again. PTR could, for example, contract its services to other agencies and projects. It could, that is, adapt and disseminate technologies on a contract basis. Also, GOH might consider the use of ESF to continue PTR. But the project must first be sheltered from political intervention, must achieve a high-quality stable staff from top to bottom, and must further the training of that staff, especially in FSR/E methods. Since USAID must approve the use of ESF, that approval should be conditioned as described in the previous recommendation.

0.8.2. Credit

Strategic Recommendations

* Intensify the link between credit and technology adoption. Credit for non-PTR-technology-related agricultural production and for the purchase of supplies (not PTR technologies) for small enterprises should be phased out. Currently, rumors are that the project will pull out of agriculture and concentrate on small enterprises. This would be a serious mistake unless there is another mechanism (another project or institution, say) to continue the FSR/E approach and thus generate and extend appropriate production technologies to small farmers. If there is no other mechanism (and there seems not to be at present), then PTR must continue working with farmers through the linkage provided by farm technologies. Even though small enterprises would be in charge of manufacturing some of those technologies, only constant contact with farmers can ensure that technologies are appropriate. PTR could continue providing credit for the purchase of farm technology through financial intermediaries (see below), but it (or someone) must maintain direct contact with farmers in order to continue to be effective. Intensifying the link between credit and technology also would insure that PTR maintains its institutional identity.

* Reduce the role of direct credit. In conjunction with the above policy reform, PTR must promote financial intermediation at the level of the small enterprise and the farm. The first can be done through the banking system, as it is being done with the banks of Occidente and Sogerin. At the farm level, financial intermediation may take place through the promotion of appropriate technology stores held in private hands but backed by

PTR-led financing. Direct credit creates a conflict of interest between technical assistance and debt collection. By reducing direct credit PTR can use its credit portfolio through intermediaries, while maintaining close touch with its clients.

* Conduct research. Being in charge of an appropriate technology agenda forces PTR to always be on the lookout for innovations that can be transferred to its clients. The same must be said of the credit component. Credit research can be very simple and cost effective once there is better access to PTR's data base. It can start with a simple statistical analysis of current data in order to generate a functional classification of credit users, and then continue with studies on new ways to deal with and prevent default, to provide credit, and to reduce operational costs. PTR should create a research department as an adjunct to the departments of credit and planning. This department would insure constant statistical feedback and would help bring innovations to PTR credit.

* Computerize field offices in the medium run. In order to increase field-staff efficiency, automatization of field operations will be necessary within the next two years, especially if the current rate of growth continues.

Operational Recommendations

* Seek assistance in marketing. So far, the weakest component that remains in the credit-technology link is a marketing strategy. No one at PTR has expertise in this area. Efforts should be made to make marketing an important component of technical change.

* Update the computer system at PTR headquarters as soon as possible. The new computer system should be IBM-compatible and should have a Bernoulli box to insure infinite storage capacity. Software, such as Paradox, D-Base IV, or similar software, should emphasize fast access to data. Other software, such as Lotus and Systat, as well as word processors, should also be available.

* Insure that next year's budget includes funds for collecting debts of the existing portfolio. At a minimum, debt collection should include one full-time staff member per zone.

* Streamline the existing credit administration process. This revision should be made in cooperation with field staff.

* Seek computer literacy for all department heads at the central office and for field personnel. At a minimum, the degree of literacy should include MS DOS, word processing, and Lotus.

* Increase bottom-up approach to managing implementation. In order to maintain its dynamism, PTR credit must set up continuous meetings with its users and its field staff to find out how it can improve credit management. Improvements are most urgently needed in the areas of applying for credit, the credit approval process, and data processing.

0.8.3. Technologies

* Include a professional-level social analyst to work with all project units (PTR, UDA, NGOs). This should be an agricultural anthropologist or agricultural sociologist trained in FSR/E methods and conversant with low-input, intermediate technology issues and options. In the DDD process, before any technology even reaches the drawing board, this individual should be a major actor in initial sondeos and in what should be sociocultural as well as economic studies of feasibility. Socioculturally astute and experienced FSR/E input at this level will speed the process of technology generation by weeding out a higher proportion of inappropriate technologies much earlier (or better targeting subsectors of the domain for which items are appropriate).

Professional social analysis is equally critical for tracking the technology transfer process, explaining the why and wherefore of each item's movement through this phase, plus the ultimate outcomes (positive or negative) and any longer term spread effects. As one thoroughgoing study of World Bank development projects demonstrates, there is a concrete economic payoff in careful attention to such issues. Projects with adequate sociological inputs were found to have economic rates of return "more than twice as high as those for socially incompatible and poorly analyzed projects" (Kottak 1985:328).

In sum, critical feedback from social analysis will result in cost savings from a tighter focus and more judicious selection of types of technology to be generated. At the same time, it will reinforce PTR sensitivity in technology design to the real-world socioeconomic, ecological, and gender diversity of the target population, lest "inequitable" technology generation result.

* PTR sorely needs to systematically strengthen its reporting and information dissemination systems, and to make sure that its findings and experiences reach audiences that can best put them to use--whether in the field or within the relevant donor and host country agencies.

* In the future, PTR should seek to retain some focus on appropriate household technologies in ways that are compatible with the project's larger mandates. It will thus reap the

advantages of easy entree, gender equity, and energy and natural resource conservation that this component offers.

* Certainly, PTR or other projects should continue the focus on resource-conserving and innovative energy-saving or fuelwood-substituting technologies that PTR has pioneered. This is one of Honduras' most pressing development needs. This is also true for import-substituting technologies, where these prove socioeconomically feasible.

* Any future project should also incorporate PTR's flexibility and openness to user feedback in the DDD process, and its model of building upon indigenous practice, technology, and socioeconomic organization wherever possible. Blind, top-down, a priori, or coercive approaches to technology generation and transfer do not work.

* At a broader level, future efforts at technology design, development, and delivery should closely attend to the features that characterize PTR's broadest successes: affordability, enhanced life quality, risk reduction, comprehensibility and ease of access, income generation, good fit with present farming and wage-labor patterns, and readily visible results.

* In the design of future projects, careful thought should be given to the post-project future, and realistic options for continuation or institutionalization of successful endeavors should be outlined and explored from the beginning.

0.8.4. NGOs/PVOs

* Create a liaison office in PTR staffed by personnel trained in PTR administrative and field methodologies (i.e., FSR/E). During the first six months of NGO/PVO project implementation, the office would train NGO/PVO staff in program supervision, FSR/E, and the administration of credit programs. In a related vein, establish minimum qualifications for NGO/PVO staff in all PTR contracts, and provide for PTR approval of all NGO/PVO personnel involved in PTR-sponsored projects.

* Examine alternative means of supporting NGOs/PVOs in technology transfer. PTR and UDA should continue to participate in the technology-generation component, but operational and financial links should be developed with NGO/PVO umbrella organizations. Two such organizations are FOPRIDEH and PYMI/ANDI, which could potentially focus on small farmers/rural households, and rural enterprises, respectively.

* Create an audiovisual office within PTR to produce original and location-specific audiovisual materials. The gains to be achieved at relatively low cost (equipment and materials)

could be substantial. Alternatively, develop an ongoing relationship between PTR and an external technical assistance agency with experience in producing audiovisual materials in developing countries.

0.8.5. Technology Generation, Extension, and Training

* That PTR goals be set in such a way that technical personnel have ample time to diagnose beneficiary needs and practices, and to test and validate technologies before releasing them for dissemination on a grand scale. A scheme whereby numerical goals are kept low during the first couple of years, and then increased gradually during the remaining program time, might be considered. This would eliminate the pressure felt by technical personnel to launch into a dissemination campaign immediately with untested and often inappropriate technologies. Such a scheme would likely have greater returns over the longer term, as it would yield technologies that are indeed appropriate and thus need little promotional effort.

* That PTR continue to operate with a systems approach (FSR/E) to technology generation, validation, and dissemination. The evidence is overwhelming that this approach has brought positive benefits to the project. Such a continuation will require substantial training of technical staff, however, for high staff turnover (a problem which shelter from the political process should largely resolve) has meant a loss of expertise in the systems approach over the past several years of project life. The project is now in a dissemination mode, harvesting the results of the systems approach as practiced three years ago.

* Strengthen training in small-enterprise extension methodologies, and concentrate to a greater degree on generating technologies appropriate to small-scale rural industrial, artisanal, and service delivery enterprises. Concentrate on those rural enterprises with the potential to have an impact on the small-scale agricultural sector, both directly (employment generation and provision of services) and indirectly (backward and forward linkages, such as tool and implement construction) where PTR/UDA could continue to make an important contribution.

* Provide systematic in-service training in FSR/E to PTR staff and offer training in these methodologies to NGOs/PVOs.

* Evaluate the impact of technology transfer based on the presence of functioning technologies after their initial introduction; and account also for technologies that have been adopted spontaneously through the diffusion process.

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We also heartily thank the many project beneficiaries with whom we talked; much of our report is their story. And on the USAID side, we extend a warm thank you to Bob Wilson, Emil Falck, and Val de Beauset for their helpful efforts during our three weeks in Honduras. Val de Beauset deserves special mention, for he spent much time with the team, tirelessly recounting nearly a decade of his experiences with the project.

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ACRONYMS

AIEH	Asociación de Instituciones Evangélicas de Honduras
AMM	América Mano a Mano
ANAH	Asociación Nacional de Artesanos de Honduras
Apaquiz	Cooperativa de Ahorro y Crédito Apaquiz Limitada
AHPROCAFE	Asociación Hondureña de Productores de Café
BANADESA	Banco Nacional de Desarrollo Agrícola
CDI	Centro de Desarrollo Industrial (of MOE)
CEDEN	Comité Evangélico de Desarrollo y Emergéncia Nacional
CEDIA	Centro de Documentación e Información Agrícola (of MRN)
CEVER	Centro Vocacional Evangélico Reformado (of AIEH)
CIIBANTRAL	Centro de Información Industrial del Banco Central
CII	Centro de Información Industrial (of UNAH)
CONDERH	Asociación de Consejeros para el Desarrollo de Honduras
Corquin	Cooperativa de Ahorro y Crédito Corquin Limitada
COSUDE	Cooperación Suiza al Desarrollo
CTTA	Communication for Technology Transfer in Agriculture Project
DDD	Design, Develop, Deliver
EAP	Escuela Agricola Panamericana
ESF	Economic Support Fund(s)
FEPROEXAH	Federación de Productores de Exportación de Honduras
FOPRIDEH	Federación de Organizaciones Privadas de Desarrollo de Honduras

FSR/E	Farming Systems Research and Extension
GOH	Government of Honduras
ICAITI	Instituto Centroamericano de Investigación y Tecnología Industrial (Guatemala)
ICTA	Instituto Científico de Tecnología Agropecuaria (Guatemala)
INFOP	Instituto Nacional de Formación Profesional
INHIBER	Instituto Hondureño de Bienestar Rural
ITIS	Intermediate Technology Information Service
L	Lempira (currency unit)
LOP	Life of Project
Menonita	Iglesia Evangélica Menonita Hondureña
MOE	Ministerio de Economía
MOH	Ministerio de Hacienda
MRN	Ministerio de Recursos Naturales
NGO	Non-Governmental Organization
PP	Project Paper
PRODIZONOH	Proyecto de Dessarrollo Integral de la Zona Norte Occidental de Honduras (of AIEH)
PROMECH	Programa de Mecanización Agrícola (of COSUDE)
PRR	Programa de Reconstrucción Rural la Buena Fe
PTR	Proyecto de Tecnologías Rurales
PVO	Private Voluntary Organization
SECPLAN	Secretaría de Coordinación, Planificación, y Presupuesto
TIRS	Technical Information and Research Service (of CDI)
UCIT	Unidad de Comunicación e Información Técnica (of PTR)

UDA	Unidad de Desarrollo y Adaptación (of MNR)
UNAH	Universidad Nacional Autónoma de Honduras
(US)AID	(United States) Agency for International Development

1. INTRODUCTION

1.1. Evaluation Objectives

According to the written scope of work (see Appendix A) prepared by USAID/Honduras, this final review of the Rural Technologies Project (PTR: 522-0157) has four objectives:

(1) To summarize project implementation over the nine years of project life.
(2) To evaluate project impacts from social, economic, technical, and institutional perspectives.
(3) To evaluate in detail the project's use of private voluntary organizations and credit mechanisms.
(4) To provide implementation and policy recommendations for future rural technology and small-enterprise projects.

For reasons explained below, the evaluation team found it necessary, within the given scope of work, to emphasize the period from 1986 to 1988. This seems reasonable since a comprehensive evaluation of the project was conducted by Winrock International in 1986.

1.2. The Evaluation Team and Its Method

Four persons conducted the evaluation: Dr. Gustavo Arcia, agricultural economist, in charge of credit and economic analysis; Dr. James Jones, team leader and social anthropologist, in charge of institutions; Dr. Constance McCorkle, social anthropologist, charged with analysis of technologies; and Dr. William Waters, rural sociologist, in charge of private voluntary organizations (NGOs/PVOs).

1.2.1. The Several Project Components

The **credit component** was evaluated by examining loan data from PTR files and by interviewing PTR Credit Department personnel, NGO administrators, PTR technicians, and credit users. Credit data reviewed include amounts lent and default rates for the following categories: rural households, farmers, rural enterprises, geographic zones, and credit intermediaries other than PTR. Attention was paid to NGO performance and to the cost of extending credit through PTR. Field interviews with PTR technicians dealt with the consequences of combining technical assistance with credit supervision and, ultimately, credit recovery. Interviews with farmers sought their views on the use of credit for nonproduction technologies, on default, and on alternatives to PTR credit. Interviews with NGOs focused on their administrative and managerial capacity to handle credit,

their perspective on loan default, and their ideas on group credit.

Evaluation of the **technology component** involved a detailed review of project documents and numerical data. Where possible, data were reorganized (aggregated or disaggregated) to better address evaluation needs. Two zones, Central and South, were selected for fieldwork by the Rural Technologies Specialist. Consultations with PTR headquarters suggested that the widest range of technologies and enterprises could be visited in the least time in these two zones. Moreover, UDA is located in the Central Zone. Finally, this schedule coordinated well with trips by other team members to the four remaining zones.

Much information on technologies was gathered through open-ended "oral history" interviews with Post-Cosecha, PROMECH, PTR, NGO, UDA, and USAID personnel. Also, "sondeos" regarding target technologies and rural enterprises were conducted by visits to rural enterprises to talk with owners and workers. Further, both group and individual interviews were conducted in rural communities with male and female adopters and non-adopters of PTR technologies.

For the **evaluation of NGOs/PVOs**, PTR records, field reports, and interim evaluations were examined first, in order to gain an understanding of PTR-NGO contracts and amendments. Open-ended interviews were then conducted with project participants, PTR staff members, and NGO administrators and field personnel. These interviews were necessary to clarify and illustrate operational relationships between PTR and the NGOs.

Taken together, the analysis of PTR records and the interviews were designed to: (a) establish the capacity of each NGO to administer and implement technology transfer projects and credit; (b) determine the degree to which NGO personnel are trained to carry out technology transfer; (c) establish the way in which technology transfer projects are planned and implemented; (d) investigate the links to PTR's operational philosophy and mode of training and project implementation (particularly with respect to its FSR/E methodology); and (e) determine the degree and nature of likely changes and reforms in NGO project implementation.

To evaluate the **institutional component**, information was gathered from project documents and through loosely structured interviews with persons either now or formerly associated with the project. These included persons within the Ministries of Natural Resources, Economics, and Finance; and persons with SECPLAN and USAID. These interviews sought in particular to elicit information regarding institutional coordination; they also gave attention to the disposition of institutional recommendations from the 1986 Winrock evaluation.

1.2.2. The Constraints

The team faced several constraints, which together conditioned the depth and scope of its work. The constraints were:

* Limited participation time of both the NGO specialist and the agricultural economist. Whereas the other team members were in Honduras from November 7 through November 29, for a total of 18 working days, the economist had to leave on November 20, after 14 working days, and the NGO specialist could not arrive in Honduras until November 13, giving him 13 working days. Continuous delays in signing the contract for the evaluation forced the economist to shorten his participation. The NGO specialist was a belated replacement for another person who was withdrawn from the original team exactly one week before its departure for Honduras. Staggered participation of team members and too little time were thus major constraints on evaluating a long and complex project.

* PTR officially ended on September 24, 1988, but is continuing at reduced activity levels, using unspent funds, through December. As a consequence, many once-key staff members, in the field and at headquarters, were no longer working for the project, and others were on vacation during the evaluation.

* A lack of any form of summary data on PTR technologies that embraces the life of the project. Such data exist only from 1984 through 1988, and these data are not disaggregated by gender, by zones of operation, by the technologies themselves, or by other critical parameters. Although the few PTR personnel remaining at headquarters were more than generous in their efforts to meet the team's data requests (even giving up parts of their weekends), the limited time for the evaluation did not permit recalculations and summations of data across the life of the project. Without properly aggregated summary figures, the full extent of the project's impact cannot be analyzed and reported.

A complete list of persons and agencies consulted by the evaluation team appears as Appendix C. A summary of rural enterprises and communities visited, with numbers of interviewees by type and sex, is presented in Appendix D.

2. PROJECT HISTORY

2.1. Project Beginnings

When the Rural Technologies Project (PTR) began in late 1979 (to last five years, until 1984), about 66 percent of the national population of Honduras lived in rural areas. By standards of income, about 93 percent of this rural population was poor, with an annual per-capita income ranging from $50 to $260. It was to the rural poor that the project was directed. Its goal: to improve their well-being. For two principal target groups, small farmers and rural entrepreneurs, this meant an increase in income. But for the rural household, the project sought improvement in well-being by other than income-increasing means. The project goal and purposes squared well with the Government of Honduras's (GOH) policies and strategies to build agricultural institutions and rural technology delivery systems (although the project could not, because of its structure, build public institutions).

The project would achieve its goal by removing technological constraints. It would establish mechanisms for the generation, adaptation, and transfer of appropriate technologies. On small farms (50,000 of them), land and labor use would be enhanced by introducing improved light capital farm implements and structures. In rural enterprises (industries and commercial establishments), productivity and employment would be increased (5 percent-20 percent production increases for 1,500 enterprises; 838 new permanent jobs created) through introducing improved technology and management schemes. And finally, the project would establish new rural pilot enterprises (about 40, employing 800 persons) and would introduce new household technologies.

PTR was designed as a cooperative effort between the Industrial Development Center (CDI--formerly the Technical Industrial Cooperation Center), lodged in the Ministry of Economy (MOE), and the Development and Adaptation Unit (UDA--in Comayagua), part of the Ministry of Natural Resources (MRN). PTR was to serve the countryside through four zonal offices to be established by CDI. The UDA had been organized under USAID's Small Farmer Technology Project (522-0123), begun in 1976. The Small Farmer Technology Project was folded into PTR in 1979 for reasons of managerial efficiency.

UDA was charged with developing and testing small-farm production technologies. Complementing it was an Intermediate Technology Information Service (ITIS), created as a subunit within UDA to gather information on available technologies for UDA researchers and to promote technologies developed by UDA among farmers. A Technical Information and Research Service (TIRS) was also established within CDI; it was to be to rural

enterprises as ITIS was to farmers. Training for both small farmers (1,000 of them) and entrepreneurs (1,000 of them) was to be provided by the Instituto Nacional de Formación Profesional (INFOP). Also slated to play important roles in the project were the Agricultural Documentation and Information Center (CEDIA) of MRN, the Industrial Information Center (CIIBANTRAL) of the Central Bank, the National Autonomous University of Honduras (UNAH), and the Industrial Information Center (CII/UNAH) of that same university.

In the initial project design, two funds were to be established, one to provide credit to small rural entrepreneurs, the other to promote the development, adaptation and dissemination of appropriate technologies. Credit, to be managed directly by CDI, was experimental and was not to be available until the third year of implementation (i.e., the fund was not to be established until then); project framers thought that only as (and if) production expanded, might credit be needed. It was to be administered with much caution. The appropriate technologies fund, also managed by CDI, was to finance feasibility studies, to contract (with rural entrepreneurs) for the production of small-farm implements and structures, to finance development and adaptation activities executed by agencies other than MRN, and to finance the promotion of rural household technologies (as opposed to agricultural production technologies) by contracting with nongovernmental organizations (NGOs).

2.2. 1980 Internal Evaluation and Project Reorganization

An internal evaluation was conducted for the period September 1979 through December 1980. There were several findings, but perhaps the most important was that GOH could not adequately staff UDA with experienced extensionists able to handle project technologies. This, and GOH's failure to provide counterpart funding, seriously delayed the project. The evaluation thus recommended greater reliance on private rather than public institutions (the project design leaned toward public ones) to develop and disseminate farm technologies. Furthermore, the evaluation cited some of the long-range targets that stipulated numbers and types of farm implements to be disseminated to a specified number of farmers as unrealistic because they ignored constraints on increased productivity. The objective should be not merely to distribute a large number of technologies to the small farmer, but to select them so that income and well-being are enhanced. The evaluation also cited the difficulties involved in achieving coordination among the large number of agencies involved in the complex undertaking.

This evaluation must have had some influence, for the project was organizationally streamlined in 1982. The number of coequal implementing organizations was reduced from six to two:

CDI and UDA. All project functional areas except the generation and testing of agricultural production technologies, which remained with UDA, were placed under CDI. A special project implementation unit--PTR--was created within CDI, and greater emphasis was placed on the use of NGOs to disseminate project technologies. A year later, in 1983, two more zones were added to the geographic coverage of the project.

2.3. First External Evaluation, 1983

An external evaluation was conducted by Development Associates in 1983 to assess progress to date and determine project directions for the longer term. The evaluation noted a marked improvement in program management deriving from the reorganization in 1982. It cited the strengths and achievements of CDI in working with rural entrepreneurs, but remarked the lack of credit when the project began as a weakness and an obstacle to further advances by CDI in working with this group.

The report cited a general weakness in the agricultural technology program and suggested that the project expand its scope to include technologies and technical assistance to improve cultivation practices--improved disease control, fertilization, soil conservation, and multiple cropping. Also, the project should consider agricultural marketing issues and should expand its credit program to include production credits for small farmers. The evaluation additionally recommended a substantial increase in staff training, especially for agricultural staff.

Further recommendations included a greater reliance on NGOs, improvements in the fiscal process to expedite the flow of funds, and reflections on the future of the project and ways to sustain its activities. The evaluation concluded that the project should be continued.

2.4. Project Extension and a Marked Shift in Approach

In 1984, a project-paper supplement extended the project to September 24, 1988, and added $4 million to the original five (see Appendix B for the supplement's Logical Framework). During the four-year extension, an additional 12,000 families (72,000 people) were to be reached with appropriate technologies, and 2,000 permanent jobs were to be created by rural enterprises. The original project goal and purposes remained unchanged, but there were modifications in other areas.

The supplement directed the project to focus on disseminating only technologies proven cost-effective (not all of the 37 technologies at the time were, the supplement says), and

to slow the development of new agricultural technologies. Simple labor-intensive agricultural processing technologies were to be emphasized, and credit (from the Economic Support Fund--ESF) was to be available for the three project components. Technology dissemination was to concentrate on selected village areas in order to make the best use of limited technical assistance.

The Farming Systems approach to technology research and extension (FSR/E) was adopted by the project in late 1984. FSR/E was to enable the project better to direct its technology-generation and extension efforts so that technologies (especially agricultural production technologies) would indeed be appropriate to recipient circumstances. The adoption of FSR/E represented a dramatic shift in project thinking and operating mode--one that would require considerable staff training and greater institutional and personnel stability.

2.5. A Negative Review and further Evaluation: 1985 to Present

In the third quarter of 1985, the USAID Regional Inspector General's office reviewed the project. According to that report, relatively few "high priority" agricultural and industrial technologies had been disseminated, and many of those were "not working." On the other hand, many simple, cost-reducing household technologies had been disseminated. The report recommended improvements in testing and evaluating technology and more training of project staff. This recommendation was "closed" upon issuance of the report, however, because the project had just adopted the farming systems research approach. The auditor's report further recommended improvements in the management of money advances in order to smooth the workings of a local-currency revolving fund.

The USAID mission took issue with some of the review's findings, especially its challenge to the viability of the technologies, and contracted an outside firm, Winrock International, to conduct an evaluation of the project. The Winrock evaluation, conducted between December 1985, and March 1986, is the most comprehensive to date. The evaluation cited as weaknesses the high turnover of managers and key technical staff (one year is the maximum contract period permitted by Honduran law for agencies without permanent status), and the excessive number of technologies that the project was using. The evaluation saw the recently instituted FSR/E approach as a potential solution to the latter problem and recommended that the approach be strengthened within UDA. The evaluation team cited the lack of a technical coordinator for the PTR Technical Unit and a blurring of lines of authority between central-office management and technical personnel, with consequent confusion at the field level.

The evaluation further recommended that the project set new operating goals in terms of number of participants and levels of benefits for each rather than continue with the unrealistic practice of setting goals in terms of numbers of specific technologies. Realistic goals of 1,500 participating families per year and an average annual income increase of Lmp 440 for each were suggested. The evaluation team recommended that a training officer be appointed within PTR and that an annual training plan be prepared, with more FSR/E training and special attention to the role of UDA and the NGOs under the FSR/E approach. The evaluation further recommended that the Small Business and Technology Advisor be relieved of administrative duties and be assigned full time to technical matters, and that more time and effort be given to developing and administering project credit through private banks, cooperatives, and NGOs.

The project has responded in substantial measure to the Winrock evaluation recommendations. A credit unit was created within PTR, for example, and an individual within the Technical Information and Communications Unit (UCIT) was appointed to coordinate training. The planning function was removed from the technical one and incorporated into a Planning and Evaluation Unit, and a Technical Coordinator was placed in charge of a new Technical Unit.

Unrelated to the Winrock evaluation has been the subsequent creation of a Public Relations Unit within PTR by the head of CDI. Also, because of internal political feuding, the administrative structure of the project changed significantly in May 1988, when the Minister of Economy made PTR directly dependent on the Ministry rather than on CDI. Such political intervention has had adverse consequences for the project since its inception.

2.6. Project Inputs

Funding levels for the project since its inception appear in Tables 2.1 and 2.2. (Unless otherwise noted, all tables are included in Appendix E.) PTR has had two foreign technical advisors, one who has remained with the project since it began. About $1.3 million has been spent on technical assistance between 1979 and the end of 1988. Roughly half of this sum (US$564,000) was spent between 1980 and 1984 and went to Partners for Productivity, a United States consulting firm. The project has purchased 24 vehicles and 36 motorcycles, and has contracted for FSR/E training with AGRIDEC, a Miami-based 8-A consulting firm. The vehicles and motorcycles were purchased at a cost of US$333,110. The project has not otherwise received commodities or external technical assistance and training.

3. PROJECT OUTPUTS AND FINAL PROJECT STATUS

3.1. Beneficiaries

PTR beneficiaries can be divided into two groups: direct and indirect. Ideally, they should also be further divided into males and females. However, no data disaggregated by sex were found to be available, with the exception of those on distribution of PTR credit to women (see Sections 4.1.2 and 4.3.7).

3.1.1. Direct Beneficiaries

Table 3.1 presents both total and, where available, year-by-year numbers of direct beneficiaries across the life of the project (LOP). Direct beneficiaries are here defined as rural units of two sorts: families and enterprises. Direct, individual beneficiaries can also be identified in the case of PTR-assisted training. However, since training can be considered as both a process and an output, and involves organizational staff as well as rural beneficiaries, this component is treated separately in Section 3.4.

Across the LOP, 23,932 families and 447 enterprises have directly benefited from PTR activities. It is significant that the preponderance of both family (76 percent) and enterprise (92 percent) beneficiaries are found in the 1986-88 period, after the project was dynamized by adoption of an FSR/E approach coupled with the institution of credit mechanisms (see Table 3.2 and other relevant sections).

As Table 3.1 indicates, PTR did not achieve the total number of family (50,000) and enterprise (1,500) beneficiaries targeted in the original PP. However, a 1984 PP Supplement sets revised goals of reaching 12,000 families during the remainder of the project (January 1984-September 1988) and establishing or assisting 110 small rural industries by end-of-project. As Table 3.1 attests, PTR far outstripped these revised goals, with figures of 21,044 and 447, respectively.

Within both family and enterprise units, one further (but partially overlapping) group of direct beneficiaries can be identified. These are the individuals who fill the 822 full-time and 9,137 part-time jobs generated by PTR assistance to small rural enterprises and service industries (Table 3.2).

3.1.2. Indirect Beneficiaries

Indirect beneficiaries can be roughly calculated in several ways. Given an average of 6.6 members per family across the PTR zones and given the essentially unitary nature of household economies in Honduras, it can be assumed that where at least one family member has participated in and benefited from PTR assistance, other members of her/his household have received indirect benefits. Under this assumption, the total of 23,932 participating families yields a figure of 134,019 indirect family-member beneficiaries (i.e. 23,932 X 6.6 - 23,932).

Although no precise definition or quantification of indirect benefits is possible, the foregoing figure is nevertheless significant. When direct and indirect family beneficiaries are summed (23,932 + 134,019 or 157,951), this represents 6 percent of the total rural population of Honduras (2,702,127) as per preliminary figures from the 1988 Census. Moreover, given sex ratios cited in the census plus common knowledge of male migration patterns, certainly over 50 percent of these indirect beneficiaries are female.

Other sectors of the population indirectly benefit from the establishment or reinforcement of rural enterprises and service industries insofar as these make for greater ease of access to and/or a wider range or higher quality of products and services available to rural Hondurans. Certainly, indirect benefits and spread effects can be assumed to have reached at least some of the other inhabitants of the 565 rural communities served by PTR during 1984-88 (Table 3.1). No precise calculations can be made in this instance, however.

Finally, where marketing mechanisms are in place, urban consumers likewise benefit from more and better rural products, and to the extent that increased agricultural yields make for lower food prices, consumers generally benefit. Unfortunately, only anecdotal data exist for productivity increases stimulated by PTR activities.

3.2. Type and Number of Technologies and Enterprises Investigated, Developed, Disseminated, Assisted

3.2.1. Types of Technologies/Enterprises Addressed

In one form or another, PTR has dealt with approximately 191 types of household, farm, and/or small enterprise technologies and techniques across the LOP (Table 3.3). "Dealt with" is purposely vague. This figure varies according to how one wishes to count "a" technology. Any given item or practice may have reached one or more stages in the process--research, design,

development, testing, redesign/retesting, dissemination--in one or more zones, and typically in more than one prototype or form.

Moreover, the classification of an item into household, agricultural, and small-enterprise categories is highly ambiguous--and rightly so, for at least two reasons. First, many PTR technologies are multipurpose. This may come about by explicit design. For example, wherever possible, small waterworks are planned to simultaneously meet multiple domestic, crop and livestock, and rural-enterprise needs. Another example is home gardening and canning, which yield cash income as well as improved family nutrition year-round. Multiple uses for an item also arise through local innovation--as when an ingenious individual finds that her/his methane biodigestor can be put to work keeping piglets warm; a woman takes a new kind of stove designed for use in a small food-processing industry (e.g., casabe) into her kitchen; or a community working in collaboration with an NGO adapts a UDA plow to its special economic and agroecological situation.

Second and more important, however, is that the proof of success in introducing a new household or agricultural technology is its generation of new or expanded rural employment opportunities and enterprises devoted to producing or maintaining it--as has occurred with stoves and silos (metalworking), agricultural implements (blacksmithing), veterinary care (new vaccination services), and more. A further example for the future is the string of secondary enterprises that shrimp culture is expected to stimulate: capture and sale of shrimp seed, cleaning and packing operations, ice plants, and manufacture of shrimp-shell and fish meal (from the tiny fish that remain behind when the pond is drained).

With these considerations in mind, Table 3.3 lays out as precisely as possible the types of technologies and small enterprises that PTR has addressed at any stage of the design/develop/deliver (DDD) process across the LOP. This table is based on a thorough review of PTR documents plus extensive oral-history interviewing of PTR and UDA staff. For simplicity's sake, each entry in Table 3.3 is here counted as one "type" of technology or enterprise. The level of detail presented in this lengthy table, however, leaves the reader free to collapse and recount categories as desired.

Readers should be aware that Table 3.3 is perforce an imperfect listing because of a number of problems: ambiguities in classifying the differing types of technologies; questions of how to enumerate various prototypes of the same technology; the blurry line between technologies and the enterprises they give rise to; and above all, the lack of complete and/or synthesizing PTR and UDA records on the full DDD process by type of item.

3.2.2. Numbers of Technologies Disseminated/Enterprises Assisted

Table 3.2 indicates that a total of 28,753 instances of technology distribution took place across the LOP--70 percent more than the 17,000 targeted. (However, in an independent review of documents, the present evaluation team found a total of 29,330; see Table 3.4). Following Table 4.5's benefit-cost analysis and assuming a 5 percent diffusion rate, this figure increases to 30,191. For enterprises, again, Table 3.1 reveals a total of 447 assisted.

Of the total of approximately 191 types of technologies and enterprises listed in Table 3.3, some 127 or 66 percent appear to have reached a dissemination stage--whether they were promoted broadly or, as in the case of experimental or agroecologically specific technologies and enterprises, in limited areas. Table 3.4 displays details of dissemination/assistance by type of technology and enterprise, where information was available.

The reader will note that the total assistance and distribution figures in Table 3.4 do not match Table 3.1's and 3.2's. This discrepancy is due to myriad factors. In order to get at distribution by both type and numbers of technology disseminated or enterprise assisted across nearly a decade of project operation, many different sources had to be consulted. Predictably, these sources "split" and "lumped" items in widely varying classification systems. Moreover, they often employed different units of enumeration (e.g., families vs. item) and used different terminologies to refer to what might (or might not) be the same item. For reasons explained above, understandably, they also vary in classifying a given item under the household, agricultural, or small enterprise rubrics. Finally, data are very sketchy for the early years of the project, when recordkeeping--and development, dissemination, and assistance efforts themselves--were inadequate.

In sum, while Table 3.4 does its best to reconcile these inconsistencies, it should be primarily regarded as suggestive of the relative importance of different technology-dissemination and small-enterprise assistance efforts, especially in the pre-1985 period.

Despite these drawbacks, Table 3.4 does serve to pinpoint PTR's most successful endeavors. Most notably, these include, in rank order:

1. Veterinary services (8,694). However, beware that this figure is confounded by different enumeration systems (numbers of families vs. numbers of livestock vs. numbers of small enterprises providing the service).

2. Domestic stoves (4,888).

3. A variety of soil and water conservation techniques (3,536) and, closely related, new earth-working agricultural implements (plows, tool bars, harrows--888).

4. Metal silos (3,281).

5. Corn shellers (3,048).

6. Innovations in cropping systems and cultivars (2,698).

The effects of these and many other PTR endeavors are explored in Section 4, "Project Impacts".

3.2.3. Present Status

As Table 3.3 and Appendix G indicate, the present status of the many technologies and enterprises PTR has dealt with is highly variable, depending upon the stage they reached in the DDD process as well as on critical turning points in PTR's own development.

Naturally, many items were discarded early in the study, preliminary, or on-farm/enterprise trial stage, as they were investigated by PTR/UDA and judged economically, technically, agroecologically, socially, or otherwise infeasible. Examples include the following.

* At the study phase, expansion of women's small-enterprise production of Panama-type hats was judged infeasible because without the importation of special machinery, hatmakers found it technically difficult to modify their native designs to meet current fashion demands. Also, information on international market outlets, demands, and trends was hard to obtain.

* At a later phase of dissemination, promotion of women's soap-making enterprises was halted because of unanticipated bottlenecks in the supply of imported lye and the negative economics of home production of lye from stove ash.

* The modified hand-planter/seeder, or <u>chuzo mejorado</u>, has experienced a number of problems in technical design and maintenance under everyday wear and tear--for instance, like the propensity of the seed-dropping mechanism to rust shut or to drop an

incorrect number of seeds. Users also raised aesthetic complaints about the item's handle.

* Dissemination of harrows was not pushed when studies revealed that PTR's small-farmer target group found them inappropriate to their overall needs vis-à-vis their price and limited use. Multipurpose technologies like the animal tool bar proved more popular (though still costly).

* In similar vein, despite going through approximately seven design and redesign phases, the forage cutter remains too expensive for the majority of PTR producers, who do not own enough animals to justify its purchase.

* A large-scale UDA corn sheller suffered a similar fate.

* At the on-farm and pilot demonstration phase, introduction of soybeans in the Zona Sur reportedly proved unworkable because of a poorly suited ecology and people's resistance to unfamiliar products like soy milk, cheese, and tofu.

Further examples could be cited. But these suffice to indicate that PTR/UDA has been judicious in selecting which light capital technologies and rural enterprises to promote in seeking to fulfill its larger mandates. Further testimony of the project's good judgment and the basic soundness of its DDD process are the six widely disseminated "successes" listed earlier, plus other in-progress examples like the following.

* The unequivocally enthusiastic adoption of shrimp culture in the Zona Sur, where informants say it will be "the salvation" of their families, cooperatives, and indeed, the region as a whole.

* Keen interest among small-scale lime producers in PTR/UDA experiments with new (modified traditional and continuous production) kiln models designed to generate significant fuel savings--which means lower costs and ecological benefits.

* Establishment and/or significant expansion of small enterprises like metal-working, carpentry, ceramics, and agricultural machinery manufacture through technical and administrative training, financing of materials and equipment, and introduction of new product lines. Some of these enterprises have already been able to pay off the credit advanced to them in the past two to three years.

In sum, at end-of-project, the status of PTR-promoted technologies and enterprises aptly reflects the DDD process itself. Many had been dropped as inappropriate; some are indisputable successes; and many others remain in various stages of study, experimentation, and dissemination. (Consult footnotes to Tables 3.3 and 3.5.)

At a broader level, the evolution of the project itself has affected the types and present status of PTR technology and enterprise development. Specifically, the shift in 1985 to an FSR/E approach and a concomitant emphasis on farm practices as well as on "hardware," seem to have enhanced the overall "appropriateness" to the small producer of activities selected for support. Coupled with a tighter focus on fewer but higher-income producing endeavors--as recommended by the Winrock evaluation in 1986--DDD activities appear to have become somewhat better integrated and targeted. As a 1986 memorandum details, 26 project activities (Table 3.5) were prioritized according to the following criteria.

* They fill a felt need.
* They have economic impact.
* They are low cost.
* Adequate infrastructure, materials, and labor are on hand to support them in the zone where they are to be implemented.
* They have been proved out and officially released.
* They have a high degree of acceptability.
* They have social impact (after PTR Memorandum OPAT-206- 86, 8 September 1986:1).

As noted elsewhere in this report, the institution of a significant credit program about this time also galvanized PTR outreach. This raises one concern about the present status of PTR-assisted enterprises, however. Since credit was introduced so recently, many enterprises are still indebted; others that have paid off their loans have yet to realize any significant net earnings to date; and still others have systematically plowed their earnings back into the enterprise. The concern is that many of these enterprises are still highly dependent on PTR for future technical, marketing, and in some cases additional financial, assistance.

The three-year-old women's ceramics cooperative in Choluteca offers a dramatic example of this quandary. In addition to traditional wares, the cooperative now produces the pieces that

make up the ceramic stove developed by PTR. (This represents a significant improvement on the Lorena model, which presented difficulties in construction that often nullified its fuel-saving advantages.) The group's members have repaid all their PTR credit, and have sunk the bulk of their earnings into buildings and equipment. Now, however, they find themselves with an elegant refractory-brick kiln (supplied gratis by PTR as an experimental item) which, since they have not yet received the promised training, they do not know how to operate. The new kiln would allow them to expand their product line into decorative, hand-painted ceramic items. But training in painting and glazing also remains for the future. In the meantime, without PTR assistance in marketing (radio spots, pamphlets, negotiation of bulk contracts) and transport, they can find no outlets for their now-intensive production of stove pieces. Meanwhile, at least, a use has been found for the expensive, new, but as yet untried kiln. It serves to store the backlog of stove pieces already produced.

Further examples of enterprises in similar straits could be adduced. But one can only wonder what will be the fate of these small producers who have invested years of work, risk, and enthusiasm in PTR-sponsored projects if all PTR assistance is definitively terminated. Prospects for the sustainability of such enterprises are at this point dim.

3.3. Credit Mechanisms

Credit for PTR beneficiaries is a project output that was generated by the need to finance technological change. It is an output that was not envisioned at the inception of the project, yet that has become one of its most important benefits. As early as 1984, farmers receiving PTR advice requested financial help for acquiring the new technologies. Since no credit institution served the poorer segments of the farm population at the time, PTR simply filled the vacuum by providing short-term credit at terms that were approximately half the rates charged in the informal market. (Personal communication from Humberto Alvarenga, Manager, Cooperativa Corquin.)

Beginning in September 1985, PTR gave credit to farmers while it tried itself to learn about credit administration and supervision. During 1985 and 1986 only 96 loans were given to farmers; however, between January 1987 and September 30, 1988, PTR gave and supervised 4,701 loans to small farmers and small enterprises (Table 3.2). For a relatively modest institution in the farm sector, this rate of growth in the credit component is truly remarkable--especially since PTR is not, and was not intended to be, a financial institution. In only three years PTR went from base zero to a portfolio of L 7,529,063 distributed

among 4,659 farmers and 447 entrepreneurs. A total of 23,932 families were assisted by PTR in the process (Table 3.1).

In order to distribute credit funds more widely and also to save on the cost of supervision, PTR has signed several agreements with private organizations (NGOs) working in rural areas, and with two private banks. The agreements provide these intermediaries with funds that can be lent on the same terms that PTR uses while keeping a portion of the earned interest. Thus, of the 16 percentage points charged by PTR, an intermediary may keep between 2 and 6 points, depending on the amount of supervision called for in the agreement. In general, cooperatives and nonprofit NGOs keep 6 percentage points and banks keep about 2.

PTR's lending is fairly equally divided between small farmers and small rural enterprises. However, the average amount borrowed by farmers is L 721, which is about 7 percent of the size of the average loan to small entrepreneurs (Table 3.6). A third component of PTR's loan portfolio is household lending, which allows rural families to finance technologies to improve their quality of life, such as the Lorena stove and the dry latrine. The amount lent for household technologies, however, accounts only for 2 percent of the total portfolio (Table 3.7).

Table 3.7 shows that despite PTR's brief experience with rural finance, the project has recovered about 90 percent of its scheduled payments. The total amount in arrears as of October 1988 was L 750,628 or 10.5 percent of the total credit portfolio. This rate of default is too high to make the credit component self-sustaining, but it compares very favorably with the default record of rural lending in Honduras generally.

3.4. Training

One of the more crucial elements in the shift of PTR field methodology to FSR/E (enfoque de sistemas) has been training. It would not be an exaggeration to suggest that the conversion to FSR/E was a traumatic experience for PTR; it required a shift in thinking by a very young professional staff, and it is undoubtedly the case that much of what had been learned in previous formal training had to be unlearned. Nevertheless, there is complete consensus among PTR field and office personnel that the project was ultimately strengthened by the adoption of the new methodology, and that the process of technology transfer--to small farmers, rural households, and rural enterprises--has been vastly improved.

Training in FSR/E began with contacts made through visits by ICTA staff in 1985 and was initiated in a formal sense in the same year through in-country training provided by AGRIDEC, a

Miami-based 8-A consulting firm, to some 18 coordinators and key office personnel. In addition, the same individuals made field trips to Guatamala to observe the workings of the FSR/E methodology there. These courses and field trips were very important in that they provided a solid base for later training and reorientation; they represented PTR's commitment to shifting to the new orientation. Nevertheless, participation was limited to a small part of the field staff and the introductory training was essentially theoretical in nature. The participants--and the institution--were evidently convinced that the proposed shift to FSR/E was the right course, but at the same time, they recognized that it would be necessary to provide the institution with the required training in a more local context.

3.4.1. Number of Persons Trained

In September 1986, an impressive set of in-house training courses was initiated. In all, 18 courses, lasting from 25 to 50 hours each, were given in a total of 31 separate seminars throughout the country. The last course was held in October 1987, and was to be followed up by international training for selected staff members. Ultimately, virtually all PTR staff participated in at least some of the courses; in addition, representatives of NGOs/PVOs and CDI took part.

Table 3.8 shows that at least 102 individuals in PTR participated in at least one course, along with 18 NGO/PVO personnel and 20 CDI representatives. Total participation can be measured at 604 person courses (566 for PTR personnel and 38 non-PTR).

These figures do not include additional and follow-up training. While organized FSR/E training has not been offered since 1985, all PTR field staff (estimated at 72 individuals) have received training in the use and dissemination of specific technologies. In the past, these seminars were conducted at the UDA center in Comayagua, but the present director of UDA has modified this policy so that training now takes place on a rotational basis in each zone. PTR staff, in turn, instruct members of NGO/PVO agencies in the use of the technologies (NGO/PVO field staff also interact directly with UDA).

3.4.2. Effects of Training

Taken together with the reorganization of field staff into zones and areas, the effects of FSR/E training on PTR have been far-reaching. In large measure, the earlier extension focus was stood on its head; whereas under the old scheme promising technologies were approved and then passed on to a target population without prior researcher understanding of the

population's circumstances, the FSR/E orientation was based on a new concept: technology generation and transfer must consider the target population in the context of its felt needs and its complex and multifaceted socioeconomic and agroecological systems. It follows that beneficiaries must be participants in all stages of the FSR/E process. (See Section 4.3.4 for an analysis of the way that PTR has implemented the FSR/E orientation.)

This shift in orientation first proved to be a challenge for both PTR personnel and the rural target population. Zonal field workers now faced a potentially long process of technology testing, demonstration, and dissemination instead of the simpler (but less effective) tactic of merely convincing persons to adopt a new practice. Furthermore, PTR staff had to regard their relationship with target clientele as interactive; they now had to work **with** the rural population, not for them. At the same time, the FSR/E process has placed new demands on would-be beneficiaries unaccustomed to playing a key role in technology design and testing.

It is clear that FSR/E training has transformed the approach to technology transfer to small farmers and rural households. It is less clear that FSR/E training has had as much direct impact with respect to PTR's relationship with rural enterprises, nor is it clear that it can. A recommendation domain consists of a group of relatively homogeneous farms or households that can be expected to adopt a technology or set of technologies subsequent to testing, demonstration, and dissemination activities. In the case of rural enterprises, however, contact between PTR and project participants must necessarily be on a one-on-one basis, since wide-scale adoption is not expected or desired at the local level. For example, a particular community may be able to support one carpentry shop, and one metalworking shop may support a relatively large geographical area. Here, the concept of recommendation domain must be extended to the regional or even national level; it cannot be restricted to the local community. For that reason, part of the training program discussed above and summarized in Table 3.8 was directed specifically to technology transfer to rural enterprises. Nevertheless, the overall systems focus has allowed PTR to work at all three levels--small farmers, rural households, and rural enterprises--simultaneously and in an integrated fashion.

The major limitations of the training received by PTR staff are: (1) there has been no systematic follow-up in-service training in FSR/E (although seminars in the use of specific technologies continue to be offered); and (2) staff hired after the courses described above were given have not been brought into the FSR/E fold, so that PTR implementation has been uneven and inconsistent.

3.5. Extension Materials

Even prior to the initiation of the FSR/E methodology, PTR had published printed training materials for extension purposes. Beginning in 1980, a "Series on Appropriate Technology" was initiated, and periodic bulletins were released on such specific technologies as hydraulic pumps, composting, French drains, dry latrines, brickmaking, solar dryers, and the Lorena stove. These manuals are written in a simple style and are amply illustrated in a manner consistent with local cultural norms (dress, house construction, etc.). Nevertheless, the Honduran population is characterized by high levels of illiteracy, and the manuals alone are not sufficient for instructing illiterates in the use of the new technologies. The manuals seem intended for use mainly by persons of greater literacy trained by PTR. Presumably, local variations in the technologies that are not reflected in the manuals are discussed during training.

Two other series of publications were subsequently introduced. First, UDA/PTR publishes manuals in the use of specific implements, while PTR has independently released manuals on the operation and maintenance of technologies that are in the dissemination stage. These publications, like the earlier series, are written in simple language and are amply illustrated. And they too are aimed at the more literate persons trained by PTR.

Second, UCIT/PTR publishes small folders that briefly describe specific devices that are available (e.g., bread ovens, biodigesters, brickmaking kilns, and solar dryers) and specific problems that small farmers are likely to confront (e.g., infestation by particular insect pests). These folders provide very general information about the device in question and list its advantages (or describe the nature of the problem and offer a brief solution), and invite the reader to contact PTR for further information. Here again, the information is written in a simple style that is appropriate for an audience with little formal education.

UCIT has faced a problem with respect to the availability of audiovisual equipment, which would be of great use for a population that is generally illiterate and/or accustomed to learning by seeing and hearing, not by reading. With outside assistance, PTR acquired a limited amount of audiovisual equipment and some films and filmstrips, which were sent out to the zonal offices. Much of the material, however, had no audio component, and where there was sound and/or written material, it was often in English. Some materials were translated, but the experience demonstrated the general need for material more suited to the specific problems that face small farmers, rural households, and rural enterprises in Honduras. This limitation

could best be resolved by forming a special unit within PTR that would be charged with the production of suitable audiovisual materials or, alternatively, by contracting outside technical assistance.

4. PROJECT IMPACTS

4.1. Beneficiary Profile

4.1.1. Economic Characteristics

The target population is defined as small farmers with between 1 and 30 hectares (2.5 and 74 acres) of land and with annual per capita income of no more than L 600 (US$300). Particular emphasis is placed on farmers with less than five manzanas (2.86 hectares, or 7.1 acres). Rural enterprises are included in the project if their total value (excluding land and buildings) is less than L 30,000 (US$15,000) (PTR 1986:12). The evaluation team's research indicates that PTR has indeed been reaching these target groups, with few exceptions.

4.1.2. Gender

A precise profile of PTR beneficiaries by gender is not possible since, as explained elsewhere, the only PTR records on beneficiaries disaggregated by sex are credit accounts. However, these records show that 20 percent of credit recipients are women. They include such groups as women's ceramics cooperatives, the Women's Club of pepper growers discussed later in this section, and women-headed enterprises of other sorts (e.g., metalworking, cast aluminum products, cashew and snack-food processing and marketing, candy-making).

When oral-history and field-interview findings are taken into account, it is clear that the number of female direct beneficiaries is far larger than indicated by credit figures alone. During the early years of the project, a focus on household technologies (consciously selected to serve as an entree into rural communities) meant that women were often the primary beneficiaries. Aside from the nearly 5,000 improved stoves disseminated, plus a number of home food-processing technologies, women have directly benefited from many of the waterworks, veterinary technologies, and new cultivars designed for home production of fruits, vegetables, and poultry. Indirectly, women's work load has been lightened by the introduction of new milling and grinding services.

4.1.3. Social Characteristics

PTR beneficiaries naturally vary in age, marital status, and educational, religious, and ethnic makeup. The Winrock sample can perhaps be taken as suggestive of the range of social characteristics among PTR beneficiaries, with the caution that

this sample apparently was stratified according to types and numbers of technologies/enterprises assisted.

With this important caveat in mind, the Winrock survey found the following characteristics. The average age of beneficiaries was 41. Families averaged 6.6 members, and 81 percent of respondents were married, whether by civil, church, or common law. Average schooling per beneficiary was 3.2 years, and 82 percent of interviewees claimed to be literate. The Winrock study offers no data on religious conviction or ethnicity. However, it was clear from the evaluation team's fieldwork that both Protestants and Catholics are well-represented among post-1986 beneficiaries. Moreover, PTR serves both mestizos and, in certain coastal areas, blacks.

4.1.4. Geographic Characteristics

Table 4.1 displays the distribution of PTR technologies to beneficiaries by the six geographic zones of operation, while Table 4.2 lists total beneficiaries by zone from 1980 to the present. Although both data sets are drawn from the same source--the computer files of PTR's Unidad de Planificacion y Evaluacion--as usual, there are discrepancies in the totals.

4.2. Social and Economic Impact

4.2.1. Socioeconomic Changes

Based on the evaluation team's documentary, fieldwork, and oral-history research, it is clear that PTR has had significant socioeconomic impacts among its beneficiaries. It is equally clear, however, that these have not been systematically studied or recorded across the LOP. This is particularly true for social impacts. While PTR documents are well larded with (often conflicting) figures on economic impacts, one finds only snippets of information on the social and cultural correlates of the DDD process. Lacking any professional-level capability in anthropological or sociological analysis, PTR has left the depth and dynamics of such changes unstudied. The result is that the project has "undersold" its impact in this realm.

Because of the lack of such monitoring and reporting, evidence of social impacts is largely limited to the anecdotal. Following are some of the evaluation team's findings and impressions for a number of PTR's most successful initiatives. These cases aptly illustrate important qualities of life that are not captured in reports on GNP or income distribution. Often termed "intangibles," these qualities are typically subjective

and difficult to quantify. But as one authoritative text on social impact assessment notes:

> . . . at a personal level, they are a very real part of what makes life pleasurable and worth living. Among other things, these factors can include feeling a part of the community where you live; . . . having a sense that you and people in your community have control over the decisions that affect your future; knowing that your government strives to act in ways that benefit everyone equitably . . . and feeling confident that your children will get a fair start in life (Branch et al. 1984:7).

Such themes of control, security, and (especially among women) a new sense of self frequently surfaced in PTR beneficiaries' own comments during the evaluation team's field interviews. In particular, many informants noted that as a result of their PTR participation, for the first time they have found hope for a better life for themselves and their children. Or, as one man proverbialized, "We now have hope where before there was none; and although 'La esperanza no llena, por lo menos mantiene'."

Impacts on Households

Certainly, "quality of life" impacts are perceived among adopters of PTR household technologies. The "classic" example here--and the one most frequently cited in project documents--is the introduction of improved stoves. In addition to halving the labor time or cash needed to collect or purchase fuelwood, the stoves have enhanced living conditions and women's lot in a number of ways, as informants are quick to point out.

For example, rural homes with properly functioning, improved stoves are now free of smoke and soot, and kitchen areas are much cleaner and cooler. There are safety advantages, too, with the addition of a cover on the firebox. Women perceive still further benefits. Their eyes no longer sting and water from smoke. Cookware is far easier and faster to clean, since it no longer comes into direct contact with the fire. And, say some women, they now spend less time cooking because the new stoves heat up faster and temperatures are more controllable. Finally, the addition of an oven in some models is greatly appreciated. Women emphasize that they can bake bread right there, thus saving on the cost of purchasing bread and on the time/cost of collecting/buying wood to fire up traditional bakery ovens. Moreover, their families enjoy the greater culinary variety the oven permits, in the form of roasted instead of just boiled or fried meats.

Many other PTR technologies have contributed to more comfortable and/or sanitary living conditions. These include things like:

* Certain space-saving innovations for the one-room rural home. Some of these were rejected as socioculturally inappropriate, however; they represented imposition of unacceptable Western-world and/or Protestant norms.

* Waste disposal systems, like latrines and French drains.

* Water-collection/transport/purification technologies.

Consult Table 3.3 again for other examples.

Impacts on Farms

Here, the classic example is the introduction of metal silos. Like stoves, they have impacts in a number of realms. In economic terms, of course, when properly cleaned, fumigated, positioned, and maintained, the silos make for zero storage losses. This reportedly translates into an average of six qq (quintal, one hundredweight) of basic grains saved per farm family, for a PTR-reported total value of L 90 as of 1988. Equally important, the silos give producers more control over the timing and channel of their grain marketing. Farmers can now choose to sell when prices are highest, to the highest bidder.

Aside from their economic impacts, silos also make for more sanitary conditions in the home, as grain is no longer stored in piles within the house, where it attracts insects and rodents. This also makes for more living space. Another benefit is that silos ensure high-quality foodstuffs year-round. Families with silos no longer need consume moldy, bug- and feces-infested grains as the year progresses.

PTR and other fieldworkers have remarked still other, attitudinal impacts among adopters of silos. They report a new sense of confidence as a result of increased control over the disposal of farm produce--as versus an "if God wills" fatalism. Fieldworkers have also observed a new sense of self among women, who can now take their daily grain needs directly from the silo instead of having to ask their husbands to bring grain out of traditional storage for them. The claim is that women's roles and decision-making authority within the household are thus reinforced.

Although the case of silos is a particularly eloquent and persuasive one, further examples of socioeconomic impacts of PTR interventions in the farming systems of small rural producers can

be adduced. For instance, many informants averred that, along with silos, new soil conservation and cultivation practices now assure them enough basic grains to meet their family's annual food needs--often with a surplus left for sale. One PTR beneficiary offered a dramatic example. He now gets an average of 80-100 qq of maize from a 2 manzana plot that used to yield only 20 qq; and last year, the plot yielded an astonishing 140 qq. As this man sums up, "We used to work so hard for so very little; but [with the new farming practices] now we get triple or quadruple the amount of maize."

Other informants are excited about actual or potential earnings from new cash crops like cabbage, peppers, and shrimp. In the realm of animal husbandry, adopters of forage silos are unequivocally enthusiastic about increased calf and milk yields from cows that are now assured good nutrition throughout the dry season, without costly commercial supplements. Furthermore, the introduction of new grasses and forage cutters have permitted some stockowners to expand herd numbers. One informant notes that he is now able to sustain six head of cattle as against only two before. Forage cutters offer additional benefits: in comparison to machetes, the cutters' greater safety and ease of use means that even children can handle them. Reportedly, such technologies netted cattle-owning beneficiary families L 150 each in 1988. With these and other forage technologies, more and better feeds may make it possible to raise improved breeds, like the Kentucky-criollo burros now under trial. Finally, poultry raisers utilizing PTR-organized veterinary services reportedly realized a 1988 savings of L 235 each, because of lower flock mortality; presumably, their families also benefited from a better diet of poultry and eggs.

Although further examples could be cited here, Sections 4.2.3. and 4.4. detail the impacts of additional agricultural innovations, emphasizing changes in income, land, labor, and natural-resource utilization.

Impacts on Enterprises

Themes of new-found hope, confidence, and security were perhaps most strongly enunciated in interviews with owners and co-workers of small enterprises assisted by PTR. Time and again, interviewees avowed that PTR training and financing had allowed them to establish or expand an enterprise. A particular benefit they emphasized was job security for themselves and their children in the face of an unstable economy and a concomitant lack of opportunities for permanent, salaried employment. Some examples drawn from the team's fieldwork follow.

Case No. 1

Sr. Ramon is a carpenter with 30 year's experience at his craft. One-and-a-half years ago, he received PTR financial assistance to buy two electric saws and other items for his business. He himself paid for the installation of electricity in his shop, and for a third piece of heavy equipment. Since that time, he says that he has doubled his shop's income and expanded his product line to include items like dining sets, bureaus, and molds and boxes used in sugarcane processing. He produces the latter items under large contracts.

Sr. Ramon has experienced no difficulty in making his loan payments so far. And he feels that earnings from his growing business will assure his children the education they desire--or at the very least, steady employment. Meanwhile, he has been able to "fix up the house," adding new furnitur for himself.

Case No. 2

Sr. Ruben operates a metal mechanics shop. He has 22 years in his field. He received both financial assistance and training in producing metal silos from PTR two years ago. With this new product plus making improved stove chimneys, covers, and flaps, he has added six part-time employees to the enterprise. Also, he has found new markets for the silos among coffee planters who must store food for many laborers. With his increased earnings, Sr. Ramon has walled in his workshed to make a permanent, cinderblock shop. His wife proudly points to the new color TV in their living room and the raised roof and ceiling of their home.

However, Sr. Ruben is worried about his future without PTR. While he has as yet experienced no problems making his loan repayments, he is uncertain whether, without PTR marketing assistance and promotion, there will be enough demand for silos for him to continue to cover his debt and pay for the rising cost of materials.

Case No. 3

Sr. Gonzalo and his wife Gloria own a leatherworking shop that makes saddles, cinches, quirts, etc. Also an experienced cobbler, Gonzalo has pursued this trade for 15 years. With extremely modest PTR credit (L 4,000) received in September 1988, and with the sale of an old billiard table, the couple raised enough money to purchase equipment and materials to expand into shoe- and boot-making, along

with other items like handbags, wallets, and coin purses. They plan to add another full-time worker, thereby leaving Gonzalo free to pursue contracts and market their wares throughout the region and in the capital. Meanwhile, Gloria will oversee the enterprise and take care of the accounts. Other goals include closing in the front of their shop for greater security, and improving their home. Above all, they want to build up a business that they can leave for their children, "since one always worries for one's children," they say.

Case No. 4

Sra. Elida and her husband Tino operate a metal-mechanics shop that produces agricultural equipment based on UDA and PROMECH designs. Tino used to work with UDA as a mechanical and automotive technician. With PTR credit, training, and marketing assistance, the couple opened their own workshop in 1986. Tino received advanced training in Mexico; and Elida, a former accountant, took courses in business administration.

Despite some family problems that led to unexpected financial drains, the business is doing well now. Elida manages the shop and its three full-time and six part-time workers. She has found new talents and interests in overseeing employees and learning to solder, and she has been able to add windows, a handsome tile floor, and a wrought-iron-fenced patio to her home.

Like Sr. Ruben of Case No. 2, though, Elida is worried about the future, given the rising cost and uncertain supply of basic materials, along with the termination of PTR assistance. Many of the agricultural implements fabricated in the shop are too new (like the forage cutter and the semi-experimental Rosario pump) and/or too expensive (like the animal tool bars and multicultivators) to have as yet gained a large clientele.

Despite these unknowns, Elida is optimistic. She notes that with any success, she and her family will have a secure livelihood of their own instead of having to rely on salaried employment or projects where, she ruefully notes, "all jobs are political."

Case No. 5

With PTR financial, "paperwork," and technical assistance, the 26-family, 400-ha Cooperativa Ojochal Ltd., in Choluteca Department, took up shrimp cultivation one year ago. They

have already made two harvests (the norm is three per year), earning approximately L 12,000 total or some L 460 per family. The members could not be more enthusiastic about their new-found cash earner. They see it as a low-risk, high-return operation that will, they hope, smooth out climatic uncertainties in their other agricultural pursuits--primarily cattle, cane, and cotton, along with subsistence maize and beans. The co-op members believe they can pay off all their debt in two to three years, at the same time adding two to four more shrimp ponds on their land while still bearing the costs of technical assistance (e.g., to check periodically on saline and oxygen levels in the ponds).

In less than a year, this new enterprise has already generated new part-time employment in the form of post-harvest shrimp cleaning. In fact, co-op women and children, as well as outsiders, now earn L .10 for each pound of partially cleaned shrimp.

Informants cite as their ultimate goals better health and education for their families, which, they say, add up to a guarantee of a better life for their children. In fact, they hope some children of the community will grow up to be shrimp technicians. Finally, in face of recent plant-crop problems, they believe that "shrimp can save the cooperative."

In assessing the impacts of shrimp culture, some cautions are in order for the future. Not all the shrimp enterprises assisted by PTR have fared so well. Some have been washouts owing to various combinations of flooding, imperfect technical training, poor pond construction, or other problems. Also, PTR currently supplies its new shrimp enterprises with all necessary technical assistance and equipment. At present, it is unclear how these fledgling enterprises would fare without outside assistance. The complex techno-ecological knowledge needed for successful shrimp culture has not yet been fully absorbed. Nor do these small producers have direct access to all the required equipment. For example, the cost of one saline and one oxygen gauge is reportedly U.S. $1350. Finally, as the large-scale, commercial shrimp industry burgeons, there may be negative outcomes for small-scale growers. Without going into detail here, on the basis of other countries' experiences, there are certainly potentials for large producer takeovers of smaller producers and for general ecological deterioration, unless careful organizational and resource planning is done.

Indeed, for all of the foregoing cases, it is difficult to see what the future holds because the evaluation team could acquire no time-depth data on enterprises begun much before the last one to two years. When PTR personnel were queried as to why

it was not possible to visit entrepreneurs with a longer history, answers were of two sorts: first, that PTR has aperiodically changed its subzones of operations, and hence was no longer operating in areas where it had begun enterprises earlier; second, that both farmer and entrepreneur acceptance of new technology was primarily stimulated by the extension of credit, which was limited before 1986. Had some examples of longer-standing successes been available for study, more could be said here about the long-term sustainability of PTR efforts. The lack of any form of follow-up monitoring and reporting in this regard is deplorable.

4.2.2. Emergence of New Forms of Socioeconomic Organization

PTR has often and wisely built upon existing forms of socioeconomic organization. For example, in experimenting with new lime kilns, it has patterned its efforts after the existing organization of multifamily groups of lime producers. At the same time, however, PTR has also stimulated the adoption of organizational forms that were new to some communities. The following cases are illustrative:

Case No. 6

With PTR assistance, the women of one community have established a "Club de Amas de Casa." Although a common feature of the Honduran social landscape, this was the first such club in this village. The club coalesced around PTR work on bell pepper production. This new cultivar was selected as a promising garden cash crop for this hillside area, based on earlier field trials with a variety of peppers.

The women (28 of them) have elected a board of officers, collected monies, and with PTR assistance, carefully investigated input costs, market prices, and outlets for their peppers. They have also received PTR credit to purchase garden hoses and/or watering cans, plus hybrid seed. Their first crop will be harvested in late December 1988, and the prospects of a bountiful harvest are good. By avoiding "coyotes" (middlemen) and cooperating among themselves in transport and marketing, they hope to clear L 250 each this year.

Aside from their planned economic benefits, these women have found an exciting new sense of unity and self-empowerment. As one informant in the group put it, "One person alone could never achieve what we are achieving together." Already, they are looking ahead to future activities. From their pepper earnings, they would like to buy sewing

machines and form a sewing group for themselves and their daughters.

Case No. 7

An even more dramatic example comes from the women's ceramics cooperative discussed in Chapter 3. This form of socioeconomic organization was utterly new to the potters of the village. Before, each woman worked alone in her own house. Now they work together in a clean, open-air shed, with children and husbands helping out as needed. Together, the women decide on profit sharing and reinvestments.

As discussed in Chapter 3, the economic future of this group is uncertain. But its socio-organizational effects are not. Members have found new status in their community. Belatedly, other women now want to join the group. Also, members feel they have a more fulfilling family life because their husbands do not need to migrate so often and so long in search of work. Their wives keep them busy enough collecting and transporting wood and clay for the ceramics enterprise. A future plan is to involve the men in manufacturing and marketing the stove pieces, too, while the women turn to new, decorative kinds of wares.

Case No. 8

Another example of new socioeconomic mechanisms coming into play has been one community's formation of a Cómite Agrícola around its extensive soil conservation works. This dynamic committee is already thinking ahead to establishing a store for agricultural inputs by combining forces with a neighboring community, and to ways to supply credit through the store by approaching banks or supply firms directly.

Case No. 9

A final, fascinating example is PTR work with traditional sea-salt makers--a family pursuit. In addition to introducing fuel-efficient solar methods of desalinization to this group, PTR has helped some salt-makers organize into a sort of pre-cooperative to collaborate in a unique new endeavor--rotating salt extraction in the dry season with shrimp culture in the salt ponds during the rainy season.

Still other cases could be adduced from past PTR experience--perhaps in enterprises like candy-making, snack-food production, vaccination services, coconut and cassava shredding,

and milling operations. Unfortunately, time did not permit the team to visit these and still other PTR initiatives.

4.2.3. Impacts on Production and Employment

The economic impacts of PTR technologies at the household, farm, and enterprise levels are summarized in Table 4.3. The choice of technologies in the table closely follows the Winrock report to allow for comparison. A few modifications have been made to comply with shifts in technological emphases during the last two years and to revise certain initial benefit estimates.

First, the impact of irrigating with water wheels has been downgraded from L 874 to L 30, following PTR's recommendation. Dissemination of this technology has practically stopped. Second, the impact of silos has been increased from L 46 to 75. Also, the impact of miscellaneous technologies has been changed from L 200 to L 50 to reflect the impact of vaccinations and other new technologies.

Other deviations from the Winrock report include a lower impact for improved stoves because of a lower estimate for the price of home-gathered wood, and a substantially lower impact for small industries, which seem to have declined in numbers since the 1986 evaluation. In addition, employment has been explicitly included among the benefits, including L 300 for every part-time job generated, and L 1200 for every full-time job.

Results indicate that between 1980 and 1985 the average gain from PTR technologies was about L 202. Between 1986 and 1988, when PTR really took off, the average gain increased to L 230.

Benefit-Cost Analysis

To allow for a comparison with the situation in 1986, the economic analysis reported here follows the same method and format as the Winrock report. Tables 4.4 and 4.5 show the costs and benefits of the PTR project from 1980 to 1989, with and without spontaneous diffusion. Table 4.4 indicates that the total discounted benefits without diffusion add up to L 23.5 million, while the discounted costs add up to L 16.9 million, yielding a benefit/cost ratio of 1.39. This ratio is slightly larger than the 1.22 estimated by Winrock, due to the significantly larger number of beneficiaries served by PTR during the last two years.

If one allows for a modest 5 percent rate of diffusion--meaning that for every 100 beneficiaries, 5 new beneficiaries would buy a technology spontaneously--then the benefit/cost ratio increases to 1.81 (Table 4.5). The results

indicate that in terms of economic impact the project has been very successful.

It is important here to emphasize the composition of PTR's technology portfolio. Most of the technologies promoted by PTR, and the larger share of their impact, accrue to a large number of very small farmers. This has important distributional implications since it means that the added income due to technical change will most likely generate the consumption of goods a high proportion of which are domestically produced. Large, export-oriented projects, on the other hand, tend to benefit fewer persons, usually of greater economic means. Given the society and culture of Honduras, a large portion of such added income is spent on imported luxury items. Small farmers, by contrast, tend to spend their income on clothing, food, medical care, and liquor, all of which are predominantly produced locally.

4.3. Political and Institutional Impact

This section describes and analyzes the institutional workings of PTR. Emphasis is accorded problem areas, from which "lessons learned" have been extracted and listed at the close of the report.

4.3.1. Organization of PTR as of September 1988

An organigram of project organization at the close of USAID funding on September 24 is included as Appendix F. A comparison of this organigram with that appearing in the Winrock evaluation report reveals changes that have occurred since 1986 (see also Project History, Section 3). A listing of project staff by function and location is included as Table 4.6 in Appendix E.

PTR is directed by a Manager and Assistant Manager, who reported to the Executive Director of CDI until May of 1988. An Executive Committee made up of the AID project manager, the CDI Director, and a representative of MRN provides project guidance. A separate Technical Unit, created after the Winrock evaluation, advises in technical matters. There is a separate unit for planning, which is also charged with evaluation. In addition, there is a unit for credit, created after the Winrock evaluation, which reflects the expanded role of credit after 1985.

At the field level, PTR is organized into six zones, each divided into three, sometimes four, areas. Each zone has a coordinator who reports to the PTR Manager, and multidisciplinary technical teams exist at both the zone and area levels.

PTR has been operating since September on unspent budgeted funds and will continue to do so until the end of the year.

These residual funds have not been sufficient to maintain staffing and activity levels, so the contracts of several staff have not been renewed. UDA, always administratively dependent on MRN, was separated from PTR in September and is temporarily under the financial auspices of a USAID-funded natural resources project lodged in MRN.

The CDI Director reports not to the Minister of Economy, but rather to a board of directors (Junta Directiva) composed of the Ministers of Hacienda, SECPLAN, Economía, and Recursos Naturales, and representatives from the Asociación Nacional de Industriales, Asociación Nacional de Pequeños Industriales, and the Asociación Nacional de Artesanos. This arrangement is in keeping with the semiautonomous status of CDI--a status that led USAID to locate PTR there in the first place.

As a gambit in an internal political conflict, however, the Minister of Economy unilaterally removed PTR from CDI in May 1988 and made it directly dependent on the Ministry. This was a radical and controversial move and is one more manifestation of the disruptive political milieu in which the project has operated since its inception. More on this below.

4.3.2. Institutional Issues

The history of PTR has been one of reducing the number of public entities originally structured into the project (a significant reduction occurred during the first two years) and generally moving project functions away from the public sector and toward private-sector institutions such as NGOs. This has taken place to avoid the difficulties inherent in coordinating activities involving several public institutions and to escape the destructive political interventions characteristic of the Honduran political-bureaucratic setting.

The linkage between MOE and MRN has been fragile and tension-prone. The link is UDA, an entity created in the 1970s under the USAID-supported Small Farmer Development Project (522-0123). UDA has been administratively dependent on MRN, but financially dependent (for more than half of its funds) on PTR. UDA has consequently suffered from a sort of schizophrenia: there have been conflicts between UDA and PTR managements with regard to UDA's program agenda and its use of funds, and, since UDA represents agriculture and CDI represents industry, UDA has never fully identified with PTR. This lack of identification has been a major institutional problem of the project and represents a flaw in its original design.

The project has had no significant impact on GOH institutions, nor, it seems, was one ever intended; PTR was not designed to build public institutions. Both PTR and UDA were

created under USAID-supported projects; neither is an indigenous institution. For PTR to have had an impact it would have had to be "embedded" in an institution--in MOE or MRN, say--and to employ that institution's line personnel and agencies rather than be appended to an institution as it has been to CDI. PTR seems not to have changed CDI or MRN in any remarkable way. Furthermore, PTR's attachment to a semiautonomous institution has given it only limited shelter from disruptive political interventions. To think that there was such shelter, as project framers seemingly did, was in retrospect naive. At the same time, however, the evidence suggests that the alternative of "embedding" the project in a public institution would have encountered even greater problems.

A bit of historical reflection suggests that the current institutional state of affairs is approaching that obtaining on the eve of PTR inception nearly a decade ago. The project cast off several institutions within its first two years, and UDA returned to its MRN berth only recently. It is presently rumored that PTR will be reduced to support for industrial and service enterprises only--which is what CDI (or its predecessor) has always done. In the institutional sense, things have come full circle since 1979. The project's impacts--which are otherwise considerable, one must recall--are confined to its achievements in the countryside.

4.3.3. Management, Personnel, and Budget Issues

The Honduran political process has operated adversely on PTR. The positions of both manager and assistant manager are filled by political appointees, and PTR has had seven managers over its nine-year life. This is not to say that all of these managers have lacked competence; indeed, some of them have been extremely competent. But the lack of managerial stability has compromised program continuity: a new manager has often brought a new agenda to the project. With the arrival of a new manager in 1982, the project did a quick turnabout from promoting rural enterprise to promoting household technologies, especially Lorena stoves. New management in 1984, brought a sudden tilt toward agricultural production technologies.

Furthermore, management has too often been subjected to political pressures from above or below--from above to replace competent technical staff with the politically favored, from below to ignore malfeasance among politically connected subalterns.

Several informed and well-placed persons commented to the evaluation team on the harm done the project by the Honduran political process and on the stress that the uncertain political milieu creates for PTR personnel. A lack of job security creates

much anxiety. This milieu has contributed directly (through removal and replacement of personnel) and indirectly (personnel become insecure and take the first opportunity to leave) to a high project staff turnover at all levels. The turnover was stemmed to a degree when the term of PTR employee contracts was extended from three months to a year, the maximum length permitted under Honduran law for non-permanent personnel. This extension was achieved in 1985 through efforts of the AID project manager, who also initiated a system of yearly personnel proficiency reviews.

The project has been further affected by a serious and more general problem within the Honduran public sector. Highly qualified technical personnel invariably drift toward administrative positions, as those carry higher salaries. Technical skills are thus wasted, and many critical technical positions are consequently filled by persons with limited expertise.

The project has not experienced any vitiating budgetary problems. But the GOH was remiss in supplying agreed-upon counterpart funding during the first couple of years of the project, and this did create delays. The project has, moreover, experienced several problems with regard to cash-flow. First, USAID and the GOH are on different fiscal years. Second, the process by which AID funds are disbursed through the MOH has been long and tedious, involving a document trail leading from PTR and passing through CDI, MOE, and MOH. Third, the system whereby AID advanced funds to the project required that all documentation relating to one advance be complete before another one could be made. And fourth, funds were slow to come out of AID's disbursement office in Mexico City.

These problems had been largely resolved by the time of the Winrock evaluation. A Revolving Fund was established in 1985 with ESF money, and the scheme for submitting documentation of project expenditures was simplified. There have been no serious complaints of budgetary or cash-flow problems since 1985. The budgetary process, however, was modified last year, when SECPLAN replaced MOH as the institution initiating the GOH budget.

Again, PTR has had no significant impact on managerial, personnel, or budgetary processes within the Honduran public sector. The reasons are the same as those given in the previous section.

4.3.4. Agricultural Technology Generation and Extension

In late 1984, PTR began to institute a systems approach to its technology generation and extension efforts, not only in the field of agriculture, but in its other project components as

well. The approach is called Farming Systems Research and Extension (FSR/E) in the United States, Adaptive Research in parts of Africa. The new approach required a dramatic shift in PTR modes of thinking and operating. Whereas prior to 1984 the project had promoted technologies without understanding actual farmer practices and circumstances, after 1984 (at least for two or three years) it sought to involve farmers in the process so that technologies would respond to farmer-felt (as opposed to technician-felt) needs.

There are four stages to FSR/E: diagnosis, design, testing, and extension. In the diagnostic stage, multidisciplinary teams visit farmers to talk with them and observe their operations. This rapid survey, or sondeo, is critical, for it provides an initial understanding of farmer practices and circumstances. The information is used to design technologies that seem appropriate to farms within a recommendation domain (these domains are defined by the survey). The technologies are then tested on farmers' fields in the third stage, with test results cycling back to researchers, who make the indicated modifications. Once the technology is adapted, it enters an extension, or dissemination stage.

There is no doubt that FSR/E has enabled PTR better to focus its efforts--to develop and promote truly needed technologies, to know what existing technologies to promote in which geographical zones, and to know what previous technologies to discard altogether. True, there was at first a decline in technologies promoted and beneficiaries reached when FSR/E was initiated. This happened because of the need to retrain staff as well as to conduct sondeos and test technologies, and thus arrive at something viable to promote. But the numbers of beneficiaries later rose markedly in response to the new approach (and also to recent credit availability, which FSR/E facilitated).

On the organization side, rural coordinators were relocated from Tegucigalpa to their respective zones in 1984; before, they had commuted and drawn per diems. There was some resistance to this relocation, and several coordinators had to be dismissed. In 1984, the zones were divided into areas--each zone with three, sometimes four, areas--and multidisciplinary teams were located in each area. A permanent technical presence in rural areas is necessary for an effective FSR/E program. Area teams met monthly in their zonal towns to discuss problems with the zonal teams, and zonal coordinators, sometimes accompanied by zonal technicians, met every two or three months in one of the zones to discuss common problems and exchange ideas. These meetings generated enthusiasm among the technical staff, and a sort of healthy competition emerged among areas and zones; several observers commented to the evaluation team on an esprit de corps, or "mística", present at the time. This enthusiasm was reinforced by competent training conducted by a Miami-based 8-A

consulting firm (AGRIDEC), and by visits of Honduran PTR staff to Guatemala (where FSR/E has been practiced since the early 1980s) and of Guatemalans to Honduras.

With regard to technologies generated, adapted, and tested, FSR/E projects often show only modest results for the first couple of years, especially when there are no staff trained in the approach. Diagnosis, design, and testing occupy this initial period. But by about the third year (often sooner), technologies are ready for dissemination. If they are indeed appropriate and do respond to farmer-felt needs, they should promote themselves; only a modest extension effort should be required. A seeming lethargy during the initial two years is compensated for by a rapid diffusion later. This characteristic of FSR/E, however, does not square well with the AID project cycle of five years, where measurable progress toward goal achievement must be demonstrated early on.

PTR is now harvesting the results of the FSR/E approach instituted in 1985; the project is in an extension phase. It will not be able to continue in the FSR/E mode without further training of staff and without shelter for them from the Honduran political-bureaucratic milieu, which creates personnel anxiety and instability.

4.3.5. Rural Household Technology Generation and Extension

The effectiveness of PTR in the past three years is closely related to two institutional innovations. First, the shift to the FSR/E orientation completely altered the relationships between PTR staff, project participants, and the technologies themselves; a rather standard top-down extension approach was replaced by a methodology that for the first time incorporated rural inhabitants into the project as active participants in the technology and extension process. Second, the center of activities was moved out of Tegucigalpa and into the field, a change implemented, as noted, by dividing the area of PTR operations into zones, subdivided into areas. This increased the amount of contact between field staff and project participants, while the shift to FSR/E meant that the nature of the contact was also altered.

As implemented by PTR, the FSR/E methodology (<u>enfoque de sistemas</u>) is:

1. Practical, because it is based on the knowledge accumulated by rural inhabitants and on their needs.

2. Responsive to real needs and circumstances, through continuous feed-back processes.

3. Interdisciplinary, in the sense that multidimensional teams interact constantly in order to arrive at a broad-scale consensus to problem solving.

4. Dynamic, in that it is subject to continuous review and reprogramming of activities.

5. Participatory, because rural inhabitants are involved in all stages of the technology generation and transfer process, not as simple objects of project implementation, and because field staff live in area in which they work.

6. Interinstitutional, given that other public, as well as private organizations participate in different stages of the project.

7. Integral and ultimately effective because technologies are evaluated and ultimately adopted within the context of the rural socioeconomic and cultural milieu (PTR, 1986:5-6).

According to the PTR methodology, the generation and transfer of technology is broken down into three stages: diagnosis, program design, and program execution.

1. DIAGNOSIS. At the outset, information is collected and analyzed in order to understand the socioeconomic situation of the rural population in each zone, as well as to provide a preliminary analysis of its specific problems and available resources. The objective of this step is the definition of recommendation domains, which consist of communities or groups of families that have similar socioeconomic characteristics, especially with respect to access to productive resources, particularly land.

This information is collected through a series of direct interviews (sondeos) with potential project participants, additional focused interviews, and case studies. A fourth element, daily records, which called for potential participants to record quantitative data on all productive activities, was discarded because it placed unreasonable demands on the individual.

2. PROGRAM DESIGN. In this stage, operational strategies are designed for each zone. First, project participants are identified within the recommendation domains, potential gains and the receptivity of the population are assessed, existing technologies are evaluated, and the level of existing infrastructure is gauged. Second, problems and potential solutions are prioritized by quantifying each problem in terms of

intensity and the number of families affected. Third, the potential for solving the problems, the feasibility of project implementation, and the potential impact are estimated. Finally, an action plan is drafted, in which goals and objectives are established and implementation steps are specified.

3. PROGRAM EXECUTION. It is during the third stage that technology generation and diffusion take place. Following the selection of project participants, PTR embarks on the initial stages of technology development and adaptation. At this stage, PTR maintains a close working relationship with UDA, which is charged with the actual construction of implements selected by PTR for testing. In theory, other national and international institutions (e.g., NGOs/PVOs and universities) can have an input at this stage, but in practice this rarely occurs. At the zonal level, local workshops can be used for developing and/or modifying technologies at this early stage.

The next step is economic and technical validation, in which previously identified technologies are evaluated with the participation of selected families in the recommendation domain. Families involved at this stage provide all required labor and available resources (e.g., land), while PTR staff provide the technical input. Technologies that have been proven to be technically and economically viable are incorporated directly into the farming system of project participants in order to test their potential under actual field conditions.

Once technologies are validated and proven to be effective, they are "liberated," or approved for dissemination by UDA, and technical manuals on their use and maintenance are prepared. Where appropriate, local shops are selected (or set up) and owners/operators trained to produce the required technologies. At that point, PTR initiates the process of promotion and dissemination. In order to reach as many potential adopters as possible within the recommendation domain, field staff endeavor to work with groups rather than with individual families. Field trips are another important element of the field methodology: in the promotion and dissemination stage, project participants are brought together to observe the performance of potentially useful technologies (PTR, 1986:7-19).

The complexity of this methodology can be readily appreciated, especially as compared to the earlier model employed by PTR, in which promising technologies were simply promoted and made available to interested parties. At first glance, it may well appear that the methodology is extremely slow or even overly cautious, and in fact it has the relative disadvantage of not delivering large numbers of adopters in the early stages of project implementation. This occurs not only because of the time required to carry out the first and second stages of project implementation, but because a technology introduced at the

beginning of the process can drop out of consideration at any stage (up to and including promotion and dissemination). When a technology is found to be unsuitable or unacceptable--either in general or for a particular recommendation domain--it is either returned to UDA for further modification (and then reintroduced for validation), or it is dropped entirely from further consideration. Furthermore, technologies have to be tested in a manner that is consistent with the farming system characteristic of the recommendation domain and at the appropriate point of the cropping cycle. Thus, validation and testing may have to wait for the proper time of year. In sum, a considerable period of time can pass between the time that a technology is first considered by PTR and its dissemination.

Additional time is required for the start-up of production at the local or regional level. Nevertheless, this step is crucial. First, small industrial enterprises are created to produce the implement or device in question (e.g., metal silos and tool bars). Second, rural services are created to support agricultural production processes (e.g., plowing and fumigation). And finally, time is required to develop credit schemes appropriate for financing the acquisition of technologies to be adopted.

The concept of teamwork employed by PTR and used to carry out the steps described above has proved to be quite effective. PTR zonal offices are staffed by a support team that consists of the zonal coordinator, an economist, an agronomist, a social promoter, and an industrial technician. Each area office is staffed by (at least) an agronomist, a promoter and (if necessary) an industrial promoter. On a monthly basis, all zonal and area personnel meet to plan their activities and rotational trips to each area by zonal personnel, and to request further assistance from the central office if necessary. There is, then, repeated backup and feedback between the central, zonal, and area levels. This system has produced a high degree of motivation and esprit de corps among PTR office and field personnel.

It is clear that since 1986, PTR has increased its capacity effectively to generate and transfer appropriate technology to small farmers and rural households. While the FSR/E methodology requires substantial inputs of time, the medium- and long-range benefits can be substantial because a solid base has been built. Two additional comments are in order, however, in relation to the means by which PTR sets and meets its goals. First, objectives are lumped together such that areas of land put into soil conservation, numbers of implements, and numbers of meetings are added even though the units of analysis are clearly different. Second, the establishment of objectives in terms of the number of technologies transferred and number of adopters ignores two important facts relevant to long-term project impact: adopters may discontinue use of technologies initially accepted, and

technologies may be adopted spontaneously through the diffusion process. Project impact, therefore, should be measured after a specific period of time by calculating the proportion of technologies still in use as well as the number of technologies adopted by initial non-adopters or non-project participants. This kind of evaluation could be carried out periodically, using standard cluster and stratification sampling techniques to take into account adopters and non-adopters in each zone.

4.3.6. NGOs and PVOs

The inclusion of nongovernmental and private voluntary organizations in the diffusion of rural technologies is a concept that has been of interest from the beginning of the PTR project. Based on the recognition that a governmental agency with rather limited financial and human resources cannot by itself effectively serve a large, widely dispersed, and heterogeneous rural population, the assumption has been that NGOs/PVOs (the two kinds of organizations are considered together in order to avoid semantic difficulties) can play a significant role in achieving the goals and objectives set forth by PTR. In large part, PTR hoped (and has been able) to take advantage of NGO/PVO field experience and of a potential clientele that already has a working relationship with development agencies. Nevertheless, it has also been assumed that NGOs/PVOs would play an essentially supplementary role in the context of the overall project. For that reason, the 1983 DAI evaluation observed that "the PVOs' total coverage is very small in relation to CDI-PTR's total target population. The CDI-PTR cannot avoid carrying the principal target group load . . . if the program is to come near reaching a significant proportion of the relevant population group" (DAI, 1983:9-10). Overall, participation of NGOs/PVOs in the project has received high marks; a later evaluation (Winrock, 1986:3-22) concludes that in "some cases, PTR's relationship with PVOs have (sic) been extremely fruitful." In general terms, the present evaluation concurs with that judgment.

Table 4.7 provides a list of NGOs/PVOs that have had formal working relations (i.e., contracts) with PTR from the initiation of the project through 1986 and for the period 1987-1988, which is the focus of this part of the present evaluation. PTR has worked with a wide variety of institutions, ranging from local multipurpose cooperatives (e.g., Corquin and Apaquiz) and organizations that serve their own specialized membership (e.g., ANAH and AHPROCAFE) to a broad spectrum of community-development organizations (e.g., CONDERH and INHBIER), to public institutions (Agrarian National Institute) and international agencies (e.g., the Peace Corps). During the period 1987-1988, PTR had contracts with 11 NGOs/PVOs. Table 4.8 provides the start up and termination dates for each contract. The major purposes of maintaining these ties have not varied. First, they allow PTR to

extend its coverage, at least indirectly, to include rural inhabitants who would probably be otherwise excluded from the project. Second, they permit PTR to reduce operating costs related to extending credit.

Administrative and Implementational Capacity of NGOs/PVOs as Technical Service Delivery Agents

The role of NGOs/PVOs has been limited almost entirely to the dissemination of technologies previously tested and approved by PTR. While NGOs/PVOs can theoretically broaden their participation by transferring an awareness of potentially useful technologies from the field to PTR (PTR, 1986:3), this does not happen in practice. At the same time, NGOs/PVOs do not have the technical capacity to modify PTR-approved technologies. A notable exception is CEVER (of AIEH), which has a well-equipped workshop in Yoro, and which has, for instance, made modifications in a plow released by UDA/PTR in order to adapt it to local conditions.

There is wide variation in the capacity of the eleven NGOs/PVOs currently working with PTR to diffuse new rural technologies effectively. Six factors of roughly equal importance have contributed to this variation.

1. The relationship between the overall goals, objectives, activities, priorities, and methodologies of NGOs/PVOs and those of PTR. NGOs/PVOs must clearly integrate their PTR-sponsored activities into their overall schema, and it is clear that the different NGOs/PVOs have a wide variety of interests. PTR has proven to be quite flexible in this respect; it has clearly delineated priorities, but as Table 4.8 shows, a total of 14 different specific objectives appear in PTR-NGO contracts, and the number of objectives per contract varies from 2 to 8.

2. Variation in NGO/PVO experience and capacity in formal planning, administrative, and field techniques. First, an examination of the evaluations conducted by PTR reveals that NGOs/PVOs tend to overestimate either the number of technologies that can be diffused, the number of beneficiaries that can be reached, and/or the time necessary to carry out the agreed-upon activities. Table 4.8 shows that of 14 contracts signed with NGOs/PVOs between mid-1986 and 1988, 10 have required amendments--sometimes, as many as four--to allow for changes in the original agreements. In many cases, the changes represent debt rollovers, but in others, changes have been made in actual programming. Second, according to PTR evaluations, several NGOs/PVOs lacked clearly defined field methodologies as well as an ability to plan their activities adequately through the implementation of an organized system of setting and meeting goals. Finally, as we will note below, the PTR's reporting

requirements have not uniformly been met by all of the NGOs/PVOs.

3. The degree and kind of PTR oversight and supervision. PTR provides NGOs/PVOs with guidelines for the preparation of project proposals, administrative requirements, and reporting procedures. Nevertheless, once underway, NGO/PVO projects have had no regular contact with PTR's central office, and contact with or supervision by PTR zonal offices is sporadic or nonexistent. Some NGOs/PVOs have complied completely with PTR monthly reporting procedures, while others have not. PTR evaluations are carried out every six months, and have proven to be an invaluable means of correcting administrative and operational problems, but in most cases, six months of erroneous operation has proven to be extremely damaging to the overall effort. In order to address this problem, PTR has begun to assign liaisons to NGO/PVO projects. This innovation has undoubtedly helped to tighten up NGO/PVO operations; nevertheless, it appears that these liaisons do not necessarily have sufficient professional background themselves to be able to carry out the important task at hand.

4. Variation in the size and kind of field staff in relation to target populations. It is difficult to make generalizations on the ideal number of beneficiaries that individual field staff members can effectively cover because of a variety of conditioning factors such as population density in the project area, distance between communities served, and the capacity of NGOs/PVOs to plan their activities adequately. One NGO/PVO (CEDEN) has adopted a methodology that calls for weekly visits by field personnel to project sites in the first year of implementation, every two weeks in the second year, and so on. This policy is possible because field personnel live in (and in some cases are natives of) the project area itself, and they work with groups, not individuals. At the other end of the scale, several NGOs/PVOs have field personnel/target population ratios that are low enough so as to suggest that contact with project participants is a rather rare event. In addition, in at least one instance, the NGO field promoter has no transportation and spends most of his time out of the project zone entirely. Thus, the question of logistical support is a critical element in the determination of the adequacy of the capacity of an NGO/PVO to serve as an effective agent of technology transfer. Here again, the review of NGOs/PVOs collaborating with PTR is mixed.

5. Variation in the kind and amount of professional training and experience of NGO/PVO field staff. The degree to which NGOs/PVOs have succeeded is closely related to the dedication and enthusiasm of their field personnel. Numerous interviews have revealed that promoters and extensionists are willing to operate under often difficult circumstances (relative isolation, logistical difficulties, low pay) and in addition, to identify closely with the way of life and the problems of their

target population. This close identification is, in turn, revealed by interviews with project participants, who speak highly of NGO/PVO field staff. The background of NGO/PVO field staff is highly variable. It is not the case that all promoters or extensionists are trained agronomists; and contracts between PTR and NGOs/PVOs do not stipulate minimum educational levels, professional background, or years of experience. As a result, it seems clear that some of the unsatisfactory results obtained by some NGOs/PVOs are attributable to underqualified field staff. In addition, the in-service training received from PTR is, at best, incomplete. Short courses are given in the use of specific implements, but the FSR/E orientation that has been so crucial to the success of PTR has not been adopted by or instilled in NGOs/PVOs, which use a wide variety of field methodologies, so that the results are of highly variable quality.

6. Initial PTR inexperience in relating to NGOs/PVOs, particularly in the area of credit management. The administrative, technical, logistical, and human resources that an NGO/PVO must possess in order to be effective were essentially unknown variables when PTR first began to work with private counterparts. Between 1986 and 1988, however, PTR has matured much in this respect.

The impact of NGOs/PVOs in terms of numbers of technologies transferred is presented in Tables 4.9 and 4.10. The total numbers of beneficiaries and technologies transferred between 1986 and 1988 represent small, but not insignificant fractions of total PTR figures for the same period (9.9 percent of beneficiaries and 15.1 percent of technologies transferred). These results assume even more significance in light of two facts. First, NGOs/PVOs serve populations not served by PTR. In fact, a criterion for the selection of communities that is employed by several NGOs/PVOs (e.g., CEDEN and INHBIER) is that the community cannot be receiving assistance from any other public or private institution. Second, the number of technologies transferred must be considered in the context of other activities carried out in the same communities by NGOs/PVOs, but which are not part of the PTR project itself. For example, projects in soil conservation, installation of metal silos, etc., are almost always complementary to other NGO/PVO activities which, taken together, have a much more wide-ranging impact on the community.

It should be noted that impact is not measured in terms of sustainability (i.e., whether the technology is still in proper use several years after its acceptance). Nevertheless, it can be concluded that the dissemination of technologies by NGOs/PVOs has constituted an important complement to direct PTR intervention. Thinking ahead, it is clear that both PTR and NGOs/PVOs have learned a great deal in the past two years, not only in terms of administrative procedures, which have to a great extent been

standardized, but also in terms of valuable field experience with technologies that have the potential to change the lives of marginal rural Honduran populations.

Table 4.11 shows that NGOs/PVOs have had a modest impact on the creation of rural industries and businesses; the generation of new workplaces has not been significant. This analysis must be made, however, in terms of overall benefit--that is, the number of rural persons whose lives have been improved through this project intervention. Assuming an average of 6.6 persons per family, it can be concluded that 944 persons have benefited at least indirectly from this component. Using the same assumption, the agricultural and rural household components have benefited a total of 21,542 persons. These figures clearly show that while NGOs/PVOs can make an important contribution to the development of rural businesses and industries, their real strength lies in the area of improving agricultural production and promoting sustainable agriculture through such measures as soil conservation. Undoubtedly, the spread of agricultural and household technologies will in the future increase the probability of further demand for rural industrial products and services, and vice versa.

4.3.7. Credit Delivery

There are two types of credit delivery. The first consists of direct credit given by PTR; the second is credit delivered through private banks and NGOs. Direct PTR credit covers farmers and small entrepreneurs who most closely resemble the group targeted in the project design. NGOs' and banks' credit users differ slightly from PTR's clients because these entities have their own rules for selecting and assigning credit to their members or clients. PTR requires only that the credit be used to purchase PTR technology and/or to generate employment.

The selection of clients for direct PTR credit follows a series of loan evaluation activities (reviewed in detail in another section of this report). Briefly, however, the PTR lending process starts with the collection of personal information about the applicant, a brief financial profile of her/his debt, equity, and cash flow, and a more detailed profile of the loan project. If approved at the zone level, the documentation is sent to headquarters, where the application is reviewed and processed. Funds are disbursed to the farmer/entrepreneur, and supervisory visits are scheduled. From start to finish, this process takes an average of 24 days.

Involvement of Private Banks and Access to Credit for Individuals and Groups Previously Outside the Credit System

Private banks in developing countries have tended to avoid small loans to risky farmers on grounds that they are too small to be profitable. The amount of interest collected from loans to the poorest farmers does not cover the cost of administering the loan, let alone the financial risks. As the financial literature clearly indicates (Von Pischke, Adams, and Donald 1983), private banks tend to be very conservative in the selection of their clients, relying heavily on the quality of the collateral and the record of financial risks associated with the prospective projects. Moreover, in cases where official policy makes banks set aside credit funds for small farmers at low interest rates, the general response has been to minimize the number of loans given to small farmers, or simply to cheat and redistribute funds to the banks' traditional clients.

The foregoing remarks serve to underscore the achievements of PTR in involving private banks in providing credit. The incentives of banks to participate in the program are mainly financial. First, the 16 percent interest charged on PTR loans is competitive and above subsidy levels, even though it is 2 percentage points lower than the banks' own rates. Second, the burden of credit supervision falls on PTR, since holders of agricultural credit (whether for production or for buying technology) still receive supervisory visits by PTR personnel. Finally, small enterprise loans are larger than agricultural loans and closely approximate the standards of banks' usual clientele. Hence, although banks tend to select their clients according to their own criteria, PTR help has insured that many farmers who would otherwise have been left out now borrow from private banks.

Thus, between January and September 1988, the Banco del Occidente lent L 745,000 to 108 farmers and small entrepreneurs under the II Agreement with PTR. These borrowers would not have applied (or qualified) for credit outside the PTR project. In August 1988, the Banco Sogerin started lending PTR funds. During September 1988, 34 farmers and entrepreneurs were served by this bank.

A related achievement of PTR's credit program is the number of women in the small enterprise portfolio. Of 360 small enterprise loans given by PTR between 1987 and 1988, 72 loans, or 20 percent of the total, were given to women. The proportion is substantially less among clients of private banks (17 women among 144 loans), but it indicates nonetheless a willingness to involve women in the credit process.

Although the total number of loans by private banks is quite small in comparison with the number of loans implemented by PTR,

the results are encouraging since they are based exclusively on the banks' willingness to serve as an intermediary of PTR funds. This voluntary participation of private banks in small farm and small enterprise lending is rare. In consequence, the experience of these banks needs to be monitored closely so it can be transferred to other projects in Honduras.

Administrative and Implementational Capacity of NGOs as Financial Service Delivery Agents

One of the key questions regarding the expansion of credit services in rural areas is the use of NGOs as financial intermediaries. The experience has been mixed. PTR has dealt with ten NGOs within the past two years; currently it has active loan agreements with only seven, as it had administrative and default problems with three.

First, the geographical coverage of NGOs is limited. A great many communities are not served by cooperatives or church groups. A second drawback is the highly uneven quality of NGOs. Based on interviews with PTR personnel, NGOs tend to be sloppy in their administrative procedures and somewhat irregular in their recordkeeping. As a consequence, dealing with NGOs can be very frustrating in terms of allocating all the capital stipulated in the credit agreement, and in maintaining a low default rate. Still, PTR is trying to maintain relations with NGOs in hopes that the cumulative experience will improve their performance since, after all, NGOs do provide access to credit to a large number of farmers that would be excluded from the regular credit system.

As of August 1988, PTR records show that of all the funds set aside in the credit agreements to be handled by NGOs, only 52 percent had been lent. This left a large proportion of the funds idle. In addition, the amount of funds in arrears was 41 percent of the amount disbursed as of the above date (Table 4.12). Under pressure from PTR to improve performance, the NGO portfolio showed substantial improvement by mid-October 1988. However, of the ten original NGOs with a signed agreement, PTR had to renegotiate the debt with two and initiate legal proceedings against a third.

A notable exception to the quality of the NGOs working with PTR is the Cooperativa Corquin, in the Department of Copan. This cooperative is run so well that it should serve as a model for training other NGOs and PTR personnel. The cooperative's conditions for borrowing are as stringent as the banks'. However, it continues to reach for small farmers as active members and it encourages them to save in order to gain the level of collateral it requires for lending.

Development of New Credit Mechanisms and Modification of Traditional Credit Systems

The innovations that PTR credit has brought to rural areas have more to do with the incorporation of new people into the financial system than with internal administration. PTR has created two small but significant changes in the way credit is promoted in Honduras. The first is that no collateral is required for loans of less than L 200. The second is the use of "sondeos," in the FSR/E tradition, to identify potential users of credit. These two measures have been very useful for expanding credit among people who would not otherwise be interested in borrowing from an official institution.

Findings seem to indicate that requiring no collateral for small loans does help decrease the administrative cost of credit, but it does not decrease the default rate. As of October 1988, PTR direct loans to rural households for purchasing household technologies amounted to L 41,871. But records show L 17,425 in arrears, yielding a default rate of 41 percent of funds disbursed. This loan category is almost exclusively composed of loans of less than L 200 each.

The use of sondeos to identify small entrepreneurs, however, has been more successful. As reported by respondents in field interviews and by PTR field personnel, most of the 447 small entrepreneurs have not used bank credit before. However, the overall rate of default among small enterprise loans is less than 10 percent.

4.4. Technological Impact

4.4.1. Changes in Local Technology

Has local technology been modified as a result of PTR efforts? The answer, of course, is yes--as preceding sections have repeatedly documented. More interesting, perhaps, is the question, "Did locals modify PTR technologies?" Again, the answer is yes. This is a significant finding, for when adopters of new technology begin to "fiddle with" and adapt it, this is often a sign that it has found a permanent place in a given farming system or enterprise. It is simply the endpoint of the DDD process, since users themselves are the final judge of a technology. A few brief examples of this people-technology interaction follow.

* Don Antonio is the proud owner of an improved brick and tile kiln (which has created nine new jobs). In his

first use of the kiln, however, some guy wires turned red-hot and set fire to the roof of the kiln's shelter. Ingeniously, he obtained glass telephone-pole insulators and placed them between the wire and the roof. Also worried about the possibility of earthquakes bringing down the roof, he modified PTR's design to make the shelter independent of the kiln itself.

* The women's ceramic cooperative discussed earlier successfully experimented with the size of the stove pieces to deal with customers' complaints that the stoves were too high to cook on comfortably. A side benefit of their experiments is that the smaller pieces require less clay--a saving for the cooperative. The women also found a way to reshape the interior of the stove's burners so as to focus the flame directly on the burner--another fuel efficiency.

* One man was unsatisfied with the performance of his forage cutter. He therefore had the local blacksmith forge new blades to his specifications. Now, he claims, the machine cuts much more sharply and quickly.

* Reportedly, people in one community adapted a PTR-introduced plow to better suit their local oxen. They substituted wood for the metal pill bar to make the implement lighter, and they made changes in the yoke and harness to fit their relatively small animals better.

* One man who adopted the forage silo has found a way to reduce its cost to zero. Instead of lining it with expensive plastic sheeting (which has to be replaced almost annually), he has woven his own lining out of grasses and hays. He finds that the silo does just as well with his innovation as with the plastic. This same man has also experimented with his own forage mixes--including different amounts of hays, corn cobs, raw molasses, and other ingredients--so that he no longer need feed any purchased supplements to his animals.

4.4.2. Spread of Innovations

Have innovations spread beyond project participants? Hard data on this question simply are not available--another instance of the lack of proper social and economic monitoring. But certainly it seems that stoves and silos have reached a takeoff point of their own. Indeed, many people that the team interviewed on other matters noted that they hope to install an

improved stove. Reportedly, vaccination services are being used by ever-growing numbers of people. Other technologies predictably may not be diffusing so rapidly because of the capital-intensive investments they require. For example, the manual labor called for in constructing and maintaining many soil conservation works is great. People without animal traction and earth-working equipment, or access to credit to purchase them, are less likely to undertake such tasks.

4.4.3. Foreign Exchange Requirements

Do technologies require excess foreign exchange? By and large, the answer seems to be no. Where its technology or enterprise generation have encountered high costs and bottlenecks for imported materials, PTR usually has dropped the initiative, as in hat- and soap-making (refer to Section 3 and Table 3.3).

To the contrary, one of the primary aims of PTR technologies is to relieve Honduras of reliance on imported products that it can produce in-country. A few simple examples include: making vinegar from waste pineapples; local wine-making using blackberries, mangos, and apricots; and processing cacao products locally, to avoid importing luxury chocolate items and begin exporting raw materials like cocoa butter. More amusing, Honduras is reported to be a major exporter of broom handles but an importer of brooms! Hence, PTR/UDA have investigated possibilities and machinery designs for producing the complete product locally.

There is some question as to where the metal for silos comes from, however. Faced with local price hikes, on at least one occasion COSUDE arranged for German sheet metal to be imported for silo construction. It is unlikely that the GOH lost any foreign exchange in this transaction, but the point is technologies should be supported by local materials and infrastructure on a near-complete basis. The margins of profit that small farmers and entrepreneurs work on do not leave any room for the vagaries of international trade and tariffs. As noted earlier, plans for small producers' long-term access to technical assistance and equipment for the shrimp industry deserve closer scrutiny in this regard.

4.4.4. Changes in Local Resource Use

PTR technologies have brought about changes in the use of land, labor, and natural resources in rural Honduras. The most dramatic and perhaps important changes have been in the use of forest resources--where PTR has pioneered important and successful energy and agricultural technologies. For any future projects in this realm, it would be wise to build upon this

decade of experience and to incorporate the human expertise already accumulated.

Natural Resource Use

By one estimate, 80,000 ha/year of Honduran forest is being destroyed for a variety of reasons, including ever-growing demands for fuelwood and agricultural land. A more careful cartographic study of deforestation between 1966 and 1986 shows a 50 percent decline in vegetation. And though the fact is self-evident, studies of fuelwood cost-distance ratios and other data unequivocally indicate that the pace of destruction is accelerating.

Many PTR technologies are designed to combat this frightening trend. Energy-oriented technologies address it directly through significant savings on fuelwood with such technologies as improved stoves and lime, brick, and ceramics kilns; improved charcoal and bakery ovens, and sugarcane cookers; solar desalinization and pasteurization techniques; new bellows designs for blacksmiths; methane biodigestors for home, farm, and enterprise; and full or finish solar drying of fruits, grains, fish, cacao, and coffee plus more fuel-efficient toasters (e.g., for cashews, peanuts) and combustion dryers (e.g., for spices and peppers). Table 4.13 summarizes the data available to date on fuelwood savings.

A particularly interesting PTR pilot effort is directed at protecting the coastal mangrove swamps, which are the breeding grounds of shrimp. Mangrove bark is a primary source of tannin; the mangrove forests and the wildlife they shelter have suffered accordingly. However, PTR investigations have discovered an alternative source of tannin in the nut of a sylvan tree known as nacas colo. At end-of-project, pilot studies on cultivating this species were under way.

Most PTR agricultural technologies--e.g., soil conservation (and its related earth-working equipment), new cropping practices like irrigation and cessation of burning, and more efficient animal husbandry systems--address the deforestation problem indirectly by seeking to multiply the productivity of existing farmlands, thus forestalling agriculturalists' further encroachment upon forest reserves.

Land Use

The benefits of soil conservation techniques have already been highlighted in several sections. The changes resulting from various irrigation technologies are self-evident--intensification of land use, usually along with introduction of high-value cash

crops. However, intensive animal husbandry techniques perhaps deserve a further word. With the forage and ensilage practices introduced by PTR, users have found that they can now pen or corral their animals for much, or in the case of some species (e.g., swine), all of the year. This translates into less land cleared for pasturage and less destruction of sylvan areas by the rooting, trampling, grazing, and browsing of roaming animals.

A particularly ingenious PTR innovation in land use is Case 9's introduction of rotational "cropping" of salt and shrimp among sea-salt makers. The salt works cover huge expanses of briny lands where no domesticated plant crops can be raised and where mangroves no longer grow. Yet traditional salt-making--heretofore the only productive option on such lands--reportedly works out to be a losing proposition economically. The situation improves with introduction of solar desalinization techniques, but profits are still tiny. However, with shrimp rotated into the production system at a time when the lands would lie idle anyway, earnings skyrocket.

Labor Use

Many PTR technologies are expressly designed to save on labor, whether in the household, farm, or enterprise. These include items such as waterworks that bring water conveniently closer to home, garden, corral, and field; domestic stoves and other energy-efficient devices that save on fuel-gathering labor; various threshing, shredding, hulling, shelling, and grinding machines/services; and UDA-designed or PTR-credit-assisted equipment for metalworking, carpentry, and potting.

The UDA manual corn sheller is one example that ranked high on dissemination. After passing through several design stages to ensure durability and workability for all sizes of cobs, the final, metal version has proved quite popular. Even children can operate it, and it certainly saves women labor in the daily preparation of the staple food. Coconut and cassava shredders have saved labor in small-enterprise processing in the zones where these crops predominate.

Other technologies have probably increased labor overall, insofar as they are aimed at agricultural intensification. While perhaps saving labor on a particular task (e.g., planting, plowing, harvesting), intensification generally implies more work for the farmer in the end--especially when new cultivars are added to the list of traditional ones. But fuller employment in rural areas is one of the central aims of PTR, particularly as it relates to rural-to-urban migration.

PTR support of rural enterprises has clearly had the effect of creating employment, both directly, in the form of jobs in

rural industries and services, and indirectly, by establishing a context for more labor-intensive agriculture. Project activities on small farms and in rural households have also tended to create additional demands for labor, again because they involve new requirements for family and/or extra-family labor.

Introduction of technologies of this kind must take into account the availability of labor at different times of the year. Particularly important is the degree to which members of the recommendation domain engage in wage labor (agricultural or nonagricultural) outside their communities. Many, if not most, families in the area served by PTR must migrate for two to three months per year in order to earn the cash to cover unavoidable monetary expenses. This movement is inversely related to the quantity and quality of their landholdings. That is, migrants generally consist of the most marginal segments of the rural population.

For example, residents of western Francisco Moran migrate from late November to February to harvest coffee. A family can net L 200 a year; this may represent their sole source of cash income. Without exception, these families would be willing to forgo migrant labor if they could find income-generating work in their home communities. Hence, to be successful, technologies in areas with high rates of seasonal migration must either not require year-round participation by all adult household members, so they can continue to migrate; or provide a guaranteed substitute source of income, e.g., an assured market for crops.

4.5. Sustainability

This section deals with the sustainability of project activities. After nine years and $16,000,000, can the project's activities continue into the future?

4.5.1. Continued Access to Technological and Financial Services

The provision of project services--technological and credit support to small farmers, rural households, and rural enterprises--has been highly dependent on USAID funding and, to a degree, on USAID monitoring to check the worst abuses of the local political-bureaucratic culture. These matters are dealt with more fully in the institutions section of the report, which is relevant to the discussion here. One must recall that PTR, the creation of a USAID-funded project, was never embedded in Honduran institutions, but rather was appended to a semiautonomous institution, CDI, which belongs to MOE. And PTR has linked with MRN through UDA, also created by a USAID-funded project; UDA has already been returned to MRN.

As far as the evaluation team could learn, PTR is the only institution in Honduras today that even remotely follows the FSR/E approach. But this approach, by which technologies are generated, adapted, and disseminated to the rural population, requires training. To maintain the project's effectiveness, once personnel are trained they must remain with the project and be made secure in their jobs. This means that the project must be sheltered from political intervention.

PTR's experience with credit has been very positive in terms of the number of people served. Setting the program in motion has been expensive, however. Whether this effort will result in a sustainable credit mechanism will depend on the way credit is administered in the future, the nature of the target group, and the dynamics of PTR within the highly politicized institutional framework in Honduras.

Approximately 32 percent of PTR's operating budget during the last two years (1987 and 1988) has been spent in administering and supervising credit. In other words, approximately L 2.5 million has been spent to give and supervise credit to 4,569 farmers. This results in per capita expenditures of L 548 per credit user. In contrast, the amount of interest due or received from loans for the entire portfolio equals L 221 per capita. Evidently the program is not yet self-sustaining. In fairness, however, setting up the program is expected to be a deficit operation.

What PTR needs to examine in great detail is how per capita expenditures for administering and overseeing loans can become less than the per capita interest income. In other words, the above per capita figures must be continuously reviewed in order to find ways to increase the productivity of the credit component. This constant evaluation of the cost of credit for small farmers and small entrepreneurs applies equally to any institution that takes over from PTR. The sections on "Considerations for the Future" and "Recommendations" suggest ways in which productivity at PTR can be enhanced.

Another aspect to consider in improving productivity is the nature of the target group. PTR's limited experience in the past two years indicates two important trends. First, small loans without collateral (less than L 200) and/or loans that could be considered consumer loans show a high rate of default. Second, loans for agricultural production tend to be more risky than loans destined for the purchase of technology. As Table 4.14 shows, loans used for agricultural production (i.e., hiring labor, buying inputs, etc.) show arrears that are approximately 20 percent of the amount disbursed for agricultural production. In contrast, for loans used to acquire capital goods (i.e., PTR technologies), the rate of default is only about 8 percent. Thus, by changing its target group PTR might be able to cut the

amounts in arrears by more than half. This would save on supervisory and capital recovery costs.

The last (but not necessarily the least) factor influencing the cost of the credit program is the dynamics of the institutional framework in Honduras. As explained in other sections of this report, PTR has had its share of institutional quarrels. To lower the cost of providing credit, PTR must adhere to its technological identity and concentrate on tying its credit to its technologies. This will insure a more focused management of credit costs and will better define the avenues left for increasing productivity in the administration of PTR's credit program.

Without GOH (or other) funding, shelter from harmful political intervention, and further FSR/E training, PTR and its supporting services to the rural population will wither away. What may remain are the project gains achieved in the rural areas over the past nine years--the improved technologies disseminated, the rural enterprises set up by project assistance. The evidence is that these gains have been substantial. It is a flaw in the project design (and redesign of 1984) that no plan was ever prepared to ensure sustainability. One can only hope that GOH will see fit to capture the PTR experience and do what is necessary to project it into the future.

4.5.2. Cost Recovery Schemes

Aside from the high cost of administration, small-farm and small-enterprise credit has been plagued by low rates of recovery. PTR is no exception. Table 4.15 displays the amounts of arrears for all sources of funds by zone and by length of arrears. The results show that of L 7 million lent by PTR between 1985 and 1988, approximately L 0.5 million have been in arrears at one time or another. Moreover, 2.8 percent of the entire portfolio has been in arrears for more than 180 days. This pattern underscores the need for credit supervision, client selection, and debt collection.

Within the constraints under which it operates, PTR has an effective system of data collection. As field interviews corroborated, credit personnel at PTR field offices do visit clients from time to time to collect debts. In most cases, as the data in the Table 4.15 show, there was a significant drop in the amount of arrears after the fourth month, when farmers and entrepreneurs began to recoup their investments. (The only exception is the Southern Zone, which sustained catastrophic losses due to weather). Nevertheless, as long as the debt collector kept coming, credit users were reminded that they still owed money.

As indicated at the beginning of this evaluation, PTR will stop lending funds for agricultural production starting next year. In addition, it is expected that its lending portfolio for farm technologies will be reduced substantially. These facts create a major problem for PTR--recovering the existing loans. PTR has almost L 3.5 million outstanding in agricultural loans which need to be followed up and collected. Since it will stop lending to many of its current debtors, PTR's collection problem will become more acute.

To say that PTR has established an effective system to recover credit funds must be viewed within the above context. Unless something is done by the MOE to insure that funds are set aside for debt collection during the next three years, losses will be inevitable and the damage to the moral climate necessary for rural lending will be very significant.

PTR's mandate to provide and promote appropriate technologies among small farmers and small entrepreneurs does not easily allow for a self-sustaining institution. Although the technological hardware could be a source of income, it is supposed to be the domain of private enterprise. As for advice, the clientele to which PTR addresses its advice cannot afford to pay for it. They can barely achieve the economies of scale to pay for the hardware itself. Furthermore, there is no tradition among small farmers and entrepreneurs of dealing with institutions on a pay-as-you-go basis.

There may be a few exceptions, however. The vaccination of poultry and pigs has now been left in the hands of local entrepreneurs who charge for their services; the same is true for crop fumigation and land preparation services. In the first case, though, PTR underwrote the initial vaccinations to make farmers aware of their benefit. Even if all types of farmers fell within PTR's recommendation domain, the possibility of a self-sustaining institution in the short or medium run is remote.

4.5.3. Financial Returns

The financial benefits of PTR technologies at the household, farm, and enterprise levels have been much more noticeable during the past three years. PTR is almost ten years old. It has had to undergo growing pains, administrative instability, lack of a consistent institutional identity, and a difficult mandate. Still, as shown in the benefit-cost analysis, the successes it has had with a few technologies have offset the above costs. In asking farmers and technicians point blank about the most successful technologies, one gets an immediate answer: silos, soil conservation, Lorena stoves, and plows, in that order. All of them have proven to be financially successful for farmers and all of them are likely to be bought again.

Documenting the financial benefits varies from one technology to another. The above four--plus some others like the vaccination of pigs and poultry and the Samoa coffee dryers--are not very difficult to evaluate. The problem lies in technologies that are still under refinement, technologies that are inappropriate, and technologies that somehow have simply not caught on with farmers. Below are a few comments on the financial benefits of the four most popular technologies. These comments are qualitative, because the evaluation schedule did not permit a thorough series of case studies.

* The financial gains from silos, as documented in the 1986 Winrock report are fairly obvious. During field interviews in Occidente and Olancho, every farmer interviewed said that silos reduced grain losses from 25 percent of the stored grain to negligible amounts. (In fact, though, technical studies show this figure to be 10 percent.) Moreover, storage gains pay for the cost of this technology in two years or less, depending on the size of the silo.

* Farmers with steeply sloped fields have experienced substantial gains in yields as a result of the construction of terraces and contour canals. Intuitively, soil conservation seems a long-run endeavor. Yet the evidence from field interviews and PTR records indicates almost immediate gains from this technology.

  For example, farmers in Chalmeca, between the Departments of Copan and Santa Barbara, indicated that their expected yields this year will be at least 30 percent greater than without soil conservation. In another village in Francisco Moran, farmers reported "visible results" in harvests only one year after installing contour canals. They believe their production this year will be sufficient to feed their families; before, they always had to buy extra maize. Seventeen members of the Cómite Agrícola of Chauhitiyo--a village located on a rugged mountainside in Choluteca--claim that combined with fertilizer, their contour canals and terraces have increased production more than 15-fold across the past eight years.

* The financial gains from improved stoves are not readily tangible, but their rapid diffusion rate indicates their attractiveness. Asked about their financial benefits, families interviewed could not give any. Almost all households in rural areas collect their own wood, and the time saved is not necessarily

invested in other productive activities. The socially perceived gains have already been enumerated above. In financial terms, however, the cost of the wood saved in one year alone is several times the cost of the stove.

* The combined PROMECH plow has proven very popular among farmers. Asked about its benefits, they point out its light weight, which increases their productivity and that of their oxen. Whether the increased productivity in plowing time results in financial gains can be documented only among those farmers who plow for other farmers in their village. As a rough estimate, farmers can save about three extra days of plowing during the season of land preparation. This translates into L 45-50 of additional revenue resulting from working for other farmers.

5. FACTORS CONDITIONING PROJECT IMPACTS

5.1. GOH Policies and Procedures

PTR has generally squared well with GOH policies aimed at developing the rural areas, although it has not contributed much toward developing public institutions for adapting and transferring technologies--nor, it seems, was it designed to--as GOH policy sought to do when the project began. GOH macroeconomic and agricultural sector policies have adversely affected rural areas through price distortions. An overvalued exchange rate has depressed agricultural prices relative to nonagricultural ones, thus forcing farmers to sell low and buy high. Moreover, agricultural protection rates have been lower than industrial ones, with the same result.

The Honduran political milieu has also adversely affected the project. This matter has been dealt with in more detail in the institutions section of this report.

5.2. Beneficiaries

5.2.1. Beneficiary Inputs

Beneficiaries themselves nearly always contribute to PTR activities. Examples of their inputs of native technical know-how were given in 4.4.1. As noted, the result is fine-tuning of technologies to make them even more efficient and/or appropriate to users' situations.

Even when PTR endows an individual or group with experimental or demonstration items, beneficiaries provide land, labor, and materials. For example, for the experimental continuous-production lime kiln now under construction in Comayagua Department, a group of four lime-making families have organized to contribute wood for scaffolding, build a road to the construction site, and donate land on which the structure stands. Almost daily, one or more persons in the group visit the site to discuss progress with the mason and doubtless add their own insights based on years of traditional lime-making. This makes them an integral and active part of the process of technology generation.

Perhaps more important than physical inputs, beneficiaries provide critical feedback to PTR and UDA on the new technologies throughout the first field and on-farm trials. Also, farmers who receive implements and credit assistance are asked by PTR to serve as demonstrators and trainers for others in their community and region. Likewise, entrepreneurs who receive specialized training are expected to pass this knowledge along to employees and others. This makes beneficiaries themselves active agents of

change. When the technology "proves out"--for example, as in the case of the forage silos enthusiastically adopted by one group of stockowners with whom the team spoke--beneficiaries themselves thus provide the "multiplier" effect that is key to successful technology transfer.

5.2.2. Social, Cultural, and Economic Characteristics and Motivations of Rural Inhabitants

Economic status clearly plays a role in beneficiaries' acceptance of PTR technologies. Not all people can afford all of the technologies, no matter how well they work, and many people have the wisdom to see that they cannot always bear the burden of short-term credit, even when it is offered. Still, in much of its technology development, PTR has provided different options to accord with socioeconomic diversity within its recommendation domain.

A good example is that of earth-working agricultural implements. Only very large farmers and the agrarian reform cooperatives can afford the tractors needed to pull some of PROMECH's and UDA's heavier equipment like harrows and multicultivators. However, medium-sized farmers may be able to afford an animal tool bar or, more modest still, a manual tool bar rig. The poorest farmers at least have the option of replacing their traditional dibble stick with an improved hand-planter/seeder (at a cost of L 35 in 1988). As a further example, silos can be produced in varying sizes (most typically, 12, 18, 30, and 40 qq) to accommodate varying budgets and productive capacities.

Of course, agroecology also constrains adoption of specific technologies. But again, PTR/UDA has sought to accommodate diversity along this parameter. The many kinds of pumps are illustrative. They differ in design according to the water table (e.g., the Rosario for areas with a high water table; the popular hand pump elsewhere), the availability of free-flowing (the Linares) versus sluggish water (e.g., the axial pump for shrimpers in the mangrove swamps), or the reliability of winds (the windmill pump).

Social and cultural factors, naturally, also play a role in adoption. Although information on this aspect of PTR technologies is slim, one or two examples come to mind. An improved stove apparently confers prestige on its owner, thanks to a cleaner, neater house and more culinary options. Interestingly, owners also paint their stoves in bright colors and designs, as though to highlight their place in the home.

Conversely, some technologies have been effectively rejected on sociocultural grounds. Room partitions and trundle-like beds

are a case in point. Perhaps imposed by Western-world and/or Protestant notions of propriety, these were not particularly popular with rural families. According to some reports, people felt uneasy being visually or physically separated from their children at night.

As for other adoption motivaters, unquestionably one of the strongest has been access to credit. This has opened the way for improved technologies that were heretofore out of reach of the average rural family.

5.3. Project Design

The project design has both strengths and flaws. Certainly a strength was its willingness to experiment and try new things. The use of NGOs, for example, was entirely experimental, and was a bold thing to try in the late 1970s. Much has been learned about their use, about their strengths and weaknesses.

The design also had its flaws. First, it tried to incorporate too many implementing agencies and institutions into the project, and soon had to begin casting them off. Second, its approach to technology adaptation and dissemination was very "top down" and ignored actual beneficiary practices and felt needs. Although this approach was still largely in line with the thinking of the time, there were experiments in the late 1970's in the region (e.g., Plan Puebla in Mexico, ICTA in Guatemala), even in Honduras (e.g., the Unidad Central de Investigación Agrícola in Comayagua), with "bottom-up" approaches and with what would soon become FSR/E. And last, there was no provision in the design for effective monitoring of the project's impact, especially its social impact; indeed, there are few reliable data on this today, after nine years of project life.

These design flaws apply also to the project extension in 1984--when redesign might have rectified them. For example, no mention is made of the systems approach to generating, testing, and extending technologies, yet FSR/E was a major issue in the region and in the developing world. That it was not addressed was a serious omission, as was the failure to address the matter of project sustainability after 1988.

5.4. Project Implementation

5.4.1. Management and Technical Assistance

USAID project management has been largely unremarkable, except perhaps during the critical period when PTR shifted from a top-down to a bottom-up system (i.e., FSR/E) approach. The USAID project manager at the time (1984-1986) was highly supportive of

this reorientation and did much to facilitate it. His efforts bore (and continue to bear) fruit, as has been argued elsewhere in this report.

The quality of host-country management has varied substantially over the nine years. There have been seven PTR managers during this time. Management during the years 1984-1986 was probably the most innovative: it supported the reorientation of the project to the systems approach and sought (though itself politically appointed) to shelter the project from harmful political intrusions, and thus protect its staff. (Managerial instability and other managerial problems are dealt with in the institutions section of this report.)

Technical assistance has primarily taken the form of two foreign technical advisors, one for small enterprises and the other for agricultural matters. The small-enterprise advisor has been with the project since its inception. An innovative and resourceful man with much international experience, he has been a major (and positive) driving force in the project and has exercised much influence over the technologies PTR has elected to work with. The agricultural advisor began about the time the project adopted the systems approach; having formerly worked for ICTA in Guatemala, he was experienced in FSR/E and was instrumental in staff training and in reorienting the project.

Some technical assistance was also provided by a United States consulting firm, Partnership for Productivity, until about 1984. This firm, which maintained a team in the country, received about half of the money spent by the project for technical assistance over nine years. The firm provided management training and technical assistance to small business enterprises. It trained INFOP how to train small business entrepreneurs. Project returns on this training, however, were modest since a lack of credit at the time was a major obstacle to greater efficiency and productivity.

5.4.2. Training

As noted in section 4.3.6., the shift to the FSR/E orientation required substantial retooling within PTR. For the most part, the shift was made possible by an ambitious training program, which took place in three stages and which required substantial outside technical assistance.

First came several visits to Honduras by Guatemala's ICTA staff experienced in FSR/E. Later, technical information from ICAITI was incorporated into the design of some technologies developed by UDA. Second, the Miami-based 8-A consulting firm AGRIDEC provided introductory FSR/E training to some 18 PTR staff members in 1985. As part of their training, these individuals

participated in field trips to ICTA the same year. These two steps were very important because they provided a base from which PTR could launch a strong and effective client-oriented field methodology.

Third, although the in-depth training provided to all PTR staff members between 1986 and 1987 (see Section 3.5) used predominantly national resources, AGRIDEC did provide two instructors for a one-week course in FSR/E approaches to technology validation and testing.

5.4.3. NGOs/PVOs

The manner in which NGOs/PVOs plan and implement PTR-sponsored technology dissemination activities is closely related to the nature, goals, and objectives of their organizations and to the manner in which technology transfer is incorporated into their overall project activities. In this section, the eleven NGOs/PVOs are grouped into three classes: community development agencies; specialized, membership-oriented organizations; and savings and loan cooperatives.

1. COMMUNITY DEVELOPMENT AGENCIES. Seven of the eleven NGOs/PVOs that worked with PTR between 1986 and 1988 are organized around objectives related to community and rural development. They are: CEDEN, Menonita, INHBIER, AIEH, PRR, AMM, and CONDERH. In all seven cases, the overall objective is to assist in a broad range of areas of concern, including health and nutrition, production of traditional and non-traditional crops, family gardens, small animal production, soil conservation, improving organizational capacity and infrastructure, and operating communal stores. Three of the seven (CEDEN, Menonita, and AIEH) are or are affiliated with evangelical organizations, but no evidence could be found that development activities were directly related to religious ones. Some (e.g., CEDEN and INHBIER) place special emphasis on leadership training, the principal goal being that training can then be provided to other community members. With the exception of Menonita, all contract agronomists, promoters, or extensionists provide technical assistance, which is combined with credit as a mechanism for technology adoption.

As indicated in section 4.3.7., the capacity of these organizations varies widely in terms of experience, size of staff, and breadth of involvement in PTR-funded and other project areas. Whereas CEDEN has operated for twenty years in refugee relief and (later) community development in five regions of the country, with a relatively large professional and paraprofessional field staff, INHBIER is new, works in only one area, and has a total of eight employees. While AIEH (through CEVER and PRODIZONOH, respectively) provides vocational training

in established workshops and technical assistance in rural communities, the other organizations specialize in extension.

On the whole, these seven organizations had relatively limited experience in promoting rural enterprises prior to working with PTR. Nevertheless, the PTR focus on small farms, rural households, and rural enterprises as part of a single system has essentially allowed the NGOs/PVOs to broaden and extend their coverage to include an important element in the rural landscape. Nevertheless, it is important to note that none of the agencies discussed in this section employs the FSR/E orientation that PTR adopted with great success.

2. SPECIALIZED MEMBERSHIP-ORIENTED ORGANIZATIONS. Two NGOs/PVOs are concerned principally with organizing individuals within a specific occupational category in order to promote their common interests with respect to incomes, technical assistance, and credit. ANAH, the National Association of Artisans, unites some 300 independent artisans, while AHPROCAFE, the Honduran Association of Coffee Producers, represents 37,759 small, medium, and large-scale coffee producers and operates several special programs on their behalf, including some 450 groups and individuals interested in beekeeping in order to sell honey (AHPROCAFE, 1988).

PTR funding to these agencies consisted of loans to provide credit to finance members' operating expenses. In the case of AHPROCAFE, collateral rural industries were also supported, although no new jobs were created. If funding is no longer to be provided to small farmers within a slimmed-down PTR, this category represents an alternative means of improving living conditions in the rural sector. Artisan workshops are labor intensive and require relatively little capital outlay, so that employment could be generated and markets expanded through continued or increased levels of support for operating expenses and technical assistance (aimed at improving product quality and locating export markets). Beekeeping, if extended beyond its modest present limits, has the potential to generate direct and indirect employment. In both cases, substantial improvements would have to be made in accounting and credit-management procedures.

3. SAVINGS AND LOAN ASSOCIATIONS. Two cooperatives, Corquin and Apaquiz, were supported by PTR in the period 1986-1988. The common element is that while both institutions represent their members' interests, they are profit-seeking organizations. Both implemented rural development projects with PTR funding as a means of maximizing the effectiveness of credit schemes. But, while Corquin included a variety of interrelated activities, Apaquiz merely provided funding for metal silos. Both used PTR funding for developing credit programs to hire

field and office staff to implement the agreed-upon projects. The Corquin project combines credit and technical assistance as components in an integrated project, while the Apaquiz project was designed to respond to only one felt need.

The evaluation team had the opportunity of interacting with office and field staff from most of the NGOs/PVOs that worked with PTR in the period 1986-1988. They were largely dedicated and committed to their activities, primarily because they felt that their institutional and personal commitment was important and potentially effective in improving living standards and production in rural areas, with the ultimate effect of improving conditions at the national level.

Given that professional and paraprofessional office and field staff members of NGOs/PVOs are poorly paid, the only factor that can explain their commitment is the essentially altruistic goals expressed to the evaluation team on numerous occasions. For the most part, central offices are understaffed and overworked, while field staff usually live in the areas in which projects are implemented and are therefore adversely affected by isolation, a lack of amenities and transportation, and so on.

5.4.4. Credit Delivery

PTR is not a financial institution, and this is evident in its strategic planning and in its credit management. In terms of strategic planning there is no clear agenda. Since the demand for credit came from rural dwellers, the institution responded in an ad hoc manner, improvising its administrative structure as it went along. This strategy actually has helped PTR by keeping its credit component lean in terms of personnel and making it very responsive to rural needs.

The negative side of this approach is that it can handle only a few problems at a time. Also, by being flexible with its loans, PTR may lose its technological identity. The current credit policy, as outlined in PTR's Reglamento de Crédito, relates only to the legal aspects of financial intermediation. Consistent with its past problems of identity, there is no clear feeling for the boundaries of PTR credit for the short and long runs. As a consequence, following its bottom-up approach, many farmers have received credit for agricultural production, even though this clearly lies outside PTR's technological mandate.

This problem of institutional identity is significantly more acute in the case of small enterprises where, with a few exceptions, there is almost a one-to-one correspondence between the small enterprises and loans intended for the purchase of

supplies. Among the small entrepreneurs borrowing from PTR, technological change seems to be only incidental.

Institutional identity can be a problem in more ways than one. By combining credit and technology within one institution, PTR has created a conflict of interest. Farmers and entrepreneurs whose credit is in arrears have a disincentive to communicate with field staff. As a consequence, technical assistance is delayed and PTR's institutional image suffers because clients with debt problems will tend to see a bill collector behind every technician. Thus PTR will need to put some distance between its direct credit and technological components.

In terms of managing its credit program, PTR must be commended for the careful set of controls it has set in place. The program has been kept honest in terms of serving its intended clients, and it has provided the necessary data base for loan supervision and debt collection. These management procedures, however, have reached their limits of efficiency and need to be streamlined--especially at the level of the central office in Tegucigalpa. The amount of paperwork required under the current system was designed to insure on-the-job training for its field personnel. As a result, it is repetitive and full of unnecessary information.

For example, before disbursement begins, the original documents from every credit application are reviewed three times: by the zone office, by the credit department, and by the auditor's (contracts) office. Moreover, applications are photocopied once and parts of them are recorded in computer files. This process is excessively cumbersome and costly; field personnel are already well trained.

A problem closely related to that of excessive paperwork is the inadequacy of PTR's current computer system. The present hardware and software packages need to be updated. Given the limitations--both budgetary and human--with which PTR's credit department has worked during the last few years, the amount and quality of its data management have been good. Credit has grown so fast, and computer technology has improved so much, however, that PTR cannot afford to continue under the present system.

This system relies on a four-year-old Wang microcomputer with 256 K of capacity and a 10 Mb hard disk. Therefore, a simple cross-tabulation for 4000 records takes about 25 minutes. In terms of software, the problem is also acute. Data management is done in COBOL, which takes a long time to program and "debug" relative to software packages such as D-Base or Paradox. Nobody has easy access to data or cross-tabs that are not already on a fixed menu. If new cross-tabs are needed, programming takes two

days or more for something that could be done in 15 minutes with another software package.

The dedication and good will of PTR's credit personnel is exceptional. During the evaluation period and during the field visits, one could observe that PTR technical staff are fully committed to their work and that they like what they do. Contacts between the field offices and headquarters are frequent and fruitful. Many of the changes that are expected to occur in the current paperwork have already been anticipated by field personnel working in collaboration with headquarters.

For many managerial and administrative aspects of credit, PTR credit staff have an influence in deciding on how things are run. However, they seem to have little influence on certain structural aspects of the program, such as the direction in which PTR will go with credit or the inclusion of some stipulations outlined in the Reglamento de Crédito. An example of the latter is the PTR requirement that borrowers must generate one full-time job for every L 3000 borrowed. This requirement is somewhat nonsensical, since it allows credit to determine the production function of the borrower. Moreover, the L 3000 threshold is far too restrictive to be meaningful. Credit personnel and field staff have argued against this regulation but no change has occurred.

A crucial positive factor in the success of PTR credit delivery has been the dynamism of the institution in relation to its clientele. Borrowing some of its methods from FSR/E has proven very useful. By allowing rural clientele to determine to a large extent the way credit is administered and implemented, PTR staff get immediate feedback on their successes and failures. This feedback can be very satisfying to young professionals eager to see change as a result of their actions.

Another positive factor has been the financial health of the project. Field staff have easy access to transportation and equipment. This has allowed them to dedicate time to their work without becoming frustrated by an overly restricted budget.

6. IMPLEMENTATION AND POLICY: CONSIDERATIONS FOR THE FUTURE

6.1. Lessons Learned

The PTR experience has provided several lessons that can be transferred to other projects engaged in promoting technical change among poorer sectors of the rural population.

6.1.1. Institutions and Management

* In the political-bureaucratic climate of Honduras, the number of key public institutions/agencies structured into a project should be as few as possible in order to avoid problems of coordination and of destructive political interventions. In a sense, the history of PTR over the past nine years has been one of either eliminating public institutions from the project, or of moving project functions away from them and toward private ones.

* Project components or activities should be kept to a manageable number, and should be mutually reinforcing, mutually consistent. PTR has had three major components, concerned with validating and extending a wide variety of technologies to rural households, to rural enterprises, and to small farms. The project has further sought to develop and strengthen the organization of rural industries and commercial enterprises. This mix of activities has been unwieldy. A narrower and more calculated focus on technologies that are mutually reinforcing--technologies for the production of agricultural products integrated with those to process the same products, for example--would have been desirable. This lesson is related to the one above, for to address rural technologies on such a broad front leads inevitably to the involvement of more institutions.

* Care should be exercised not to divorce financial from administrative authority. This admonition is stronger when the two authorities belong to institutions of widely differing mandates. UDA has been administratively dependent on MRN (and to a degree financially), but financially dependent on PTR. Consequently, the head of UDA has often been in an allegiance bind, and UDA has experienced competing program demands from the two authorities. MRN is legally charged with agricultural research and extension in Honduras, yet PTR, an appendage of CDI (an institution charged with industrial development), has engaged in agricultural technology adaptation (a form of research) and extension. This arrangement has created tensions between MRN and PTR, with the result that UDA has never fully identified with the project.

* In order for a project to have program continuity and to maintain competent staff, it must be sheltered from harmful political intervention. The management especially must be

sheltered. PTR has had seven managers in nine years, and its program has often changed dramatically with a change of managers. Such political intervention has also contributed to a high turnover of project technical personnel.

Furthermore, attaching a project to a semiautonomous agency (such as CDI) does not of itself necessarily provide such shelter nor make the project semiautonomous (as it should be). The PTR manager is appointed by the director of CDI and is thus a political appointee. In May 1988, amid internal political conflict, the Minister of Economy removed PTR from CDI and made it directly dependent on the Ministry. Such actions (and actions that may beget them) reduce the project to a pawn in a destructive political game.

* An effective technology adaptation and extension project must have at least semiautonomous status if it is to be lodged in the public sector. It must have timely access to operating funds (through a revolving fund, perhaps) because its work requires highly mobile technical teams whose effectiveness depends upon frequent visits to rural beneficiaries. Bureaucratic delays in funding can adversely affect the critical technician-beneficiary relationship. Additionally, such projects must be able to control the composition and quality of their staffs.

6.1.2. Credit

* It is possible to link credit and technical change effectively. There have been many projects that promote credit and technical change among small farmers in Honduras. Most have failed. What sets PTR apart from other projects is its use of farming systems methods. This allows farmers to have a voice in the design of technologies and, to a large extent, in the design of the credit program. In addition, the use of sondeos has helped identify potential users of credit and technology. Although PTR is not, and will not be, a financial institution, it has set an example of how to reach a potential clientele effectively. Moreover, without knowing it, PTR has shown how farming system methods can be applied to credit.

* Financial intermediation for small farmers and entrepreneurs is possible but it has a rough road ahead. The experience with banks has been good but it is too recent to know if it will last. The basis for a good relationship with banks is the use of profitable, but reasonable, interest rates, and the canvassing of potential credit users by PTR field staff.

* Credit supervision does count. The moral climate established by PTR has been much better than might be expected for the rural sector in Honduras. Past experiences with development banks and other assistance projects working in rural

finance have been disastrous. Nevertheless, PTR's overall portfolio has survived two rough years (which witnessed climatic disasters in several regions of Honduras), with an approximate repayment rate of 90 percent.

6.1.3. Technologies

* Across the LOP, the breadth of PTR vision in considering new technologies has been impressive (although some might say "scattershot"). Without losing this questing, open-minded approach to new technologies, however, any future project should try to focus sooner on the most realistic options--before, say, five to eight prototypes are designed, only to find that the technology does not suit the real and felt needs or the pocketbooks of the recommendation domain.

* In recent years, PTR has done a fair job of tracking quantitative indicators of its technology generation successes. But qualitative monitoring and reporting of both successes and failures to find out why a given item worked or did not (because of which socio-organizational, socioeconomic, and other parameters) has been extremely limited. This has had two predictable outcomes. First, many larger "lessons learned" in the DDD process are lost to new staff, to other development groups like NGOs/PVOs, or to future projects. This means that fresh initiatives run the risk of re-inventing the wheel--a costly proposition. Second, this inattention to field-level follow-up, analysis, and formal and public-information reporting of long-term impacts and social benefits may have caused the project to underrepresent its real success and indirect outreach. This has hurt.

* PTR's work with certain "household" technologies has been important in at least three critical respects. First, it has provided a relatively easy entree into rural families and communities which smooths the way for later, larger technology transfer efforts. Second, it has tackled important problems in energy demands and natural resource depletion. Third, it has benefited far more women than would a project without this component.

* Related to the foregoing, an overview of PRT work testifies to the complex agro-sylvo-pastoral linkages in rural milieux. Changes in any one of these areas may have surprisingly positive (or negative) implications for others. A focus on only one part of this equation could lead to very disappointing results in future projects.

* In designing technology for rural enterprises, in many instances PTR/UDA have wisely chosen to begin with indigenous practice and equipment, working toward modest modifications of

familiar, time-tested designs that use locally available materials. Examples include: modified traditional kilns and ovens; putting salt-making infrastructure to work raising shrimp; and somewhat less successful, improved hand-planters. Similarly, in disseminating technology among rural producers, the project has built upon existing models of socioeconomic organization in Honduras--Clubs de Amas de Casa, Comités Agrícolas, cooperatives. Among rural enterprises, it has respected (or readapted) traditional individual or multifamily patterns of cooperation and existing land tenure. In other words, PTR has been cognizant of the dangers of over-innovation along certain fronts--perhaps a lesson learned from some of its less successful DDD initiatives.

* Reviewing the six top-ranked technologies disseminated by PTR, several key characteristics emerge.

  -- Most are fairly affordable--in 1988, materials and labor for an improved stove cost approximately L 80; a manual corn sheller sold for L 35, the popular combined PROMECH plow for L 175, and an 18 qq silo for L 160.

  -- A number enhance life quality--by decreasing drudgery (shelling corn, gathering wood daily) or by improving the quality and quantity of foodstuffs (silos, new garden crops, higher yields from healthier livestock).

  -- Many reduce risks from natural and climatic vagaries--e.g., veterinary services, soil and water conservation, silos.

  -- They are easy to understand and use or access.

  -- A number generate cash earnings, either directly or indirectly.

  -- Most fit comfortably into present systems of farming combined with migration.

  -- Results of all the top-ranked technologies are readily and fairly quickly visible; even in the case of soil conservation, farmers remark notable increases in production in the space of one cropping season.

* The confused ending (at least of USAID funding) and the uncertain future of PTR point to the need for effective forward planning for such projects. The exponentially growing impetus built up by PTR across the last several years has been halted. Good staff have been lost and many of those remaining are demoralized. More important, PTR's credibility with its client audience has been damaged. Many beneficiaries are deeply worried about the future of their new undertakings without PTR follow-through on training and marketing assistance.

6.1.4. NGOs/PVOs

* NGOs/PVOs have participated effectively in the technology transfer process, and indications are that they could play a greater role than they have to date. PTR has already achieved some of its technology transfer goals by working with a handful of NGOs/PVOs, and there are dozens of others with whom the project could establish working relationships. The chief advantage to this approach has been that many NGOs/PVOs have established close ties with rural inhabitants and are working in a wide variety of development activities. In addition, PTR operating expenses are reduced to the extent that areas not covered directly by PTR are covered by NGOs/PVOs. PTR has had relatively good success in inserting rural technology transfer into these kinds of projects. Nevertheless, the administrative and field operations of NGOs/PVOs vary widely in terms of quality, so they must be closely monitored and supervised in order to assure strict adherence to agreed-upon requirements and procedures.

* NGO/PVO efforts were particularly significant in the small-farm and rural-household components of PTR, principally because those components fit most closely into their ongoing activities and corresponded to their areas of greatest expertise. Nevertheless, because of the integrated nature of rural socioeconomic systems, NGOs/PVOs have also tried to incorporate the rural enterprise component into their projects.

* NGO/PVO administrative and field staff are generally highly motivated and in some cases have been very effective. Nevertheless, personnel standards vary widely, and PTR contracts have not stipulated minimum requirements for educational level, professional background, or experience. Since good results have been achieved in some cases with paraprofessionals, high levels of formal education need not be uniformly required of all NGO/PVO field personnel. Nevertheless, contracts that leave this area unspecified, and that permit PTR no part in NGO/PVO staff selection and approval invite uneven results in the long run.

* NGOs/PVOs vary in the quality of in-service training that is offered to administrative and field staff, and they use a variety of operational methodologies; none currently employ the FSR/E approach. Standardization of training and operational methodologies along the lines of FSR/E would be a relatively difficult process, but it is an innovation that would be likely to have substantial long-term benefits.

6.1.5. Technology Generation, Extension, and Training

Several lessons are associated with the adoption by the project of the systems approach (FSR/E) in late 1984.

* The goals for technology adaptation and extension projects that follow the systems approach should be set with much care. As the Winrock evaluation suggested, goals should be set not in terms of number of technologies developed or disseminated, but rather in terms of number of families benefited and of income increases. The lesson here may be an even deeper one, however. The systems approach requires an initial diagnosis of client needs and practices (i.e., the sondeo), followed by a period of testing, client feedback, and adaptation. This process, which may take from one to three years before certain technologies are ready for dissemination, conflicts with conventional USAID practices of setting numerical goals that must be achieved in yearly steps over the usual project interval of five years.

Technical personnel working on such projects face much pressure to meet yearly quotas and often pursue them with blind and reckless desperation--as happened at different times in the life of PTR. Without such pressure, personnel could be engaged in understanding current client practices and needs more fully, and in developing more appropriate technologies to respond to them. Once developed, these technologies, designed for a large homogeneous target group, will spread quickly and without much extension effort. The returns to the systems approach are low over the short term, but rise dramatically over the long term (beyond about three years, say).

* The systems approach should have been adopted earlier, at the beginning of the project.

* Beneficiaries must participate in the technology adaptation process. Another way of saying this is that PTR should work on the basis of needs felt by rural beneficiaries. It should not, as it did in the early years, work on the basis of what project technical staff think beneficiaries need.

* Esprit de corps among the technical field staff is valuable. The systems approach involves intense interaction of the different technical disciplines at the field level (zone and area levels) in order collectively to diagnose and address beneficiary needs. The interaction entails periodic meetings of the members of an area team, of these teams and members of the zonal team, and of members of different zonal teams, to exchange ideas and address common problems. This intense interaction creates a mística, which was remarked by several informed persons as something new and valuable for PTR. Job insecurity and high personnel turnover, it should be said, work against this mística.

* It is essential that technical personnel be based in the rural milieu, as they came to be in 1985 with the initiation of the systems approach. Each zone has three or four areas; a technical team is based in each area. (It was only in 1984 that zonal coordinators were assigned to their zones; before, they were based in Tegucigalpa and commuted, drawing per diems.)

* PTR cannot work effectively without a well-defined methodology. The systems approach, beginning with diagnosis and moving through the stages of testing, adaptation, and dissemination, provides such a methodology.

* There is a close relationship between effective technology generation and extension and the kind and amount of training received by field personnel. Relevant and systematic in-service training is particularly important in this regard.

* It is crucial to monitor and evaluate project implementation on a regular basis. In addition, it is necessary to set long-term goals based on the sustainability of the technology transfer process. At present, the measure of success is based on largely short-term goals, namely, numbers of technologies introduced and families involved in the process. A better measure of the strengthening of rural institutions--small farms, rural households, and rural enterprises--would consider the proper use of technologies after their introduction.

6.2. Recommendations and Policy Reforms

6.2.1. Institutions and Management

* That the entire PTR structure be buffered against political intervention. The positions of manager and assistant manager of PTR should be nonpolitical; candidates for these positions should meet specified technical criteria suitable for the jobs, and the positions should carry tenure guarantees. This is not to say that the several persons occupying these positions have in all cases been unqualified; to the contrary, some have been well qualified. But even when they were so qualified, they often were removed from office for political reasons, in the same way that political influence put them there. Such frequent changes are disruptive to program. Job insecurity at all levels has created morale problems. The Government of Honduras should, therefore, take steps to buffer the PTR structure and stabilize project personnel.

In the future, USAID funding of projects such as PTR should be contingent upon the GOH's prior fulfillment of certain conditions. These conditions might include the following: a detailed plan prepared by GOH for USAID approval and specifying

just how the project is to be made autonomous, or at least buffered against capricious political-bureaucratic intrusions. At the very least, the plan should provide for the hiring of an independent (i.e., politically unaffiliated) manager and assistant manager; these persons should be hired on the basis of technical qualifications for the jobs and should be given long-term (three years, say) contracts. The same applies to zonal coordinators, in order to assure continuity of quality activity at the field level.

Furthermore, the GOH plan should provide guarantees of job security for technical personnel throughout the project structure and should establish (or provide for the establishment of) technical criteria for hiring those personnel. Also, the plan should stipulate that the hiring and dismissal of project personnel be approved by a project-oversight committee (the Cómite Ejecutivo, in the case of PTR) on which USAID is fully represented (i.e., with voice and vote).

* That PTR/GOH creatively consider ways to continue PTR. Such a continuation would preclude the loss of much valuable experience gained at high cost over nearly ten years--a cost that should not be incurred again. PTR could, for example, contract its services to other agencies and projects. It could, that is, adapt and disseminate technologies on a contract basis. Also, GOH might consider the use of ESF to continue PTR. But the project must first be sheltered from political intervention, must achieve a high-quality stable staff from top to bottom, and must further the training of that staff, especially in FSR/E methods. Since USAID must approve the use of ESF, that approval should be conditioned as described in the previous recommendation.

6.2.2. Credit

Strategic Recommendations

* Intensify the link between credit and technology adoption. Credit for non-PTR-technology-related agricultural production and for the purchase of supplies (not PTR technologies) for small enterprises should be phased out. Currently, rumors are that the project will pull out of agriculture and concentrate on small enterprises. This would be a serious mistake unless there is another mechanism (another project or institution, say) to continue the FSR/E approach and thus generate and extend appropriate production technologies to small farmers. If there is no other mechanism (and there seems not to be at present), then PTR must continue working with farmers through the linkage provided by farm technologies. Even though small enterprises would be in charge of manufacturing some of those technologies, only constant contact with farmers can ensure that the technologies are appropriate. PTR could continue providing credit for the purchase of farm technology through financial

intermediaries (see below), but it (or someone) must maintain direct contact with farmers in order to continue to be effective. Intensifying the link between credit and technology also would insure that PTR maintains its institutional identity.

* Reduce the role of direct credit. In conjunction with the above policy reform, PTR must promote financial intermediation at the level of the small enterprise and the farm. The first can be done through the banking system, as it is being done with the banks of Occidente and Sogerin. At the farm level, financial intermediation may take place through the promotion of appropriate technology stores held in private hands but backed by PTR-led financing. Direct credit creates a conflict of interest between technical assistance and debt collection. By reducing direct credit PTR can channel its credit portfolio through intermediaries, while maintaining close touch with its clients.

* Conduct research. Being in charge of an appropriate technology agenda forces PTR to be always on the lookout for innovations that can be transferred to its clients. The same must be said of the credit component. Credit research can become very simple and cost effective once there is better access to PTR's data base. It can start with a simple statistical analysis of current data in order to generate a functional classification of credit users, and then continue with studies on new ways to deal with and prevent default, to provide credit, and to reduce operational costs. PTR should create a research department as an adjunct to the departments of credit and planning. This department would insure constant statistical feedback and would help bring innovations to PTR credit.

* Computerize field offices in the medium run. In order to increase field-staff efficiency, automatization of field operations will be necessary within the next two years, especially if the current rate of growth continues.

Operational Recommendations

* Seek assistance in marketing. So far, the weakest component that remains in the credit-technology link is marketing strategy. No one at PTR has expertise in this area. Efforts should be made to make marketing an important component of technical change.

* Update the computer system at PTR headquarters as soon as possible. The new computer system should be IBM-compatible and should have a Bernoulli box to insure infinite storage capacity. Software should emphasize fast access to data, such as Paradox, D-Base IV, or similar software. Other software, such as Lotus and Systat, as well as word processors, should also be available.

* Insure that next year's budget includes funds for debt collection for the existing portfolio. At a minimum, debt collection should include one full-time staff member per zone.

* Streamline the existing credit administration process to minimize it. These revisions should be made in cooperation with field staff.

* Seek computer literacy for all department heads at the central office and for field personnel. At a minimum the degree of literacy should include MS DOS, word processing, and Lotus.

* Increase the bottom-up approach to implementation management. In order to maintain its dynamism, PTR credit must set up continual meetings with its users and its field staff to find out how it can improve credit management. Improvements are most urgently needed in the areas of credit application, the credit approval process, and data processing.

6.2.3. Technologies

* Include a professional-level social analyst to work with all project units (PTR, UDA, NGOs). This should be an agricultural anthropologist or agricultural sociologist trained in FSR/E methods and conversant with low-input, intermediate-technology issues and options. In the DDD process, before any technology even reaches the drawing board, this individual should be a major actor in initial sondeos and in what should be sociocultural as well as economic studies of feasibility. Socioculturally astute and experienced FSR/E input at this level will speed the process of technology generation by weeding out a higher proportion of inappropriate technologies (or better targeting subsectors of the domain for which items are appropriate) much earlier.

Professional social analysis is equally critical for tracking the technology transfer process, explaining the why and wherefore of each item's movement through this phase, plus the ultimate outcomes (positive or negative) and any longer-term spread effects. As one thoroughgoing study of World Bank development projects demonstrates, there is a concrete economic payoff in careful attention to such issues. Projects with adequate sociological inputs were found to have economic rates of return "more than twice as high as those for socially incompatible and poorly analyzed projects" (Kottak 1985:328).

In sum, critical feedback from social analysis will result in cost savings from a tighter focus and more judicious selection of the types of technology to be generated. At the same time, it will reinforce PTR sensitivity in technology design to the real-world socioeconomic, ecological, and gender diversity of the target population, lest "inequitable" technology generation result.

* PTR sorely needs to strengthen systematically its reporting and information dissemination systems, to make sure that its findings and experiences reach audiences that can best put them to use--whether in the field or within the relevant donor and host-country agencies.

* In the future, PTR should seek to retain some focus on appropriate household technologies in ways that are compatible with the project's larger mandates. It will thus reap the advantages of easy entree, gender equity, and energy and natural resource conservation that this component offers.

* Certainly, PTR or other projects should continue the focus on resource-conserving and innovative energy-saving or fuelwood-substituting technologies that PTR has pioneered. This is one of Honduras' most pressing development needs. The same should occur for import-substituting technologies, where these prove socioeconomically feasible.

* Any future project should also incorporate PTR's flexibility and openness to user feedback in the DDD process, and its model of building upon indigenous practice, technology, and socioeconomic organization wherever possible. Blind, top-down, a priori, or coercive approaches to technology generation and transfer do not work.

* At a broader level, future efforts at technology design, development, and delivery should closely attend to the features that characterize PTR's broadest successes--affordability, enhanced life quality, risk reduction, comprehensibility and ease of access, income generation, good fit with present farming and wage-labor patterns, and readily visible results.

* In the design of future projects, careful thought should be given to the post-project future, and realistic options for continuing or institutionalizing successful endeavors should be outlined and explored from the beginning.

6.2.4. NGOs/PVOs

* Create a liaison office in PTR staffed by personnel trained in PTR administrative and field methodologies (i.e., FSR/E). During the first six months of NGO/PVO project implementation, the office would train NGO/PVO staff in program supervision, FSR/E, and the administration of credit programs. In a related vein, establish minimum qualifications for NGO/PVO staff in all PTR contracts, and provide for PTR approval of all NGO/PVO personnel involved in PTR-sponsored projects.

* Examine alternative means of supporting NGOs/PVOs in technology transfer. PTR and UDA should continue to participate in the technology-generation component, but operational and financial links should be developed with NGO/PVO umbrella organizations. Two such organizations are FOPRIDEH and PYMI/ANDI, which could potentially focus on small farmers/rural households and rural enterprises, respectively.

* Create an audiovisual office within PTR to produce original and location-specific audiovisual materials. The gains to be achieved at relatively low cost (equipment and materials) could be substantial. Alternatively, develop an ongoing relationship between PTR and an external technical assistance agency with experience in producing audiovisual materials in developing countries.

6.2.5. Technology Generation, Extension, and Training

* That PTR goals be set in such a way that technical personnel have ample time to diagnose beneficiary needs and practices, and to test and validate technologies before releasing them for dissemination on a grand scale. A scheme whereby numerical goals are kept low during the first couple of years, and then increased gradually during the remaining program time might be considered. This would eliminate the pressure felt by technical personnel to launch into a dissemination campaign immediately with untested and often inappropriate technologies. Such a scheme would likely have greater returns over the longer term since it would yield technologies that are indeed appropriate, and thus need little promotional effort.

* That PTR continue to operate with a systems approach (FSR/E) to technology generation, validation, and dissemination. The evidence is overwhelming that this approach has brought positive benefits to the project. However, such a continuation will require substantial training of technical staff, for high staff turnover (a problem that shelter from the political process should largely resolve) has meant a loss of expertise in the systems approach over the past several years of project life. The project is now in a dissemination mode, harvesting the results of the systems approach as introduced three years ago.

* Strengthen training in small-enterprise extension methodologies, and concentrate to a greater degree on generating technologies appropriate to small-scale rural industrial, artisanal, and service-delivery enterprises. Concentrate on those rural enterprises that have the potential of affecting the small-scale agricultural sector, both directly (employment generation and provision of services) and indirectly (backward and forward linkages, such as tool and implement construction) where PTR/UDA could continue to make an important contribution.

* Provide systematic in-service training in FSR/E to PTR staff and offer training in these methodologies to NGOs/PVOs.

* Evaluate the impact of technology transfer based on the continuing presence of functioning technologies after their initial introduction, and account also for technologies that have been adopted spontaneously through the diffusion process.

BIBLIOGRAPHY

Asociación Hondureña de Productores de Café
1988 Informe anual 1987/88. Tegucigalpa: AHPROCAFE.

Branch, Kristi, Douglas A. Hooper, James Thompson, and James Creighton
1984 Guide to Social Assessment: A Framework for Assessing Social Change. Social Impact Assessment Series, No. 11. Boulder and London: Westview Press.

Development Associates
1983 An Impact Evaluation Report on the Honduras Rural Technologies Program. Washington, D.C.: Development Associates.

ECONSULT
1988 Credit Policy in Honduras in the Context of Macroeconomic Constraints. Consulting report to USAID/Honduras.

Jones, James C.
1985 Farming Systems Research and Extension in CATIE, 1975-1985: Notes and Observations. A report prepared for Centro Agronómico Tropical de Investigación y Enseñanza. Gainesville, Florida.

Kottak, Conrad Phillip
1985 When People Don't Come First: Some Sociological Lessons from Completed Projects. In Michael M. Cernea, ed., Putting People First: Sociological Variables in Rural Development. New York: Oxford University Press. Pp. 325-356.

Programa de Tecnologías Rurales (PTR)
1988 Plan Operativo-Presupuesto Institucional, 1989. Tegucigalpa.
1988 Seminario sobre Crédito. September 1-8, 1988. Unpublished mimeograph. Tegucigalpa.
1987 PTR, ¿qué es? Tegucigalpa.
1987 Reglamento de Crédito. Anexo I. Unpublished mimeograph. Tegucigalpa.
1986 Bases para Priorización de Tecnologías. Memorandum del 8 de septiembre de Lic. Silvia V. de Zúñiga para el Ing. Ramón Arturo Espinoza. Tegucigalpa.
1986 Guía Técnica. Tegucigalpa: PTR.

Schneider, Kurt
1987 "Unidad Postcosecha." Experiencia del Proyecto para la Reducción de Pérdidas Post-Cosecha en Honduras. Tegucigalpa: MRN/COSUDE.

Unidad de Desarrollo y Adaptación
1988 Informes de UDA. Tegucigalpa: UDA.

USAID
1988 Strategy Paper for the Agricultural Sector in Honduras. Office of Agriculture and Rural Development. Tegucigalpa: USAID/Honduras.
1985 Review of USAID/Honduras' Rural Technologies Project No. 522-0157. Audit Report No. 1-522-14. Tegucigalpa.
1984 Project Paper Supplement. (For an extension of PTR, No. 522-0157). Tegucigalpa.
1981 Project Evaluation Summary. (Summary of an internal evaluation of PTR). Tegucigalpa.
1979 Project Paper. (PTR design). Tegucigalpa.

USDA (US Department of Agriculture)
1988 Agricultural Development Policies in Honduras: A Consumption Perspective. A report prepared in cooperation with USAID. Washington, D.C.

Von Pischke, J. D., Dale W. Adams, and Gordon Donald, eds.
1983 Rural Financial Markets in Developing Countries: Their Use and Abuse. Baltimore: Published for the Economic Development Institute of the World Bank by the Johns Hopkins University Press.

Wiggins, Ray L.
1988 Agroindustria en la Región de Occidente: Departamentos de Copán, Lempira, Ocotepeque. Consulting report prepared by Development Associates, Inc. for SECPLAN, Government of Honduras, and USAID/Honduras.

Winrock International
1986 Impact Evaluation of the Honduras Rural Technologies Project. Winrock International.

APPENDIX A

FINAL EVALUATION SCOPE OF WORK

BACKGROUND:

Over the past nine years, the Rural Technology Project (522-0157) has been one of the USAID/Honduras Mission's premier projects of technology transfer. The purpose of this project is three-fold: a) to increase effective utilization of labor and land on small farms through the use of improved light capital farm implements and systems to increase the income of the small farmer; b) to increase small-scale rural industrial production and employment through the introduction of improved production and management systems and the establishment of new enterprises; and c) to increase utilization by the rural poor of low-cost appropriate technologies or products designed to improve the quality of life. Major components are: Adaptive Research and Information Networks, Rural Industrial Extension Services, on-the-job training of Small Farmers and Entrepreneurs, and Project Coordination and Management.

The project is being carried out through the Rural Technologies Program (PTR) of the GOH's Ministry of Economy. PTR is responsible for testing and, together with approximately 10 Honduran and international PVOs, the dissemination of technologies for use by small farmers and rural households. Small-scale rural enterprises and industries are being assisted to enter into the production of the technologies. Also under the project, the Ministry of Natural Resources is developing and testing improved farm implements. Several credit mechanisms have been instituted to finance the adoption of technologies and investments at the household, farm and enterprise level. Examples of technologies developed and disseminated to date include: waterwheels, grain storage silos, grain dryers, fuel-efficient stoves. The project has established enterprises ranging from brickmaking and blacksmithing to shrimp cultivation and agricultural supply stores. Thousands of families have already benefited from the technologies disseminated. Several of these beneficiary families have doubled or tripled incomes. This has been verified in project evaluations in 1983 and 1986.

On December 31, 1988, the project will come to completion, and will no longer receive direct financial or technical assistance from the USAID Mission. Nevertheless, the PTR project unit now is being considered for future GOH institutional support, and several of its activities as contracted service components of new AID technology transfer projects. Given that the project represents a relevant experience for any future activities, the successful completion of the reporting and evaluation tasks described below will ensure that the project outputs and impacts are adequately documented, and that the project serves to enhance the effectiveness and productivity of new technology transfer activities.

TITLE: Project Assistance Completion Report and Final Evaluation of the Rural Technologies Project (522-0157)

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OBJECTIVE: The objectives of this evaluation are:

A. Summarize project implementation over the life of the project, the final level of inputs and outputs provided by the project's activities and the end-of-project status regarding achievement of objectives as stated in project agreements;

B. Evaluate the impacts of the project from social, economic, technical, and institutional perspectives; analyze the factors explaining such impacts; determine the lessons learned from project implementation;

C. Evaluate specifically and in detail, the implementational strategies, impacts, and factors explaining the impacts of project involvement with private and voluntary organizations, and the project's credit mechanisms;

D. Provide implementational and policy recommendations for future rural technology and small enterprise programs which would enhance their effectiveness in promoting rural development.

STATEMENT OF WORK

A. Conduct a thorough review of the project paper and amendments, project implementation letters, previous evaluations (1983, 1986), reports, other background materials and interviews with AID and GOH project staffs to develop an historical description of the project from its beginning to present day. This description shall include sections on:

- the political, technical, economic, social, and institutional context of the project, and how this has changed over time;

- the project organization and implementational strategies for i) farm and household technology development and dissemination, ii) small enterprise development, iii) mariculture development, iv) staff training, support and institutional development, v) extension and training programs, vi) credit, viii) project monitoring, data collection and evaluation;

- the project objectives over time;

- how previous evaluations have influenced the project direction; and

- the level of human resource, financial and commodity inputs. (Estimated length: not exceed 5 pages)

B. On the basis of existing evaluations and project data bases, describe the project outputs and end-of-project status with respect to project objectives. Project outputs should be classified in terms of:

- direct and indirect beneficiaries;
- numbers and types of technologies developed, disseminated, and in use by beneficiaries;

- direct and indirect effects of techonologies developed and disseminated;
- numbers and types of small enterprises established and current status of those enterprises;
- number of loans provided and repaid; number of credit mechanisms;
- number of people trained and effects of this training;
- amount and level of extension materials;
- extent of institutional capability to identify and evaluate rural technology problems, develop solutions, and effectively execute a delivery and service system.

This section should make maximum use of tabular, graphical, and organigram-type formats as the bases for discussion. To the extend existing data permit, all beneficiary information should be disaggregated according to the sex of the beneficiary.

(Estimated length: 10 pages text with supporting quantitative and qualitative information as appendixes.)

C. On the basis of representative individual and group interviews, site visits, observations, and analyses of existing data describe the impacts (positive and negative) of the project from the following standpoints, among others as appropriate:

- Beneficiaries: Who were they? What were their gender, social, economic, geographic characteristics?
- Social and Economic Impact: What social and economic changes occurred? Did new forms of social and economic organization occur (i.e. service industries, cooperative societies, enterprises, farming systems evolving around a certain technology or process)? What was the project's impact on production, employment, and GDP? What was the project's impact on rural investment?
- Political and Institutional Impact: Were there changes in institutional, managerial, and budgetary processes? Were there changes in institutional implementation responsibility? What was the extent of PVO/NGO and Private bank involvement? Did the project bring about effective, sustainable credit mechanisms?
- Technological Impact: Was local technology modified? Did innovations spread beyond project participants? Did the technologies create constraints on other resources, require excess foreign exchange, or effect interesting changes in local resource use, such as land, labor, other natural resources, etc.? What were the positive and negative impacts of these technologies?
- Sustainability: Do rural populations face the prospects of sustained productivity, and continued access to quality technological and financial services? Were there developments of effective cost recovery schemes, as in credit funds, and/or other sustainable service mechanisms? Did technological investments at the home, farm, and enterprise level experience positive net returns in financial terms, and will these continue to be experienced?

In the above section, impacts on PVOs (i.e. their administrative and implementational capacity as technical and or financial service delivery agents) and credit delivery (e.g. access for individuals or groups previously outside the credit system, development of new credit mechanisms, involvement of private banks, modifications of traditional credit systems) shall be dealt with in detail.

(Estimated length: not to exceed 10 pages)

D. Identify the causes, reasons, and variables effecting the impacts described above. The following questions may assist in this task:

- Role of Host Government: How did policies and procedures toward rural areas and populations influence the impacts?;

- Role of Beneficiaries: What has been the effect of beneficiaries inputs to the impact of the project? What social, cultural, economic characteristics influenced their participation? What motivated or failed to motivate rural inhabitants?;

- Project Design: What particular design features contributed to the positive or negative project impacts?

- Implementation: To what extent did project managers and implementators and their strategies affect impacts? Were implementation systems (planning, execution, management and use of staff and TA resources) particularly influential in affecting project impacts? Was performance, staff commitment significantly influential? What factors determined performance and commitment of project staffs?

Within this section, particular emphasis shall be given to PVOs/NGOs and credit. Design features, roles of institutional staff and beneficiaries, and implementation strategies of these elements of the project shall be discussed in detail.

(Estimated length: not to exceed 10 pages)

E. Assess the implementation and policy implications of the project. Identify those policy reforms which merit priority attention by policy makers, perhaps as conditions to contemplated assistance, for the effectiveness of future programs in rural technology development and transfer. These policy actions should be discussed in terms of their priority (degree of influence over the success of contemplated rural technology transfer programs); their feasibility; the particular policy implementation strategy and alternatives; and their costs and benefits. Specific attention shall be given to PVO and credit policies. Recommend feasible implementation strategies for future projects in rural technology, with specific attention to PVO and credit implementation.

(Estimated length: not to exceed 10 pages)

F. Composition and Qualifications of Evaluation Team:

1. Evaluation Specialist (25 person days). Graduate degree in social sciences; strong writing and analytical skills; 5 to 10 years of project evaluation experience in Latin America; must speak and read Spanish at the S-3/R-3 level; should have strong practical experience in designing and carrying out AID-type evaluations, especially impact evaluations; must possess practical skills in evaluation methodologies (surveys, representative sampling, data analysis, and field work). Policy analysis experience desired.

2. Appropriate Technology Specialist (20 person days). Graduate degree in agricultural, civil or mechanical engineering preferred; strong writing and analytical skills; 5 to 10 years practical experience in technology transfer projects, preferably in Latin America; practical experience in design, dissemination, adaptation and evaluation of household, farm and rural enterprise techonologies; must speak and read Spanish at the S-3/R-3 level.

3. Agricultural Economist/Credit Specialist (20 person days). Graduate degree in agricultural economics (finance) or business administration; strong writing and analytical skills; 5 to 10 years practical experience in economic, financial, credit and policy analysis in developing countries; practical experience in the design, implementation, and evaluation of rural credit projects; Spanish language skills of S-3/R-3.

4. Private and Voluntary Organization Specialist (20 person days). Graduate degree in social sciences; strong writing and analytical skills; 5 to 10 years practical experience in the management and evaluation of private and voluntary organization in rural development programs; Spanish language skills of S-3/R-3.

NOTE: The role of evaluation specialist may be undertaken by any of the other technical members of the team. The contractor will formally designate one of the above specialists as the team leader. In addition to this person's technical responsibilities, the team leader will be the principal interface between A.I.D. and the team and will be responsible for synthesizing the work of the various specialists into a coherent report.

IV. Reports: A draft report and debriefing of team shall be submitted to the project manager prior to leaving the country - o/a November 10, 1988. Contractors will be responsible for providing the office of Agriculture and Rural Development USAID/Honduras, with 20 copies of a final report in English and 5 copies in Spanish no later than 30 days following completion of field work and receipt of final comments from USAID/Honduras - o/a December 10, 1988.

The required format for the report is as follows:

- Executive Summary: Stating the development objectives of the project; purpose of the evaluation; study methodologies; findings; conclusions; recommendations; lessons learned; and comments on development impact. This section must be a self-contained document.

- Project Identification Data Sheet: (USAID Responsibility)

- Table of Contents

- Body of Report: (Historical description including a brief description of conclusions and recommendations of previous evaluations (1983, 1986), and how they were used in the implementation of the project; End-of-Project status with respect to objectives; Project Impacts; Analysis of Impacts; Implementation and Policy Implications; Conclusions; Recommendations, and lessons learned).

- Appendixes: (Scope-of-Work; most current logical framework; list of individuals and agencies contacted; documents consulted; data, graphs, tables, and any additional details and information upon which conclusions and recommendations are based should be included).

B. References Available in US: AID, AID Evaluation Handbook, Wash. D.C. 1987; AID, An Approach to Evaluating the Impact of AID Projects, Wash. D.C. 1986; AID, A Manual to Evaluate Small-Scale Enterprise Development Projects, Wash. D.C. 1985; American Council of Voluntary Agencies for Foreign Service, Evaluation Source Book for Private and Voluntary Organizations, N.Y. 1983; AID, Agricultural Credit, Input and Marketing Services: An Introductory Review, Wash. D.C. 1985

V. Relationships.

A. Cooperating Country Officials: Ramôn Espinoza, Director of the Rural Technologies Program; project staff; beneficiaries; and cooperating institution officials (banks, PVOs)

B. AID Liaison Officials: Robert J. Wilson, USAID/Honduras Project Manager; Emil Falck, USAID/Honduras Project Liaison Officer; Val de Beausset, USAID/Honduras Technical Advisor; David Schaer, Chief Agricultural and Rural Development Office; David Flood, Deputy Director of the Agricultural and Rural Development Office; Carmen Zambrana, USAID/Honduras Evaluation Officer.

VI. Time Frame. The period of the contract will be o/a October 15 through December 10, 1988. Five days at contractor home office will be allowed to the evaluation team leader to prepare final reports and copies.

VII. Work Days Ordered. The work order comprises a total of 85 person days. A six day work week is authorized.

VIII. Illustrative Budget. See attachment B of this PIO/T

APPENDIX B

LOGICAL FRAMEWORK (1984)

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Project Title & Number: RURAL TECHNOLOGIES PROJECT (522-0157)

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
GOAL: Increase incomes of small farmers and rural small businessmen, improve quality of rural living.	1. Small farmers/businessmen income increased. 2. Selected indicators related to specific appropriate technologies introduced. 3. Improved living standards of target population as measured by selected quality of life indicators.	1.a. Baseline and post-assistance longitudinal studies that will show income changes for beneficiary and non-beneficiary small enterprises b. 1975, 1977 (ATAC) and future small farmer surveys planned under Agriculture Sector II. 2. Evaluation reports by entity (PVO or other) responsible for dissemination of specific appropriate technology. 3. Based on Loan Agreements actual calculation of increased income and for industries the number of increased employees.	Small farmer and small rural industry development will continue to be a high priority area for the GOH.
PROJECT PURPOSE: 1. Increase small farm effective utilization of labor and land through the use of improved light capital farm implements and structures.	EOPS: 1.a. Increased yield per hectare. b. Cultivation of more land appropriate for production. c. Conservation of long-term land productivity.	1. Agriculture Sector II small farmer surveys; longitudinal studies; project evaluation.	1. Continued GOH commitment to small farm agriculture development; small farmers will be receptive to light capital farm implements and structures.

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Project Title & Number: RURAL TECHNOLOGIES PROJECT (522-0157)

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
	d. Decreased number of man hours per unit of productivity of peak labor demand periods. e. Increased labor use during slack demand periods. f. Increased value and quantity of marketable products per unit of pre-harvest production. g. 50,000 users of light capital technology structures and implements. h. Participants in demonstration activities are willing to purchase implements or structures at end of demonstration period and demand exists among non-participants.		
2. Increase small-scale rural industrial productivity and employment through the introduction of improved production and management systems in existing small enterprises and through the establishment of new pilot enterprises.	2.a. 1500 assisted existing small enterprises increase employment by additional 1,679 work-years, for a total of 2000 jobs. b. Increased returns to capital and labor for existing small enterprises.	2. Project evaluation; longitudinal studies.	2. Small scale industrial entrepreneurs will be receptive to improve production and management systems; formal credit systems possesses flexibility to deal with credit needs of micro-businessmen.

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Project Title & Number: RURAL TECHNOLOGIES PROJECT (522-0157)

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
	c. Establish new viable industries that add value to rural resources and products, increase rural employment.		
	d. Increased utilization by small enterprises of formal credit system, with acceptable default rates.		
3. Increased utilization by rural poor of low-cost appropriate technologies or products designed to improve the quality of life.	3. Acceptance of low-cost capital technologies among demonstration groups and replication to additional users.	3. Project evaluation; USAID field inspection.	3. Rural poor will be receptive to low-cost appropriate technologies.
OUTPUTS:	MAGNITUDE OF OUTPUTS:		
1. Improve and expand systems for identification of problems; development, adaptation and dissemination of technologies appropriate for small farmers, rural enterprises and rural households.	1.a. Establishment in CDI of a capacity to identify problems and practical D&A activity through its field agents, advisory panels, special surveys and access to other information centers, and to develop solutions itself or in coordination with other D&A units and to disseminate technology on a reactive or assertive basis to the users through the delivery system.	1. Observation; reports prepared by information association; periodic reports prepared by CDI, MNR, UNAH, and PVO's.	
	b. Expansion of effort of MNR Small Farmers D&A Unit establishment under Small Technology Project.		MNR, and UNAH will provide continued support for D&A activities.

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Project Title & Number: RURAL TECHNOLOGIES PROJECT (522-0157)

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
	e. Appropriate technology pilot project referred to PVOs or other organizations for further development, field testing and/or dissemination, if activity not suitable for execution by above mentioned units.		
2. Delivery system for management and technical advisory services for small enterprises.	2.a. Six zonal offices located throughout the country. b. 1,500 small businessmen receive TA in areas of production, management and/or marketing. c. Training needs identified of 500 small businessmen and success of training evaluated for feedback to training system. d. 500 small businessmen advised on credit use, sources and application producers. e. Lenders provided with general advice on lending to small businesses and specific information regarding potential borrowers.	2. Observation; periodic reports prepared by the Industrial Development Center (CDI); project evaluation; USAID field inspection.	2. GOH continues to support and give high priority to the activities of CDI. b. Entreprenuers are receptive to the technical assistance provided.

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Project Title & Number: RURAL TECHNOLOGIES PROJECT (522-0157)

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
	f. Experimentation and development of various means of community and group participation or organization appropriate for the particular community or venture (e.g. community advisory committees, associations, of small businessmen, coops, etc.).		
3. System for delivering training to small farmers and rural enterprises.	3.a. Inter-institutional arrangements established between CDI and appropriate training institutions such as INFOP to have these institutions provide to small farmers and small enterprises the training identified as necessary by CDI field agents and special studies.	3.a. Observations; periodic reports by CDI, INFOP, and A.I.D. field visits.	
	b. Training provided in at least the following areas: operation, maintenance and repair of farm machinery (500 small farmers and 100 mechanical repairmen); management and technical aspects of small businesses (1500 individuals).	b. USAID field inspection, INFOP and CDI reports.	b. Levels of participation and interest sufficient for continued training programs.
	c. Training techniques and curriculum revised and improved through regular evaluation feedback mechanism.	c. Observation.	
4. Small Enterprises Development Fund established and operating.	4.a. 110 Pilot small enterprises established and operating.	4. Observation; USAID field inspection.	4. Opportunities exist for expansion or creation of small or medium enterprises

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Project Title & Number: RURAL TECHNOLOGIES PROJECT (522-0157)

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
	b. Loans or experimental type of financial transactions made to intermediary credit organizations which lend to small enterprises.		that are economically viable and financially sound over the long term.
5. Small Farmer and Appropriate Technologies Development and Adaptation and Dissemination Fund.	5.a. 10-15 blacksmiths and metalmechanic shops producing implements for demonstration.	5. USAID field inspection; MNR and CDI periodic reports.	
	b. At least 25 different prototype implements or structures produced and disseminated.		
	c. Inter-institutional arrangements established between CDI, MNR and other appropriate institutions for the planning, execution and evaluation of prototypes and field demonstrations.		

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Project Title & Number: RURAL TECHNOLOGIES PROJECT (522-0157)

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
6. Establishment of an evaluation/planning capacity in CDI to more precisely identify problems of small enterprises and continuously improve programs to assist small entrepreneurs.	6.a. Unit established which performs socio-economic baseline and project impact studies and utilizes results to revise implementation plans for this and other small business projects and for the design of new small business promotion initiatives. b. Also prepares zonal resources inventory and industrial development plans, in consultation with other GOH planning activities.	6. Observation.	
7. Establishment of Project Coordination and Management and Administration Office to perform GOH/AID and inter-institutional coordination and to administer project activities.	7.a. Project Coordination and Management and Administration Office established and fully staffed. b. Timely execution of budget preparation, disbursements, etc.	7. Observation Evaluation	
INPUTS: See Financial Plan for Project cost details.			Inputs will be made available on a timely basis.

APPENDIX C

INDIVIDUALS AND AGENCIES CONSULTED

LIST OF PERSONS CONTACTED

COSUDE

Schneider, Kurt, Asesor, Unidad Postcosecha

Stauffer, Claudio, Ingeniero Mecanico, PROMECH

Teruel, Angel D., Ingeniero Agricola, PROMECH

CTTA

Munoz, Milton, Director

GOH

Alvarado, Leopoldo, Director General de Agricultura, MRN

Carranza, Cesar, Director de Credito Publico, Ministerio de Hacienda

Espinal, Edilberto, Director Ejecutivo, CDI

Morales, Lilia de, Directora, Direccion de Sectores Productivos, SECPLAN

NGOs/PVOs

Alvarenga, Emilio H., Gerente, Cooperative Corquin

Bustio, Juan A., Coordinador Zonal, AIEH

Chicas, Florentino, Promotor, CEDEN

Flores,Alfredo, Promotor, CEDEN

Orsorto, Adrian, Promotor, INHBIER

Orsorto, Victor A., Presidente, ANAH

Mendez, Francisco, Coordinador, CEDEN

Peraza, Jose L., Extensionista, AIEH

Pizzati, Rene E., Executive Director, CEDEN

Ramirez, Pedro, Asesor Technico, FOPRIDEH

Rivera, Feliciano, Administrador, AIEH

Romero, Antonio, Coordinador, Proyecto de Apicultura, AHPROCAFE

Ucles, Luis, Extensionista, AIEH

Peace Corps

Grabowska, John and Monica

Ricketts, Laurie (CEDEN)

Strenge, Kristina (PTR)

Trevelis, Mark (CEDEN)

PTR/CDI

Almendariz, Roque D., Coordinador, Zona Norte

Amaya, Gilberto, Coordinador, Unidad Tecnica

Banegas de Gochez, Mayra, Oficial de Credito, La Entrada, Copan

Bonilla, Adan, former Subdirector

Diaz, Pompilio, Ingeniero, Oficina de Juticalpa, Olancho

Diaz, Thoris, Coordinador, Zona Central

Dominguez, Jose L., Shrimp Technician, Zona Choluteca

Espinoza, Ramon, Director

Fonseca, Roberto, Programador de Computadoras

Funes, Luis, Shrimp Technician, Zona Choluteca

Glynn de Gutierrez, Nora, Oficial Administrativo

Giron, Reynieri, Coordinador, Zona Sur

Hernandez, Felipe, Tecnico Industrial, Zona Central

Hernandez, Joaquin, Coordinador, Unidad de Communicacion e Informacion Tecnica

Manzanares, Sergio, Economista, Zona Central

Pascua, Herman, Jefe, Oficina de Juticalpa, Olancho

Ponce, Juan R., formerly Gerente

Prado de Romero, Carmen, Licenciado, Unidad de Credito

Rivera, Ramon, Ingeniero, Oficina de Juticalpa, Olancho

Rocha, Vilma, Biologist, Zona Choluteca

Urqia, Julio C, Adminstrador de Empresas

Valle, Carlos, Coordinador, Unidad de Credito

Vasquez de Zuniga, Silvia, Coordinador, Unidad de Planificacion y Evaluacion

Zolaya, Alberto, Appropriate Technology Specialist and Official Translator

PROMECH

Snidder, Kurt, Asesor Tecnico

UDA

Zuniga, Alfredo, Director

USAID/Honduras

Cooper, Blair, former PTR Project Officer

de Beauset, Val, Technical Consultant, USAID/PTR

Falck, Emil, Assistant Project Officer, USAID/PTR

Rivera, Art, Program Officer

Shaer, David, Chief, Agricultural Office

Wilson, Robert, PTR Project Officer

Zambrana, Carmen, Evaluation Specialist

Other

Otava, Francisco, Consultant, World Bank

Valencia, Isabel, Consultant, Tropical Research and Development

APPENDIX D

FIELD INTERVIEWS BY LOCATION AND GENDER

APPENDIX D
Field Interviews

City/Community	Type of Respondent	Males	Females
A. SMALL BUSINESS			
Comayagua, Comayagua	Owner of metal mechanic shop producing PTR/UDA implements.	0	1
Comayagua, Comayagua	Owners of aluminum goods shop producing silos, etc.	1	1
El Currizal, Comayagua	Member of group of 10 investors in an experimental lime kiln.	0	1
Buenos Aires, Comayagua	Owner of improved brick and tile kiln.	1	0
Jardines del Lago, Comayagua	Owners of leatherworking shop.	1	1
El Currizal, Comayagua	Owner of a tradtional lime kiln.	1	0
Siguatepeque, Comayagua	Owner and workers of improved brick and tile kiln.	4	1
San Mirano, Francisco Morazon	Owners and workers of carpentry shop.	3	0
Maraitas, Francisco Morazon	Owner-operator of aluminum goods shop (silos, etc.)	1	0
La Entrada, Copan	Workshop owner-operator.	1	0
La Entrada, Copan	Carpentry shop owner-operator	1	0
Juticalpa, Olancho	Brickmaker	1	0
Jutquile, Olancho	Workshop owner-operator.	1	0
Catamacas, Olancho	Shoemaker.	1	0
Ocomico, Choluteca	Members of womens' ceramics	0	8
El Ojochal, Choluteca	Members of agrarian reform with shrimp enterprise	3	0
San Lorenzo, Choluteca	PTR technicians and PCV at saltworks/shrimp enterprise	4	1
SUBTOTAL		24	14

APPENDIX D (con't.)

B. SMALL-SCALE FARMERS

San Antonio de Chauhituyo, Comayagua	17	0
Estancia, Francisco Morazon	12	0
Galeras and Lizapa, Paraiso	5	2
Agujas, Francisco Morazon	15	20
Coato, Francisco Morazon	1	0
Laguna, Francisco Morazon	7	0
San Simon, Yoro	4	0
SUBTOTAL	61	22
TOTAL	**85**	**36**

APPENDIX E

TABLES

Table 2.1

PTR Project Expenditures, 1979-1988 (000 Lempiras)

Calendar Year	Source of Funds			Total
	USAID (522-0517)	GOH/ESF (522-0230)	GOH	
1980	821		56	877
1981	1,822		125	1,947
1982	2,307		312	2,619
1983	2,130	2,523	229	4,882
1984	1,839	1,590	159	3,588
1985	2,588	1,686	128	4,402
1986	2,088	2,395	151	4,634
1987	1,522	3,044	181	4,747
1988	674	2,749	141	3,564
Total	15,791	13,987	1,482	31,260
(000 $U.S.)	7,896	6,993	741	15,630

Note: Official exchange rate during project life has been Lmp 2 = U.S. $1

Source: PTA and USAID

Table 2.2

PTR Expenditures as Percentage of Budget, 1979-1988
(US$ 000)

Category	Budgeted	Spent	Expenditure as % of Budget
AID(522-0157)	11,462	7,896	69
ESF(522-030)	8,071	6,993	87
GOH	806	741	65
Total	20,339	15,630	77

Source: PTR and USAID

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Table 3.1
Direct Beneficiaries of PTR Programs

Year	No. Families	No. Enterprises Assisted	No. Towns Covered
< 1984	2888	n.d	n.d.
1984	913	n.d	50
1985	1933	37	85
1986	3764	41	233
1987	7894	170	440
1988*	6540	199	565
Total Executed	23932	447	565
Total Planned	50000	1500	N/A

* To September 30, 1988.

Source: PTR, 1988. Informe de Resultados 1984-1988.
USAID/Honduras, 1984. Honduras Project Paper Rural Technologies (Amended).

Table 3.2
Distribution of Project Outputs Among Beneficiaries

Year	No. Technologies Distributed	Full-time Jobs	Part-time Jobs	No. Farm and Business Loans
<1984	4292	n.d.	n.d.	N/A
1984	1040	n.d.	n.d.	n.d.
1985	1941	79	187	32
1986	4496	239	250	64
1987	9669	288	4116	2128
1988*	7315	216	4584	2573
Total	28753	822	9137	4797
Planned	17000	2000	N/A	N/A

* To September 30, 1988.

Source: PTR, 1988. Informe de Resultados 1984-1988.
USAID/Honduras, 1984. Honduras Project Paper
Rural Technologies (Amended).

TABLE 3.3: PTR TECHNOLOGIES/ENTERPRISES: 1979-1988
(N = approx. 191)[1]

Household Technologies (Tecnologias del Hogar)

Bed sets (juegos de camas)--a set of three stacked beds, to leave more space during the day in the often one-room houses of rural poor. But not popular; ran against cultural norms.

Coconut or cassava shredder (rayadora de coco)--for home (cassava) and cooperative or small enterprise (coconut) use, e.g., in candy-making.

Corn shellers (desgranadoras de maiz)
- o Manual wooden corn sheller (desgranadora manual de madera)--rejected, teeth not durable.
- o Manual metal corn sheller (desgranadora manual metalica)[2]

Domestic stoves (estufas domesticas)[2]
- o Adobe stove (estufa de adobe)--Central, Olancho; earliest model, later improved as the Lorena.
- o Casabe stove (estufa de casabe)--Norte; introduced for casabe enterprise (see below) but also independently adopted by some women for home use.
- o Ceramic stove (estufa ceramica)
- o Electric stove (estufa electrica)[3]
- o Lorena stove (estufa Lorena)[2]
- o Quasi-Singer solar stove (estufa solar cuasi-Singer)--Unpopular because cooked too slow and incorporated only one "burner."

Earth/cement floors (pisos de terracreto)--to replace dirt floors in rural homes. A popular innovation but dropped by PTR to focus on other, income-generating or agricultural technologies.

Family gardens (huertos familiares)--for improved nutrition and also cash earnings (see below).[4]

French drains (pisos absorbentes)--to avoid buildup of puddles of stagnant waste water (e.g., from washing and cooking) in and around the home. This discourages mosquito and other insect breeding and forestalls diseases vectored by them, e.g., malaria, dengue. Same comments as for earth/cement floors.

Garbage boxes (recolectoras de basura)--essentially, small biodigestors to generate methane gas. Discovered to be feasible only where a continous supply of wastes is available, as in fairly large dairy or poultry operations.

Home water filters (filtros de agua)

Latrines (letrinas)--for sanitation; also produces fertilizer for gardens and fields.

- Dry latrines (letrinas secas)[2]--mostly used in the south, where water table is high.
- Pour-flush toilets (letrinas con balde)

Methane biodigestors (biodigestores)--to run stoves, electric lights, and refrigerators in the home; also used to warm piglet quarters (an indigenous innovation); waste products used as fertilizer. A principal objective was to make use of farm materials like manure. Problems in widespread adoption because of difficulty both in finding sufficient waste materials and in storing the gas. Used primarily on large farms and cooperatives.

Multiple-use tables (mesas de uso multiple)--to take advantage of limited living space.

Potable water tanks (casquetes esfericos para almacenar agua)--also used for irrigating family gardens and nurseries (e.g., coffee). Central, Paraiso. Very costly.

Room ceilings (cielos razos)--of woven reed mats; to ward off insects and rodents.

Room partitions (biombos)--to improve living conditions in one-room homes. Not popular. Ran against cultural norms. People saw little use for.

Tortilla presses (tortilleras)--of metal or wood.

Water faucets and sinks (pilas de agua)--to bring and store water in the rural home, saving time and labor in hauling water.

<u>Agricultural Technologies (Tecnologias Agricolas)</u>

Animal tool bars (multibarras) and their attachments (aperos)

- Manual
- Animal-drawn

Burro breeding (burras)[4]--crossing criollo with Kentucky breeds to get a larger, stronger traction animal that retains some of the natural tolerances of the native breed.

Composting (abonera organica)[2]--primarily for garden vegetables.

Diffused light storage (luz difusa)--for potatoes.[3]

Fertilizer utilization (fertilizacion)

- Fertilizing equipment (fertilizadoras)[3]

Forage cutters (picadoras de pastos)[2]--for chopping e.g., native and introduced forage grasses, sugarcane leaves, and especially maize leaves, for storing or immediate feeding as fodder. Considered effective but expensive.

Fruit-tree and ornamental plant nurseries (viveros frutales y de plantas ornamentales)[4]--primarily for sale.

Fruit and vegetable cultivation (cultivo de frutas y de hortalizas)--includes both traditional and new cultivars.

- Apples (manzanas)
- Bell peppers (chile verde)
- Cabbage (repollo)
- Cantalope (melons)
- Cayenne (cayenne)
- Onions (cebollas)
- Potatoes (papas)
- Tabasco peppers (chiles tabasco)
- Tomatoes (tomates)
- Watermelon (sandia)

Hand tools for weed control

Harrows (rastras)--rejected by small farmers as too expensive or too heavy; used on some large farms and co-ops with tractors.

- Offset harrow (rastra offset)
- PROMECH harrow (rastra PROMECH)
- Rasma harrow (rastra Rasma)
- Terracer harrow (rastra V)
- Rigid disc harrow (rastra de puas rigidas)[3]
- Rotating disc harrow (rastra de puas flexibles)[3]

Improved hand-planter/dibble stick (chuzo mejorado)--with seeder. Some design problems.

Irrigation--for crops and/or pasturage

- Drip irrigation (irrigacion por goteo)
- Gravity irrigation (irrigacion por gravedad)[2]
  - Flood irrigation (inundacion)
  - Canals (irrigacion por surcos)
- Sprinkler irrigation (aspersion)
- Low pressure sprinkling (micro-aspersion con manguera perforada)

Large UDA corn sheller (desgranadora UDA grande)--for commercial use and/or shelling of whole harvest. Dropped at study phase. No market for.

Multicultivator (yunticultor) and attachments (aperos)

- Cultivator (cultivadora)
- Large plow (arado grande)
- Ridger (surcadora o mariposa)

- Small plow (arado pequeno)

Multiplication of improved maize seed (produccion de semilla mejorada de maiz)

New cultivars (nuevos cultivos)[2]
- Leucaena trees (arboles leucaena)--for use as a living barrier in terrace construction and to provide green manure and fodder.
- Forage crops--for use both as fodder and as a living barriers (typically with contour canals).
  - Forage sorghum (sorgo forrajero)
  - Kinggrass (zacate)
  - Napier (zacate gigante)
  - Pigeon pea (gandule)
- Sicaocho rice (arroz sicaocho)
- Soybeans (soya)
- Sorghum for producing brooms (sorgo escobero)

Planting techniques (tecnicas de siembra)[2]--e.g., plant densities, weeding practices, intercropping, crop rotation, abandonment of burning practices.

Plows (arados)
- Combined PROMECH plow (arado PROMECH combinado)[2]
- Double-winged PROMECH plow (arado PROMECH de doble vertedera)[2]
- Modified traditional plow (arado UDA)
- PROMECH knife plow (arado PROMECH de vertedera)--two designs, for use with one or two traction animals.
- Reversible plow (arado reversible)[3]

Promotion of traditional cultivars (fomento de cultivos tradicionales)
- Beans (frijoles)--with the aim of getting a double harvest.
- Cardamon (cardamono)--for the export spice market.
- Plantain (platano)--investigation for establishment of a small packing plant.
- Sesame (ajonjoli)--an export crop; modification of selecting tables and seed cleaners.
- Sugarcane (cana)--streamlining processing operations and using the bagasse for fuel instead of wood.

Pumps (bombas)
- Axial pump (bomba axial IRRI-UDA)--for use in shrimp production.[3]
- Diaphragm pump (bomba de diafragma)[3]
- Hand pump (bomba de camisa)[2]
- Hydraulic pump (ariete hidraulico)--gravity.
- Hydraulic row pump (bomba Linares)--for use in rivers.
- Rope lift pump (bomba Rosario)--for use where water table is high.[3]

- Windmill pump (bomba de molino de viento)--problems with bushing design; little popular interest.[5]

Disc seeder (sembradora de disco)--for maize and beans.

Silos (silos)
- Asbestos silos (silos de asbestos)--materials hard to get.[5]
- Brick silos (silos de ladrillo)--too heavy and not portable.[5]
- Cement silos (silos de cemento)--too often cracked.[5]
- Metal silos (silos metalicos)[2]
- Forage silos (hornos forajeros)[2]

Soil and water conservation equipment (equipamento de conservacion de suelos y agua)[2]
- Ditch diggers (cavadoras de acequias)--to be used with animal drawn plow.[3]
- Earth movers (fresnos)[3]
- Earth rollers (rodillos compactadores)[3]
- Land levelers/terracers (niveladoras/terraceadoras)[3]

Soil and water conservation techniques (tecnicas de conservacion de suelos y agua)[2]
- Barriers of rock and wood (barreras muertas)
- Contour canals (acequias o zanjas de ladera)
- Dikes (diques)
- Fallow legumes (frijol de abono)--also provide a substitute for coffee when roasted.
- Individual terracing (terrazas individuales)
- Living barriers (barreras vivas)--using kinggrass, napier, pineapples, "baleriana" (a native leguminous tree also known as madre de cacao), other.
- Step terracing (terrazas continuas)
- Tillage techniques (tecnicas de labranza)
  - Conventional tillage (convencional)
  - Minimal tillage (minima)
  - Zero tillage (zero)

Water wheels (norias)--of wood and/or metal; box and bucket paddles; rejected as too heavy; difficult to pull up out of rivers when waters were high; expensive.

Wind mills (molinos de viento)--primarily for moving water; too expensive for general use. Three varieties according to type of blade.
- Propellors (propulsores)
- Split oil drums (aletas de barriles)
- Sailcloth (de lona)

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Small Enterprises and Technologies (Pequenas Empresas y Tecnologias)

Achiote production and processing (produccion y procesamiento de achiote)--for export as a dye and a condiment.[3]

Aluminum casting (fundicion aluminio)--heavy pots, cementary plaques, ashtrays.

Bean threshers (trilladoras de frijoles)--as a service enterprise.

Beekeeping (apicultura)[4]
- Brazil smoker (ahumador Brazil)
- Honey extractor (extractor de miel)
- Improved and enlarged beehives (apiarios mejorados)
- Overalls, veils, hats (overales, velos, cascos)
- Reproduction of queen bees (reproduccion de reinas)
- Swarm traps (trampeo de enjambres)

Blacksmithing (herreria)[4]
- Improved bellows (fragua mejorada)
- Soldering equipment (equipamento de soldadura)

Brick- and tile-making kiln (horno para ladrillos y tejas de barro).[4]

Briquette press (prensa para fabricacion de briquetas)--to make "logs" from sawdust.[3]

Broom industry and broom-sewing machine[3]

Cacao fermentation and derivatives (fermentacion de cacao y derivados)[3]--e.g., powder for instant chocolate milk and other chocolate products for national market; cocoa butter for export; using Samoa drier.

Candy-making (fabricacion de dulces)[4]--financing, administrative, and technical assistance.

Carpentry (carpinteria)--design of hand lathe, financial assistance.[4]

Cashew processing (procesamiento de maranon)[2]
- Bagging machine (selladora de bolsas)
- Improved roasting oven (horno mejorado de maranon)
- Sheller (partidora de semilla de maranon)

Cassava processing
- Shredder (rayadora de yuca)[2]--a small service enterprise; same machine as for coconut.
- Snack food production (produccion de casabe)--continues to

sell throughout the country.
- o Starch production (almidon de yuca)[3]
- o Improved starch decanter (decantador mejorado)[3]

Lime hydrate production (produccion de cal hidratada)[3]--for use in the cement industry.
- o Continuous-production kiln (horno de produccion continuo)[4]
- o Modified traditional lime kiln (horno de cal)[2]

Cement floor tiles (mosaicos)--financing to CDI to develop a hydraulic press.[3]

Ceramics (alfareria)[4]--includes manufacturing the components of the ceramic stoves as well as traditional and new, decorative ceramic wares.

Charcoal production and improved charcoal kiln (produccion de carbon y horno mejorado)[3]

Citronelle oil production (aciete de citronela)--e.g., for perfumes and automotive lubricants.[3]

Coffee production and processing (produccion y procesamiento de cafe)--plans to install small plants for small producers in remote areas.[3]
- o Depulper (despulpadora de cafe)--machine design by UDA.
- o Toaster--a revolving cylinder, UDA design.
- o Use of coffe parchament (pergamina) to fuel both coffee toasters and dryers.

Crop spraying services (servicios de fumigacion)[4]
- o Control of diseases (control fitosanitario)[2]
- o Control of insects (control plagas)
- o Development of backpack sprayer (asperjadora de mochila)--in both single and dual models.

Dairy module (modulo lechero)--expanded, in study phase[3]
- o Pasteurized milk production (produccion de leche pasteurizada)[3]
- o Solar pasteurizers (pasteurisadoras solares)
- o Methane biodigestors (biodigestores)

Dryers (secadoras)[4]
- o "Samoa" combustion dryer (secadora a combustion "Samoa")--for cardamon, pepper, coffee, fish, cacao, grains; using novel fuels.
- o Solar dryer (secadora solar)--fruit, grain, fish.

Fiber cement panels (laminas de fibrocemento)--for use as roofing and other materials; a small plant established.

Fish culture (pisicultura)--Requires a lot of technical follow-up

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and organization of feed cycles, e.g., swine and poultry waste to create algae.[3]

Fish meal production (produccion de harina de pescado)[3]
- o Hammer mill (molino de martillo)
- o Processing of shrimp wastes and fish left behind in shrimp ponds into meal.

Furniture finishing (ebanisteria)[4]

Gasifiers (gasificadoras)--to generate village electricity; tested in one village; still working on removing residues.[3]
- o Charcoal (de carbon)
- o Wood (de madera)

Hat-making (sombreros de junco)--Panama-style, women's enterprises.[3]

Home canning (envasados)--e.g., pickled vegetables, jams, jellies. Primarily for sale, but also consumed at home.

Hydroelectric turbines (turbinas hidroelectricas)--under testing for use in dairying, refrigeration of fruits, other uses.[3]

Iron foundry (fundicion ferrosa)--under construction; to try to make goods that are currently imported.[3]

Jewelry-making (bisuteria de collares)[4]--ceramics, women's enterprise.

Juice-making (elaboracion de jugos)

Leatherworking, tanning, and dyeing (talabarteria y curtiembre)[4]--e.g., saddles, cinches, quirts, lassos, harnesses, shoes, boots, belts, pocketbooks, wallets, coin purses, etc.

Metal mechanics shops and equipment (hojalateria)[4]--metal silos plus rain gutters, cookware, buckets, kerosene stoves, juicers, basins, watering cans, and domestic stove pieces (chiminies, burners, covers, etc.).
- o Drills (perforadoras de laminas)
- o Metal cutters (cizallas)
- o Sheet-metal roller (dobladora de laminas)
- o Tube rolling machine (dobladora de tubos)

Oil presses (extractoras de aceite)--designed by UDA, for use with cacao, castor, and peanut oils.

Ovens (hornos)
- o Improved bakery oven (horno de pan) and baking sheets (cazuejelas)[2]
- o "Panela" (blocks of coarse brown sugar) oven (horno para

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panela)[4]

Ox team and plow (yunta de bueyes y arado)[4]--for small-enterprise services for land preparation.

Peanut production (produccion de mani)
- o Sheller (descascaradora de mani)[3]
- o Toaster (tostadora de mani)

Pineapple-vinegar production (vinagre de pina)--natural vinager, to replace current imports[3]

Potato flour production (harina de papa)[3]

Poultry module (modulo de aves)--production of eggs and birds for sale and home consumption, with bird penned and supplemented.

Rice processing and marketing (procesamiento y comercializacion de arroz)
- o Rice bagging (empaque arroz)
- o Hullers (descascaradoras)[3]
- o Sickles (segaderas)
- o Threshers (trilladoras)

Refractory brick-making (ladrillo refractario)[3]--for higher-temperature kiln and furnace construction; financing CDI plant.

Rocker-boxes for placer mining (cajas ajitadoras para extraccion de minerales)[3]

Shrimp culture (cultivo de camarones)[2]

Soap making (elaboracion de jabon)--

Solar desalinization (desalinizacion)[2]--using black plastic sheeting.

Sugarcane processing (trapiche)--streamlining operations and reducing fuel use with new ovens and using the bagasse as fuel.

Swine module (modulo de cerdos)--penning.

Tailoring and needlework (costura)[4]

Tannin production (taninos)--to extact tannin from a sylvan tree, <u>nascas cola</u>, to combat destruction of mangroves.[3]

Tricycle carts (triciclos de carga)--experimental; problems with stability.[3]

Vaccination and/or anti-parasitism services for livestock (vacunancion/desparasitacion)[4]

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- Cattle (bovinos)
- Poultry (aves)[2]
- Swine (porcinos)

Warrent warehouse (bodega Warrent)--for largescale storage of maize.

Water buffalos (bufalos de agua)--for use in swampy areas.[3]

Wicker furniture making (tejido de mimbre)--improved bleaching techniques, to make Honduran products more competetive with international fashions[4]

Wine-making (produccion de vino)--from blackberries, mangos, apricots; to substitute for expensive imported wine. One factory established.

Wooden mimeograph (mimeografo de madera)--for schools and rural offices.

Woodworking (escultora en madera)[4]

[1] Sources: Development Associates 1983; Memorando UDA #263-88, 1988; PTR Memoria 1987; PTR Plan Operativo-Presupuesto Institucional 1989; Winrock 1986:A1-2; UDA Document "Tecnologias Investigadas por la Unidad de Desarrollo y Adaptacion," n.d.; USAID PP Supplement 1984; and oral-history interviews with Post-Cosecha, PROMECH, PTR, and UDA personnel.

[2] Retained as target technologies for dissemination after 1986; see Table A.2.

[3] At end of project, these technologies were in various stages of design, testing, delivery, including: development of prototype equipment; analysis of samples; studies of technical and economic (inputs, market demand, etc.) feasibility; existing infrastructural support systems; field trials; and the purely "idea" stage.

[4] Mentioned in various sources and interviews as technologies being tested/disseminated/assisted in 1986-88.

[5] Discarded as inappropriate early in the DDD process.

TABLE 3.4

NUMBERS OF TECHNOLOGIES/ENTERPRISES BY TYPE

TYPE	NUMBERS DISSEMINATED					
	<1984	1985	1986	1987	1988	Total
Household Technologies[1]						
Baking dishes	nd	25	0	0	0	25
Bed sets	nd	26	0	0	0	26
Corn shellers	2880	27	0	73	68	3048
Domestic stoves	1394	279	324	1752	1139	4888
Earth/cement floors	nd	41	0	0	0	41
Food processing technologies	nd	0	65	1	0	66
French drains	nd	45	0	0	0	45
Garbage boxes	nd	24	0	0	0	24
Latrines	2	10	23	0	5	40
Multiple use tables	nd	3	0	0	0	3
Room ceilings	nd	2	0	0	0	2
Room partitions	nd	26	0	0	0	26
Soap-making	nd	18	0	0	0	18
Tortilla presses	nd	6	0	0	0	6
Water faucets/troughs	nd	6	0	0	0	6
Water filters	8	3	0	0	0	11
Agricultural Technologies[1]						
Animal modules	nd	30	0	0	0	30
Animal traction	nd	0	0	0	70	70
Bee colonies/keeping	255	0	150	43	0	448
Composting	28	65	0	0	0	93
Cropping systems/ cultivars	1811[4]	211	386	287	3	2698
Family gardens	nd	99	0	12	0	111
Fish culture	48	0	0	0	0	48
Forage cutters	nd	5	0	0	6	11
Forage silos	nd	1	43	35	1	80
Gravity irrigation[3]	nd	5	30	0	6	41
Hydraulic ram	23	1	13	11	0	48
Improved hand-planter other implements	nd	0	0	0	123	123
Metal silos	1686[2]	78	143	886	488	3281
Methane biodigestors	nd	5	7	9	0	21
Plows,tool bars,harrows	nd	45	0	450	393	888
Shrimp enterprises[6]	3	0	0	0	0	3
Soil conservation	533[3]	119	426	1934	524	3536

Vaccination of livestock[5]	nd	219	2484	3991	2000	8694
Water pumps	14	0	0	0	0	14
Water wheels	219	2	5	0	28	254
<u>Small Enterprises</u>						
Coconut/cassava shredding	nd	0	21	0	0	21
Combustion drying	2	3	29	15	3	52
Solar dryers[6]	82	0	0	0	0	82
Undifferentiated	35	37	41	170	125	408
TOTAL	9023	1466	4190	9669	4982	29330

<u>Sources</u>: PTR Plan Operativo - Presupuesto Institucional 1989; Project Paper Supplement Rural Technologies Project, 1984; DAI 1983:61.

[1] Many of the technologies listed were not yet operative by 1984. Also, pre-1985 recordkeeping left much to be desired. Hence the many "no data" entries for <1984. The reader should note that figures from the Winrock evaluation's Table 4.1 (1986:4-2) are not utilized here because their derivation is unclear. In general, across all the documents reviewed by the team, there are great discrepancies in numbers and types of technologies recorded.

[2] Includes an undifferentiated number of driers.

[3] Includes various gravity irrigation, land leveling, terracing, and water catchment and retention techniques, all undifferentiated.

[4] Includes improved seed, animal, and feed production.

[5] Number of families.

[6] These data are manifestly incorrect or highly dubious, based on findings from the team's fieldwork and interviews.

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TABLE 3.5

TECHNOLOGIES FOR PRIORITY DISSEMINATION IN 1986-88 (N = 26)[1]

Tecnologias	Central	Norte	Sur	Olancho	Occidente	Paraiso
Estufa domestica	B	B	A	A	A	A
Desgranadora de maiz	B	B	B	A	B	C
Conservacion de suelo	A	B	A	A	A	A
Abonera organica	A	C	B	A	B	A
Vacunacion y desparasi-tacion de	A	A	A	A	A	A
Silos metalicos	A	A	B	A	B	A
Hornos forrajeros	C	C	A	A	C	A
Control fitosanitario	C	A	B	A	A	A
Arado PROMECH	A	C	-	A	B	B
Cultivos nuevos	B	A	B	B	A	B
Sistema cultivos	B	B	B	A	B	B
Rayadora de coco	-	A	-	-	-	-
Rayadora de yuca	-	A	-	-	-	-
Horno de panaderia	B	A	-	-	-	-
Secadora Samoa	B	A	B	B	B	B
Picadora de pasto	-	B	-	B	B	-
Letrina	-	-	A	-	B	-
Riego por gravedad	-	C	-	-	B	A
Secadora solar	-	-	B	-	-	B
Cultivo camaron	-	-	B	-	-	-
Bomba camisa	-	B	-	-	B	-
Platos solares	-	-	A	-	-	-
Horno de ladrillo	B	-	-	B	-	-
Semilla de maranon	-	-	B	-	-	-
Pasa maranon	-	-	B	-	-	-
Riego por goteo	-	-	-	-	-	B

[1] Technologies in category A are items which meet the majority of 1986 prioritized criteria (see text) in the zones in which they have been tested. Items in category B were still in the investigation stage as of September 1986. If proven appropriate, they could later be upgraded to A status. C items are technologies with limited, zone-specific applications (after PTR Memorandum OPAT-206-86 1986).

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Table 3.6
Number of Loans and Total PTR Credit by Category, 1988 only

Category	No. Loans	Amount Lent (L.)	Average Loan Size (L.)
Rural Household	285	25384	89
Farm Prod./Tech.	2115	1525712	721
Small Enterprise	173	1751836	10126
Total	2573	3302932	1284

Source: PTR, Dept. of Credit.

Table 3.7
Total PTR Credit Portfolio by Component (L.)

Component	Approved Loans	Amount Disbursed	Payments to Principal	Interest Paid	Total in Arrears	Percent in Arrears
Household	150057	149415	68189	1457	18252	12.2
Agriculture	3344078	3229741	818416	111832	360806	11.2
Enterprise	4034927	3767445	380407	92863	371570	9.9
TOTAL*	7529062	7146601	1267012	206152	750628	10.5

* Includes credits by banks and NGOs.

Source: PTR, Dept. of Credit.

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TABLE 3.8

IN-HOUSE TRAINING CONDUCTED BY PTR: SEPTEMBER 1986-APRIL 1987

COURSE	DURATION (hours)	No. OF PARTICIPANTS	TYPE OF PARTICIPANT
Administration by objectives and results	25	28	Directors, coordinators, administrators
Fowl and pig management	50	55	Social and rural household promoters; agronomists
Achievement motivation	50	102	Zonal personnel
Small and medium industry development	40	20	Institutions of industrial development
Social research and promotion	50	26	Social and rural household promoters
Technology testing and validation	50	32	Agronomists
Management and communication of technical information	30	19	Secretaries, social promotors, zonal and central offices
Introduction to farming systems	50	18	Representatives of NGOs/PVOs
General administration theory	40	21	Zonal coordinators; zonal and central planning personnel

Table 3.8 (continued)

Rural communication techniques	50	20	Social and small enterprise promoters
Organizational development	50	102	Zonal personnel
Methods and techniques of technology transfer and dissemination	50	51	Social promoters; agonomists
Introduction to applied research and statistical design	40	22	Economists; agronomists
Follow-up course in achievement and organizational motivation	30	19	Zonal personnel
Small business	50	26	Small enterprise promoters; industrial technicians; zonal planning personnel
Soil and water	50	18	Agronomists and paraprofessionals
Industrial production marketing	72	25	Executive and planning staff in small industry
Scholarships	----	ND	Technical personnel
18 Courses		604 Person-courses	

SOURCE: PTR files

Table 4.1
Geographic Distribution of Technologies

Zone	Users with One or More Technologies			
	One Tech.	Percent of Total	More than One Tech.	Percent of Total
Central	2754	88.5	357	11.5
Norte	2514	87.1	371	12.9
Sur	1698	91.1	165	8.9
Olancho	2305	69.8	994	30.2
Occidente	2731	89.7	314	10.3
El Paraiso	1957	80.0	488	20.0

Source: PTR, Dept. of Evaluation and Planning

TABLE 4.2

PTR BENEFICIARIES BY ZONE, 1980-PRESENT

Zone	Beneficiaries
Central	5,072
Norte	4,441
Sur	2,990
Olancho	4,836
Occidente	5,735
El Paraiso	4,470
Total	27,544

Table 4.3
Summary of PTR Outputs and Associated Net Benefit

	1980-1985			1986-1988		
	Number of Techs	Benefit per Tech (L.)	Total Benefit (L.)	Number of Techs	Benefit per Tech (L.)	Total Benefit (L.)
FARM						
Silos	778	46	35788	1517	75	113775
Soil Conservation	383	202	77366	3003	150	450450
Irrigation	314	30	9420	5	30	
Corn Sheller	765	20	15300	141	20	2820
Miscellaneous*	1181	200	236200	17978	50	898900
HOME						
Lorena Stove	3562	269	958178	3215	187	601205
Soap	552	9	4968			
Small Business	37	1000	37000	410	1000	410000
Small Industry	1	6000	6000	228	200	45600
EMPLOYMENT						
Part Time	187	300	56100	8950	300	2685000
Full Time	79	1200	94800	743	1200	891600
TOTAL BENEFIT	7573		1531120	26497		6099350
AVERAGE BENEFIT		202			230	

* Includes new items such as plows, training on agronomic practices and massive vaccination of poultry and pigs.

Source: PTR, Dept. of Evaluation, and Winrock Report, 1986.

Table 4.4
Benefit-Cost Analysis of PTR Without Diffusion

Year	Direct	After Diffusion (0 %)	Benefit per Tech (L.)	Total Benefits (in 1000's L.)	Cost AID and GOH	Present Value* Benefits (in 1000's L.)	Present Value* Costs (in 1000's L.)
1980	450	450	202	91	877	81	783
1981	998	1448	202	293	1947	233	1552
1982	1342	2790	202	564	2619	402	1864
1983	2503	52^3	202	1070	4882	680	3103
1984	1040	6333	202	1280	3588	727	2036
1985	1941	8274	202	1673	4402	848	2230
1986	4496	12770	230	2940	4634	1330	2096
1987	9669	22439	230	5165	4747	2086	1917
1988	7315	29754	230	6849	3564	2470	1285
1989		29754	230	6849		2205	0
1990		29754	230	6849		1969	0
1991		29754	230	6849		1758	0
1992		29754	230	6849		1570	0
1993		29754	230	6849		1401	0
1994		29754	230	6849		1251	0
1995		29754	230	6849		1117	0
1996		29754	230	6849		998	0
1997		29754	230	6849		891	0
1998		29754	230	6849		795	0
1999		29754	230	6849		710	0
TOTALS	29754	416845		95265	31260	23521	16867
BENEFIT/COST RATIO							1.39

* Discount rate = 12%. Present value is calculated as

$$PV = NV/(1 + r)^t$$

where NV is the nominal valus, r is the discount rate, and the the exponent t is the number of years to be discounted to the present.

Source: PTR, Dept. of Evaluation, and Winrock Report, 1986.

Table 4.5
Benefit-Cost Analysis of PTR with a Diffusion Rate of 5 Percent

Year	Direct	After Diffusion (1 %)	Benefit per Tech (L.)	Total Benefits (in 1000's L.)	Cost AID and GOH	Present Value* Benefits (in 1000's L.)	Present Value* Costs (in 1000's L.)
1980	450	450	202	91	877	81	783
1981	998	1471	202	297	1947	237	1552
1982	1342	2886	202	584	2619	415	1864
1983	2503	5533	202	1119	4882	711	3103
1984	1040	6850	202	1385	3588	786	2036
1985	1941	9133	202	1847	4402	936	2230
1986	4496	14086	230	3242	4634	1467	2096
1987	9669	24459	230	5630	4747	2274	1917
1988	7315	32997	230	7596	3564	2739	1285
1989		34647	230	7975		2568	0
1990		36380	230	8374		2407	0
1991		38199	230	8793		2257	0
1992		40109	230	9233		2116	0
1993		42114	230	9694		1984	0
1994		44220	230	10179		1860	0
1995		46431	230	10688		1743	0
1996		48752	230	11222		1634	0
1997		51190	230	11783		1532	0
1998		53749	230	12373		1437	0
1999		56437	230	12991		1347	0
TOTALS	29754	590094		135096	31260	30531	16867

BENEFIT/COST RATIO 1.81

* Discount rate = 12%. Present value is calculated as

$$PV = NV/(1 + r)^t$$

where NV is the nominal valus, r is the discount rate, and the the exponent t is the number of years to be discounted to the present.

Source: PTR, Dept. of Evaluation, and Winrock Report, 1986.

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Table 4.6

PTR STAFF BY FUNCTION AND LOCATION

Central Office

Management (4)

- Manager
- Assistant Manager
- Secretaries (2)

UCIT--Communications and Technology Information Unit (14)

- Coordinator
- Documentalists (3)
- Secretaries (3)
- Graphics Artist
- Technical Writer
- Offset Operators (2)
- Technical Translator
- Technical Information Specialist
- Public Relations Specialist

Administration (26)

- Administrative Officer
- Computer Operator
- Watchmen (2)
- Accountant Assistants (5)
- Janitors (4)
- Messengers (2)
- Drivers (6)
- Accountants (2)
- Secretaries (2)
- Mechanic Assistant

Planning and Evaluation (4)

- Chief
- Assistant
- Computer Programmer
- Secretary

Technical Unit (9)

- Coordinator
- Mechanical Engineer
- Agronomist

Table 4.6 (continued)

Agroforestry Expert
Economist
Small Enterprise Technician
Secretary

UDA--Development and Adaptation Unit (9)

Coordinator
Industrial Technician
Agronomists (3)
Mechanics (2)
Carpenter
Warehouse Attendant

Credit (6)

Credit Officer
Assistant
Credit Analysts (2)
Secretaries (2)

Auditor (3)

Auditors (3)

Contracts Office (2)

Contracts Officer
Secretary

The Field

Central Zone (16)
Headquarters: Siguatepeque

Coordinator
Agronomist
Agricultural Technicians (4)
Rural Home Extensionists (4)
Industrial Technician
Economist
Social Extensionist
Small-Enterprise Extensionist
Messenger
Secretary

Table 4.6 (continued)

Southern Zone (14)
Headquarters: Choluteca

- Coordinator
- Economist
- Rural Home Extensionists (3)
- Agricultural Technicians (2)
- Social Extensionist
- Shrimp Technician (2)
- Small-Enterprise Extensionist
- Janitor
- Secretaries (2)

North Zone (17)
Headquarters: La Ceiba

- Coordinator
- Economist
- Agronomist
- Agricultural Technicians (3)
- Social Extensionist
- Rural Home Extensionists (4)
- Small-Enterprise Extensionist
- Industrial Technician
- Administrator
- Business Administrator
- Messenger
- Secretary

Northeast Zone (16)
Headquarters: Juticalpa

- Coordinator
- Economist
- Agronomist
- Agricultural Technicians (4)
- Rural Home Extensionists (3)
- Small-Enterprise Extensionists (2)
- Industrial Technician
- Social Extensionist
- Messenger
- Secretary

East Zone (17)
Headquarters: Danli

- Coordinator
- Economist
- Rural Home Extensionists (4)

Table 4.6 (continued)

Agronomist
Agricultural Technicians (3)
Small-Enterprise Extensionists (2)
Industrial Technician
Social Extensionist
Credit Specialist
Messenger
Secretary

West Zone (14)
Headquarters: La Entrada

Coordinator
Economist
Agronomists (2)
Agricultural Technicians (3)
Small-Enterprise Extensionists (2)
Rural Home Extensionists (3)
Social Extensionist
Credit Assistant

Totals:

Personnel in Central Office:	77
Personnel in Field:	94
	171

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TABLE 4.7

NGOs/PVOs WITH PRESENT OR PAST TIES TO PTR

Name of Organization	Active: Only prior to 1986	Active: 1986-1988
1. National Association of Artisans (ANAH)		X
2. Honduran Association of Coffee Producers (AHPROCAFE)		X
3. Alfalit of Honduras	X	
4. Association of Evangelical Institutions of Honduras (AIEH)	X	
5. Panamerican Agricultural School (EAP)	X (1)	
6. Apiarian Technology Center (CTA)	X	
7. South Honduran Development Association (FUNDESUR)	X	
8. Fraternity of Honduras	X	
9. America Mano y Mano (AMM)		X
10. Plan of Honduras	X	
11. San Jose Working Association (ASJO)	X	
12. Corquin Multiple Services Cooperative		X
13. Bernardo Rivera Cooperative	X	
14. San Lorenzo Multiple Services Cooperative	X	
15. Pablo Quintana Hydroelectric Project	X	
16. Evangelical Committee for Development and National Emergencies (CEDEN)		X
17. Salter Module	X	
18. Federation of Honduran Associations of Agricultural Producers and Exporters (FEPROEXAH)	X	
19. Authentic Federation of Savings and Loan Cooperatives (FACACH)	X	
20. Peace Corps	X (2)	
21. Agrarian National Institute (IAN)	X	

22. Rural Reconstruction Program (PRR)		X
23. Maya Occidental Cooperative	X	
24. Menonite Evangelical Church (Menonita)		X
25. Honduran Institute Rural Welfare (INHBIER)		X
26. Apaquiz Savings and Loan Cooperative		X
27. Advisory Association for the Development of Honduras (CONDERH)		X

SOURCES: Winrock (1986:318-319); PTR files.

(1) PTR maintains a working relationship with EAP for water buffalo breeding and dissemination.

(2) PTR has no current contractual arrangement with the Peace Corps, although volunteers work with several of the NGOs/PVOs that have had contracts with PTR in the period 1986-1988.

TABLE 4.8.

CONTRACTS BETWEEN PTR AND NGOs/PVOs, 1986-1988

NGO/PVO	Date of Last Contract	No. of Amend-ments	End of Implemen-tation	Objectives of Contract[1]
ANAH	11/87	1	8/88	A,J,K
CEDEN 1	2/87	3	5/88	A,B,C,D,E,F,G,H,I
CEDEN 2	12/87	2	8/88	A,B,C,D,F,G,J,K
CORQUIN 1	8/86	2	12/88	A,D,G.L.M
CORQUIN 2	4/88	0	8/88	A,I,K
MENONITA	11/86	1	7/88	A,B,C,D,G,I
INHBIER	2/87	2	7/88	A,B,C,D,G,M
APAQUIZ	10/86	2	12/87	A,B,C,D
AIEH	4/86	2[2]	12/87	A,B,C,D
AHPROCAFE	11/86	1	2/88	B,C,D,G,I
PRR	6/86	4	12/87	A,B,C,D,I
AMM 1	1/86	0	ND	A,I
AMM 2	3/88	0	8/88	A,B,C,I,N
CONDERH	6/87	0	1/88	A,B,C,D,L

SOURCE: PTR files.

[1] A. Technology transfer.
B. Increase the efficiency of land and labor
C. Increase the productivity of rural industries.
D. Improve the utilization of appropriate technology to improve living standards.
E. Improve human resources.
F. Develop a participatory development model.
G. Provide training.
H. Diversity agricultural production.
I. Provide credit.
J. Diversify non-agricultural production.

K. Generate employment.
L. Increase income.
M. Promote the rational use of natural and human resources.
N. Promote marketing opportunities.

[2] Plus agreement to cancel project, dated 11/87.

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TABLE 4.9.

BENEFICIARIES OF NGOs/PVOs TECHNOLOGY TRANSFER PROJECTS
1986-1988

	TARGET NUMBER OF: BENEFICIARIES	COMMUNITIES	NUMBER OF BENEFICIARIES AT END OF PROJECT
ANAH	83	7	16
CEDEN 1	300	24	389
CEDEN 2	100	ND	47
CORQUIN	384	14	226
MENONITA	213	11	47
INHBIER	350	15	227
APAQUIZ	165	36	112
AIEH	402	13	111
AHPROCAFE	83	54	8
PRR	450	27	420
AMM	ND	ND	ND
CONDERH	238	11	195
TOTALS	2760	212	1798
			(= 65% of target)

SOURCE: PTR files.

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TABLE 4.10.

TECHNOLOGY TRANSFER BY TYPE OF TECHNOLOGY AND N60/PVO
1986-1988

	METAL SILOS	SOIL CONSERVATION	PLOWS, TOOLBARS	CORN SHELLER	IMPROVED STOVES	OTHER	TOTAL
ANAH	0	0	0	0	0	ND	ND
CEDEN	50	164	9	16	54	426	719
CORQUIN	149	256	0	0	62	322	789
MENONITA	0	56	0	0	34	0	90
INHBIER	66	94	91	0	210	36	417
APAQUIZ	112	0	0	0	0	0	112
AIEH	45	67	6	0	0	71	189
AHPROCAFE	0	0	0	0	0	83	83
PRR	49	78	0	0	79	152	592
AMM	0	0	0	0	0	ND	ND
CONDERH	9	0	0	93	91	0	193
TOTALS	480	949	106	109	530	1090	3264

SOURCE: PTR files.

TABLE 4.11.

TA AND CREATION OF SMALL RURAL INDUSTRIES, BUSINESSES, AND NEW WORKPLACES BY NGOS/PVOS 1986-1988[1]

NGO/PVO		NO. OF RURAL ENTERPRISES: INDUSTRIES[2]	BUSINESSES[3]	NEW WORKPLACES
ANAH	ND	0	0	ND
CEDEN 1	0	4	52	1
CEDEN 2	47	0	0	8
CORQUIN	0	1	0	O
MENONITA	0	0	15	0
INHBIER	0	0	0	0
APAQUIZ	0	0	0	0
AIEH	0	0	0	0
AHPROCAFE	0	6	0	0
PRR	0	2	5	0
AMM	0	0	0	0
CONDERH	0	2	0	0
TOTALS	47	15	72	9

SOURCE: PTR files.
1. Other than training involved in setting up rural enterprises.
2. Includes metalworking, toolmaking and carpentry shops.
3. Includes cane presses, services for crop spraying, plowing and animal vacination.

Table 4.12
Amount in Arrears for PTR Funds Held by NGOs
(Lempiras)

Institution	Loan Agreement	Amount Disbursed	Percent Disbursed	Amount in Arrears	Percent in Arrears*
ANAH	31250	21000	67.20	0.00	0.00
CEDEN	228900	156432	68.34	42751	27.33
CONDERH	101500	75020	73.91	51006	67.99
Cooperativa Corquin	592995	92995	15.68	16782	18.05
Iglesia Menonita	43000	31173	72.50	41058	131.71
INHBIER	80000	49585	61.98	22335	45.04
APAGUIZ	24164	24164	100.00	16609	68.73
AIEH	218998	218998	100.00	151879	69.35
AHPROCAFE	106600	66297	62.19	0	0.00
PRR	172656	90265	52.28	0	0.00
Total	1600063	825929	51.62	342420	41.46

* As of August 22, 1988.
Percent is based on the amount disbursed.

Source: PTR, Dept. of Credit

TABLE 4.13.

FUELWOOD SAVINGS FROM PTR TECHNOLOGIES

Improved domestic stove--savings per daily use = 50% (traditional: 50 lbs. wood; Lorena model: 25 lbs. wood).

Improved domestic stove--savings per daily use = 68% (traditional: 50 lbs. wood; ceramic model: 16 lbs. wood)

Improved casabe stove--savings per use = 39% (traditional: 440 lbs. wood; modified: 270 lbs. wood)

Modified traditional lime kiln--savings per firing = 37% (traditional: 21,600 lbs. wood; modified: 13,500 lbs.)

Continuous production lime kiln--experimental design under construction.

Modified traditional brick kiln--savings per firing = 70+% (traditional: 14,670 lbs. wood/3000 pieces fired; modified: 4,455 lbs. wood/5000 pieces).

Modified traditional ceramics kiln--savings per firing = 75% (traditional: 2,700 lbs. wood/100 pieces fired; modified: 675 lbs. wood/100 pieces).

Refractory-brick ceramics kiln--experimental design under investigation.

Charcoal kiln--under investigation.

Modified traditional bakery oven--savings per firing = 85% (traditional: 3,600 lbs. wood/17 trays baked; modified: 540 lbs. wood/17 trays).

Samoa combustion drier--no traditional model exists. Present model uses 540 lbs. wood to dry 1,600 lbs. of grain.

Solar drier--100% savings over traditional techniques. Can dry 200 lbs. of fish with 6 hours of sun for 2 days. Obviously, uses no wood.

Solar desalinization--100% savings over traditional techniques. Uses 89 lbs. of plastic of 35 m X 1.5 m.

Solar pasteurization--no traditional model. Uses photovoltaic panels.

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Bagasse as fuel for panela ovens--100% savings. 100 bundles of bagasse/16 lbs. of block sugar.

Coffee parchment as fuel for toasting--n.d. but 100% savings over traditional techniques.

Cashew toaster--n.d.

Coffee toaster--n.d.; uses charcoal.

Peanut toaster--n.d.; uses charcoal.

Table 4.14
Default Rates for Loans for Agricultural Production and for the Purchase of Technology

	Amount Disbursed	Amount in Arrears	Percent in Arrears
PTR Loans			
Production	358864	73228	20.41
Technology	1872884	162839	8.69
All Loans			
Production	592459	80854	13.65
Technology	2531894	276202	10.91

Source: PTR, Dept. of Credit

Table 4.15
PTR Loans in Arrears by Zone and Length of Time in Lempiras

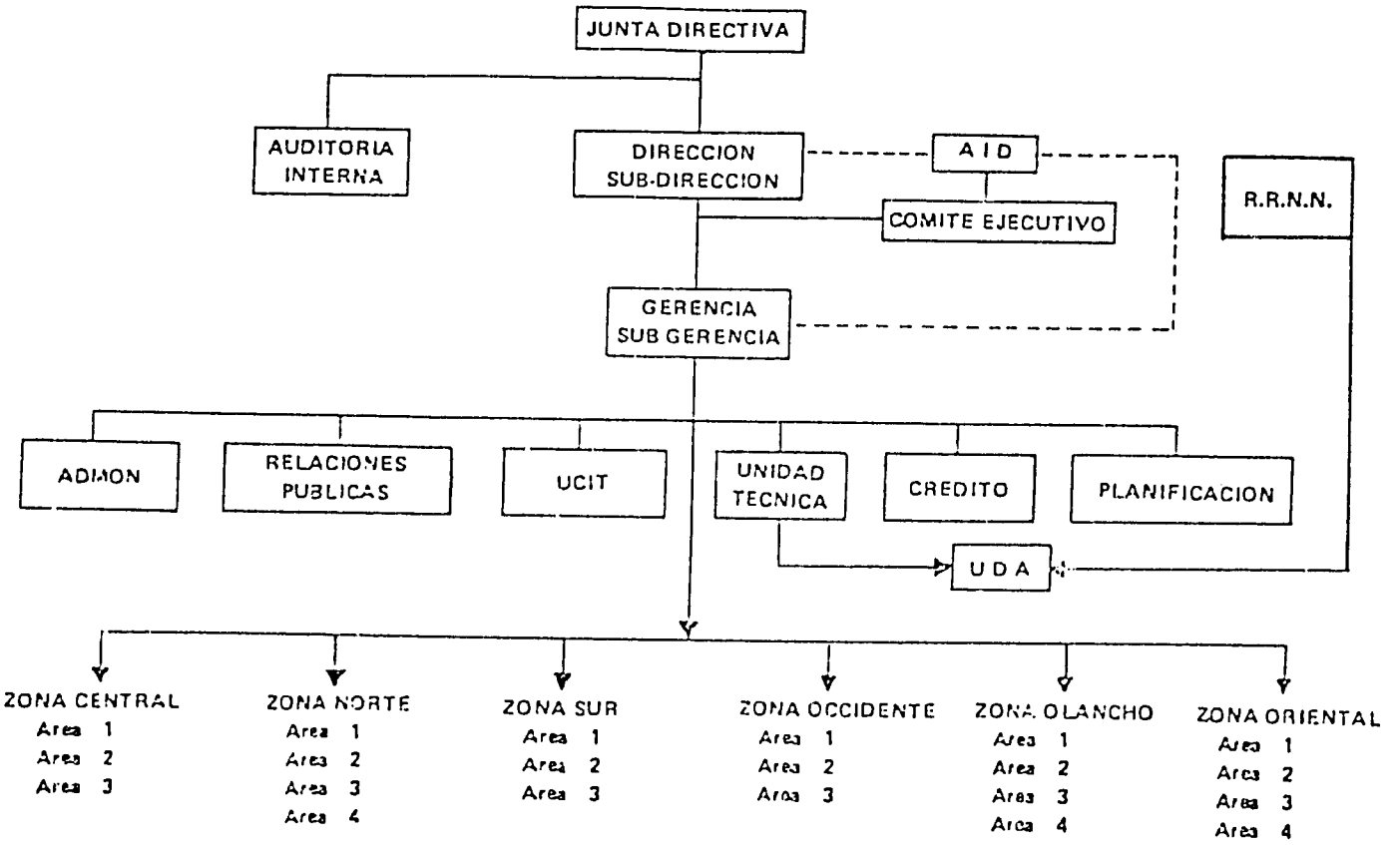
Zone	Total	30 Days	60 Days	90 Days	120 Days	150 Days	180 Days	>180 Days
Tegucigalpa	14632	2470	2308	2308	1610	1489	1111	3333
Central	71249	12644	3844	4156	7305	2748	6776	33773
Norte	52633	12688	9413	6062	5647	4993	1739	12088
Sur	169931	46654	14790	4562	28977	6064	12083	56798
Olancho	89458	12040	8653	8420	17329	4286	12695	26032
Occidente	68936	12291	4458	8797	28318	5156	1693	8219
El Paraiso	37968	7903	1569	1608	1300	2263	4887	18435
TOTAL	504809	106694	45037	35916	90490	27002	40986	158680

Source: PTR, Dept. of Credit

APPENDIX F

PTR ORGANIZATION CHART

Organigrama



APPENDIX G

DETAIL OF PTR TECHNOLOGIES AND OUTCOMES, 1988

Anexo 5

TECNOLOGIA	FUENTE	ZONAS	SEXO	OVP'S	OBJETIVO	ETAPA	RESULTADOS
PEQUEÑO AGRICULTOR							
- Multibarra	Promech- UDA	Occidente	Masculino	AIEH	Contribuir a mejorar la productividad del sueldo	Prueba y Comp.	Aunque es de buen resultado su alto costo no permite diseminarla en nuestro grupo meta.
- Rastra	Promech	Central	Masculino	No AIEH	Contribuir a mejorar la productividad del sueldo	Prueba y Comp.	Para nuestro grupo meta no era tan necesario.
- Yunticultor	Promech	Central	Masculino	AIEH	Contribuir a mejorar la productividad del sueldo	Prueba y Comp.	Fue aceptado en su mayoría por grupos de medianos agricultores.
Arados	Promech -UDA	Central, Olancho El Paraiso, Sur, Norte.	Masculino	INHB.-CORQU. AIEH (CEVER)	Contribuir a mejorar la productividad del sueldo	Prueba y Comp.	Ha sido adoptada por un buen número de pequeños agricultores.
- Chuzo Mejorado	U.D.A.	Todas las zonas	Masculino	No	Disminución hrs/hombre/m²	Validación	Se trabajo desde 1986. Hasta la fecha, los resultados no son eficientes por la calidad y funcionamiento de la tecnología.
- Abonera Orgánica	P.T.R.	Paraiso, Central, Occidente.	Ambos	PRR-CEDEN-CORQUIN, MENONITA.	Conservar el suelo	Diseminación	Los pequeños agricultores han adoptado esta técnica como complemento de la Conservación de Suelos.
Conservación de Suelos	P.T.R.	Occidente, Centr. Paraiso, Sur, Olancho, Norte.	Masculino	PRR, CEDEN, AIEH, INHBIER Menonita, Corquín.	Evitar la erosión	Diseminación	Fue de amplia aceptación dado que atacaba un problema agrícola generalizado, en el Peq. Agricult
Fertilización	P.T.R.	Todas las zonas	Masculino	" "	Incrementar la producción	Diseminación	Esta técnica ya era conocida, la disponibilidad crédito influyó en su us
Viveros, cultivos de frutas y hortalizas	P.T.R.	Central, Occident. Paraiso, Sur.	Masculino	No	Diversif. e incrementar la producción.	Validación	Se realizó poca activid los resultados no fueron concluyentes, se descart la idea

TECNOLOGIA	FUENTE	ZONAS	SEXO	OVP'S	OBJETIVO	ETAPA	RESULTADOS
- Cultivos Nuevos	P.T.R.	Occidente, Central Paraiso.	Masculin	No	Diversificar e incrementar la producción.	Diseminación	-El arroz CICA 8 es el mayor aceptación en la zona Central.
- Fomento de cultivos no tradicionales.	P.T.R.	Occidente, Paraiso Sur.	Masculin FEM	CEDEN	Diversificar e incrementar la producción.	Diseminación	-60% de los cultivos f bueno.
- Tecnologías de Riego	PTR- UDA	Occidente, Paraiso Central.	Masculin	Corq. Ceden	Producir en época seca	Diseminación	-Ha sido adoptada en es cial para cultivos com ciales, dado su costo.
- Técnicas de siembra	P.T.R.	Occidente, Central Paraiso, Norte	Masculin	No	Incrementar la productiv	Diseminación	-Buen resultado, poster mente no se continuó p mocionando para evitar duplicidad de funciones con otra institución.
- Burras	P.T.R.		Mascul.	Ceden	Tracción animal	Validación	-Aun no tenemos los resultados, proyecto a l go plazo.
- Picadoras de pastos	- U.D.A.	Occidente, Paraiso, Central.	Mascul.	No	Ahorro de tiempo y mejorar proceso de picado del alimento.	Diseminación	-Poca diseminación por costo y escasos partic pantes ganaderos.
- Silos	Post-Cosecha-UDA.	Todas las zonas	Mascul.	Apaguiz, Corquín, AIEH, CEDEN, INHBIER, PRR.	Evitar pérdidas post-cosecha, en maíz.	Diseminación	-Es una tecnología de am plia aceptación, dado q contribuye a solucionar un problema de los pe agricultores.
- Desgranadora UDA (grande)	U.D.A.	Central, Norte, Occidente.	Masculino	No	Ahorro horas/hombre en el proceso de desgranado y menor esfuerzo físico.	Validación	-Los resultados no eran aceptables y no se lleg a perfeccionar su func namiento y calidad.

TECNOLOGIA	FUENTE	ZONAS	SEXO	OVP'S	OBJETIVO	ETAPA	RESULTADOS
Bombas	U.D.A.	Occidente,Cent. El Paraiso,Olancho,Norte,Sur.	Masculino	No	Riego en época seca.	Diseminación	-Se logró el control de irrigación,elevar el nivel del agua hasta 15Mts. la desalinización en los estanques de camarón,etc.
Sembradora	Promech	Central	Masculin.	No	Ahorro horas/hombre por Mz.	Investigación	-No se transfirió al PTR, por su alto costo.
Noria	U.D.A.	Occidente,Olancho, El Paraiso, Norte, Central	Masculin.	No [illegible]	Elevar el nivel del agua para riego en época seca	Diseminación	-Tuvo amplia aceptación por su funcionamiento,pero se descontinuó por su mal manejo y falta de asistencia técnica.
Casquete Esférico	P.T.R.	Central,Paraiso	Masculin.	Ceden	Irrigación huertos familiares y cultivos (chile)	Diseminación	Por su alto costo,se ha diseminado poco y además requiere de la existencia de fuentes de agua.

1.

PROYECTO	FUENTE	ZONAS	SEXO	OVP'S	OBJETIVO PRINCIPAL	ETAPA	RESULTADOS
Sombreros de junco.	Productores	Central	Femenino	No	Lograr que las mujeres realicen todo el proceso hasta producto final.	Experimentación	-No ha sido posible obtener maquinaria a nivel nacional, no se ha avanzado por ésta razón.
Ladrillo Refractario	P.T.R.	Central	masculino	No	Introducir el producto para construir hornos de altas temperaturas.	Experimentación	-A la fecha se han construido 4.500, aún no se ha transferido el proy.
Producción de cal hidratada.	P.T.R.	Central	Masculino	No	Minimizar el consumo de leña, aumentar producción de cal y mejorar la calidad.	Experimental	-Construcción horno en S
Bisutería de collares	Empresario	Norte	Masculino	ANAH	Mejorar el estilo de los collares.	Diseminación	- Mejoró ventas.
Elaboración jugos	Empresario	Norte,Olancho	Masculino	No	Mejorar el empaque de los jugos.	Diseminación	- Mejoró comercialización y el manejo del product
Curtiembres	Empresarios	Occidente, Olancho	Masculino	P.R.R.	Mejorar la calidad del producto e incremento de producción.	Diseminación	-Se ha mejorado la calida del producto y se generó materia prima para talabarterías y zapaterías a las cuales también atendió el P.T.R.
Talabarterías	Empresarios	Central,Olancho,Norte, Occidente.	Masculino	ANAH-DECEN	Ampliación	Diseminación	-Algunas de las empresas han utilizado bien los recursos financieros,otros han fracasado.
Fundición Ferrosa	P.T.R.	Norte	Masculino	No	Producción de piezas de maquinaria.	Experimentación	-Proyecto instalado en la Ceiba, se ha fundido aluminio, no así hierro.
Hornos	PTR/ICAITI	Todas las zonas.	Ambos	No	Ahorro de combustible aumento capacidad producción.	Diseminación	-Generación de hornos,para varias industrias (pa casabe,ladrillo,etc.)

PROYECTO	FUENTE	ZONAS	SEXO	OVP'S	OBJETIVO PRINCIPAL	ETAPA	RESULTADOS
							hay aceptación.
- Producción leche pasteurizada.	P.T.R.	Norte	Ambos	No	Mejorar proceso producción.	Investigación	- Estudio en proceso.
- Tostadora de maní	P.T.R.	Occidente	Ambos	No	Aumentar producción y mejorar calidad.	Diseminación	- Se introdujo el proceso de tostado.
- Vinagre natural de piña.	P.T.R.	Central	Ambos	No	Aprovechamiento de excedentes materia prima.	Experimentac.	- Se hicieron pruebas, se está afinando la calidad del producto.
- Harina de papa	ICAITI/RR.NN.	Central	masculino	No	Aprovechamiento de excedentes de producción.	Idea	- No se llevó a cabo.
- Módulo de aves	P.T.R.	Todas las zonas.	Ambos	No	Aumentar ingresos mediante la venta de huevos.	Experimental	- No resultó rentable por el tamaño de los módulos (muy pequeños).
- Servicios de vacunac.	P.T.R.	Todas las zonas.	Ambos	No	Evitar la mortalidad de aves de corral.	Diseminación	-Se logró controlar índices de mortalidad y se crearon empresas de servicio de 2 ó 3 personas
- Empaque de arroz	P.T.R.	Central	Masculino	No	Lograr mejores precios a través del beneficiado del arroz.	Investigació	-Estudio sobre posibilidades, resultó negativo demasiada competencia.
- Cultivo de camarón	P.T.R.	Sur	Masculino	No	Aprovechamiento de estanques salineros en Invierno	Diseminación	-Los Proyectos en si han sido rentables,pero problemas naturales incidieron en los resultados.
- Elaboración jabón 1984.	P.T.R.	Todas las zonas.	Ambos	No	Disminuir los gastos en el consumo de jabón.	Diseminación	- Escasez de materia prima en el mercado nacional,(potasa),obligó a olvidar esta actividad.

PROYECTO	FUENTE	ZONAS	SEXO	OVP'S	OBJETIVO PRINCIPAL	ETAPA	RESULTADOS
- Producción de sal	PTR/ICAITI	Sur	Masculino	No	Evitar la desforestación del mangle.	Diseminación	Ahorro de leña, sin embar no todos los salineros l han adoptado porque var precio en relación a sal cocida.
- Bodegas warrent	Asesor Agrícola	Occidente	Masculino		Almacenamiento de granos para mejorar comercialización del producto (granos básicos).	Idea	Se descartó la investigación sobre producción; arrojó poca participación del Pequeño Agricultor.
- Modulo cerdos	P.T.R.	Todas las zonas.	Masculino		Incrementar ingresos introduciendo mejores razas.	Esperimental	Negativo, porque el alimento no estaba disponible en las comunidades y los precios del concentrado eran altos.
- Costureras	P.T.R.	Todas las zonas.	Femenino	Ceden	Ampliación	Diseminación	- Positivo, diversificó producción y mejora de ingresos.
- Triciclo de carga	P.T..R	Olancho	Masculino	Ceden	Introducción de equipo en pequeña empresa, para agilizar reparto de productos.	Experimental	- Se tiene prototipo construido.
- Turbinas hidroeléctricas	ICAITI	Sur, Central	Masculino		Generar energía eléctrica y ahorro de combustible	Experimental	- Los dos prototipos construídos aún están en prueba.
- Trapiches	P.T.R.	Paraiso, Occidente.	Masculino	P.R.R. Menonita	Mejorar el proceso de producción y bajos costos.	Diseminación	- Buenos resultados del equipo introducido.

PROYECTO	FUENTE	ZONAS	SEXO	OVP'S	OBJETIVO PRINCIPAL	ETAPA	RESULTADOS
Vinos	Empresario	Central	Masculino	No	Aprovechamiento de materia prima, local y beneficiar a sus productores.	Prueba y Comp.	-Actualmente se produce vino de mora, naranja y toronja, de muy buena aceptación, se beneficio por lo menos a 50 mujeres campesinas recolectoras de mora.
- Metal Mecánica	Empresarios UDA- P.T.R.	Occidente, Central, Olancho, Sur.	Masculino	Coruquín, AIEH, Conderh.	Crear fuentes de producción de tecnología agrícola.	Diseminación	-Se capacitó y brindó asistencia técnica a talleres mecánicos los cuales resultaron más accesibles las zonas rurales.

PROYECTO	FUENTE	ZONAS	SEXO	OVP'S	OBJETIVO	ETAPA	RESULTADOS
PEQUEÑA EMPRESA							
Producción y procesamiento de achiote.	P.T.R.	Norte-Occidente	Masculino	No	Producir variedades de alto rendimiento y colorantes que puedan sustituir a los sintéticos.	Experimentación	-Se han cultivado 6 viveros de una nueva variedad.
Hojalaterías	P.T.R.	Sur, Occidente, Olancho.	Ambos	Ceden AHPROCAFE	Diversificar la producción	Diseminación	-Se logró introducir la producción de silos, comales y chimeneas y fomentar la producción de estufas de gas.
Desparasitación	P.T.R.	Occidente, Norte, Paraiso	Ambos	No	Sanidad Animal	Prueba	Formación de grupos para prestar servicios en las épocas más propicias.
Apicultura	P.T.R.	Occidente, Centr. Sur, Olancho	Ambos	C.T.A. AHPROCAFE	-Modernización de apiarios rústicos -Equipamiento apiarios modernos. -Manejo de abeja africanizada	Diseminación	Se tecnificó y se proveyó de equipo a pequeños apicultores, y se enseñó el manejo de la abeja africana; por haber sufrido un cambio bruzco en la producción de miel, solo se atendió 30% de los productores.
Herrerías	P.T.R.	Paraiso	Masculino	CEDEN	Agilizar proceso de producción.	Diseminación	Mejoraron su capacidad técnica y su equipo de trabajo.

PROYECTO	FUENTE	ZONAS	SEXO	OVP'S	OBJETIVO PRINCIPAL	ETAPA	RESULTADOS
Ladrillería y Tejeras	P.T.R.	Central, Sur Olancho, Occidente, Paraiso	Masculino	No	Incremento de ingresos y generación de empleo.	diseminación	- Mejoraron su productividad y calidad.
Fermentación de cacao y derivados.	P.T.R.	Zona Norte	Femenino	No	Sustitución de importación, introducción de tecnología de procesamiento.	Experimentación	- Instalación de equipo y pruebas preliminares de producción.
Fabricación de dulces	Empresario	Norte, Olancho	Femenino	No	Crédito para capital de trabajo	Diseminación	- de dos (2) proyectos, uno tuvo éxito, otro se descapitalizó.
Carpintería	Empresarios	Todas las zonas	Masculino	ANAH, CEDEN	Ampliación y diversificación.	Diseminación	- Mejoramiento proceso, productividad y calidad del producto.
Procesamiento de marañón.	Empresarios	Zona Sur	Masculino y Femenino.	No	Ampliación	Diseminación	- Introducción de equipo y mejoramiento en la presentación del producto (empaque) baja producción por compromisos económicos del empres.
Rayadora de yuca.	PTR(Bibliog.	Norte	Femenino	No	Agilizar proceso de rayado y calidad.	Diseminación	- Exitoso en las comunidades garifunas, a nivel comunal.
Mosaicos	Empresario	Central, Sur Norte.	Masculino	No	Ampliación	Diseminación	-Mejor aprovechamiento de los recursos locales y producción.
Alfarería	Empresarios	Sur, Central, Occidente.	Femenino	ANAH	Diversificación produc.	Diseminación	-Fabricación de un nuevo produc. que tiene merca
Citronela	P.T.R.	Norte	Masculino	No	Sustitución de importación	Diseminación	-Diseño de planta, pruebas preliminares en Universidad.

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PROYECTO	FUENTE	ZONAS	SEXO	OVP'S	OBJETIVO PRINCIPAL	ETAPA	RESULTADOS
- Control Fitosanitario	Varios	Occidente, Paraiso, Central.	Masculino	Ceden	Evitar pérdidas por enfermedades y plagas.	Diseminación	-Creación de grupos de servicio en las comunidades, mayor control, mejor producción.
- Módulo lechero	P.T.R.	Todas las zonas	Masculino	No	Mantener producción de leche en época Verano.	Experimentac.	-Positivo, no se continuó porque se detectó que el grupo meta a que iba dirigido, no correspondía a las características del grupo meta del proyecto.
- Secadoras	P.T.R.	Occidente, Norte Central, Sur, Paraiso.	Masculin	AID/IHCAFE	Mejorar la calidad del grano, ahorro leña, agilización del proceso.		-Exitoso, útil para pequeños productores de café, pimienta, cardamomo y sal solar.
- Taninos	P.T.R.	Sur	Masculino	No	Reducir la importación de curtientes químicos.	Experimentac.	-Pruebas preliminares a nivel laboratorio.
- Láminas de fibro-cemento	P.T.R.	Oriental	Masculino	No	Producción de productos a menor precio.	Experimentac.	-No se logró tener un producto de buena calidad.
- Harina de Pescado	P.T.R.	Sur	Masculino	No	Sustitución de importaciones.	Experimentac.	-Se tiene fábrica y equipo instalado, faltan pruebas finales.
- Ebanistería	Empresario	Todas las zonas	masculino	ANAH	Ampliación de la empresa.	Diseminación	Mayor producción.

TECNOLOGIA	FUENTE	ZONAS	SEXO	OVP'S	OBJETIVOS	ETAPA	RESULTADOS
HOGAR RURAL							
1- Juego de camas	PTR (Bibliografía VITA)	Todas las zonas	Ambos	No	Mayor disponib. de espacio físico interior de la casa.	Prueba y Comp.	Poca aceptación por tener poca vida útil
2- Biombos	PTR(Bibliografía VITA)	Central,Olancho	Ambos	No	Evitar el hacinamiento	Prueba y Comp.	Ninguna aceptación
3- Cielo Raso	PTR(Bibliografía VITA)	Central,Olancho	Ambos	No	Mejoramiento vivienda.	Validación	no hubo demanda.
4- Tortillera	PTR(Bibliografía	Central,Olancho	Femenino	No	Mayor eficiencia y Menor esfuerzo físico.	Prueba-Comp.	No hubo demanda
5- Pilas de agua	PTR(Bibliografía VITA)	Central,Olancho	Femenino	No	Prevenir enfermedades,mejorando la higiene.	Validación	No funcionaron por ser de adobe.
6- Filtros de agua	PTR(Bibliografía VITA)	Paraiso,Central	Femenino	No	Prev.enferm.mejor. la higiene.	Validación	No hubo demanda,alto costo.
7- Recolector basura	PTR(Bibliografía VITA)	Central,Olancho	Femenino	No	Prev.enferm.mejor. de la higiene.	Prueba-Comp.	La clientela no la consideró necesar.
8- Pisos absorbentes	PTR(Bibliografía VITA)	Olancho,Occidente.	Femenino	No	Prev.enferm.mejor. de la higiene.	Prueba-comp.	Fue aceptado pero su construc. requiere mucho esfuerzo físic
9- Pisos Terracreto	PTR(Bibliografía VITA)	Central,Norte	Femenino	No	Prev. enferm.mejor. de la higiene	Prueba y comp.	Se descartó por su alto costo y requería mano de obra especializada.
0- Letrinas Secas	PTR (Bibliografía VITA)	Central- Sur	Ambos	No	Prev. Enferm.Mejor. de la higiene.	Diseminación	Actualrente solo se diseminan en el Sur
1- Desgranadora de maíz madera.	PTR (Bibliografía VITA).	Todas las zonas	Ambos	No	Disminuir el esfuerzo físico.	Diseminación	Su diseminación fue afectada por la poca vida útil de la tecnología.
2- Desgranad. maíz tipo UDA	UDA	Sur,Paraiso,Occidente,Central	Ambos	CEDEN CORQUIN	Disminuir el esfuerzo físico.	Diseminación	Buena aceptación por su bajo precio y fácil manejo.

TECNOLOGIA	FUENTE	ZONAS	SEXO	OVP'S	OBJETIVO	ETAPA	RESULTADOS
- Envasados	P.T.R.	Central,Norte	Femenino	No	Conservación de alimentos y valor agregado.	Capacitación	-Algunas amas de casa se capacitaron para envasar legumbres para su consumo.
- Biodigestor	PTR-ICAITI	Occidente-Paraiso.	Masculino	No	Aprovechar material degradable y producción de gas butano.	Capacitación	-No se ha continuado diseminando por su alto costo y problemas de almacenamiento de gas.
- Rayadora de coco	P.T.R.	Norte	Femenino	No	Agilización del proceso productivo.	Validación	-Su funcionamiento no fue eficiente,necesita mejoras.
- Estanque para peces	P.T.R.	Todas las zonas	Ambos	No	Mejorar dieta familiar	Prueba-Comprob.	-Los resultados fueron buenos,pero el manejo del proyecto para una segunda cosecha requería mayor esfuerzo del cliente y no lo hizo.
- Estufas Domésticas	PTR (Bibliograf.) VITA e ICAITI.	Todas	Femenino	CEDEN,INHB. CORQUIN,Menonita,PRR,CONDERH.	Disminuir el consumo de leña y evitar la desforestación.	Diseminación	-Amplia diseminación,fue aceptada por su efectividad y presentación,costos bajos.

APPENDIX H

DETAIL OF PRIORITY TECHNOLOGIES BY ZONE (SEPTEMBER 1986)

APPENDIX H

DETAIL OF PRIORITY TECHNOLOGIES BY ZONE (SEPTEMBER 1986)

Zona Central (1)

A Status
1. Arado PROMECH
2. Silos metalicos
3. Conservacion de suelos
4. Abonera organica
5. Vacunacion aves y cerdos
6. Validacion de 3 cultivos promisorios
7. Validacion de la tecnologia de alcitrones
8. Validacion de cultivo de soya y sus usos
9. Validacion sistemas de cultivo

B Status
10. Multibarra
11. Secadora solar
12. Horno de panaderia ICAITI
13. Horno para cocer ladrillo y teja
14. Pila casquete esferico
15. Horno para cal

C Status
16. Rastra
17. Yunticultor
18. Secadora Samoa
19. Horno forrajero

Zona Norte (2)

A Status
1. Rayadora de coco
2. Rayadora de yuca
3. Estufa mejorada (casabe, Lorena)
4. Horno de panaderia tradicional mejorado
5. Decantadora de almidon (investigacion)
6. Silo metalico
7. Control fitosanitario
8. Vacunacion

B Status
9. Desgranadora de maiz UDA
10. Secadora Samoa
11. Prensa para exprimir yuca
12. Conservacion de suelo
13. Picadora de pastos
14. Riego por gravedad

C Status

15. Horno de panaderia ICAITI
16. Arietes
17. Multibarra (bueyes)
18. Molino de viento
19. Gasificador
20. Rastra offset (bueyes)21. Bomba de camisa
22. Horno de carbon vegetal
23. Arado PROMECH
24. Rastra PROMECH

Zona Sur (3)

A Status

1. Estufa Lorena
2. Secadora solar (copa)
3. Platos solares
4. Desgranadora de maiz
5. Conservacion de suelos
6. Camaron
7. Abonera organica
8. Vacunacion
9. Desparasitacion bovinos y porcinos
10. Silos metatalicos
11. Hornos forrajeros
12. Herbicidas
13. Control fitosanitario
14. Harina de pescado
15. Secadora Samoa
16. Nuevos cultivos

B Status

17. Letrinas secas
18. Suelos terracretos
19. Pisos absorbentes
20. Horno de maranon
21. Picadora de pastos
22. Partidora de semilla de maranon

Zona Olancho (4)

A Status

1. Abonera organica
2. Desgranadora de maiz UDA
3. Silos metalicos
4. Hornos forrajeros
5. Estufa domestica
6. Control fitosanitario
7. Sistema de riego por gravedad
8. Nuevos cultivos
9. Conservacion de suelos

B Status
10. Arado PROMECH
11. Norias
12. Arietes
13. Secadora Samoa

C Status
14. Multibarra
15. Yunticultor
16. Rastra
17. Picadora de pastos18. Piso absorbente
19. Piso terracreto
20. Pila de adobe
21. Camas a bajo costo
22. Biodigestor
23. Bomba de agua (generacion)

Zona Occidente (5)

A Status
1. Abonera organica
2. Desgranadora de maiz
3. Silo metalico
4. Estufa domestica
5. Vacunacion de animales domesticos
6. Control de plagas
7. Siembra de hortalizas
8. Conservacion de suelos

B Status
9. Arado multibarra
10. Norias
11. Arietes
12. Secadora Samoa
13. Bodega Warrent
14. Riego por gravedad
15. Carbon vegetal
16. Piso absorbente
17. Arado PROMECH
18. Sorgo escobero

C Status
19. Rastras
20. Picadoras de pasto
21. Biodigestor ecomonico
22. Horno de panaderia
23. Molino de viento
24. Letrina seca
25. Horno forrajero

Zona El Paraiso (6)

A Status

1. Silos metalicos
2. Conservacion de suelos
3. Aboneras
4. Horno forrajero
5. Estufas
6. Desgranadora de maiz
7. Riego por gravedad
8. Vacunacion aves y cerdos
9. Nuevos cultivos

B Status

10. Arado PROMECH
11. Pilas de agua
12. Casquete esferico13. Deshidratadores solares
14. Secadoras
15. Riego por goteo

C Status

16. Pisos absorbentes
17. Norias
18. Rastras
19. Multibarra
20. Yunticultor
21. Picadora de pastos