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FINANCIAL AND ECONOMIC ANALYSIS  
OF THE  
APPROPRIATE SIZE AND DIVISION OF COSTS  
UNDER  
PROJECT 596-0066 : TRANSFER OF TECHNOLOGY

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LAC/DR/EEAD  
September 1, 1978

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1. Background

The Program for Technology Transfer (PTT) of the Central American Institute of Industrial and Technological Research (ICAITI) represents a significant commitment of resources. When PTT started, little was known of what kind of problems would be encountered. In fact, PTT has been so changed by its experience as an "operational feasibility study" that it bears little relation to the original description of the mechanism. Now PTT is fast becoming central to ICAITI operations.

Experience to date shows that PTT, by its nature, involves many activities that do not produce revenues, such as promotional visits and simple transfers of information or identification of sources of information. In consequence PTT has not produced revenues sufficient to cover costs. PTT depends for its existence on ICAITI's willingness and ability to use other ICAITI resources and on AID grant funds through ROCAP. As the number of field representatives increases from three (at present) to five (in the near future), ICAITI will show an even greater disparity between PTT costs and revenues. The first problem is to make PTT as financially self sufficient as possible. The second problem is to ensure that the scale of PTT operations is not uneconomic.

2. Scope of this Report

The purpose of this report, then, is to assess the financial and economic viability in the long run of the PTT system. Although this report will have some characteristics in common with a traditional market survey as far as the demand side goes, it will go on to deal with supply questions and also draw some conclusions, even if tentative at this point, about the proper scale of activities.

### 3. Demand

#### A. Size of the Market

PTT is aimed primarily at medium size manufacturing enterprises, that is, those having from 30 to 99 employees, or having \$200,000 to \$1,000,000 invested. Larger and smaller firms are not excluded from receiving PTT services, although it is recognized that (a) larger firms are much more likely to be using their own information systems that have worked in the past for solving their typical problems, and (b) smaller firms are less likely to know that their problems can be (and somewhere probably have been) solved and are less likely to seek professional advice from available sources.

According to the most recent data available (1968), about twenty percent of all industrial enterprises in Central America fell into the medium size classification. They accounted for about 40 percent of industrial value added. Table I presents information by country on the size distribution of firms in 1968. Because of the methodology used to derive an estimate of the 1968 situation in El Salvador, the total for that year is probably conservative. Table II gives a rather conservative personal projection of the size distribution of firms as of 1977. The major piece of information conveyed by Tables I and II is that there are many firms that

TABLE I

SIZE DISTRIBUTION OF INDUSTRIAL FIRMS  
IN CENTRAL AMERICA: 1968

	<u>Small</u>	<u>Medium</u>	<u>Large</u>	<u>Total</u>
Costa Rica	527	170	56	753
El Salvador	1057	359	143	1559
Guatemala	718	235	100	1053
Honduras	333	120	45	498
Nicaragua	293	110	53	456
	<hr/>	<hr/>	<hr/>	<hr/>
Total	2928	994	397	4319

Source: Elaborated from data collected for the first  
Central American Industrial Census (1968).

NOTE: El Salvador did not participate in census. Data  
for El Salvador were derived by assuming that  
(a) total number of enterprises in El Salvador  
maintained the same relationship to the number of  
firms in other countries as it had in 1962, and  
(b) size distribution had a similar relationship.

TABLE IISIZE DISTRIBUTION OF INDUSTRIAL  
FIRMS IN CENTRAL AMERICA: 1977

	<u>Small</u>	<u>Medium</u>	<u>Large</u>	<u>Total</u>
Costa Rica	630	212	73	915
El Salvador	1263	448	187	1898
Guatemala	858	293	130	1281
Honduras	398	150	59	607
Nicaragua	350	137	69	556
	<hr/>	<hr/>	<hr/>	<hr/>
Total	3499	1240	518	5257

Methodology: 1968 data were taken as the base. Growth rates were assumed to be 2% per year for small firms, 2.5% per year for medium firms and 3% per year for large firms.

fall into the PTT main target group by size and many more in the secondary target groups.

Future growth, expected to follow roughly the same pattern, will ensure a constantly enlarging market for PTT. Such a projection is not unreasonable. Real industrial value added has grown at an annual rate of 6.3 percent in the 1968-77 period in Central America, versus a 5.4 percent rate of real GDP growth.

B. PTT Contacts to Date

Experience has shown that less than half of all field agent contacts result in the delivery of information or other services. This is to be expected in the early phases of a program such as PTT. Differences between countries should also be expected. Promotional activities require a major portion of field representative time. Table III shows in broad perspectives the results of an analysis of field representative activities for the period from September, 1977 to May, 1978. Annex A presents country data on the same subject. Unfortunately, no records were kept that would show the size of firms receiving promotional visits. The Project Coordinator has taken steps to correct this gap and generally to improve data collection. Annex B reproduces the latest draft of the new monthly report to be used by field representatives.

4a.

TABLE III

SUMMARY OF PTT ACTIVITIES

SEPTEMBER 1977 THROUGH MAY 1978

<u>Countries</u>	<u>Promotional Contacts</u>	<u>Service contacts</u>					<u>Total</u>	<u>Total Contacts</u>
		<u>Info.</u>	<u>Tech.</u>	<u>Asst.</u>	<u>Service</u>	<u>None</u>		
Guatemala	37	16	37		14	12	79	116
El Salvador	92	16	16		3	-	35	127
Honduras	25	23	3		5	13	44	69
Nicaragua	4	7	8		3	1	19	23
Costa Rica	<u>44</u>	<u>36</u>	<u>3</u>		<u>22</u>	<u>11</u>	<u>72</u>	<u>116</u>
PTT Total	<u>202</u>	<u>98</u>	<u>67</u>		<u>47</u>	<u>37</u>	<u>249</u>	<u>451</u>

A further breakdown of the service delivery contacts is presented as Table IV, which shows not only who received services but also which source provided that service. Annex C presents country-specific data. Table IV gives the best picture we have yet had of what the effective demand is for PTT services.

The following narrative accompanied Table IV:

"Analyzing the summary data of services rendered through PTT it can be confirmed that the greatest efforts have been given to aiding the small and medium size industry (39.0 and 42.1 per cent respectively), leaving only 18.9 per cent of the activity dedicated to the large industry. Information service leads as the most popular type of service rendered (59.1 per cent of all services rendered), followed by services with a 24.5 per cent, rendered usually by either ICAITI or the field representatives who are engineers. Technical assistance is last with 16.5 per cent.

"The above percentages are logical and normal. Information is most common for the following reasons:

- a) information has been used as the introductory activity that demonstrates to the potential clients the usefulness of the services;
- b) the cost of this service is relatively low and no change is made for it;
- c) when capable people receive adequate information, they themselves can implement it, at a high degree of success, and they frequently demonstrate it to others; and
- d) many contacts want to see something in writing from a reliable source before they make a decision.

**TABLE IV**  
**SUMMARY DATA OF PTT SERVICE: 9/77 - 5/78**

**GRAND TOTAL CENTRAL AMERICA**

SIZE OF INDUSTRY	TYPE OF SERVICE				ACTION TAKEN				TYPE OF INDUSTRY							
	RAW MAT.	PROCESS	EQUIPMENT	OTHER	REP.	LOCAL	ICAITI	OTHER	1	2	3	4	5	6	7	
<b>Information</b>																
Total	94	25	35	17	30	40	20	27	7	32	9	6	6	10	1	30
Small	40	14	16	8	8	24	7	8	1	22	4	1	4	4	1	4
Medium	36	9	14	8	16	15	8	12	1	8	3	4	2	6	-	13
Large	18	2	5	1	6	1	5	7	5	2	2	1	-	-	-	13
<b>Technical Assistance</b>																
Total	26	-	26	-	-	11	1	13	1	13	2	-	-	-	9	2
Small	12	-	12	-	-	10	-	2	-	2	1	-	-	-	9	-
Medium	11	-	11	-	-	1	1	8	1	9	1	-	-	-	-	1
Large	3	-	3	-	-	-	-	3	-	2	-	-	-	-	-	1
<b>Service</b>																
Total	39	-	36	-	1	10	3	25	1	15	7	3	1	5	-	8
Small	10	-	9	-	1	2	1	7	-	6	2	-	-	1	-	1
Medium	20	-	18	-	-	5	2	13	-	7	3	3	-	4	-	3
Large	9	-	9	-	-	3	-	5	1	2	2	-	1	-	-	4
Total	159	25	97	17	31	61	24	65	9	60	18	9	7	15	10	40
Small	62	14	37	8	9	36	8	17	1	30	7	1	4	5	10	5
Medium	67	9	43	8	16	21	11	33	2	24	7	7	2	10	-	17
Large	30	2	17	1	6	4	5	15	6	6	4	1	1	-	-	18

**Industry Key:**

1. Food
2. Chemical
3. Textile
4. Paper
5. Metal Mechanic
6. Construction
7. Others

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"Service is next. It consists of lab analysis in most cases, in the area of quality control and process evaluations. This activity is also not expensive and seen by contacts as being very necessary, mainly in the food industry.

"Technical assistance is the least used service. This is logical, as this requires more effort from the consultant, and more understanding from the users in relation to the service they are to receive. This type of activity requires personal attention of a technician at the premises of the industrialist; consequently, this is the most expensive and least used of the three services.

"As far as the action taken is concerned, we can see that the field representatives play an important role; they alone account for 38.4 per cent of the services delivered to the users. ICAITI, of course, leads with a 40.9 per cent as all the divisions within ICAITI have participated in delivering services. Local sources of assistance, most of an informational nature, are now low, but are participating more and more in delivering services to the users. Local sources account for 15.1 per cent of all services delivered. Adding that percentage to the percentage handled by the field agents shows that a total of 53.5 per cent is handled locally. "Other" is the least used (5.7%) and refers almost always to cases referred to Georgia Tech., DRI, and CODOT. PTT is structured to exhaust first local and regional capability prior to utilizing outside resources.

"The type of industry mainly serviced is the food industry (37.7%). Traditionally ICAITI has been well known in the area as an institute with knowledge and equipment in this field. Lately, the Technical Services Division has strive for providing assistance to other type of industries backed up by the PTT outreach system. Day by day ICAITI is penetrating other areas more and more, areas such as metal-mechanics (9.5%), the chemical industry (11.3%), construction (6.3%), etc.. The case of textiles (5.7%) is an interesting one; since the arrival of a textile technician financed by the German Government, ICAITI has been able to provide assistance in this area, now almost a traditional industry in Central America, at an increasing pace. "

### C. Probable Shape of the Demand Curve

PTT representatives report that there is considerable sales resistance from the people they contact once the question of cost is brought into the discussion. Of course, ICAITI's other operating branches have been aware of this for quite some time. Their response generally has been to change the level of effort, as ICAITI procedures preclude significant changes in price per unit of input. They are mindful of the fact that they face stronger competition in some areas than in others.

If their experience can validly be extended to PTT-generated activities generally, it is probable that the demand curve for such activities is elastic. This means that the level of sales depends strongly on the lowness of the price charged.

#### 4. Supply

The PTT system has been adequately described in the Project Paper revision and, to a lesser extent, in the most recent evaluation (see CAPTO A-28 of 8/7/78). It is important to remember that PTT is only one small, but important, part of the technical information/problem solving apparatus that services Central American manufacturing concerns. Other parts of the apparatus include local productivity centers,

the Central American network of national information centers, industry groups, salesmen, consultants, etc. While these other parts of the apparatus sometimes compete with PTT, at other times they complement it.

A. ICAITI Priorities for PTT

ICAITI is a well regarded, relatively well-established Central American institution. This is attested to by the increasing demands for its services by other regional and international organizations. Its capacities and recent undertakings have been described in the institutional analysis section of the revised Project Paper. Of most immediate importance to this discussion is the fact that ICAITI has financial and technical capability limitations. It is not, and should not be, all things to all men. But, as a result, ICAITI has to make sure that it does not take on activities that could strangle its ability to do what it does best. It must set priorities.

One of the first outputs of the project was a special study by ICAITI to determine where PTT efforts should be concentrated. The study ranked the twenty manufacturing sub-sectors (as conventionally defined by the UN standard classification system) according to the following criteria:

- National or regional importance, specifically its priority in national development plans and its potential contribution to the development of natural resources.
- Economic importance of the sector, both now (measured by employees, value added and investment) and in the future (import substitution and export potentials).
- Capacity of the sector to accept technology transfers, including specifically the financial capacity to pay for technology and the technical capacity to use it.
- Ability of ICAITI to provide assistance, based on present ICAITI capacity and contacts with the sector.

These criteria were arrived at after lengthy discussions within ICAITI and with outside consultants. Each criterion was then given a weight on a scale of 100. National/regional importance was given a weight of 56.6, economic importance was given a weight of 53.2, capacity of the sector was given a weight of 100 and ICAITI capacity was given a weight of 93.3. Each industrial sector was then ranked against each criterion and an overall rating of sectors was derived. The adjusted\* results for the six areas of highest

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\* The adjustment dropped petroleum from consideration because no need for services was perceived.

priority are as follows:

Rank	Sector	Ranking by Criterion				
		I	II	III	IV	Total
1	Food Products	2.4	19.8	35.4	30.3	87.9
2	Chemical Products	7.4	5.8	11.7	14.8	39.7
3	Textiles	7.4	4.0	2.6	11.3	25.3
4	Paper Products	5.0	1.3	1.6	11.6	19.5
5	Metal Products	2.4	1.7	0.9	10.8	15.8
6	Leather Products	<u>2.4</u>	<u>0.2</u>	<u>0.9</u>	<u>10.2</u>	<u>13.7</u>
	Total	27.0	32.8	53.1	89.0	201.9

As can be seen from the above ranking, ICAITI ability to provide services was for all intents and purposes the real deciding factor. Some 45 percent (89.0 out of 201.9 points) over the overall scores were due to the influence of this one factor. This is important because ICAITI ability is the only supply factor among the criteria; the rest deal with demand. On the other hand, however, if ICAITI were completely competent in all fields, such that the prioritization exercise would not consider ICAITI capacity, the prioritization would have resulted in the same rank order among these six sectors. Among all sectors (excluding petroleum again), only one significant change in rankings would have occurred by excluding the ICAITI capacity question--wood (now number eight) would have changed places

with metal products and become the fifth highest priority.

Mention should be made here that the prioritization was not meant to help decide which industries should be excluded from receiving PTT services. It is clear that exclusionary criteria are inappropriate in the light of what is actually happening: PTT effort is being concentrated on the sectors chosen for priority attention and on firms whose size indicates they are in the main target group. This can be seen by comparing experience to date (shown in Table III, above) with the stated targets for size and sector.

B. ICAITI as a Business

ICAITI should regard PTT as a sales tool, since in fact PTT does serve that function, and ICAITI should regard itself as a business, even though it is not in existence for profit. Its business is to provide services, services that should be worth at least what they cost. It therefore stands to reason that there is no better measure of ICAITI's usefulness than the revenues it generates through its own activities. \*

There are indications that ICAITI is now beginning to regard PTT as its sales arm. This should be encouraged.

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\* This does not mean that users of ICAITI services should be asked to pay full costs. This topic is discussed in some detail later in this report.

ICAITI itself has been increasingly aware of its need to change from what it once was. It now seems to be genuinely concerned that it find ways of expanding services in traditional areas and traditional markets as well as move into new areas such as assistance to smaller firms and to rural-based enterprises.

Market forces dictate that ICAITI operate more like a business. Depending on the kind of service involved, ICAITI does have competition in the market place. Given that it is probable that demand is elastic, at least for many of the services PTT has been facilitating, it is incumbent on ICAITI to expand its sales so as to cut average costs as much as possible.

It should be noted that this discussion is limited to ICAITI sales to industrial manufacturing concerns. Sales to regional and international organizations have always been an important part of ICAITI revenues, but are a separate matter beyond the scope of this report. Their contribution to supporting ICAITI overhead will continue to be crucial to the overall sales effort.

If ICAITI were managed so as to maximize revenues from sales, it would have to increase its marketing efforts (i.e., PTT) to increase market penetration and restructure its accounting to give better information to management on the true state of the business's finances.

### C. Marketing Strategy

The need for, and general outlines of, a sensible market strategy have already been presented as part of the recent evaluation of PTT. Relevant portions of that study are reproduced below because they are too important to be relegated to an annex or only cited.

#### (1) Marketing Approach

How to convert a potential client into an actual fee-paying client is a problem that bedevils many professionals in the business of selling services. Doctors, dentists, lawyers and the like have little trouble in this respect because their patients and clients recognize their need for the services and are used to the idea of paying hefty fees to get them. The purveyor of technical services to the small and medium size industry is rarely in such an enviable position.

Management of small and medium size industry in areas such as Central America are almost always non-professional, unspecialized, and in the hands of the owner and his family who do everything. If the business is keeping its head above water, the owner-manager believes that all is well and that he is the master of his affairs. It is usually only when something is obviously wrong and he is more or less on the edge of disaster that he admits to himself the need for outside help. How then can ICAITI sell technical services to small and medium industry that might have an unrecognized need before the business is in severe difficulty?

We believe, on the basis of experience in similar situations in other parts of the world, that a short, relatively inexpensive general business check-up is a workable approach to the problem. In Central America it goes by the name of industrial diagnostic; in other places it may be called a management or operations audit-- the name is not important, but the price tag is. It must be modest in all respects: broad in coverage rather than intense, short in duration, and low in price -- yet a professional job that gives the client at least his money's worth and a taste for more. Above all it must reflect well on ICAITI.

There is a market for this kind of study as indicated by several requests for proposals that have come to our attention. ICAITI's present response to this market is a proposal -- usually drafted in an information and data vacuum -- that offers a multi-person, rather in-depth study at a price that runs to a thousand or two, or more, dollars. We submit that this kind of proposal to a first-time small-to-medium size prospect is inappropriate and premature. If one wants to catch a fish, one selects a proper hook and baits it with what appeals to the fish. ICAITI's bait is fine but the hook is too big for the fish to swallow. So he nibbles at the bait and then goes off. Not only is the proposal turned down, with all the consequent loss of effort and expense of contact, communications, and proposal writing, but ICAITI is not likely to see that prospect or his industrialist friends again.

The diagnostic we recommend is a one- to three-day affair -- depending on the size and complexity of the operation -- performed by one man at a price of a few hundred dollars, at most. It would serve to define the problem and suggest simple solutions where possible. It would leave the industrialist, if not with a solution, then with a more precise identification of what and where his trouble is. In many cases it would provide the information base upon which ICAITI could submit more pointed, relevant proposals for further study and action.

We suggest that the field representatives are the most likely people to perform these small introductory diagnostics as a low cost selling device to win more of the small-to-medium size industrial technology services market. They are technically trained people, capable in the food technology area where the largest part of the small-to-medium market resides, and are accustomed to recognizing and dealing with facts. They can easily be trained for this task by the SSE (Project Coordinator) who has done this training several times in other places. In the beginning the SSE may participate in the first few diagnostics until he is satisfied that the field men are ready to carry on alone. For some time longer it should be required that the diagnostic report to the client be reviewed by the SSE for content and appropriate presentation.

(2) Expanded Product Line

PTT has a rather restricted stock of products to offer. In addition to a quite complete service in food technology, some geological capabilities, a document information service heavy in food technology but growing into other areas, and the courage to try almost anything, the inventory includes a textile manufacturing specialist provided under the auspices of FRG external assistance and a furniture manufacturing specialist in the person of the SSE.

Appendix C shows the PTT has been able to sell seven textile technical service jobs for almost \$34,000 ranging from a quick \$240 cost accounting assignment to a substantial \$25,000 general technical assistance contract still in progress. The furniture specialist has recently completed a \$6,000 general technical assistance contract with a firm in El Salvador. The field representatives report that it is relatively easy to sell such expertise and say that they could do more if there were a wider range of industry specific technical expertise readily available at ICAITI. Based on the experience to date in textiles and furniture we have every reason to respect their judgement.

It is likely that other industry experts could be available considering the apparent increase in interest in the transfer of technology among various bilateral and multilateral assistance agencies. The problem for PTT is to know precisely what kind and how many specialists it could effectively employ on the spot.

We recommend that SSE survey the regional market for the services of high level generalists in specific industrial sectors as exemplified by the textile and furniture specialists. In those cases where it appears fairly certain that the specialist could be substantially employed full time, ICAITI should approach interested donor agencies with a view to obtaining the assignment of such specialists as resident experts on ICAITI's staff for appropriate periods.

In the case of a need for a more narrowly specialized technician or for a generalist for shorter periods of service PTT will have to rely on its facilities for calling short-term specialists to Central America. At present the contracts with U.S. sources of technology are the only available vehicles for meeting this possible need.

In addition to changing its marketing approach and expanding its "product line," as recommended above, ICAITI should also have PTT set up sales targets for its field representatives, just like other sales organizations. The evaluation discusses what is needed:

As far as we were able to detect, the marketing activities of the field representatives are under only general guidance and control. We saw no evidence of a tight marketing plan with quotas and targets for periodic achievement. Lacking these, it is pretty much up to the field representative to do as he wishes within the general guidelines of the strategy laid out by the SSE.

Impressive as the initial results seem to be, we believe that sustained and improved marketing performance will require more direction from the SSE. Without periodic targets and quotas - say, monthly targets for the number and kind of organizational and industrial contacts to be made and, perhaps, volume of sales concluded - the efforts of the field representatives remain undirected, except in the most general way, and without effective measures of performance.

There is no way at present to be satisfied that the field representatives are exerting their maximum effort and that their efforts are directed toward the goals of the PTT. In fact, the goals of the PTT need to be translated into near-term targets that can serve as the basis for specifications of what each field man should do in each country in the near term. There are no doubt many useful things a field man can do that would promote PTT success. It is up to the SSE to select among these for the activities that will do the job best--to specify the amount and priority of each kind of activity. For example, how much of the time of the field representative in country X should be devoted in the next month or two to the mix of public relations, industrial contacts/sales, seminars, and other kinds of activity? We believe these trade-offs should be made by the SSE, and that the field representatives performance should be judged according to how well he carries out his marketing plan.

In sum, adoption of these recommendations will go a long way in changing PTT from an exploratory "operating feasibility study" to a successful sales arm. It has changed a great deal already, but more changes are needed. At some point in the future, ICAITI should evaluate its field operations just as any sales organization would: does it make good sense to expand (or consolidate) operations, given the probable impact of such an action on organizational goals?

D. Costing of Services

(1) Present Accounting Practices\*

ICAITI services to clients are accounted for on a project or contract basis. Both income and expense are distributed to the appropriate project/contract and the consolidated net income of all projects/contracts handled by a particular division constitutes that division's contribution to overhead.

PTT is accounted for in much the same manner as any other ICAITI contract, except that it is set up to earn no income other than the charges reimbursed by ROCAP. Once PTT field service has brought in an income-producing job, the contract is accounted for as a part of the activity of the division(s) that perform the work. For financial purposes, the contract loses its PTT identity. The exception to this generality is the case where information or services are procured for clients from one of the U.S. contractors. In such a situation the costs are charged to the PTT account but any income thereby produced loses its identity and disappears into the general funds.

The PTT field service direct costs are neither charged to overhead nor in any way added to the price of contracted services to clients. Furthermore, the PTT is charged with the direct cost of the participation of any ICAITI divisional personnel in PTT activities, such as attendance at PTT coordinating committee meetings and, occasionally, in public relations activities that the SSE may deem useful for expanding PTT relationships.

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\* As described in the latest evaluation.

What all this adds up to is that there is no recovery or financial recognition of the PTT contribution to ICAITI's actual and potential income-producing activity. The sales and public relations activities of the PTT field service are, in financial terms, taken for granted (no pun intended) and, to the extent that the services of the U.S. contractors are sold to clients, there is a double charge -- one to the PTT contractor funding and one to the client.

Under the circumstances there is no way to tell from ICAITI accounting records and statements the extent to which PTT is earning its keep.

(2) Recommended Changes

The evaluators went on to recommend that ICAITI accounting be adjusted to reflect the income side of PTT as well as its costs. This translates into the following specific steps, some of which are apparently ready to be adopted or are already adopted by ICAITI:

(a) Costs of PTT should be regarded an element of overhead expenses in the same way that the cost of other service divisions is charged to overhead;

(b) AID grant support should be a regular income item, although it is recognized that it is a cost reimbursement type of income; and

(c) In general, full accrual accounting should be used because it gives a more accurate picture of financial status. (At present, overhead in any one year is charged to

projects completed in that year. The recommended change would have the effect of charging all activities with the full overhead associated with it that year.)

E. The Problem of Small Firms

Perhaps most in "need" of ICAITI services and least able to pay for them, small firms represent a special problem both for PTT and ICAITI in general. They are difficult for PTT field representatives to reach and in general do not figure as major sales targets. This calls into question whether field representatives should spend as much time with them as available data (see Table IV) indicate has been the case. Since the group as a whole probably includes very profitable as well as marginal operations, more study will be necessary to determine the profitability of <sup>generalized</sup> sales efforts directed to small firms.

Even if these studies show that such efforts are likely to be unprofitable, that does not mean that ICAITI should forget about small firms. ICAITI feels small firms are an important factor in industrial improvement in Central America. Even from a business point of view, sales to them could result in a contribution to reducing average costs per unit of service delivered. In addition, carefully kept records of assistance to small firms could be the basis of a strong, persuasive presentation to the Central American governments to request them to increase their financial support for

ICAITI or to international agencies interested in spreading better technologies downwards among small firms. To be successful, however, such presentation would also have to show ICAITI's success in becoming more self-financing in other aspects of its operations.

The above position could be interpreted as implying a "trickle-down" approach to small firms. This is a misinterpretation. Rather, it is a reflection of the business-like seriousness with which ICAITI must treat all of its operations. Above all, ICAITI must be on a strong financial basis, so as to be less dependent on the vagaries of non-industrial revenues like government contributions and grants from international donors, and so as to better guarantee a continuation of its ability to serve in the future.

## 5. Proper Size of Activity and Funding

The previous sections have in reality only drawn together in one place various factors which have been more or less well discussed within ROCAP and ICAITI. The most important questions have not been addressed squarely. These are: (a) What is the appropriate scale of project activities? and (b) What is the appropriate division of financial support among the various sources of revenue?

These are difficult questions which are by no means unidimensional. First, one should consider PTT/ICAITI as a separate entity and also as part of the larger technology transfer mechanism. Second, the analysis should look at both financial and economic aspects, and deal with the situation as it changes between the short and long run.

Even though the theoretical need to distinguish between PTT/ICAITI and the entire technology transfer mechanism in Central America is recognizable, this report is not the vehicle to address this aspect of either basic question. To a certain extent, market forces will determine the relationship between the two. It can be said, however, that the experience to date with PTT/ICAITI indicates that there is clearly a role PTT can play in the technology transfer system. Our inability

to deal with this aspect of the problems does not in any way undermine its importance.

A. Appropriate Scale

(1) Financial Analysis

In financial terms, the appropriate scale of project activities is that level of activities at which ICAITI's income equals its costs. In practice, this point is hard to specify on an a priori basis. To be sure, the financial costs of PTT are known, but since there is no practical way to distinguish the real effects of PTT on ICAITI as a whole, PTT generated income will remain indefinite. That is why PTT has to be handled as a general overhead item and that is why the analysis should be of all ICAITI activities. But this theoretical requirement is difficult to handle in practical terms, and not very helpful in discussing the real-world decision that has to be made.

The financial answer to the question of appropriate scale for practical purposes really boils down to a demand analysis. A firm answer will come only as PTT/ICAITI activities discover more and more about demand through additional experience. This does not mean that PTT is still an "operational feasibility study" of how to design an outreach mechanism for delivering ICAITI services. In that sense, the feasibility study seems rather clearly closed: PTT gives every

indication that it is the mechanism ICAITI (and AID) searched for. Nor does it mean that an interim answer cannot be derived.

The PTT coordinator projects that the five-man system will make over 600 contacts per year. At this rate, it would take over two years to contact all medium size firms, and over six years to contact all small and medium size firms thought to be operating in Central America at present, and proportionally more if repeat contacts are involved. Of these contacts, perhaps 300 will be only promotional and not result in the identification of a technology need. Of the remaining 300, perhaps about half can be satisfied by a simple transfer of information. The other half are expected to be willing to pay for a service from ICAITI that they otherwise would not have sought. If each of these firms would be willing to spend only \$1,000 on the average, full PTT costs would be covered. This figure does not include the sales of diagnostics, an attractive sales item, nor does it consider the overall effect of reducing the average cost to ICAITI of providing all services, both those generated through PTT and through other means.

The above analysis, despite its being based on projections only partially subject to verification through the history of PTT to date, is a reasonably assuring analysis. It contains optimism which is combined with conservative estimates of the effect of those factors which may be optimistic. The net result is that a five-man, well established PTT should not only be able to support itself but, even more interestingly, also make a strong contribution to ICAITI's overall financial well-being.

It should be pointed out here that the analysis of demand only says that a five-man PTT system does not seem to be too large a structure to build. It does not specify exactly of what size the optimum structure should be. That answer can only be derived through more experience.

(Note: ROCAP prepared an analysis of the effect of PTT on ICAITI's break-even point which clearly supports the main thrust of the above analysis and underlines the importance of decreasing average costs. The analysis is on file in LAC/DR/EEAD.)

(2) Economic Analysis

The difference between financial and economic analysis rests in differences in the private and social valuation of benefits or costs, or both. In the case of PTT, the most obvious differences are the social valuation of information now distributed (almost always at no charge if

it is readily available) and the social valuation of the technologies themselves.

While it is easy to presume that a more accurate valuation of information would lead to a higher level of project benefits, it is not clear that the implementation of the technologies themselves will not involve divergence between private and social costs and benefits. There is in fact nothing that can be done during project design to preclude a misapplication of technologies. Nevertheless, since the PTT (and ICAITI's own priorities) will move the major focus of ICAITI's programs from large/medium size firms to medium/small firms, there is some reason to expect that any misapplications will have only minimal undesirable effects. In fact, however, it is not clear that the overall effect of the technologies would necessarily lead to a worse allocation of resources than at present and an improvement is, of course, still a distinct possibility as well as the intention.

In view of the uncertainties of the relative strengths of the two divergences, this economic analysis cannot invalidate the earlier financial analysis.

B. Division of Costs

In addition to having financial and economic aspects, analyses of a proper division of costs have an inter-temporal

aspect. Different answers obtain in the short and long runs. The following analyses therefore incorporate time in their expositions.

(1) Financial Analysis

During its placement (or growth) stage, PTT requires higher outside levels of financing than during its implementation phase. Its own income will not cover its costs at first. During the implementation phase the PTT mechanism will not require outside financing. (ICAITI could still need outside financing, however, in an amount that depends on its success in selling services.) The practical problem is to maximize income from all sources--contributions from member governments, fees from industrial users of services and contracts from outside organization (including economic development agencies)--to support the development of PTT. ICAITI has actively searched out possible funding with some heartening success. Several institutions hosting field representatives have already expanded their contributions beyond minimal in-kind services to include support in cash and in the form of additional in-kind support. Even after the end of PTT's placement stage, ICAITI should continue to urge the maintenance or even expansion of such support so that it can expand activities in other fields which are part of its mandate. (See Postscript on Differential Pricing, Annex E.) In general, the

principle guiding ICAITI's exploration of the supply curve covering support funds should be to seek funds from all possible sources in accordance with their ability to pay, but at least equal to the benefits they derive.

(2) Economic Analysis

The above prescription is more substantive when we examine the economics of the situation. This can best be done by splitting up economic benefits by recipient.

<u>Recipient</u>	<u>Nature and Extent of Benefit</u>
User	Provided with information or other service. Value to user unknown. In contractual situations, presumed to be above cost.
C.A. Govt.	External effects through expanded employment or savings of resources. Partially captured through tax system. Difficult to assess value of benefit.
A.I.D.	Establishment of PTT necessary to achieving AID goal of helping increase the welfare of CA citizens through spread of better technology. Extent of benefits presumed to be lower than for CA governments. PTT also useful in other programs beyond industry.

Other Donors	Similar to AID. Benefits less immediate, but see Annexes 10 and 17 in revised Project Paper for evidence of other donor interest.
ICAITI	PTT seen as necessary to increase productivity of existing fixed cost items, lowering total average costs of all services. ICAITI is agency of CA governments. Benefit at least equal to contribution to establish PTT.
Local Institution	Presence of PTT agent benefits membership. Size of benefit not known.
U.S. Institution	PTT strengthens potential subcontractor (ICAITI), possibly magnifies research capability at U.S. institution through cross pollenization. Benefits believed small at present.
Other Institutions (e.g. SIATE)	Complementary work, but potential source of competition. Benefits thought to outweigh costs slightly.

This may not be an exhaustive taxonomy of the economics involved, but it clearly indicates the several interests that are at play. Without further analysis, however, no clearer definition is possible of what an appropriate cost sharing formula applicable to the growth phase would look like.

The same analysis could be useful in determining appropriate cost sharing in the long run if that were necessary. It is expected, however, that PTT as presently structured (a five-man system) will not need outside subsidies. Just as profits should signal a profit-oriented entrepreneur that an expansion is warranted, an excess of economic benefit over economic costs should signal ICAITI that an expansion of its operations could be justified. CA governments would have to decide that such subsidies would constitute a better use of national funds than alternative uses of the same funds.

SUMMARY OF REPORTED PTT ACTIVITIES

SEPTEMBER 1977 THROUGH MAY 1978

<u>Countries by months</u>	<u>Total Contacts</u>	<u>Promotional Contacts</u>	<u>Service contacts and follow-ups</u>				<u>Size of Industry</u>		
			<u>Info.</u>	<u>Tech. Asst.</u>	<u>Service</u>	<u>None</u>	<u>Small</u>	<u>Med.</u>	<u>Large</u>
<u>1977</u>									
<u>September</u>									
<u>Total</u>	<u>30</u>	<u>12</u>	<u>11</u>	<u>2</u>	<u>3</u>	<u>2</u>	<u>7</u>	<u>8</u>	<u>3</u>
Guatemala	7	3	2	-	1	1	2	2	-
El Salvador	4	2	2	-	-	-	-	1	1
Honduras	-	-	-	-	-	-	-	-	-
Nicaragua	5	-	2	2	1	-	2	3	-
Costa Rica	14	7	5	-	1	1	3	2	2
<u>October</u>									
<u>Total</u>	<u>46</u>	<u>14</u>	<u>18</u>	<u>4</u>	<u>3</u>	<u>7</u>	<u>17</u>	<u>11</u>	<u>4</u>
Guatemala	12	5	4	-	1	2	3	3	1
El Salvador	6	2	2	1	1	-	1	2	1
Honduras	8	3	3	-	-	2	5	-	-
Nicaragua	6	2	1	2	-	1	2	2	-
Costa Rica	14	2	8	1	1	2	6	4	2

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Countries by months	Total Contacts	Promotional Contacts	Service contacts and follow-ups				Size of Industry		
			Info.	Tech. Asst.	Service	None	Small	Med.	Large
<u>November</u>									
<u>Total</u>	<u>47</u>	<u>13</u>	<u>18</u>	<u>3</u>	<u>7</u>	<u>6</u>	<u>13</u>	<u>20</u>	<u>1</u>
Guatemala	14	6	3	1	2	2	3	4	1
El Salvador	4	-	4	-	-	-	1	3	-
Honduras	10	4	3	-	1	2	3	3	-
Nicaragua	3	-	2	1	-	-	1	2	-
Costa Rica	16	3	6	1	4	2	5	8	-
<u>December</u>									
<u>Total</u>	<u>20</u>	<u>10</u>	<u>4</u>	<u>1</u>	<u>3</u>	<u>2</u>	<u>4</u>	<u>5</u>	<u>1</u>
Guatemala	12	6	2	-	3	1	2	3	1
El Salvador	-	-	-	-	-	-	-	-	-
Honduras	8	4	2	1	-	1	2	2	-
Nicaragua	-	-	-	-	-	-	-	-	-
Costa Rica	-	-	-	-	-	-	-	-	-
<u>1978</u>									
<u>January</u>									
<u>Total</u>	<u>59</u>	<u>26</u>	<u>11</u>	<u>5</u>	<u>11</u>	<u>6</u>	<u>14</u>	<u>19</u>	<u>2</u>
Guatemala	10	4	2	1	2	1	2	4	-
El Salvador	12	7	2	2	1	-	1	4	-
Honduras	7	2	1	1	1	2	4	3	-
Nicaragua	5	1	2	1	1	-	2	2	-
Costa Rica	25	12	4	-	6	3	5	6	2

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<u>Countries by months</u>	<u>Total Contacts</u>	<u>Promotional Contacts</u>	<u>Service contacts and follow-ups</u>				<u>Size of Industry</u>		
			<u>Info.</u>	<u>Tech. Asst.</u>	<u>Service</u>	<u>None</u>	<u>Small</u>	<u>Med.</u>	<u>Large</u>
<u>February</u>									
<u>Total</u>	<u>64</u>	<u>33</u>	<u>12</u>	<u>15</u>	<u>3</u>	<u>1</u>	<u>18</u>	<u>13</u>	<u>-</u>
Guatemala	13	5	-	8	-	-	8	-	-
El Salvador	25	19	1	5	-	-	2	4	-
Honduras	14	3	10	1	-	-	6	5	-
Nicaragua	-	-	-	-	-	-	-	-	-
Costa Rica	12	6	1	1	3	1	2	4	-
<u>March</u>									
<u>Total</u>	<u>51</u>	<u>30</u>	<u>4</u>	<u>11</u>	<u>3</u>	<u>3</u>	<u>12</u>	<u>9</u>	<u>1</u>
Guatemala	16	3	-	9	2	2	9	3	1
El Salvador	28	24	2	1	1	-	1	3	-
Honduras	-	-	-	-	-	-	-	-	-
Nicaragua	2	1	-	1	-	-	1	-	-
Costa Rica	5	2	2	-	-	1	1	3	-
<u>April</u>									
<u>Total</u>	<u>80</u>	<u>37</u>	<u>14</u>	<u>15</u>	<u>8</u>	<u>6</u>	<u>17</u>	<u>22</u>	<u>4</u>
Guatemala	20	3	2	9	3	3	9	6	2
El Salvador	27	20	1	6	-	-	2	5	-
Honduras	10	4	2	-	1	3	2	4	-
Nicaragua	-	-	-	-	-	-	-	-	-
Costa Rica	23	10	9	-	4	-	4	7	2

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<u>Countries by months</u>	<u>Total Contacts</u>	<u>Promotional Contacts</u>	<u>Service contacts and follow-ups</u>				<u>Size of Industry</u>		
			<u>Info.</u>	<u>Tech. Asst.</u>	<u>Service</u>	<u>None</u>	<u>Small</u>	<u>Med.</u>	<u>Large</u>
<u>May</u>									
<u>Total</u>	<u>54</u>	<u>27</u>	<u>6</u>	<u>11</u>	<u>6</u>	<u>4</u>	<u>14</u>	<u>11</u>	<u>2</u>
Guatemala	12	2	1	9	-	-	9	-	1
El Salvador	21	18	2	1	-	-	1	2	-
Honduras	12	5	2	-	2	3	2	5	-
Nicaragua	2	-	-	1	1	-	-	2	-
Costa Rica	7	2	1	-	3	1	2	2	1
<u>Total</u>	<u>451</u>	<u>202</u>	<u>98</u>	<u>67</u>	<u>47</u>	<u>37</u>	<u>116</u>	<u>118</u>	<u>18</u>

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Significado de las abreviaturas de la hoja de resumen de contactos del PTT

<u>Abreviaturas</u>	<u>Significado</u>
R	Representante
C	Cliente
TE	Teléfono
E	Escrita
P.	Personal
PR	Promoción
SG	Seguimiento
TR	Trabajo
PQ	Pequeña
MD	Mediana
GR	Grande
INSTIT	Institución
PER	Persona
INF	Información
AT	Asistencia Técnica
ENT	Entrenamiento
SER	Servicio
N	Nada
L	Local
I	ICAITI
O	Otros
PRO	En proceso
PND.A	Pendiente de aceptación
NO A	No aceptada
T	Terminado

Rama Industrial

- |                           |  |
|---------------------------|--|
| 1. Productos alimenticios | 11. Caucho                                       |
| 2. Bebidas                | 12. Productos químicos                           |
| 3. Tabaco                 | 13. Derivados del petróleo                       |
| 4. Textiles               | 14. Productos minerales no metálicos             |
| 5. Calzado y vestuario    | 15. Metales básicos                              |
| 6. Madera                 | 16. Productos metálicos                          |
| 7. Muebles                | 17. Maquinaria, excepto eléctrica                |
| 8. Papel y cartón         | 18. Maquinaria, aparatos y accesorios eléctricos |
| 9. Imprentas              | 19. Equipo de transporte                         |
| 10. Cuero y productos     | 20. Industrias diversas                          |
|                           | 21. Otras  |

Instituciones

- |                              |                |
|------------------------------|----------------|
| 1. Gubernamentales centrales | 3. Educacional |
| 2. Gubernamentales locales   | 4. Médica      |

- |                  |                              |
|------------------|------------------------------|
| 5. Comunicación  | 12. Internacional            |
| 6. Financiera    | 13. Embajada                 |
| 7. Profesional   | 14. Cooperativa              |
| 8. Investigación | 15. Autónoma                 |
| 9. Comercio      | 16. Semi-autónoma            |
| 10. Religiosas   | 17. Asistencia internacional |
| 11. Culturales   | 18. Fundación                |
|                  | 19. Otros                    |

NOTA: Deberá especificarse si es (a) Institución privada, o (b) estatal.

Tipo de información

1. Materia prima
2. Procesos
3. Equipo
4. Otros

Tipo de asistencia técnica

- |                        |                                    |
|------------------------|------------------------------------|
| 1. Diagnóstico         | 9. Relaciones humanas              |
| 2. Administración      | 10. Normas de calidad              |
| 3. Finanzas            | 11. Factibilidad                   |
| 4. Producción          | 12. Organización                   |
| 5. Compras             | 13. Procesos                       |
| 6. Mercado             | 14. Contable                       |
| 7. Diseño              | 15. Otros                          |
| 8. Relaciones públicas | c. Cuando quede a nivel de estudio |

Servicios

- |  |  |
|--|--|
| 1. Analítico   | 3. Certificado de capacidad instalada                |
| 2. Certificado de origen de materia prima y/o producción | 4. Dictámen técnico (d) analítico o (e) no analítico |
|  | 5. Otros   |

Entrenamiento

- |                               |                                     |
|-------------------------------|-------------------------------------|
| 1. Cursos                     | 3. Conferencias                     |
| 2. Entrenamiento "on the job" | 4. Seminarios, mesas redondas, etc. |
|                               | 5. Otros                            |

NOTA: Deberá especificarse el lugar donde se llevó a cabo el entrenamiento así: (f) en el ICAITI, (g) en el local del contrato y (h) en otro lugar

Propuestas en proceso por:

1. Representante
2. Divisiones ICAITI
  - (I) Dirección
  - (J) Desarrollo Científico y Tecnológico

- (k) Documentación e Información
  - (l) Servicios Técnico-Industriales
  - (m) Análisis, Pruebas y Ensayos
  - (n) Investigación Aplicada
  - (o) Edición Técnica
  - (p) Normas
  - (q) Geología
3. Oficina central PTT
  4. Otros

Propuestas pendientes de aceptación

Indicar en orden numérico las veces que se hagan cambios en la propuesta antes de su firma.

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NOTA: En "ORGANIZACION/EMPRESA" agregar al nombre un (1) si afecta a dos o más Instituciones

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SUMMARY DATA OF PTT SERVICE

GUATEMALA

SIZE OF INDUSTRY	TYPE OF SERVICE				ACTION TAKEN				TYPE OF INDUSTRY						
	RAW MAT.	PROCESS	EQUIPMENT	OTHER	REP.	LOCAL	ICAITI	OTHER	1	2	3	4	5	6	7
<u>Information</u>															
Total	16	4	7	3	7	6	2	8	-	7	5	1	-	3	-
Small	7	2	2	2	3	4	2	1	-	4	3	-	-	-	-
Medium	5	2	3	1	2	2	-	3	-	2	-	-	-	3	-
Large	4	-	2	-	2	-	-	4	-	1	2	1	-	-	-
<u>Technical Assistance</u>															
Total	11	-	11	-	-	9	-	2	-	2	-	-	-	-	9
Small	9	-	9	-	-	9	-	-	-	-	-	-	-	-	9
Medium	2	-	2	-	-	-	-	-	-	-	-	-	-	-	2
Large	-	-	-	-	-	-	-	2	-	2	-	-	-	-	-
<u>Service</u>															
Total	15	-	15	-	-	-	-	15	-	11	2	-	-	2	-
Small	4	-	4	-	-	-	-	4	-	4	-	-	-	-	-
Medium	8	-	8	-	-	-	-	8	-	6	-	-	-	2	-
Large	3	-	3	-	-	-	-	3	-	1	2	-	-	-	-

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SUMMARY DATA OF PTT SERVICE

EL SALVADOR

SIZE OF INDUSTRY		TYPE OF SERVICE				ACTION TAKEN				TYPE OF INDUSTRY						
		RAW MAT.	PROCESS	EQUIPMENT	OTHER	REP.	LOCAL	ICAITI	OTHER	1	2	3	4	5	6	7
<u>Information</u>																
Total	15	6	9	5	7	3	3	6	3	3	-	1	1	1	1	8
Small	6	3	3	2	-	2	1	2	1	3	-	-	1	1	1	-
Medium	5	2	4	2	4	1	1	3	1	3	-	-	1	1	1	-
Large	4	1	2	1	3	-	1	1	2	-	-	1	-	-	-	4
<u>Technical Assistance</u>																
Total	8	-	8	-	-	-	-	8	-	7	-	-	-	-	-	1
Small	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Medium	5	-	5	-	-	-	-	5	-	5	-	-	-	-	-	-
Large	3	-	3	-	-	-	-	3	-	2	-	-	-	-	-	1
<u>Service</u>																
Total	4	-	4	-	-	-	-	4	-	2	-	-	1	1	-	-
Small	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Medium	2	-	2	-	-	-	-	2	-	1	-	-	-	1	-	-
Large	2	-	2	-	-	-	-	2	-	1	-	-	1	-	-	-

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SUMMARY DATA OF PTT SERVICE

HONDURAS

SIZE OF INDUSTRY	TYPE OF SERVICE				ACTION TAKEN				TYPE OF INDUSTRY							
	RAW MAT.	PROCESS	EQUIPMENT	OTHER	REP.	LOCAL	ICAITI	OTHER	1	2	3	4	5	6	7	
<u>Information</u>																
Total	23	9	10	5	5	14	4	5	-	8	3	3	1	5	-	3
Small	14	5	7	2	2	9	2	3	-	8	-	-	-	3	-	3
Medium	9	4	3	3	3	5	2	2	-	-	3	3	1	2	-	-
Large	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Technical Assistance</u>																
Total	3	-	3	-	-	-	-	3	-	3	-	-	-	-	-	-
Small	2	-	2	-	-	-	-	2	-	2	-	-	-	-	-	-
Medium	1	-	1	-	-	-	-	1	-	1	-	-	-	-	-	-
Large	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Service</u>																
Total	5	-	3	-	-	-	2	3	-	2	-	3	-	-	-	-
Small	2	-	2	-	-	-	-	2	-	2	-	-	-	-	-	-
Medium	3	-	1	-	-	-	2	1	-	-	-	3	-	-	-	-
Large	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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SUMMARY DATA OF PTT SERVICE

NICARAGUA

SIZE OF INDUSTRY	TYPE OF SERVICE				ACTION TAKEN				TYPE OF INDUSTRY							
	RAW MAT.	PROCESS	EQUIPMENT	OTHER	REP.	LOCAL	ICAITI	OTHER	1	2	3	4	5	6	7	
<u>Information</u>																
Total	7	2	1	-	4	-	2	4	1	1	-	1	-	1	-	4
Small	2	2	-	-	-	-	1	1	-	1	-	1	-	-	-	-
Medium	4	-	1	-	3	-	1	3	-	-	-	-	-	1	-	3
Large	1	-	-	-	1	-	-	-	1	-	-	-	-	-	-	1
<u>Technical Assistance</u>																
Total	2	-	2	-	-	-	1	-	1	1	-	-	-	-	-	1
Small	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Medium	2	-	2	-	-	-	1	-	1	1	-	-	-	-	-	1
Large	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Service</u>																
Total	1	-	-	-	1	-	-	1	-	-	-	-	-	-	-	1
Small	1	-	-	-	1	-	-	1	-	-	-	-	-	-	-	1
Medium	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Large	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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SUMMARY DATA OF PTT SERVICE

COSTA RICA

<u>SIZE OF INDUSTRY</u>	<u>TYPE OF SERVICE</u>				<u>ACTION TAKEN</u>				<u>TYPE OF INDUSTRY</u>						
	<u>RAW MAT.</u>	<u>PROCESS</u>	<u>EQUIPMENT</u>	<u>OTHER</u>	<u>REP.</u>	<u>LOCAL</u>	<u>ICAITI</u>	<u>OTHER</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
<u>Information</u>															
Total	33	4	8	4	7	17	9	4	3	13	1	-	4	-	15
Small	11	2	4	2	3	9	1	1	-	6	1	-	3	-	1
Medium	13	1	3	2	4	7	4	1	1	6	-	-	1	-	6
Large	9	1	1	-	-	1	4	2	2	1	-	-	-	-	8
<u>Technical Assistance</u>															
Total	2	-	2	-	-	2	-	-	-	-	2	-	-	-	-
Small	1	-	1	-	-	1	-	-	-	-	1	-	-	-	-
Medium	1	-	1	-	-	1	-	-	-	-	1	-	-	-	-
Large	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Service</u>															
Total	14	-	14	-	-	10	1	2	1	-	5	-	-	2	7
Small	3	-	3	-	-	2	1	-	-	-	2	-	-	1	-
Medium	7	-	7	-	-	5	-	2	-	-	3	-	-	1	3
Large	4	-	4	-	-	3	-	-	1	-	-	-	-	-	4

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IDENTIFICACION Y SELECCION DE RAMAS INDUSTRIALES  
PRIORITARIAS PARA EL  
PROGRAMA DE TRANSFERENCIA DE TECNOLOGIA

## ANTECEDENTES

Con fecha 28 de mayo de 1976, la Oficina Regional para Programas Centroamericanos (ROCAP), de la Agencia para el Desarrollo Internacional (AID) de los Estados Unidos, y el Instituto Centroamericano de Investigación y Tecnología Industrial (ICAITI), convinieron en que este último se encargaría de establecer un mecanismo de transferencia de tecnología (Programa para la Transferencia de Tecnología, PTT) que tuviese la capacidad de iniciar y mantener un intercambio de información y tecnología entre fuentes extranjeras y consumidores centroamericanos.

Dentro de los términos del convenio se especifica que al inicio del programa, el ICAITI, a través de la División de Servicios Técnico-Industriales, con la asistencia de consultores y con la colaboración de los representantes de campo del ICAITI dentro del PTT, se encargaría de realizar un análisis del sector industrial centroamericano con el objeto de identificar y seleccionar un número limitado de ramas industriales para los servicios del PTT.

Para la identificación y selección de las ramas prioritarias, en la primera reunión del grupo de consultores al programa, llevada a cabo en la sede del ICAITI en el mes de agosto, se preparó una lista preliminar de doce criterios de selección como orientación al grupo de trabajo.

Con base en los referidos criterios, las ramas industriales fueron clasificadas conforme a un orden de prioridad que se considera refleja la sucesión en la que ofrecen las mayores oportunidades para una transferencia de tecnología en Centroamérica.

Las ramas industriales así clasificadas y la metodología empleada para su selección, se ofrecen en el presente documento.

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## INTRODUCCION

Dentro de las actividades contempladas al inicio del programa de transferencia de tecnología, se encuentra el desarrollo de un análisis del sector industrial centroamericano, con miras a la identificación y selección de un número limitado de ramas industriales prioritarias para el programa.

Dicha selección se consideró necesaria teniendo en cuenta que el PTT es un programa prototipo cuya factibilidad se evaluará en el período relativamente corto de 18 meses y, dada la amplitud y la complejidad que caracteriza al sector industrial, para evitar correr el riesgo de diluir el impacto del programa que indudablemente resultaría de tratar de cubrir la totalidad del sector, sería necesario y conveniente canalizar los esfuerzos hacia las ramas industriales más importantes y que presenten las mejores oportunidades para una transferencia de tecnología.

Por otra parte y en este mismo orden de ideas, la selección se consideró deseable teniendo en cuenta también que el ICAITI tiene mayor experiencia en unas ramas industriales más que en otras y, por lo tanto, sería mucho más estratégico circunscribir el radio de acción del programa en aquellas áreas en donde hay más capacidad de servicio y en el que se tiene a la disposición el personal y equipo necesarios para resolver con más eficiencia los casos de transferencia de tecnología que se presenten.

Lo anterior, sin embargo, no significa que el programa excluirá totalmente ciertas ramas. Esto conllevará el peligro de que el programa, y por ende el ICAITI, podría llegar a tener una reputación discriminativa. Por lo tanto, las ramas industriales fueron clasificadas conforme a un orden de prioridades. Las de más alta prioridad serían las que activamente trabajarían los representantes de campo. Sin embargo, cualquier solicitud que hiciera un cliente dentro de las ramas de menor prioridad será procesada con la misma rapidez y eficiencia de las primeras.

Otro de los aspectos considerados en el análisis del sector industrial centroamericano para la identificación y selección de ramas prioritarias se refiere al nivel de desglose de las ramas a que se desee llegar, si a las grandes ramas (industria de productos alimenticios) o a una división de éstas (fabricación de productos lácteos) o aun a una mayor subdivisión (producción de quesos). Desde todo punto de vista, lo ideal hubiera sido lograr el mayor grado de detalle posible. Desafortunadamente, la información disponible para el análisis del sector, en su mayor parte, se encuentra tabulada al nivel de las grandes ramas, conforme a la Clasificación Industrial Internacional Uniforme (CIIU) de las Naciones Unidas. Como consecuencia, en el presente trabajo las ramas se presentan ordenadas de acuerdo a esta clasificación y dentro de cada una de estas ramas se identifican los sub-sectores prioritarios con base en una encuesta entre los jefes de división del Instituto.

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## IDENTIFICACION Y SELECCION DE RAMAS INDUSTRIALES

### 1. Fuentes de Información

Para la identificación y selección de las ramas industriales prioritarias se recabó y consultó una serie de informaciones sobre la industria centroamericana de diferentes fuentes, tanto de tipo cualitativo como cuantitativo.

Las fuentes de información fueron muy variadas, correspondiendo en algunos casos a estadísticas de tres años atrás, siendo los anuarios de comercio exterior el caso extremo, ya que los datos publicados más recientes corresponden al año 1971. Por otra parte, no toda la información era del mismo año para todos los países.

A pesar de lo anterior, se considerará que la información disponible fue lo suficientemente confiable y representativa para los propósitos de identificación y selección de las áreas prioritarias del sector industrial centroamericano.

Fueron consultados y analizados datos estadísticos centroamericanos relacionados con las importaciones y exportaciones por rama industrial, estadísticas de empleo, valor de la producción e inversión por rama industrial.

Asimismo, se efectuó una investigación de la oferta y la demanda de servicios técnicos del ICAITI, con base en las actividades desarrolladas en años recientes, de acuerdo a la capacidad técnica y aptitudes del Instituto, así como conforme a las solicitudes de asistencia que ha recibido el ICAITI durante los últimos años.

A continuación se enumeran algunos de los criterios y las fuentes de información que fueron empleados para obtener los indicadores de la prioridad por criterio y por rama:

<u>Criterio</u>	<u>Fuente</u>
1. Substitución de importaciones	Estadísticas de importación regional 1968/1971

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<u>Criterio</u>	<u>Fuente</u>
2. Potencial para exportación	Estadísticas de exportación regional 1968/1971
3. Capacidad existente en el ICAITI	Trabajos hechos por cada División del ICAITI, clasificados por rama industrial
4. Prioridades nacionales	Planes nacionales de desarrollo
5. Industrias sensitivas	Conocimiento general de las áreas sensitivas existentes en Centroamérica
6. Importancia presente	Estadísticas de empleo, valor de la producción, inversión por rama. Publicaciones de los Ministerios de Economía
7. Capacidad financiera para absorber tecnología	Publicaciones estadísticas sobre número de empleos e inversión fija por empresa y por rama industrial
8. Desarrollo de recursos naturales	Datos cualitativos sobre desarrollo de industrias intermedias
9. Contactos existentes en el ICAITI	Registros del ICAITI de las investigaciones realizadas y consultas de clientes
10. Capacidad para absorber tecnología	Información cualitativa basada en los contactos pasados y presentes del ICAITI

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## 2. Criterios para la Selección de Ramas Prioritarias

Los doce criterios que fueron propuestos en la primera reunión del grupo de consultores al programa fueron analizados y evaluados en función de la aplicabilidad de los mismos criterios de selección. También fueron analizados desde el punto de vista de la disponibilidad y adecuación de la información con que las ramas podrían ser ordenadas conforme a cada uno de los criterios.

En la evaluación de los mismos se apreció un grado relativo de traslape entre algunos criterios que tendería a una sobrevaloración, lo que llevó a considerar la conveniencia de agrupar los criterios bajo cuatro categorías.

Con esta clasificación, el riesgo de sobrevalorar ciertos criterios prácticamente desapareció. Por otra parte, esta categorización permite una comparación directa entre las dos primeras que representan la importancia político-económica del sector y las dos últimas que denotan la efectividad potencial del programa de transferencia de tecnología. Es así como los pesos relativos que se asignan a las Categorías I y II, comparados con los de las Categorías III y IV, es indicativo de la importancia del sector v.s. la de la efectividad del proyecto, ambos de importancia para el éxito del programa.

De la lista de criterios para hacer la selección de prioridades fueron eliminados dos, el que se refiere a la propiedad, tamaño e historia de las empresas de la rama, y el de la capacidad de los agentes de campo.

La razón que se tuvo fue la falta de información estadística adecuada y el hecho de involucrar en el segundo una elevada dosis de apreciación personal para clasificarla por ramas industriales.

Las cuatro categorías quedaron integradas, con sus criterios correspondientes, de la manera siguiente:

I. IMPORTANCIA NACIONAL O REGIONAL DE LA RAMA

- A. Prioridad nacional
- B. Potencial para el desarrollo de recursos naturales

II. IMPORTANCIA ECONOMICA DEL SECTOR.

- A. Importancia presente (basada en el número de empleados, valor de la producción y tamaño de la inversión)
- B. Potencial para sustituir importaciones
- C. Potencial para la exportación

III. CAPACIDAD Y DISPOSICION DEL SECTOR PARA ACEPTAR EL PTT

- A. Capacidad financiera de las empresas para pagar la tecnología
- B. Capacidad técnica de las empresas para absorber tecnología

IV. HABILIDAD DEL ICAITI PARA SUMINISTRAR ASISTENCIA TECNICA

- A. Capacidad existente en el ICAITI
- B. Contactos del ICAITI con las empresas

3. Selección y Ordenamiento de Ramas Prioritarias

Para determinar las ramas prioritarias en qué hacer énfasis con el programa de transferencia de tecnología, fue necesario establecer la mayor o menor importancia que tendría cada una de las cuatro categorías en la selección de las ramas. Esto se logró por medio de la apreciación de los jefes de las divisiones del ICAITI: Servicios Técnico-Industriales;

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Análisis, Pruebas y Ensayos; Investigación Aplicada, y Documentación e Información. En cada caso fue asignado un peso a las categorías, el que fue consolidado en uno solo.

Las apreciaciones de los cuatro jefes divisionales coincidieron en que el éxito del programa reside, no tanto en los aspectos político-económico de la rama seleccionada, como en la capacidad y disposición de la misma a aceptar el PTT y la capacidad del ICAITI para suministrar la asistencia requerida. Establecieron los siguientes pesos para cada categoría:

	<u>Peso</u>
I. Importancia nacional o regional	56.6
II. Importancia económica	53.2
III. Capacidad y disposición de la rama para aceptar el PTT	100.0
IV. Habilidad del ICAITI para suministrar asistencia técnica	93.3

La información estadística sobre la industria centroamericana permitió establecer la importancia o la participación porcentual de cada rama dentro del sector industrial y para cada uno de los criterios.

En el caso de los criterios con aspectos cualitativos, para obtener la importancia relativa de las ramas industriales se hizo uso de una escala de valoración asignándole el 100 por ciento a las ramas que estaban consideradas dentro del criterio y 0 por ciento cuando fueran ajenas al criterio. Así, por ejemplo, si una rama fue considerada en los planes nacionales de desarrollo económico como prioritaria, recibió un porcentaje del 100 por ciento, y todas las demás un 0 por ciento.

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Con las ramas industriales y con las cuatro categorías seleccionadas se formó una matriz para clasificar las ramas industriales.

En la matriz de selección, cada rama industrial tiene un porcentaje determinado con relación a cada criterio. Este porcentaje se multiplicó por el peso promedio que cada criterio tiene según la evaluación realizada por los jefes de las divisiones del ICAITI y el resultado es el producto que sumado horizontalmente y dividido entre cuatro; dio al final un porcentaje ponderado promedio cuya magnitud señala el orden de importancia de las ramas industriales como resultado de la evaluación final.

Las ramas industriales que resultaron en los primeros seis lugares de la escala fueron: productos alimenticios, productos químicos, derivados del petróleo, calzado y vestuario, papel y cartón, y productos metálicos.

Un análisis de estos resultados de la evaluación condujo a eliminar de la lista la rama de derivados del petróleo. La eliminación se debió a que las empresas que integran esa rama son en su mayoría firmas extranjeras transnacionales, con una alta tecnología, con una gran intensidad de capital, y un reducido número de plantas.

Su clasificación fue extremadamente baja en la Categoría IV, logrando tan sólo una puntuación del 0.2 por ciento. La única razón de su alta colocación se debió a su clasificación en la Categoría III, con base en su elevada relación "inversión por planta" e "inversión por personal ocupado", criterios estos seleccionados para medir la capacidad técnica y financiera para absorber y pagar tecnologías.

Por otra parte, la alta clasificación de la rama "Derivados del petróleo" se encuentra distorsionada por las refinerías de petróleo, que reciben su asistencia técnica de la casa matriz y es muy dudoso que lleguen a ser clientes del programa de transferencia de tecnología.

MATRIZ DE SELECCION DE RAMAS INDUSTRIALES

Sectores	Criterio I		Criterio II		Criterio III		Criterio IV		Rama		Ordena- miento
	%	Porcentaje ponderado									
20 Productos alimenticios	5.6	2.4	35.7	19.8	35.3	35.4	38.8	30.3	28.8	87.9	1
21 Bebidas	-	-	2.3	1.5	2.1	2.1	0.2	0.1	1.2	3.7	13
22 Tabaco	-	-	0.9	0.6	1.3	1.1	0.0	-	0.6	1.7	19
23 Textiles	12.7	7.4	6.7	4.0	2.7	2.6	10.2	11.3	8.1	25.3	4
24 Calzado y vestuario	5.6	2.4	2.9	1.8	0.3	0.3	-	-	2.2	4.5	12
25 Madera	12.7	7.4	5.4	2.9	0.3	0.2	0.9	0.5	4.8	11.0	9
26 Muebles	5.6	2.4	0.8	0.5	0.3	0.3	0.5	0.4	1.8	3.6	15
27 Papel y cartón	7.1	5.0	2.8	1.3	1.6	1.6	10.8	11.6	5.6	19.5	5
28 Imprentas	-	-	0.9	0.6	0.8	0.8	0.4	0.3	0.5	1.7	20
29 Cuero y productos	5.6	2.4	0.4	0.2	0.9	0.9	8.6	10.2	3.9	13.7	7
30 Caucho	-	-	1.4	0.7	1.9	1.9	-	-	0.8	2.6	17
31 Productos químicos	12.7	7.4	11.9	5.8	11.2	11.7	15.5	14.8	12.8	39.7	2
32 Derivados del petróleo	7.1	5.0	2.8	1.5	32.2	32.0	0.3	0.2	10.6	38.7	3
33 Productos minerales no metálicos	12.7	7.4	2.4	1.5	2.8	2.9	1.4	1.0	4.8	12.8	8
34 Metales básicos	7.1	5.0	2.3	1.1	1.3	1.3	-	-	2.7	7.4	10
35 Productos metálicos	5.6	2.4	3.2	1.7	1.0	0.9	9.6	10.8	4.8	15.8	6
36 Maquinaria, excepto eléctrica	-	-	6.1	2.6	0.5	0.5	0.9	0.6	1.9	3.7	14
37 Maquinaria, aparatos y accesorios eléctricos	-	-	3.2	1.5	0.5	0.5	-	-	0.9	2.0	18
38 Equipo de transporte	-	-	4.8	2.0	0.5	0.5	0.4	0.2	1.4	2.7	16
39 Industrias diversas	-	-	3.3	1.6	2.5	2.5	1.5	1.0	1.8	5.1	11
<b>TOTAL</b>	<b>100.0</b>	<b>56.6</b>	<b>100.0</b>	<b>53.2</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>93.3</b>	<b>100.0</b>	<b>303.1</b>	

97.9

Se efectuó también una modificación a la clasificación de las ramas industriales al agrupar cinco de ellas en una sola. Bajo la denominación "metalmecánica" fueron agrupadas las ramas de productos metálicos: maquinaria, excepto eléctrica, maquinaria, aparatos y accesorios eléctricos, y equipo de transporte. Estas ramas con baja puntuación individual, al integrarse en una sola, el porcentaje resultante de la evaluación llegó a ser del 41.6 por ciento dentro de la escala, lo que las sitúa en el segundo lugar de importancia. Esto es deseable, toda vez que el ICAITI tiene especial preferencia y capacidad para transferir tecnología en esta área de actividad.

La selección final de las ramas prioritaria y el valor final según la evaluación anterior, quedó de la siguiente manera:

<u>Número de Orden</u>	<u>Puntos</u>	<u>Rama</u>
1	87.9	Productos alimenticios
2	41.6	Metalmecánica
3	39.7	Productos químicos
4	25.3	Textiles
5	19.5	Papel y cartón
6	13.7	Cuero y productos

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ANNEX E

Page 1 of 1

A Postscript on Differential Pricing

ICAITI, even though it is not a profit making concern, can recover more than its total costs in some transactions so as to be able to provide services to others less able to pay, when such a subsidy is in keeping with ICAITI's mandate. This in no way violates the business principles that must rule its overall activities. Rather, it is a business decision (even if marginal costs exceed marginal revenue) that is faced and made frequently by virtually all businesses.

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