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**TECHNICAL INFORMATION TRANSFER
TO LATIN AMERICA AND THE CARIBBEAN:
AN EVALUATION OF THE AID-FUNDED NATIONAL
TECHNICAL INFORMATION SERVICE PROJECT**

By

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October 1985

This report was prepared by the Academy for Educational Development under its contract with the United States Agency for International Development (Contract No. PDC 1406-I-00-4052-00), for the AID/LAC/DR/EST Bureau.

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EXECUTIVE SUMMARY

This report presents the findings and recommendations of a mid-term evaluation of the AID-financed U.S. National Technical Information Service (NTIS) project in Latin America and the Caribbean (AID Project #598-0572). The work was carried out by Dr. Roger Popper under contract to the Academy for Educational Development.

PROJECT DESCRIPTION

AID-NTIS collaboration in Latin America and the Caribbean began in 1971 and intensified in 1977. The current project is the second follow-on to an arrangement begun in 1977. Current funding, which amounts to approximately \$600,000 per year, ends in 1987.

The purposes of the NTIS project are to:

1. Improve Latin American and Caribbean access to scientific and technical information; and
2. Improve access to appropriate technology information.

The project provides special priority to solving the needs of the private sector, especially small and medium level industry. It was intended that by the end of the project the system of information distribution would be capable of functioning without subsidization.

NTIS products and services available through the project in Latin America and the Caribbean are as follows:

Core Products and Services

1. The NTIS reports which present "U.S. Government-sponsored research in the hard and soft science, including substantial material on applications, business procedures, and regulatory matters."
2. Abstracts and newsletters prepared centrally (ALERTEC under contract to INFOTEC in Mexico) and locally, a recent development.
3. Three sets of indices:
 - The Government Reports and Announcements Index.
 - The NTIS Titles Index.
 - An Appropriate Technology Bibliography.

Marginal Products and Services (high potential, low use):

4. Selected Research in Microfiche (SRIM).
5. Published searches.

New Products and Services (placed in several countries):

6. Full-text microfiche libraries of the appropriate technology reports.

7. CARINET electronic mail to handle project administration, and perhaps document ordering.

AID financial support to the project pays primarily for:

- Salaries of core personnel within the NTIS International Division.
- Air mail subsidy.
- SRIM subsidy.
- Training of network agency personnel.
- Promotion publications and pilot experiments.
- Equipment for automating network agency operations.

Also, users are charged the North American price for NTIS documents, which is half the normal foreign price.

EVALUATION OBJECTIVES

Objectives of this mid-term evaluation were to assess:

1. Progress to date in meeting implementation targets.
2. The capability of the project, as currently designed, to meet project objectives.
3. NTIS' potential role over the coming years in improving access for LAC private sectors, especially small and medium level industry, to appropriate technology information.
4. Perceived usefulness of the NTIS project to LAC AID Missions, and Mission willingness to provide direct support in the future to local NTIS subsidiaries.

Where it has not been possible to meet implementation targets, the evaluation was to:

5. Identify factors that impeded completing the targets on time.
6. Recommend adjustments that should be made in project design.

The evaluation was carried out between July and October of 1985 at NTIS in Springfield, Virginia, Management Systems International (a contractor assisting NTIS) in Washington, D.C., and at four field agencies in Costa Rica, Ecuador, Honduras, and Jamaica.

In the following summary, achievement, and obstacles to achievement, of the following objectives are discussed.

1. Private sector use of NTIS information.
2. Self-sufficiency.
3. Increase in sales volume.
4. Expansion of services.
5. Promotion of services.
6. Institutional development.

PRIVATE SECTOR USE OF NTIS SERVICES

This mid-term evaluation puts little emphasis on use and impact of the information. A previous impact evaluation of the project (Fanning, 1982) found:

- A high percentage (54%) of private sector users.
- High practical, as opposed to mere reference, use of NTIS information.

Fine grain analysis of the Fanning data (Figure 1) carried out by this evaluation shows that half the private sector users in the Fanning sample applied the information in "hands-on" fashion.

Interviews conducted during this evaluation with 14 private sector users render entirely plausible the Fanning impact data. The interviews also suggest that medium-sized businesses (50 to several hundred employees) form an important portion of NTIS' clientele.

Businesses visited during the evaluation brought technical information to bear on the following types of problems:

- Alternative sources of energy.
- Excess manufacturing capacity.
- Raising of product quality to meet standards and tastes of export markets: Honduras, Costa Rica, Jamaica.

To arrive at some estimates of the project's cost-benefit to the private sector, this evaluator applied the Fanning study percentages, and some assumptions, to document sales data. An estimate is that each \$100,000 invested in technical information results in 100 private sector applications of technical information, of which 50 are of the hands-on variety.

For the same \$100,000, one year of a "technical expert" can be bought. Does a typical technical expert produce the above amount of impact?

FIGURE 1

**FINE GRAIN ANALYSIS OF FANNING IMPACT DATA
(In Percentage)**

	Central Government	Government Agency	Community Organization	Private Business	University Consultant	Government Corporation, Multinational
1. Received	1					1
2. Read				4		1
3. Circulated	1	3		8	1	
4. Taught	2	2	2	12	4	
5. Policy/ Statements	2		1	1		1
6. Applied Research	2	4	1	5	8	2
7. Hands-on Application	3	2	2	23	2	

PORTRAIT OF A TYPICAL PRIVATE SECTOR USER OF NTIS INFORMATION

Below is the portrait of a typical private sector user of NTIS information, based on this evaluator's interviews and observations. By "typical" is meant that some users have many of the characteristics, and many users have some of them.

- Sophisticated regarding technology and information.
- Usually, but not necessarily, highly educated in a formal sense.
- Repeat user. Orders information regularly, perhaps several times a year.
- Medium-sized business, between 50 and several hundred employees. (Large businesses have their own methods for acquiring necessary technological information.)
- Financial resources (for buying expensive information).
- Can read English, and perhaps speak it too.
- Clientele for NTIS appropriate technology materials does not appear to differ markedly from the general clientele.

ACHIEVEMENT OF IMPLEMENTATION TARGETS

Efforts to increase volume of services, achieve self-sufficiency, and expand the range of services have been seriously hindered by intractable economic and technical obstacles as discussed below.

Objective: Increase the Volume of Services

The 1981-1984 economic crisis decimated demand for NTIS services. Efforts to increase volume of documents sold were stymied by a crisis beginning in 1981 when currencies slid against the dollar; absolute buying power shrunk; and network agency budgets were cut throughout the region.

Figure 2 shows that between 1981 and 1984, in countries where project activities and subsidy were concentrated, document sales dropped 54% (from 3,993 to 1,849). For the entire region, sales dropped approximately 40% (9,932 to 5,835).

Objective: Self-sufficiency

Efforts to achieve self-sufficiency in any traditional sense may have been doomed from the start. Consider that NTIS operations barely cover costs in the U.S. where delivery and promotion cost less; users are sophisticated and wealthy; and currencies are not continually devalued.

Because sales volume is now low, the contribution to cost-coverage of the price buyers pay for documents is trivial. At present, the project receives between 6 and 16 cents return on the dollar from countries where the project is concentrated. This number

DOCUMENT SALES

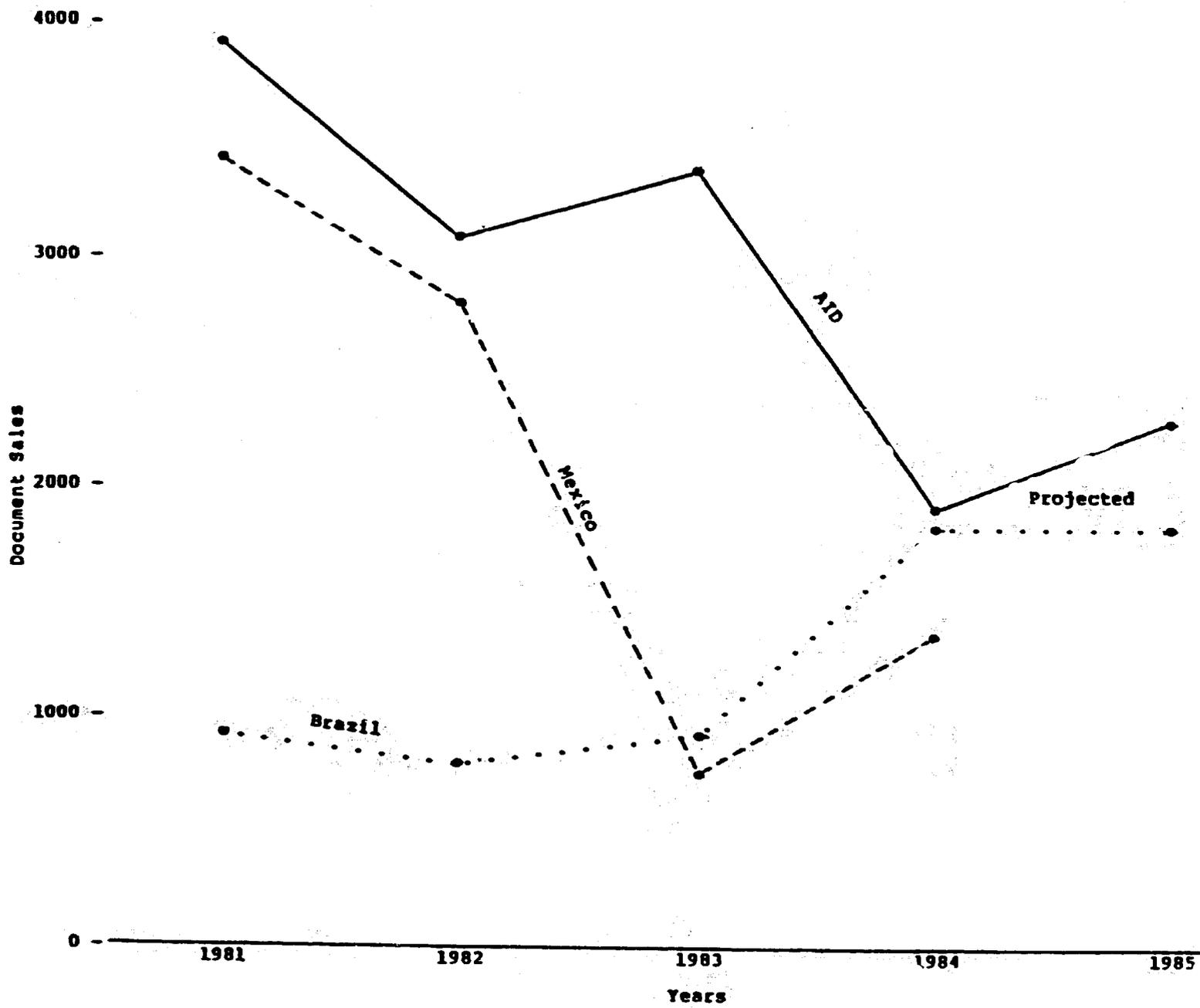


FIGURE 2

can be increased to 22-38 cents if the project is credited for the whole region, including countries such as Mexico and Brazil which receive little support from the project. Figure 3 shows that both prices and volume would have to be increased to arrive at break even, an impossibility since raising prices inhibits sales volume. Even the best country in its best year does not cover subsidy with sales revenues.

The project proposed gradual phasing out of subsidies. One serious experience with subsidy withdrawal involved NTIS' monthly promotional piece, ALERTEC (previously AMTID). For several months during 1984, network agencies and their clients were charged to cover production costs. Sales dropped, and network agencies objected strongly, resulting in reinstatement of the subsidy.

Objective: Expansion of the Range of Services

Technology necessary for carrying out proposed service expansion is just now arriving in Latin America and the Caribbean. Most efforts at expanding the range of services were proposed before the necessary technology was available. The necessary technology is now arriving as follows:

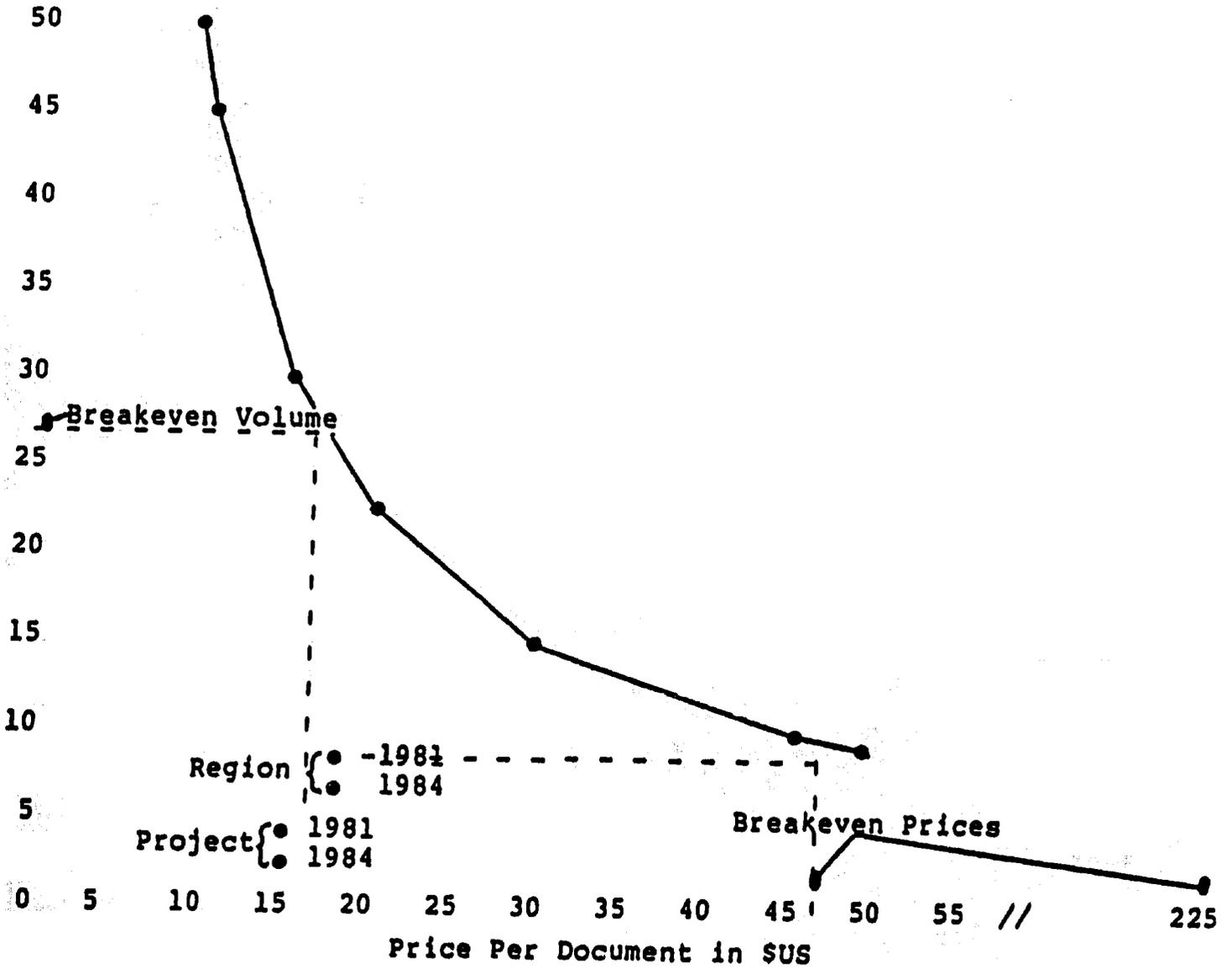
1. On-line searching requires telecommunications with packet switching which is being introduced sporadically in project countries. Countries where network agencies have a degree of access to packet switching seem to be: Barbados, Chile, Colombia, Costa Rica, Dominican Republic, Guatemala, Honduras, Panama, and Peru.
2. To gain widespread use, self-contained databases in microfiche require an inexpensive, reliable, fiche-to-paper printer to work. Such a product is just now arriving on the market.
3. Self-contained databases and local indigenous databases in computer-readable form require solutions to software problems. For example, programs must be developed to transfer databases from mainframes to micros.

Serious expansion of the range of services as proposed in the Project Paper is just now beginning. So far:

1. On-line access is off to a good start in Costa Rica, and will expand to other countries as telecommunications with packet switching spreads. Training in DIALOG has been given to several agencies under NTIS auspices. The project will probably exceed its on-line search objective, although pricing the service will be a problem.
2. The Project Paper promised five self-contained databases, but only one (appropriate technology) has been developed and distributed so far. Ecuador has demonstrated the potential for self-contained microfiche databases when accompanied by an inexpensive, reliable fiche-to-paper printer.
3. CARINET Electronic Mail for administration and document ordering was installed in Costa Rica, Honduras, and Panama, and will expand as telecommunications with packet switching spreads. Electronic mail shows promise of reducing turnaround time between client ordering and reception of documents, which is the project's major operational problem.

FIGURE 3

BREAKEVEN CURVE FOR NTIS SYSTEM IN REGION
(Volume X Price = \$450,000)



Exacerbating Factors. Efforts to achieve volume increases, self-sufficiency, and service expansion were further hindered by NTIS pricing policy, product line, operational, and institutional factors.

1. NTIS Pricing Policy: NTIS prices in Latin America and the Caribbean are pegged to prices in the U.S. The results are high prices, which rise even higher as foreign currencies slide, and currency exchange problems. Not only are the prices not covering costs, but they are almost certainly inhibiting demand. There is a conflict between the NTIS overseas objective of "appropriate, dynamic leadership in the worldwide technical information community" and current pricing policy.
2. The NTIS Product: Although NTIS documents are of high technical quality, they are also: in English, book-length, dense, sophisticated, with few illustrations, and no colors. Consequently, the clientele is sophisticated, English-reading, well-financed, and therefore, small.
3. NTIS Operations: Turnaround time between document ordering and delivery is seven weeks on the average, due almost totally to the mails. NTIS materials are available least expensively and most conveniently on microfiche; however, people have been reluctant to use microfiche reading machines.
4. NTIS Network Institutions: Incentives for network agencies and personnel to sell NTIS documents aggressively are small.

Objective: Promotion of NTIS Services

Pilot programs in promotion resulted in little sales progress; however, a promotional strategy consisting of face-to-face visits and locally prepared promotional materials was developed and seems to be spreading throughout the network. Nevertheless, active searches still form only a small portion of sales. Normally people buy what is advertised in promotional materials such as ALERTEC. Promotion is the area of least institutional self-sufficiency. One just cannot expect people to sell aggressively someone else's product without attractive incentives.

An area of particular weakness is marketing of NTIS services to USAID Missions and projects.

Objective: Institutional Strengthening

Over the past eight years, through practical experience, training, and seminars, NTIS has contributed importantly to the creation of a "critical mass" of information paraprofessionals, and a limited but faithful and sophisticated clientele for technical information.

Automation in the form of computers and "dumb" terminals shows promise of increasing the agencies' self-sufficiency. Through automation, the agencies can become active, rather than passive, players in the information industry.

At the November 1984 NTISeminario at Medellin, Colombia, the first steps were taken toward establishing an organization for the interchange of technical information among network agencies. The organization is called "Red Interamericana de Informacion Tecnologica" (REDIITEC).

An Obstacle to Institutional Strengthening

Weaknesses in the NTIS network can be attributed above all to insufficient incentives. Incentives not only reward aggressive sales, but attract and retain good people.

It makes little difference to the agency, and no difference to individual employees, if they do or do not sell NTIS products and services aggressively, and make face-to-face visits to clients. Network agencies receive a 25% commission on NTIS sales. A successful agency can earn about \$3,000 commission in a year, and an average agency can earn about \$1,000. There are easier ways to earn this amount of money.

PORTRAIT OF A TYPICAL NETWORK AGENCY

The characteristics in the following list describe a typical network agency. The characteristics are typical in that some agencies have all, and many agencies have most, of the characteristics.

The Agency's Image

- Medium, not high, prestige in the national information community.
- Perceived as peripheral to private sector initiatives, especially by AID.
- NTIS brochures, GRA&I, Appropriate Technology Bibliography, and ALERTEC are prominently displayed.
- Recently, locally produced and focused materials (boletines) promoting NTIS services have become common as a result of the project.

Employees

- Approximately four employees.
- Most employees are engineering students or graduates.
- Most employees have received some information service training, either through NTIS or OAS.

Equipment

- One microfiche reader (12 of 14 agencies at the 1982 NTISeminario).
- Either no microfiche printer, or one that does not work or is too expensive to operate regularly (7 of 14 have one, 4 of 14 use it occasionally or frequently).

- One photocopier.
- One microcomputer.
- No vehicle for outreach, perhaps an arrangement where gas or mileage will be paid on use of personal vehicle.

Information Services

- Several other information services are offered.
- A small technical library is accessed by a card catalogue.
- Widely varying sophistication and completeness of procedures for processing and indexing documents, and for processing requests for information.
- Responsibility for NTIS sales is shared and vague.

Dependence on NTIS

- Would exist with or without NTIS support.
- Above all, derives much of its image from NTIS.
- One "slot" is temporarily being paid for by NTIS in the pilot, promotional experiment countries (Costa Rica, Colombia, Jamaica).

Public Sector

Most NTIS network agencies are in the public sector. Certainly a more balanced mix of public and private sector agencies is preferable because of the private sector's agility and incentive structure. Nonetheless, public sector agencies have some features to recommend them, including:

- Subsidized office space and basic equipment.
- A captive clientele of students and professors.
- Graduates that can be users and promoters.

OPTIONS AVAILABLE TO AID REGARDING THE NTIS PROJECT

Options available to AID regarding the NTIS Project in Latin America and the Caribbean include:

1. Phase out support of the project as soon as possible, probably during 1986.
2. Fund project as planned, through 1987, but with redefined objectives and procedures.
3. Fund beyond the planned 1987 project completion.

The first option (phase out subsidy as soon as possible) should be chosen if AID and NTIS either:

- Judge the project to have met few AID objectives.
- Judge the project to have low potential of meeting more AID objectives in the future.
- Do not aspire to assist and profit from the information revolution in Latin America and the Caribbean.

The second option (fund project to completion in 1987) should be chosen if AID and NTIS:

- Judge the project as having met some AID objectives; and
- Judge the project as having potential for meeting more AID objectives in the future.

More important, the "fund to completion" option should be chosen if AID and NTIS:

1. Replace a half-hearted attempt at self-sufficiency with a full-hearted attempt at qualifying for permanent subsidy.
2. Commit to acquiring the technical expertise and adopting the breadth of interest necessary to take the lead in the information revolution in Latin America and the Caribbean.

The third option (fund beyond 1987) should occur only after successful completion of the second option has been assured. Entrance into this permanent subsidy stage will depend on the project's effectiveness at producing and documenting economic impact, and sales of U.S. products and services (including information products and services).

Clearly the decision facing AID and NTIS is between options 1 and 2. Figure 4 compares the advantages of the two options. NTIS in the developing world is at a crossroads. It can either take the lead in the revolution by becoming technically expert and broadening its interests, or it can revert to being just one more information source, albeit with a glorious past.

FIGURE 4

ADVANTAGES OF TWO ALTERNATIVES FACING AID AND NTIS

I. Phase Out Project Support as Soon as Possible During 1986 (Spend About \$600,000)

1. About \$600,000 would be saved.
2. Agencies would continue to exist, although in diminished form. They derive much of their identity and promotional materials, though not their finances, from NTIS.
3. NTIS will have contributed permanently to technical information expertise and clientele in the region.
4. NTIS may have time to improve and expand CARINET electronic mail, and find a way to fund its continuance, perhaps through REDIITEC, an organization, or network agencies formed to carry on NTIS work.
5. AID's LAC Bureau would be relieved of the chore of supporting the project.

II. Fund Project as Originally Planned through 1987, but Redefine Objectives and Procedures (Spend about \$1,200,000)

1. NTIS and AID may be able to assist and profit from the information revolution, through:
 - On-line searches.
 - Full microfiche systems.
 - Brokerage of relationships between network agencies and non-NTIS information sources.
2. Assistance would include training in all of the above and would constitute preparation for leadership in the information revolution.
3. NTIS document sales might recover to 1981 levels, especially if a mechanism for price reduction can be put in place.
4. NTIS might be able to develop markets among AID projects, especially if AID's LAC Bureau takes an active role.
5. NTIS will have a chance to qualify for permanent subsidy, not necessarily by AID (See implications of Alternative 3 following).
6. REDIITEC will be given a chance to survive.

OPERATIONAL IMPLICATIONS OF THE OPTIONS FACING AID

Detailed replanning of the NTIS Project in Latin America and the Caribbean is outside the scope of this evaluation, and requires a full planning process carried out by project and AID staff on the basis of this evaluation. Directions and guidelines for the replanning are appropriate here however.

Operational Implications of ASAP Phase-Out

Choice of the first option requires that AID and NTIS phase out support for the following as soon, and with as little surprise to network agencies, as possible:

- NTIS core personnel in the International Division of NTIS.
- Air mail subsidy.
- SRIM subsidy.
- Promotion publications, in particular, ALERTEC.
- Training of network agency personnel.
- Purchase of equipment for automating network agency operations.

It is the opinion of this evaluator that even under the ASAP Phase-Out option, efforts should be made to complete the CARINET system for cutting turnaround time on document ordering. Also under the ASAP Phase-Out option, support should be given to REDITEC, an organization of network members formed to carry on some of NTIS' activities, and to inclusion of the RTAC Spanish language materials in the NTIS collection.

Operational Implications of Funding to Completion

A final section of this summary ("Suggested Adjustments to Project Design") provides some detailed recommendations resulting from extensive discussions with deliverers and users of NTIS services in Latin America and the Caribbean, and the full evaluation report provides even more detail.

Major Changes Required by Funding to Completion

Major operational implications of replacing self-sufficiency with qualifying for permanent subsidy are:

- a. A mechanism for lowering prices and accepting payment in local currencies must be given serious consideration. Current prices are almost certainly inhibiting demand, and sales volume is so low that cost coverage is trivial.
- b. The completion of a study comparing the economic impact of information and traditional technical assistance becomes a necessity, not a luxury.

NTIS leadership in the information revolution in Latin America and the Caribbean will require expertise and interest in:

- a. On-line searching.
- b. Full microfiche systems.
- c. Brokering of sales and support relationships between network agencies and non-NTIS sources of information such as AGRICOLA, ERIC, and magazine indexes.
- d. Self-contained databases of various types.

The "brokering" area is necessary to make better use of the distribution structure which has been built. Brokering, although included in the original Project Paper Amendment, will require a large change in NTIS posture.

Minor Changes Required by Funding to Completion

Minor changes in how subsidies and objectives are defined and focused include the following:

- NTIS core personnel and training of network agency personnel should become more technical.
- Purchase of equipment for automating network agency operations may shift from purchase of computers to purchase of fiche-to-paper printers, if satisfactory printers exist.
- The "local, indigenous database" objective should be dropped in favor of inclusion of the RTAC Spanish language materials in the NTIS collection.
- Support for REDITEC, an organization made up of network agencies, should be included within "institutional development".

All changes represent a redirection of existing project resources toward existing project objectives. In no case are resources or activities suggested which do not fit within the language and budget categories in the original Project Paper Amendment. It might be maintained, in fact, that the suggested adjustments match the original sense of the project better than do current operations.

Operational Implications of Funding beyond 1987

The NTIS Project in Latin America and the Caribbean is inherently not self-sufficient in any traditional financial sense. Therefore, NTIS, or NTIS-like, activities require permanent subsidy if they are to continue. The subsidy cannot be justified on the basis of volume of documents distributed per dollar spent. Consequently, subsidy beyond 1987 will depend on NTIS ability to prove itself in one or more of the following ways:

1. The NTIS Project must convince donors of its effectiveness at producing technology transfer and economic impact. This probably requires an impact study consisting of a number of case studies. The case studies ask whether an investment in carefully chosen technical

information is more cost-effective in producing economic development than "expert person" technical assistance.

AND/OR

2. Acceptance must be gained for the idea that provision of U.S. technical information sells U.S. technical products and services. This requires presentations to the U.S. private sector, those representing it (e.g., U.S. Dept. of Commerce), and others concerned with competition in the region. A difficulty is that the causal relation between provision of information and sales of products and services is indirect and long-term, albeit powerful.

AND/OR

3. The NTIS Project must develop and document demand for NTIS as a broker of technical information in general. This depends on project performance at brokering relationships between network agencies and non-NTIS information services.

SUGGESTED ADJUSTMENTS TO PROJECT DESIGN (if the project is funded to project completion in 1987)

Figure 5 summarizes suggested adjustments to project design in the form of a "Skeleton Logical Framework".

Suggested Adjustments to Self-sufficiency Objectives

1. A Limited Definition of Self-Sufficiency: An achievable financial self-sufficiency objective might be to fund one person per agency out of the 25% commission (Costa Rica's idea).

At present there are neither network agency objectives nor human resources dedicated exclusively to NTIS activities.

2. The "Cash Cow" Concept: Cultivate one "cash cow" per agency. A "cash cow" would be a client or set of clients which buys in bulk periodically, and requires little marketing.

A classic "cash cow" is the automatic inclusion of technical information with credits awards (the Panama model).

3. An Economic Impact Study to Justify Future Subsidy: Undertaking an impact study when overseas operations are suffering may seem a luxury; however, NTIS' overseas future may depend on it. NTIS cannot justify future subsidy by virtue of volume of information disseminated, nor by promising eventual financial self-sufficiency.

A statistical survey will not be adequate. The right approach is to study in depth a number of cases from a given year whose economic impacts have a high probability of amortizing the investment in technical information for that year. Types of impacts include: new products, employment generation, and exports.

FIGURE 5

SKELETON LOGFRAME FOR THE NTIS PROJECT

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS (OVIs)	MEANS OF VERIFICATION (MOVs)	ASSUMPTIONS
Goal	<p>\$25,000/yr/country benefit:</p> <ul style="list-style-type: none"> - employment - innovation - exports - energy savings - excess capacity use 	<p>Case studies of private sector hands-on users</p>	
Purpose	<ol style="list-style-type: none"> 1. Volume: 5000 NTIS 5000 non-NTIS per year 2. Delay: <ul style="list-style-type: none"> - 1 month in CARINET countries <p>Self-sufficiency:</p> <ul style="list-style-type: none"> - 1 NTIS position funded out of commission in 7 countries 3. Revenues: <ul style="list-style-type: none"> - \$1000/yr/country from "cash cows" - \$450,000 in subsidy assured - \$X per country from AID projects 4. % of agencies named official on-line representative 		<ul style="list-style-type: none"> - AID financial support, '85-'87 - NTIS technical support, '85-'87 - Information community desire to be brokered to the developing world

FIGURE 5

SKELETON LOGRAME FOR THE NTIS PROJECT
(CONTINUED)

NARRATIVE SUMMARY

Outputs

1. **Product and Price**
 - Price reduction, and local currency mechanism
 - a. Designed
 - b. In place
 - Brokering deals with non-NTIS information sources
 - a. Designed
 - b. In place
2. **Delay**
 - Procedure for handling orders via CARINET
 - a. Designed
 - b. In place
 - CARINET installed wherever technically feasible
3. **Self-Sufficiency**
 - "Cash cows" identified, exploited
 - Impact study
 - a. Designed
 - b. Contracted
 - c. Carried out
4. **Service Expansion**
 - On-line
 - a. Training
 - b. Pricing policy
 - c. Representative
 - Microfiche systems
 - a. Fiche-paper identified
 - b. Tested
 - c. Bought
 - d. Distributed
 - Self-contained databases
 - a. New full-test microfiche libraries, indices
 - b. Identification, acquisition, distribution of non-NTIS databases
 - c. Computer-readable NTIS subdatabases
5. **Promotion**
 - AID project marketing program
 - a. Designed
 - b. Carried out
 - Active program (face to face, local materials) spread throughout network
 - ALERTEC, including "15 Years Ago Today"
6. **Institutional Development (better handled under Inputs)**
 - Financial, technical, organizational support to REDIITEC
 - Seminars and workshops carried out in all of the above
 - "Information Corps" designed, recruited, in field (either information science grads from the region and/or Peace Corps Volunteers)

Suggested Adjustments to Sales Volume Objectives

1. Reasonable Sales Targets: Sales-volume objectives must be modest and reachable, such as the following:
 - Do not let the current economic crisis destroy past sales progress.
 - Get sales volume back to 1981 levels (approximately 5,000 where the project is concentrated, and 10,000 in the region).
2. Design a Mechanism for Lowering Prices: It seems to be legally and bureaucratically unfeasible for NTIS to lower prices and accept payment in local currencies. High prices, however, are covering only a small portion of costs while they destroy the market. And the necessity of buying dollars inhibit both client and agency desire to handle NTIS documents. Therefore, NTIS should:
 - a. Work on setting up a "dummy" corporation which buys from NTIS at NTIS prices, receives the subsidy, and sells at low prices which do not stifle demand. REDIITEC and OAS may collaborate in this regard.
 - b. Explore two-tier pricing in which a government or ministry pays a yearly access fee, and users pay a nominal fee per document.
 - c. Design a mechanism or fund which allows payment in local currency.

The worst possible result of lowering prices would be expenditure of the whole \$600,000 per year instead of only \$550,000.

3. Widen the Product Line: The network developed largely through NTIS effort is adequate but underused. To use the system better NTIS might become a broker in setting up direct relationships between network agencies and non-NTIS information sources, such as magazine indexes, AGRICOLA, and ERIC.

Suggested Adjustments to Service Expansion Objectives

1. Electronic Mail: Electronic mail must be used to solve NTIS' most serious operational problem--long turnaround time between client placement of an order and reception of the document.
2. On-line Searching: Conduct on-line search demonstrations with the purpose not only of selling NTIS documents, but also of making network agencies the focal point in each country for such services. On-line demonstrations must be used to advertise all the network agencies' services, not just on-line searches. Training is needed, not just in on-line software, but also in management, budgeting, and pricing of on-line searches. A pricing policy must be worked out for on-line searches.

3. Self-contained Databases with Full-Text Libraries: Success at marketing self-contained bibliographic databases and full-text libraries may define NTIS' identity in the developing world after on-line searching becomes common.
 - a. Success at self-contained databases may depend on testing a full microfiche system. So far (except in Ecuador) experience has been with a partial system. A full system includes fiche indices, full texts in fiche, fiche readers, and an inexpensive, reliable fiche-to-paper printer. The inexpensive, reliable printer is the element which has been missing so far. (Rumors are that such a printer now exists.)
 - b. Brokerage of direct relationships between network agencies and non-NTIS information sources would probably take the form of self-contained databases. (See adjustments to Sales Volume Objectives)

NTIS might also:

- Deliver the local, indigenous database area to REDIITEC because it is not an area of NTIS interest or expertise.
- Solve the software problem for transferring databases from mainframes to microcomputers.

Suggested Adjustments to Promotion Objectives

1. Orchestrate sales of NTIS documents to AID projects.

AID projects should be the biggest "cash cow" of all. There must be an orchestrated attempt to sell documents to AID projects (not just to the Missions). This becomes one of NTIS/MSI's major jobs.

2. Include a "15 Years Ago Today" feature in ALERTEC to test Victor Martinez's theory that developing world needs are 15 years behind current developments in the U.S.

Suggested Adjustments to Institutional Strengthening Objectives

Training and equipment are necessary, but alone can make only marginal improvements in institutional strength. The only ways to make important progress at strengthening the network of NTIS agencies are to:

1. Design an incentive mechanism to reward agencies for sale of NTIS documents. This will require innovative thinking.
2. Increase the flow of information through the system. Two alternatives are lowering prices, and brokering deals between agencies and non-NTIS sources of information products.

CHAPTER I. INTRODUCTION

A. EVALUATION SCOPE OF WORK

This report presents the findings and recommendations of a mid-term evaluation of the U.S. National Technical Information Service (NTIS) project in Latin America and the Caribbean (Science and Technology Information Transfer Project #598-0572). The work was carried out by Dr. Roger Popper under contract to the Academy for Educational Development.

OBJECTIVES OF THE NTIS PROJECT IN LATIN AMERICA AND THE CARIBBEAN

The purposes of the NTIS project are to:

1. Improve Latin American and Caribbean access to scientific and technical information; and
2. Improve access to appropriate technology information.

While not explicitly stated as a purpose, the project gives special priority to solving the needs for scientific and technical information of the private sector, especially small and medium level industry.

It was intended that by the end of the project the system of information distribution which has been established with AID support will be capable of functioning without subsidization.

Specific areas of emphasis of the current phase of the NTIS project are:

1. Phase out financial subsidies
2. Increase volume of services
3. Expand range of services
4. Institutional strengthening
5. Project management.

EVALUATION OBJECTIVES

(Verbatim from the Scope of Work)

Objectives of this mid-term evaluation of NTIS' Science and Technology Information Transfer Project # 598-0572 were to assess:

1. Progress to date in meeting implementation targets.
2. The capability of the project, as currently designed, to meet end-of-project objectives.
3. NTIS' potential role over the coming years in improving access for LAC private sectors, especially small and medium level industry, to appropriate technology information resulting from worldwide investment in research and development.

4. Perceived usefulness of the NTIS project to the LAC Bureau, AID Missions, and Mission willingness to provide direct support in the future to local NTIS subsidiaries.

Where it has not been possible to meet implementation targets, the evaluation was to:

5. Identify factors that impeded completing the targets on time.
6. Recommend readjustments to the project design in order to meet these targets, or, as appropriate, remove them from the project design.

This mid-term evaluation was carried out in three phases:

1. With NTIS, Management Systems International (NTIS' contractor) assessed progress to date in meeting the implementation targets. Data available in the Washington, D.C., area was collected and analyzed. (July 17 - August 7)
2. At four field Missions (Costa Rica, Ecuador, Honduras, and Jamaica) the following were assessed: a) the progress of local subsidiaries in meeting implementation targets; b) the extent to which the local subsidiary in each country is serving the needs of the local private sector, especially small and medium enterprise; c) NTIS contribution to the implementation of ongoing AID projects; and d) AID Mission perception of NTIS potential, over the coming years, of assisting local AID Missions to implement projects, especially in areas related to private sector development. (July 22 - September 15)

Criteria for selection of countries were: a) there is an AID Mission; b) the NTIS project is working relatively well; c) there is a pilot promotion project; d) geographical distribution; and e) language spoken.

3. In Washington, D.C., information and analysis was gathered and a final report was produced. (September 16 - October 11)

METHODOLOGY

Most hard data regarding sales volume, financing, and turnaround times, for example, were available in Washington, D.C., either at NTIS or at MSI. In the field, interviews were conducted with network agency personnel; NTIS service users, primarily in the private sector; AID Mission personnel; and information telecommunications experts. To provide insight into how information technology applies to the project, Nancy Green Maloney (on-line access to databases) spent several days with the evaluation team in Costa Rica, and Douglas Goldschmidt (telecommunications) spent several days with the team in Ecuador.

USE OF OTHER REPORTS AS SOURCES FOR "USER HYPOTHESES"

This evaluation was written largely as a dialogue, with reports written by those who planned and are managing the project. Reports which have been useful as sources of "Operator Hypotheses" about what is happening in the project and why include:

- An Evaluation of Scientific and Technical Information Distribution and Use in Latin America: The NTIS Program in Five Countries, Marina Fanning, InterAmerica Research Associates, 1982.
- Transfer of Scientific and Technical Information to Latin America and the Caribbean, S. Dickson Tenney and Eireann Carroll, Office of International Affairs, National Technical Information Service, U.S. Department of Commerce, 1985.
- Revised Implementation Plan (April 1985-September 1987): USAID/NTIS Technical Information Transfer Project, Management Systems International, 1985.
- A Study of Access to On-Line DataBases from Latin America and the Caribbean, Sandra Lauffer and Margaret Anderson, 1984.

CHAPTER I. INTRODUCTION

B. A BRIEF HISTORY OF NTIS-AID COLLABORATION IN LATIN AMERICA AND THE CARIBBEAN

This history of NTIS activities in Latin America and the Caribbean is divided into five periods: 1946, 1972-1977, 1978-1980, 1980-1982, and 1983 to the present.

The Beginning, 1946

NTIS was established by President Truman as the Office of Technical Services to make government research conducted during World War II available to taxpayers.

A Project for the Developing World, 1972-1977

AID's Office for Science and Technology within the Technical Assistance Bureau launched a project throughout the developing world under a PASA arrangement with NTIS.

A noteworthy result was that operations in South Korea became self-sufficient. Apparently, an evaluation surfaced some conflict between NTIS document sales focus, and AID's interest in use of information for development.

A Regional Project, 1978-1980

The Latin America portion of the worldwide project was transferred to the Latin America Regional Bureau. Key components financed by AID were: NTIS core personnel, air mail subsidy, training for Latin American Agency personnel, and promotion publications. The focus of the project, in line with AID's policy of that era, was appropriate technology and the rural poor. Only \$200,000-\$300,000 per year of the planned \$576,000 yearly budget was made available. An evaluation judged the project to be underfunded for achieving the appropriate technology component.

The First Regional Follow-on Project, 1980-1982

An amendment for \$1.65 million was approved for three years. The focus of the follow-on project was completion of the appropriate technology component. Cooperating agencies grew from 7 to 19. A 1982 impact evaluation found a high percentage of use of technical information.

The Second Regional Follow-on Project, 1983-1987

Another amendment for \$3.8 million was approved for five years. The focus of the follow-on project was to maintain and expand the current information and technology transfer system. Specific areas of improvement and expansion proposed were: ordering, promotion, and use of telecommunications to do on-line searching of databases. Small and medium-sized businesses were added to appropriate technology as preferred markets.

In 1983, NTIS entered into partnership with Management Systems International for carrying out the project. MSI's original role was implementation planning, design and installation of outreach activities, and three pilot experiments. Their role has since

grown to include training, annual conferences, and acquisition, and introduction of Spanish language materials into the NTIS collection. In 1984, REDIITEC was founded to promote exchange of information among network agencies.

Because of economic crisis in the region, sales volume slumped between 1981 and 1984.

A MODEL FOR INTERPRETING PROJECT HISTORY

Mr. Victor Martinez of Ecuador, who has been associated with the project for many years, characterizes the history of technical information distribution and use in Latin America as a "vicious circle".

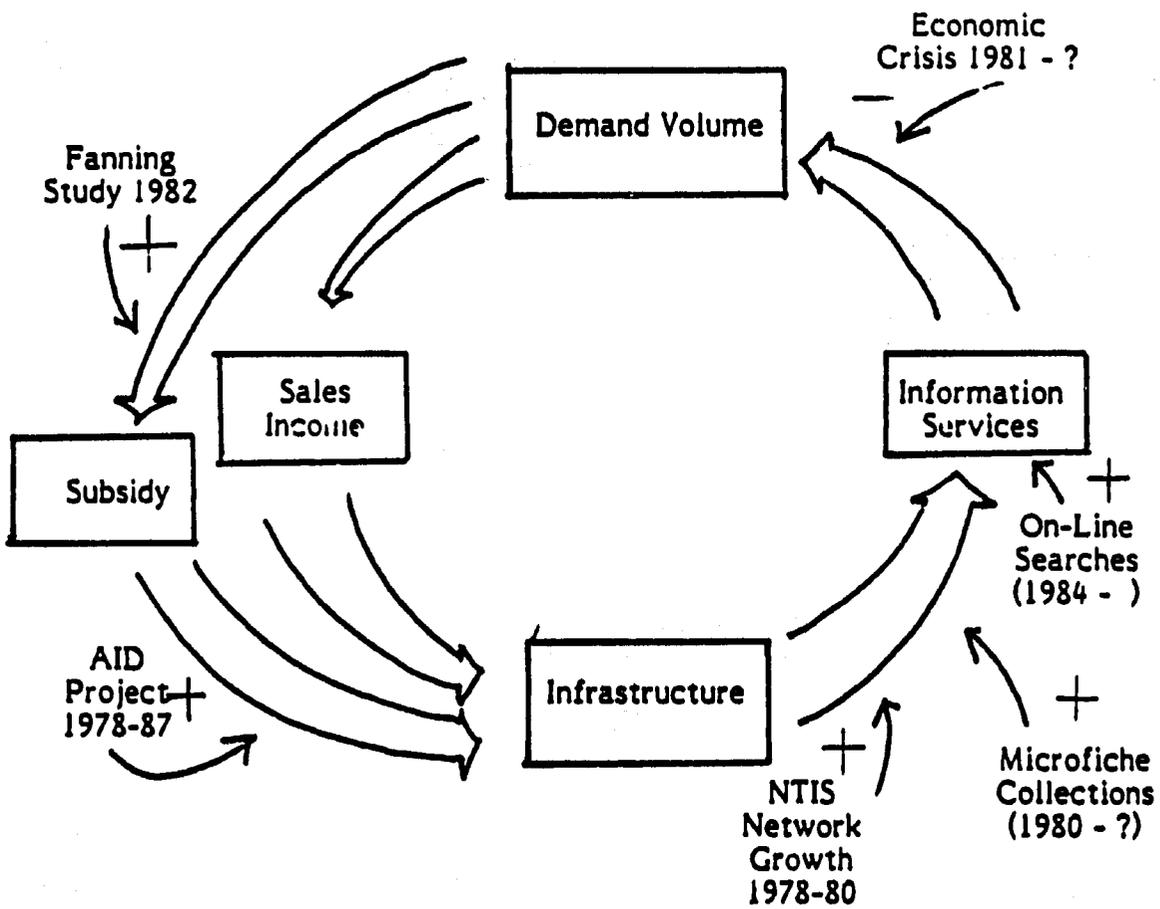
"There is a lack of infrastructure for the distribution of technical information which prevents the provision of effective services, which in turn leads to a slow growth of demand. The low demand leads to poor sales results, which means the services can neither generate their own financing, nor obtain larger donor support on the bases of sales results."

Martinez' vicious circle gives us a tool for synthesizing project history. Figure I-1 presents the circle as it applies to NTIS project history. Outside the circle are events which have caused the circle to be more or less vicious than it otherwise would have been. These events include:

1. AID/NTIS Project 1978-1987
 - Positive effect on resource level
2. NTIS Network Growth from 7 to 19 agencies, 1978-1980
 - Positive effect on infrastructure
3. Microfiche Databases and Libraries, 1982-?
 - Uncertain effect on services
 - Has not had a true test, except in Ecuador, due to lack of satisfactory fiche-to-paper printers
4. Economic Crisis, 1981-to ?
 - Negative effect on demand and volume
 - Volume has shrunk approximately 50% since 1981
5. Fanning Impact Study, 1982
 - Seems to have had a positive effect on AID's willingness to continue subsidy
6. On-line Searches, 1985-?
 - Positive effect on services
 - Probable positive effect on NTIS sales

Figure I-1

MARTINEZ' VICIOUS CIRCLE: THE PAST



CHAPTER I. INTRODUCTION

C. WHAT NTIS SERVICES ARE AVAILABLE TO LATIN AMERICA AND THE CARIBBEAN?

WHAT IS IN THE NTIS DATABASE?

"The NTIS (National Technical Information Service) database consists of U.S. Government-sponsored research, development, and engineering, plus analyses prepared by federal agencies, their contractors, or grantees . . . The NTIS database includes material from both the hard and soft sciences, including substantial material on applications, business procedures, and regulatory matters. Many topics of immediate broad interest are included, such as environmental pollution and control, energy conversion, and technology transfer." (A Study of Access to On-Line Databases from Latin America and the Caribbean, Lauffer and Anderson, AED, 1984).

CORE PRODUCTS AND SERVICES

1. The NTIS reports themselves which are usually of book length, cost approximately U.S.\$20 each in paper copy and approximately U.S.\$10 in microfiche.
2. Abstracts and newsletters prepared centrally (ALERTEC under contract to INFOTEC in Mexico) and locally (a recent development) are sent free of charge to a mailing list of past and potential clients.
3. Three sets of indexes which can be consulted to conduct searches, either by local agency personnel or by the clients. The indexes are searchable by author, title, and key word.
 - Government Reports Announcements and Indexes (GRA&I) is a biweekly compilation which includes abstracts of all reports placed into the NTIS collection during that period.
 - The NTIS Title Index is a quarterly microfiche compilation by title of all reports placed in the system.
 - An Appropriate Technology Bibliography prepared under a previous phase of this contract in 1983. The bibliography includes titles, authors, and abstracts for 1,200 articles.

PRODUCTS AND SERVICES WHICH ARE ONLY MARGINAL

1. Selected Research in Microfiche (SRIM) includes all new reports in the data collection under the key words "appropriate technology" and "developing countries". Among the research are reports placed into the system from AID, the World Bank, UNIDO, and local NTIS organizations. SRIM can be used free of charge at the network agencies, or paper copies can be bought if the agency has a

microfiche "blowback" machine. Clients can also subscribe to SRIM, and receive the microfiche, at a cost of \$1.40 per report.

2. Published searches exist in 3,500 fields, complete with abstracts of several hundred citations each. An already existing search costs about \$40, and a custom-tailored search costs about \$125, and takes several months.

NEW PRODUCTS AND SERVICES

1. A full-text microfiche library of appropriate technology reports has been placed in Costa Rica, Honduras, Ecuador, and Haiti as part of an experiment with "self-contained databases". For a discussion of the self-contained database experiment, see Chapter III.C. ("Expansion of Services Offered by Network Agencies").
2. A "dumb" terminal connecting the network agency, via CARINET (an electronic mail service), to NTIS, to other network agencies, and to on-line information search services has been installed in Costa Rica and Honduras. For a discussion of CARINET's use and potential for reducing turnaround time, see the paragraphs below. For its use in on-line searching, see Chapter III.C. ("Expansion of Services Offered by Network Agencies").

CHAPTER II. THE IMPACT AND USE OF NTIS INFORMATION

A. PRIVATE SECTOR USE OF NTIS INFORMATION

The Scope of Work for this mid-term evaluation does not emphasize the measurement of development and economic impact because: 1) mid-term evaluations emphasize improving projects rather than judging their value; and 2) a convincing impact study was carried out in 1982 (Marina Fanning, InterAmerica Research Associates).

Understanding of this project and report, however, is impossible without some appreciation of typical users and applications. Information distribution without technical transfer and economic and social impact has little meaning. For this discussion of private sector use of NTIS information, foci are:

- 1) The evaluation Scope of Work expresses interest in "small and medium-sized industries in the private sector".
- 2) Discussion with AID officials revealed interest in guidelines for a possible study of the economic and development impact of technical information.
- 3) Marina Fanning hypothesizes that "the magnitude of subsidy for each case of successful technology transfer (via distribution of NTIS information) is less than with other means of technology transfer (expert persons)."

Two sources of information on the above topics are: 1) the Fanning study; and 2) interviews and observation of information users carried out during the course of this evaluation.

INTRODUCTORY OVERVIEW BASED ON INTERVIEWS AND OBSERVATION CARRIED OUT DURING THIS EVALUATION

Below is the portrait of a "typical" user of NTIS information, according to a network agency officer from Honduras, and corroborated by this evaluator's interviews and observations. "Typical" means some users have many of the characteristics, and many users have some of them.

- Sophisticated regarding technology and information.
- Usually, but not necessarily, highly educated in a formal sense.
- Repeat user. Orders information regularly, perhaps several times a year.
- Private sector.
- Medium-sized business, between 50 and several hundred employees. (Large businesses have their own methods for acquiring necessary technological information.)
- Financial resources for buying expensive information.

- Can read English, and perhaps speak it too.
- Clientele for NTIS appropriate technology materials does not appear to differ markedly from the general clientele.

Some observations regarding the above profile:

- Medium-sized businesses clearly form an important portion of NTIS's clientele in Latin America and the Caribbean; however, small businesses probably do not.
- Those matching the profile in Latin America and the Caribbean are a small percentage of the population, and will remain so.
- The profile describes precisely the ideal client for on-line information services such as DIALOG.
- With the arrival of on-line searching in NTIS countries, it is probable that a good portion of NTIS clientele will "graduate" to this faster and wider-ranging purveyor of information.

Problems addressed by private sector users:

- Alternative sources of energy - particularly Honduras
- Excess manufacturing capacity - Honduras and Jamaica
- Raise product quality to meet standards and tastes of export markets - Honduras, Costa Rica, Jamaica.

INTERAMERICAN RESEARCH ASSOCIATES (IRA) IMPACT EVALUATION, MARINA FANNING (NOW OF MSVI), PRINCIPAL INVESTIGATOR

Quote from the 1982 Project Paper:

"To answer the question of how much actual use is being made of the NTIS-supplied technical information, LAC contracted the InterAmerican Research Associates (IRA) to do an impact evaluation.

The evaluation's major conclusion is that the exceptionally high rate of utilization (81%), and the specific uses to which NTIS information is applied, demonstrate a significant actual and potential contribution towards technological capacity building - and therefore, towards development in Latin America."

The Fanning study is at present a major justification for the project in the minds of those funding it. The mark of a valuable study is that it causes people to be interested enough to ask questions. Concerns that have arisen regarding the 1982 impact study can be summarized as follows:

- What impact does the NTIS project have within the private sector?
- How replicable and generalizable are findings regarding the high percentage of practical application of information?

- The study states there is a high percentage of practical application. But what absolute volume or coverage is there? Without absolute volume or coverage, the value received for the investment in the project cannot be assessed--80% of a million is one thing, 80% of 10 is another.

What Impact Does the NTIS Project Have Within the Private Sector?

Figure II-1 shows that 54% of the users interviewed came from the private sector. Figures II-2 and II-3 present summaries of Fanning's findings. Figure II-2 shows that the 81% "utilization rate" mentioned above consists primarily of:

- 34% Hands-on
- 22% Information assimilated and transformed (applied research)
- 20% Information transferred through courses, as part of didactic material, or through papers, reports, or speeches.

Figure II-3 presents a fine-grain analysis of the Fanning data, carried out by this evaluator. It presents a cross-tabulation of level of usage against user type. Note that 23% of users fall in the cell: "Private Sector/Hands-on Application", which is by far the largest cell in the entire table. This means that if the Fanning data is replicable and generalizable, a large fraction of all uses are of precisely the type one would choose if looking for high, tangible economic benefit.

How Replicable and Generalizable Is the Study?

Two ways to assess a study's replicability and generalizability are to: 1) examine the sampling procedures; and 2) repeat the study. In the following paragraphs are presented an assessment of sampling procedures, and sufficient repetition of the Fanning study to shed light on its replicability and generalizability.

Sampling procedures for the Fanning study are presented as follows:

"Users were considered for inclusion if they were known to have received a publication at least six months prior to the interview, the minimum time deemed appropriate to determine if the information solicited had been utilized in some way. Users further than one hour away from the city limits were eliminated on grounds of relative inaccessibility. Phone calls were then made to this list of potential interviewees.

"When phone contact was made, receipt of an NTIS publication was confirmed, and the identity of the actual recipient established. (Frequently, orders are placed by intermediaries, librarians, or secretaries.) Telephone contact was then attempted with the actual recipient of an NTIS publication. If it was not possible to establish contact for any reason (limited telephone service, people unavailable or out of town, etc.), the user was dropped from the list. Over 200 persons were contacted and 122 interviews were scheduled to yield the 99 interviews completed." (pages 14,15)

Figure II-1

**TYPE OF ORGANIZATION
REPRESENTED BY RESPONDENTS**

Private Firms/Industries	54%
Decentralized and Autonomous Organizations	14%
Universities and Research Institutes	13%
Government Ministries	11%
Non Profit Organization	5%
Consultants/Students	3%

(Marina Fanning, Impact Study, 1982.)

**UTILIZATION BREAKDOWN OF NTIS-SUPPLIED INFORMATION
IN THE DOMINICAN REPUBLIC, MEXICO, COSTA RICA, COLUMBIA, AND PERU
(97 Respondents)**

7	Hands-on application of information	342	A P P L I C A T I O N	812
6	Information assimilated and transformed (applied research)	222		
5	Information used to determine technical policies or standards	52		
4	Information transferred through courses, as part of didactic material, or through papers, reports or speeches	202		
3	Information read and circulated or incorporated in reference center or library	122	R E F E R E N C E	192
2	Information read and not used	52		
1	Information received but not read	22		

UTILIZATION BREAKDOWN

Figure II-2

Figure II-3

**FINE GRAIN ANALYSIS OF FANNING IMPACT DATA
(In Percentage)**

	Central Government	Government Agency	Community Organization	Private Business	University Consultant	Government Corporation, Multinational
1. Received	1					1
2. Read				4		1
3. Circulated	1	3		8	1	
4. Taught	2	2	2	12	4	
5. Policy/ Statements	2		1	1		1
6. Applied Research	2	4	1	5	8	2
7. Hands-on Application	3	2	2	23	2	

Conclusion Regarding the Sample

Clearly, this is not a random representative sample in a statistical sense. It is, however, hard to imagine how the sample might have been chosen more rigorously given logistical and practical problems. There are no obvious biases, except against rural users and users without telecommunications. Therefore, we can comfortably accept the conclusion that there is a high percentage of applicative, as opposed to referential, use of the information. It would be a mistake to take the 80% figure literally, however.

A Plausibility Check of the Fanning Study

In the course of this evaluation, there was occasion to interview approximately 14 private sector users of NTIS information. (A similar number of "intermediary" users also were interviewed.) The interviews were far from ideal for replicating the Fanning study. The selection:

- Included some users too recent to have applied the information; and
- Was probably to some extent chosen to please the evaluator.

Also, it was not always possible to distinguish between the effect of NTIS information, and information obtained elsewhere. Nevertheless, the interviews were sufficient to convince this evaluator that if the Fanning study were repeated, high percentages of impressive, practical application would be found. Below are summary profiles of users and applications based on interviews carried out during this evaluation.

COSTA RICA

1. **User:** Ceramic Bathroom Appliance Manufacturer
Information: Energy-saving strategies, specifications, characteristics of reinforced plastic.
Application: Used heat from oven to dry pieces of ceramic bathroom fixture to bake them, large economies of fuel (applied). Plans to experiment with and manufacture reinforced plastic for making bathroom plumbing (not applied yet).
2. **User:** Plastic Doll and Toy Manufacturer
Information: Specifications, varieties of plastic.
Application: Plastic raw material for dolls and toys. Plastic raw material arrives in varying qualities of hardness and flexibility porousness. Was not a problem with Central American market. U.S. market will not tolerate spots and uneven paint absorption.
3. **User:** Manufacturer of Artificial Flavors and Perfume
Information: FEMA, FDA health requirements (not received yet. DIALOG search carried out).
Planned Application: Ministry of Health stipulates that FDA, FEMA requirements must be followed. Ministry of Health understanding of requirements out of date. Resulted in 3 months down, 3 million colones lost. Law suit arrived on President's desk. Wants information on requirements to clarify procedures and inform ministries.

HONDURAS

4. User: Consulting, Engineering Firm
Information: Specifications for Sterling Motor, design.
Application: Local construction of motor for heat transfer, electricity generation, external bio-mass combustion engine for rural areas.
5. User: Consulting Firm in Alternative Energy, Environment
Information: Studies of solar energy, bunker coal, biogas.
Application: Solar heated swimming pool as demonstration of solar technology on basis of NTIS and other information. Paid back cost of solar heater in three to nine months depending on whether alternative is diesel or electricity.
6. User: Manufacturer of Dry Wall for Building Construction
Information: Personnel administration, personnel selection, general management, marketing distributed to management team.
Application: General
7. User: Coffee Exporter
Information: Wind mills as alternative energy, grain drying, personal projects.
Application: None yet.
8. User: Can and Plastic Container Manufacturer
Information: Production costs, energy saving, small library, distributes to friends, employees.
Application: None yet.
9. User: Pasta Factory
Information: Sales, administration, solar energy, bean powder for soup, paste.
Application: Experiments with idle capacity.

ECUADOR

10. User: Low-cost Housing Expert under contract to AID
Information: Houses which are earthquake proof, labor intensive, cool, do not use wood, use bamboo.
Application: Check progress against other experiences. Lynch pin to spending AID funds held up because of lack of capable contractor, satisfactory prototype.

JAMAICA

11. User: Consultant (same organization as network agency)
Information: Bio-mass for energy.
Application: More interested in horizontal communication with countries such as Philippines with similar problems and experiences.
12. User: Nutrition Consultant
Information: Sweetenings for yogurt which do not upset acid balance.
Application: Experiments for new products.

13. User: Paints, Adhesives Manufacturer, Local Export
Information: Castor bean production, safflower oil, pumps.
Application: None yet. Will buy no more until government supports ideas, research.
14. User: Shoe Manufacturer, Philanthropist
Information: Factory production specifications, plant requirements.
Applications: Gives loans and information packets to friends put out of work by IMF (public sector), economic conditions (large companies). Examples of businesses begun: shoe repair, castor oil processing, bicycle assembly, artificial flowers. Normally gets money back.

Estimate of the Number of Uses of NTIS Information

It would be a mistake to take the percentages in Figures II-1, 2, and 3 literally. For illustrative purposes, however, they will be used in this attempt to assess the absolute numbers of uses of NTIS information.

The formula for number of uses for a given year is simple: percent of utilizations in the sample is multiplied by the total users in the region (if only one utilization per user per year is assumed--a reasonable assumption.)

The problem is that while number of documents sold per year leaves an automatic track in NTIS records, number of users does not. And number of users cannot be derived from number of documents because:

- Many users are repeat users
- Institutions sometimes buy documents in bulk for their libraries.

A formula for estimating number of users indirectly is: number of documents sold divided by the average documents bought per user. Figure II-4 attempts to estimate average documents per user. As part of the Fanning study, users were asked, "Frequency of use last year". Figure II-4 presents the raw data, and a median frequency of 4 per year. The weakness of this treatment is that if some users bought very large numbers of documents, a frequency of four is an underestimate.

For discussion's sake, then, let us accept that:

- The utilization rates in Figures II-3 and II-4 are generalizable
- The average user buys 4 documents per year
- There is only one application per user per year
- Volume of documents for AID countries is 4,000 (a good year).

Therefore, in return for a yearly investment of \$450,000, we get:

- Uses of NTIS information per year: $80\% \times 4000/4 = 800$
- Hands-on use per year: $34\% \times 4000/4 = 340$
- Private sector hands-on use per year: $23\% \times 4000/4 = 230$

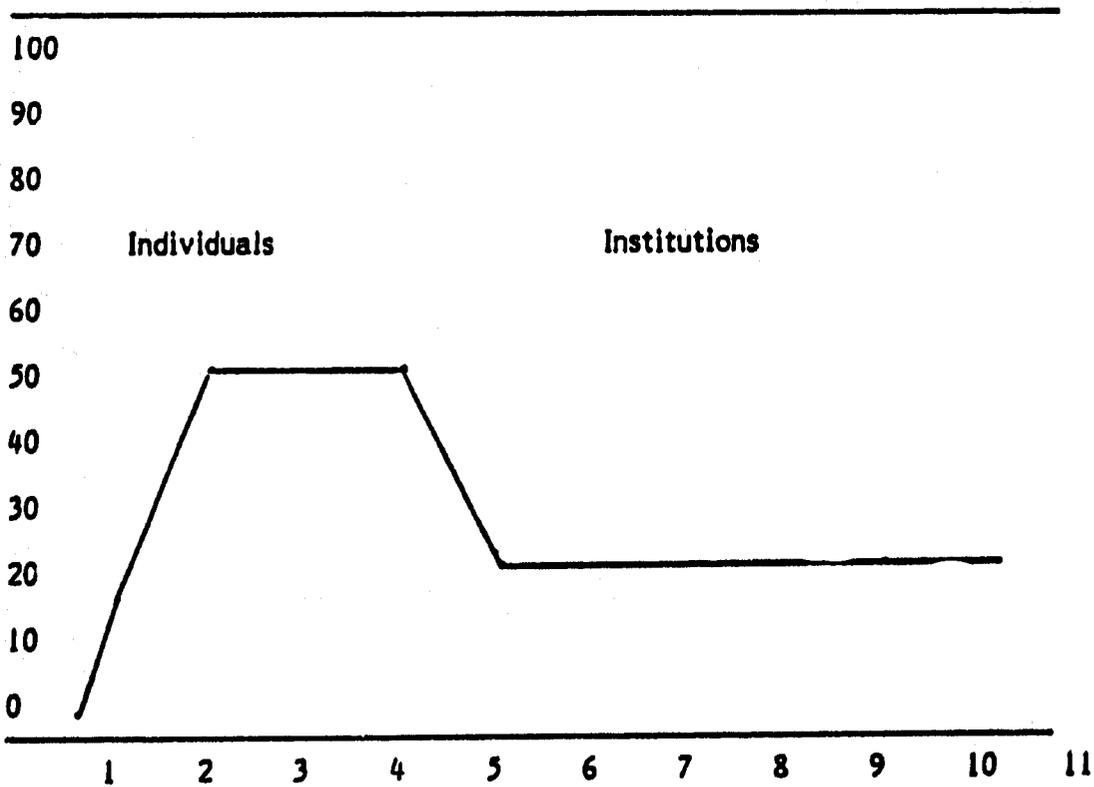
Figure II-4

**RULE OF THUMB FOR DERIVING NUMBER OF USERS
FROM NUMBER OF DOCUMENTS**

Rule of Thumb for Deriving Number of Users from Number of Documents = Divide
Number of Documents by 4

Frequency of Use in Last Year

Once	16%
2-4 times	48%
5-9 times	19%
More than 10	17%



The medium number of documents per user is approximately 4.
Number of Users = Number of Documents divided by 4.
 $5000/4 = 1,250$

- The above figures are approximately doubled if the project takes credit for Mexico and Brazil in addition to AID countries where the bulk of the subsidy is invested.
- The above figures are approximately halved if a bad year (such as 1984) is chosen.

Cost-Effectiveness Comparison between Information and Experts as Alternative Ways of Providing Technical Assistance

Since they depend on so many weak assumptions, the above numbers have little importance beyond a certain estimated value. They do suggest, however, some interesting comparisons with conventional, expert-person methods of delivering technical assistance and transfer.

The price of the above utilizations per year of technical information is approximately \$450,000--which seems like a lot of money until compared to the technical transfer yield of a typical expert.

For approximately \$100,000, an expert can be bought for one year. For that same \$100,000, according to the Fanning data and some other assumptions, the following can be bought:

- 177 utilizations ($\$100K/\$450K \times 800$) which include:
- 76 hands-on utilizations ($\$100k/\$450K \times 340$) which include:
- 51 hands-on private sector utilizations.

Does your typical expert produce the above amount of technology transfer in a year?

CHAPTER II. THE IMPACT AND USE OF NTIS INFORMATION

B. AID MISSION USE AND SUPPORT OF THE NTIS NETWORK PROJECT

Interviews with AID personnel in Costa Rica, Ecuador, Honduras, and Jamaica revealed the following:

- AID Missions, based on current knowledge of NTIS activities (which is low) have no interest in supporting network agencies directly.
- AID Missions are not, and do not perceive themselves as being, big users and purchasers of NTIS technical information. The reasons for this are that AID Mission personnel are overworked, doing research on technical problems is a luxury, and their jobs are almost exclusively administrative rather than technical.
- AID Missions are willing to allow or even encourage NTIS network agencies to market to AID-funded projects. They also are willing to contemplate inclusion of funds for information purchase within project budgets.

According to this evaluator, reasons for the "cool" attitude of AID Missions toward the NTIS project include:

1. While NTIS has done a good job selling itself to AID/Washington, NTIS and network agencies have done a poor job over the years selling themselves to the Missions.
2. Current AID policy favors private sector objectives and organizations. NTIS network agencies are usually in the public sector (attached to universities or ministries), although their objectives and clientele are in large part private sector.
3. USAID seems to be on a swing toward decentralization, which means more decisions and projects emanating from the Missions and less from the Regional Bureaus.

INFORMATION ACTIVITIES SUPPORTED BY AID MISSIONS

In Costa Rica, Ecuador, Honduras, and perhaps Jamaica, the AID Missions are in the technical information collection and distribution business, but the NTIS network agency has little or nothing to do with the Missions' plans.

Costa Rica

In Costa Rica, organizations supported by the AID Mission which are in the technological information business are the Chamber of Industries and the Chamber of Commerce. Both are funded by AID through the Coalition for Industrial Development (CINDE).

Of the two, the Chamber of Industry is the more advanced. Clientele for the Chamber of Industry include potential foreign investors in Costa Rican projects, and

buyers of Costa Rican products. Therefore, the language of operation in the Chamber of Industry tends to be English. Information collected, organized in a computerized database, and distributed by the Costa Rican Chamber of Industry includes:

1. Profiles of Costa Rican companies available for foreign investment. This database includes 900 companies.
2. Information on Costa Rican products for foreign buyers.
3. Feasibility studies on Costa Rican projects for foreign investors.

The Chamber of Commerce has apparently made less progress. Its clientele includes Costa Rican business and industry; the information it plans to collect and distribute includes information on United States and perhaps other foreign markets and prices.

The network agency in Costa Rica (the Centro de Informacion Technica of the Instituto Technologico de Costa Rica) has close informal relations with the Chamber of Industry. The Center's natural partner, however, is the Chamber of Commerce with whom they share clientele (Costa Rican industry and business), and language of operation (Spanish). It also seems that the Center could supply the Chamber of Commerce with technical assistance in setting up an information center, computerizing, and indexing, for example. A suggestion is that the Center and the Chamber of Commerce share expertise, locale, and clientele.

Honduras

In Honduras, organizations in the technical information business which are supported by the AID Mission are:

- The Foundation for Business Research and Development (FIDE)
- The Federation of Agricultural and Agribusiness, Production, Export Associations (FEPROEXAAH)
- The Center for Industrial Development (CID).

Areas of interest to FIDE are: markets, prices, export requirements, and technical information on wood, leather, food processing, and machine tooling. For the latter areas, FIDE depends on the NTIS network agency (Centro de Informacion Industrial, Universidad Autonoma de Honduras - UNAH). FIDE receives the UNAH bulletins, and indicates desired publications. FIDE is not presently equipped to get into the bibliographic data business on its own.

FEPROEXAH collects, organizes, and distributes production, market, and price information on a wide variety of Honduran agricultural products. FEPROEXAH consists of 22 organizations and 250,000 members.

The FEPROEXAH system is quite advanced, and probably represents the highest level of technical information expertise in Honduras. For example, it has much more experience with on-line searching than does the NTIS agency (UNAH). FEPROEXAH does not represent competition for UNAH, however, since it is in San Pedro Sula rather than Tegucigalpa, and its interest is market data rather than bibliographic information.

The Center for Industrial Development, or more specifically the Rural Technology Program, is a big user of NTIS materials, particularly in microfiche. Its product is Appropriate Technology, and its clientele is small agriculture and agribusiness. The Center for Industrial Development is a typical "intermediary user" of NTIS services.

Ecuador

A symbiosis between the AID Mission in Ecuador and the NTIS agency (Centro de Informacion Tecnologica, Escuela Politecnica Nacional) may be evolving based on shared needs and complementary resources as follows:

1. The center needs improved telecommunications to do on-line searches, and the AID Mission needs improved telecommunications for its relations with AID/Washington.
2. The center has technical expertise in the form of an ex-Peace Corps Volunteer who works there without pay.
3. The AID Mission has funds, but lacks computer and telecommunications expertise.

Two organizations with intentions to provide technical information in Ecuador are: FEDEXPOR (export and import data), and ANDE (National Association of Entrepreneurs). An AID contractor who will also participate in providing market information is DEVRES.

CHAPTER III. ACHIEVEMENT OF IMPLEMENTATION TARGETS

A. INCREASED VOLUME OF RELEVANT SERVICES BY NETWORK AGENCIES

HOW IMPORTANT IS VOLUME OF NTIS DOCUMENT SALES?

It would be a mistake to place too much emphasis on volume of document sales, because:

- The overriding objectives of the project, especially from AID's viewpoint, are technology transfer and economic development rather than document sales.
- Much of what is worthwhile in this project is in the area of institutional strengthening.
- NTIS and network agencies offer services other than document sales.

Services offered by NTIS and network agencies which are not reflected in the sales figures are:

- Centrally produced promotional materials (primarily ALERTEC which is published in Mexico).
- Local promotional materials which have recently increased markedly.
- Paper copies made by the collaborating agencies using microfiche lent by NTIS (not a significant factor in most countries).
- Use by the agencies of microfiche libraries using microfiche readers.

All of these services, not reflected in document sales, have their own technology transfer and economic impact value.

Although volume of NTIS documents sold is a narrow view of the project, it cannot be ignored because:

1. Amounts of technology transfer and economic development seem to be determined largely by document sales.
2. A primary justification for the current project was that volume of services would increase.
3. Strengthening institutions without using them fully is a waste.
4. NTIS is required by law to attempt cost-recovery, and cannot do so when sales volume is low.

In the final analysis, then, volume of NTIS documents sold is very important, but not all important.

SALES DATA

Operator Hypotheses Regarding Sales Data

"Increases were more the exception than the rule in 1984 as demand dropped precipitously." (1984 Project Annual Report)

"The expanded sales and distribution of NTIS documents has been much more difficult than originally anticipated." (Revised Implementation Plan)

Figure III-1 presents sales data for the years 1981 through 1984 for the countries which participated in the project to one degree or another. Figures for paper copy and microfiche have been combined. For countries with AID Missions and Mexico, sales have dropped precipitously, not only in 1984, but since 1981. For Mexico the trend has been similar, and for Brazil the trend has been gently positive, due to heavy microfiche purchases (See Figure III-5). For the entire continent, document sales have dropped approximately 40% since 1981, and for countries with AID Missions, where NTIS activities and subsidy are concentrated, sales have dropped 54% over the same period. Sales for AID countries show signs of recovering slightly in 1985.

An Optimistic View

Since the dollar is worth more foreign currency than before, the value of sold NTIS documents when expressed in foreign currency has remained more or less stable, or may even have risen slightly.

SALES DATA FOR INDIVIDUAL COUNTRIES

MSI has suggested that "decisions to offer TA and subsidies should be performance based, and concentrate on those agencies which are the most successful or have the most potential." Figure III-2 presents sales figures for the individual AID countries ranked in three ways: 1) sales totals for the years 1981-1984; 2) sales totals for 1984; and 3) sales per million inhabitants for an average year (1981-1984).

Exceptional details:

- In 1984, Jamaica jumped from 14th to 5th position.
- In 1984, Ecuador dropped from 4th to 13th position. (In 1985 Ecuador has succeeded in recovering its relatively strong position).
- Gross sales, and sales per million inhabitants differ strikingly as follows:
 - Brazil is high in absolute sales volume (rank 2), but very low in sales per million inhabitants;
 - Barbados is quite low in absolute sales volume, but by far the highest in sales per million inhabitants.

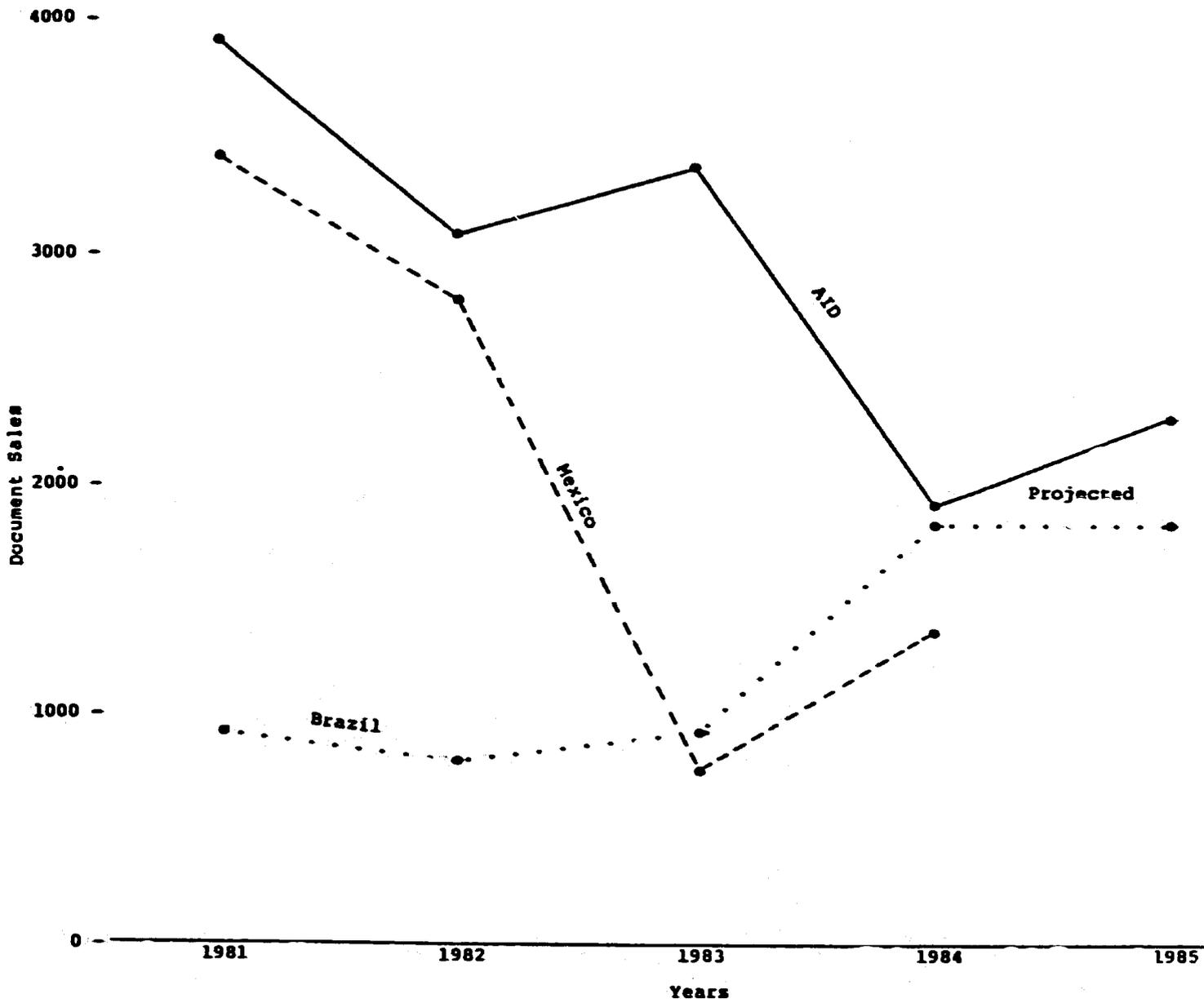


FIGURE III-1
DOCUMENT SALES

FIGURE III-2

	Document Sales		Document Sales Per Million Inhabitants	
	<u>1981-84</u>	<u>1984</u>	<u>1981-84</u>	
1. Mexico	8338	2. 1339	9.5	26
2. Brazil	4464	1. 1840	16.5	8
3. Colombia	2822	3. 424	11.	24
4. Chile	1770	4. 287	6.	37
5. Honduras	1284	5. 191	2.	.73
6. Ecuador	1033	15.5. 38	7.	29
7. Nicaragua	667	6. 167	5.	56
8. Dom. Republic	639	11. 81	9.5	26
9. Costa Rica	600	8. 114	4.	58
10. Panama	574	10. 94	3.	72
11. Peru	519	15.5. 38	18.	7
12. Guatemala	493	9. 107	14.	15
13. Barbados	471	13. 58	1.	392
14. Haiti	404	18. 5	12.	17
15. El Salvador	329	12. 60	13.	16
16. Jamaica	265	5. 131	8.	29
17. Bolivia	207	17 12	16.5	8
18. Paraguay	180	14 44	15.	12

ARE SALES HIGH OR LOW IN GENERAL AND IN ABSOLUTE TERMS?

Obviously, document sales have dropped dramatically over the past several years. Less obvious, however, is whether sales are high or low in general, and in absolute terms.

It is easier to grasp the magnitude of sales volume when focusing on one agency and country rather than on an entire continent. Thousands of documents per year, after all, seems like a lot of documents.

The median agency sells approximately 250 NTIS documents per year, which means one document every one or two days on an average. Even this image is misleading since a large portion of NTIS sales flow is not steady, but tends to "clump". Documents are not always bought singly, but often in groups of 10, 20, or even 100.

As is analyzed in Chapter III, document sales are clearly very low compared to all conceivable interpretations of cost coverage and financial self-sufficiency.

OBSTACLES TO SALES OF NTIS DOCUMENTS

Obstacles to sales of NTIS Documents are of two types:

1. Reasons why sales have dropped over the last few years; and
2. Reasons why sales are low, in general and in absolute terms.

WHY HAVE NTIS DOCUMENT SALES DROPPED?

To understand the precipitous drop in NTIS document sales over the last several years, one needs to look no farther than the "Operator Hypotheses" (from the 1984 Project Annual Report):

"NTIS experienced a drop in demand for its technical reports from virtually all parts of the world and attributed much of it to the sharp rise in the value of the U.S. dollar."

"In many Latin American and Caribbean countries, this problem was accentuated as the local currency was further devalued over and above the normal changes in U.S. dollar value. These severe devaluations in currency were often accompanied by rampant inflation and difficulties in obtaining foreign exchange. The most extreme example was in Bolivia where inflation was over 3000%, but other countries had inflation well over 100%."

"The entire region has been affected by the severe recession, which only differs in its degree and is now into its fourth year in many of the countries."

"Each of the agencies (in Central America) reported a seriously adverse economic climate, and either they or their clients faced new restrictions on dollar payments, import restrictions, or staff reductions."

WHY ARE DOCUMENT SALES LOW IN GENERAL AND IN ABSOLUTE TERMS, EVEN IN A GOOD YEAR?

In this section, reasons why document sales are low in general and in absolute terms, even in a good year, are discussed. The reasons include the following:

1. The NTIS product is sophisticated, and therefore the market is small.
2. "Real" access to the NTIS collection is limited.
3. The price of NTIS documents is high, although probably fair.
4. There are some weaknesses in the quality of NTIS documents received by clients.
5. Turnaround time between ordering and reception of a document by a client is approximately seven weeks.
6. The potential of microfiche has been unrealized due to lack of an inexpensive, reliable fiche-to-paper printer.

Discussions of the first four reasons why sales are limited are short; discussions of turnaround time and microfiche are lengthy.

1. The NTIS Product is Sophisticated, and Therefore the Market is Small

NTIS documents are a high quality but inherently low-demand product because of the publications' high degree of sophistication, length, and density.

One need only to talk to users of NTIS documents to be convinced that they are of high utility when the right match is made between a problem and information. NTIS reports are, however, in general prepared not for the public, but for the academic, research, and government communities. In addition, the vast majority of NTIS documents are in English rather than Spanish.

Therefore, demand for NTIS documents is inherently quite limited, no matter the pricing or promotion strategy. NTIS has introduced many Latin Americans to information access and use, but the NTIS reports have been a less-than-ideal vehicle.

2. Real Access to the NTIS Collection is Limited

The potential of the NTIS information collection to solve a wide variety of the developing world's problems is enormous. The potential can be realized only to the extent that developing world people know what information is in the collection.

There are two ways to know what is in the collection: an "active" search, either on-line or manually through the entire NTIS collection; or a "passive" search where one selects from published promotional material.

Whereas an active search brings the entirety of government-financed research to bear on users' problems, the passive approach brings to bear only a small portion. In the passive approach, what people know about the collection is determined by what is advertised in bulletins and newsletters, and only an infinitesimal portion can be advertised in material such as ALERTEC.

Therefore, active searches form a only a small portion of sales. The documents ordered from NTIS are determined not by what is in the collection, but by how the people who write ALERTEC can guess the market. At any given time, then, we exploit only a very narrow portion of the entire NTIS collection. And the portion we exploit is determined, necessarily, in hit or miss fashion.

Victor Martinez, a student of information distribution in Ecuador, gives an example of how decisions on what to advertise determine direction of the entire information distribution industry in Latin America. Martinez maintains that while the materials NTIS promotes in its newsletters tend to be recent, what Latin America needs, by and large, are technologies that are approximately 15 years old.

3. The Price of the NTIS Documents is High, Although Probably Fair

NTIS reports cost users in project countries approximately \$20 each in paper copy, and approximately \$10 each in microfiche (the North American price). In Latin America and the Caribbean, this seemingly fair price is a larger percentage of users' income or budget than it is of ours.

In addition, getting people to pay "true value" for information is difficult. Even sophisticated users in Latin America, including many network agency personnel, cannot believe that the prices paid for NTIS information cover only costs. People pay for what they can see. What an NTIS user sees is a publication while most of the price goes to hidden costs such as searches, storage, etc.

4. There Are Some Weaknesses in the Quality of Documents Received by Users

Users of NTIS documents are generally satisfied; however, there are complaints regarding the following:

- a. Print quality tends to be low, a characteristic, it seems, of paper copy made from microfiche by the blowback process. Users are especially perturbed when forced to pay for copies which are illegible.
- b. Sometimes publications are included in NTIS promotional materials which are available only to U.S. addresses.
- c. Some publications are entered twice under different access numbers. Users, therefore, sometimes unknowingly order duplicates which they do not then want to pay for.
- d. Sometimes publications are available only in languages other than English and Spanish.

Situations "c" and "d" are probably as much the user's fault as NTIS' fault.

5. The Turnaround Time between Ordering and Delivery of a Document is Approximately Seven Weeks

Operator Hypothesis: "Elapsed time in the document ordering process continues to be a problem." (MSI Revised Implementation Plan)

Sources of data on turnaround time between ordering and receiving documents are:

- The 1982 IRA study.
- A questionnaire filled out at the 1982 NTIS seminar in Puerto Rico.
- A 1984 "probe study" carried out by MSI in Costa Rica.

The 1982 IRA impact study places the median lag between requesting and receiving documents between six and eight weeks, and the questionnaire filled out at the 1982 NTIS seminar places the median between seven and 12 weeks. The difference between the two readings probably reflects question phrasing as much as it does real variance.

Figure III-3 and III-4 show analysis by this evaluator of the MSI "probe" data from Costa Rica. Figure III-3 is a summary diagram showing medians, and Figure III-4 is a scatter diagram showing variability. Figure III-3 shows a median overall lag of 52 days, or approximately seven weeks. Since Costa Rica is relatively close to the US, it is assumed that most lags in NTIS countries are at least seven weeks. Note that only five days of lag time occur at the network agency and the rest occurs in the mails or at NTIS.

- What portion of the lag occurs in the mails, and what portion at NTIS? The "conventional wisdom" is that the vast majority of the lag occurs in the mails.
- Is there a difference between the lag for paper copy and for microfiche? In particular, are those lag times below the median in Figure III-4 microfiche? Two reasons the lags for microfiche might be shorter than for paper copy are: 1) It takes time at NTIS to convert documents from microfiche to paper; 2) Microfiche may travel faster through the mails since they are smaller and lighter than paper copies.

Currently available alternatives for shortening lag times between requesting and receiving documents include:

- Professional expeditors or courier services for mailing documents.

In the countries visited by this evaluator, experience with expeditors and courier services has given spotty results. At times, individual users are willing to pay for and even arrange courier delivery of documents. Prices are high, ranging from U.S.\$40 to U.S.\$100 for up to two pounds, and the courier services are not always quicker than regular air mail. The price per document can be brought down by "batching", that is, not mailing documents until there are two pounds for a given country. The "batching" strategy, however, appears to inject excessive uncertainty and delay into the system.

- Telex, instead of the mails, for sending requests to NTIS.

In the countries visited by this evaluator, use of telex for ordering documents was infrequent. Apparently telex costs must be passed on to users, and agencies are reluctant to add expense to an already costly service. Also, agency access to telex service is not always

FIGURE III-3
MEDIAN LAG TIMES

Days

70

65

60

55

Document delivered to user (Day 51)

50

Document received at collaborating agency (Day 47)

45

40

35

30

25

20

15

10

5

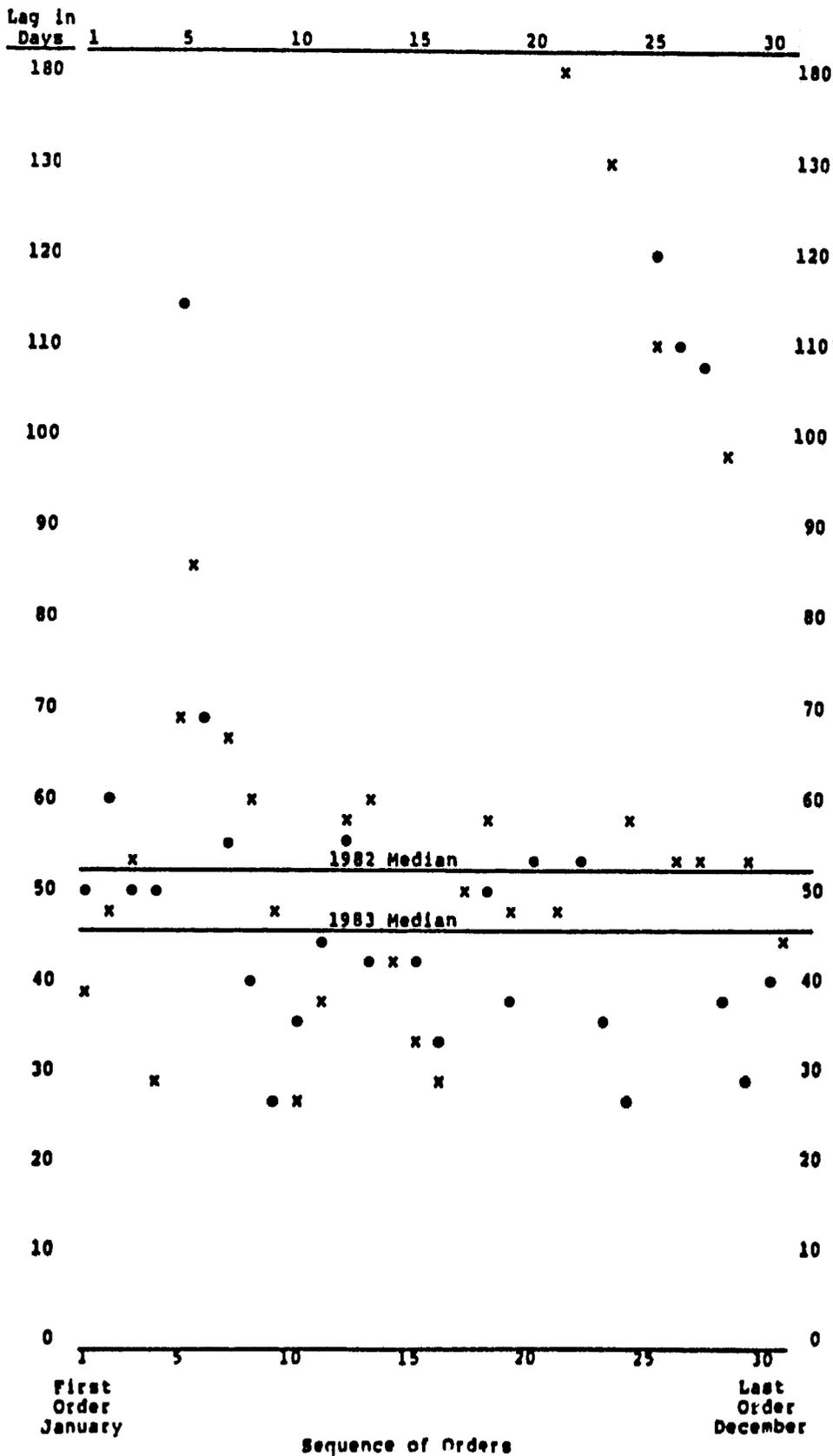
Order sent to NTIS (Day 0-1)

0

Order received at collaborating agency (Day 0)

FIGURE III-4

LAG BETWEEN SENDING OR ORDER TO NTIS AND
RECEPTION OF ORDER FROM NTIS



x = 1982
• = 1983

convenient, and often requires trips to town to place the call and to pick up answers. Sometimes telexes are lost or are slower than the mails.

CARINET electronic mail for sending requests to NTIS.

Of the three, only CARINET shows promise of offering a broad improvement in turnaround times.

6. The Potential of Microfiche is Unrealized Due to the Lack of Inexpensive, Reliable Fiche-to-Paper Printers

The NTIS archive of reports is stored primarily in microfiche form, a characteristic it shares with the Educational Research and Information Clearinghouse (ERIC), International Volunteers in Appropriate Technology (VITA), Volunteers in Asia (Stanford, California), and the Educational Research Network, financed by AID and based in Chile.

Advantages and Disadvantages of Microfiche

Microfiche offer obvious advantages. They allow storage of large amounts of information in a small space. Without microfiche technology, NTIS and other databases (such as ERIC) would not exist. Microfiche also allow mailing of large amounts of information for a low price.

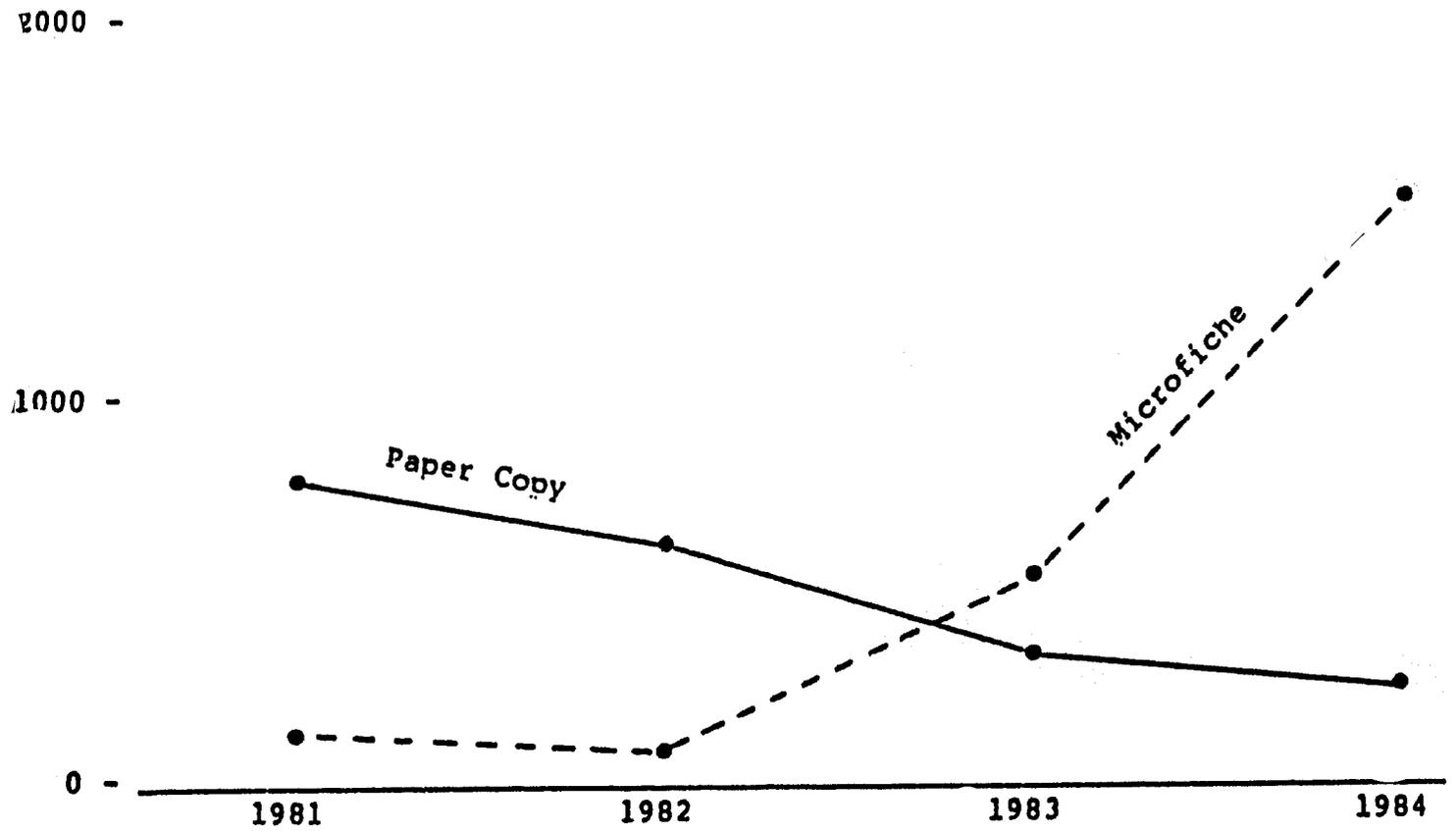
Microfiche also have disadvantages. According to NTIS agency personnel and clients, and this evaluator's observations in Latin America and the Caribbean:

- A microfiche reader is necessary. Most people do not have microfiche readers, and they do not always like to go to the library or information center to do research or study. An inexpensive microfiche reader, which costs several hundred dollars, is now on the market. But even an inexpensive microfiche reader is only for high volume users of information.
- Microfiche are good for finding an article, but are not good for reading and studying the article.
- It is difficult to study microfiche for extended periods of time (e.g., headaches).
- Microfiche are especially weak for graphs, diagrams, and flow charts.
- Once a large collection of microfiche is out of order, it is difficult to put them back in order.

Microfiche Blowback Machines

For the reasons listed above, NTIS agency use of their own microfiche collections, or ordering of documents from NTIS in microfiche form, is generally low. The exception is Brazil. Figure III-5 shows how in Brazil, microfiche sales are higher than paper copy sales.

FIGURE III-5
BRAZIL MICROFICHE VS. PAPER COPY



Theoretically, microfiche blowback machines, which convert microfiche into paper copy, are the solution to much of the above. Microfiche blowback machines, however, tend to be expensive to buy and operate, unreliable, require frequent repairs, and use only thermal paper, which is difficult to obtain.

A questionnaire filled out at the 1982 NTISeminario in Puerto Rico revealed the following:

- 12 of 14 agencies present had microfiche readers.
- 7 of 14 agencies had blowback equipment.
- Only 4 of 14 used the blowback equipment occasionally or frequently, and 10 of 14 used it infrequently or not at all.
- Only 1 of 14 used the blowback machine to make copies which they sold to clients.

CHAPTER III. ACHIEVEMENT OF IMPLEMENTATION TARGETS

B. SELF-SUFFICIENCY AND SUBSIDY WITHDRAWAL

The concept of self-sufficiency was formally introduced into project thinking by the following comment made during AID's review of the July 1982 Project Paper Amendment:

"How long and at what levels should AID carry the NTIS project? Minimum NTIS base support is at the \$300,000 a year level. This buys a minimally funded but active project. Cutting out all AID support, i.e. the PASA contract with the Dept. of Commerce, would impact the program strongly but the network would probably continue working. We can't subsidize the project indefinitely. How do we get out of funding it without killing it?"

The concept of self-sufficiency was elaborated in the following quotes from the June 1983 Implementation Plan:

"The purpose of the current project activities is now to bring about viable self-sufficiency in the LDC agencies cooperating with the project in Latin America. Self-sufficiency is defined broadly to include not merely the withdrawal of project subsidies, but also an expansion and enhancement of the services delivered through the cooperating agencies, as well as the strengthening of these organizations."

"Self-sufficiency can be viewed primarily as a relationship between two variables:

- performance, as measured by use, access, and the existence and maintenance of an information system, and
- levels of subsidies."

In the Implementation Plan, self-sufficiency is either broadly or vaguely defined, depending on the mood of the reader. It is clear there are elements of subsidy withdrawal, nonfinancial, and financial self-sufficiency.

SUBSIDY WITHDRAWAL

The one serious experience with subsidy withdrawal involved NTIS' monthly promotional piece ALERTEC (previously AMTID). For several months during 1984 network agencies and their clients were charged to cover production costs. Sales dropped, and network agencies objected strongly, resulting in a reinstatement of the subsidy. It was learned that promotional material cannot be charged for, and information sales need promotional material.

NONFINANCIAL SELF-SUFFICIENCY

Below are some aspects of nonfinancial self-sufficiency, and observations on whether or not they have been achieved:

1. Network Agency Survival: Network agencies could continue to exist without the subsidy. Agencies derive very little money from the project (several thousand dollars maximum), and no agency depends on that revenue for its existence.

2. General Information Access and Use in the Region: The project has set in motion an irreversible process of information access and use. For eight years, NTIS carried the ball in developing Latin American information capability, use, appreciation, expertise, and demand. The process is irreversible now with the advent of packet switching and on-line access throughout much of the region.
3. Sale of NTIS Documents: Without the subsidy, sale of NTIS documents could continue, but not at the same level. Without subsidy, sales of NTIS documents would go down as the price goes up, and as promotion activities are reduced. Sales would be higher, however, than they would have been had there been no project. Client and agency knowledge and appreciation of NTIS' value, and of how to deal with NTIS, will surely outlive the project and the subsidy.
4. Finding and Qualifying for New Funding: In a sense, a project is self-sufficient if it manages to find and qualify for new sources of subsidy. Two possible sources are AID Missions and REDIITEC.

AID Missions, on the basis of their current knowledge of the project, are not willing to pick up the subsidy. Writing information budgets into individual budgets, and an IQC arrangement with NTIS do seem interesting to AID Mission personnel.

REDIITEC, an organization of network agencies founded with NTIS encouragement, has the objective of developing projects and qualifying for funding. It is possible that through the activities of REDIITEC, some network activities will achieve a degree of self-sufficiency.

5. The Need for Future Training and Technical Assistance: Sales of NTIS documents will always depend in part on continued training programs and workshops at NTIS, and on promotion assistance, especially if there is no powerful incentive for sales by agencies and agency personnel.
6. The Effect of Automation on Self-Sufficiency: The project has begun to introduce network agencies to automation in the form of computers and "dumb" terminals. Increased automation shows promise of increasing agencies' self-sufficiency by making them active, rather than passive, players in the information industry, and making their information services more saleable. Precisely those agencies which cannot, for telecommunications reasons, get on-line will require continuation of traditional dependence on NTIS.

FINANCIAL SELF-SUFFICIENCY

Throughout the following discussion there is ambiguity on whether the project should earn credit for sales from countries which receive only promotional materials and SRIM from the project, especially Mexico, Brazil, and Puerto Rico. These "ambiguous" countries account for more than half the NTIS document sales in the region. Their inclusion in project tables and reports, as is NTIS' practice, makes the project look better; however, their inclusion may cloud understanding and hinder decision making.

Financial self-sufficiency can be looked at from the point of view of the entire system, or individual countries; in neither case was financial self-sufficiency achieved.

Breakeven Curves for the Entire System and for Individual Agencies

Figures III-6, and III-7 show sales performance compared to breakeven curves for NTIS Latin American and Caribbean system as a whole, and for individual countries. The vertical on the graphs represents document sales, and the horizontal represents the price per document sold. Income is arrived at by multiplying sales volume by price per document. The breakeven curves assume that subsidy costs must be covered by sales to break even.

Sales performance is shown by the dots on the curves. The object of the "breakeven game" is to get the sales performance dots above the breakeven curve. Ways to do this are:

- Raise prices (move along the horizontal) and/or.
- Increase volume (move up the vertical) and/or.
- Lower costs (lower the breakeven curve).

Self-sufficiency Performance of the Entire System

For the entire system (Figure III-6):

$$\text{Breakeven} = \text{Sales Volume} \times \text{Price per Document} = \$450,000.$$

\$450,000 is the approximate sum of all ongoing activity items in the project budget, and does not include money spent to introduce and experiment with new services (approximately an additional \$150,000 per year).

The breakeven curves represent all possible combinations of sales volume and document price which equal the subsidy budget. For the entire system, some illustrative examples of points on the curve are:

\$10 each x 45,000 volume = \$450,000
\$20 each x 22,500 volume = \$450,000
\$30 each x 15,000 volume = \$450,000

Figure III-6 shows that:

1. At current prices (between U.S.\$15 and U.S.\$16 per document (taking into account both paper copy and microfiche sales), volume would have to be approximately 25,000.

FIGURE III-6

BREAKEVEN CURVE FOR NTIS SYSTEM IN REGION
(Volume X Price = \$450,000)

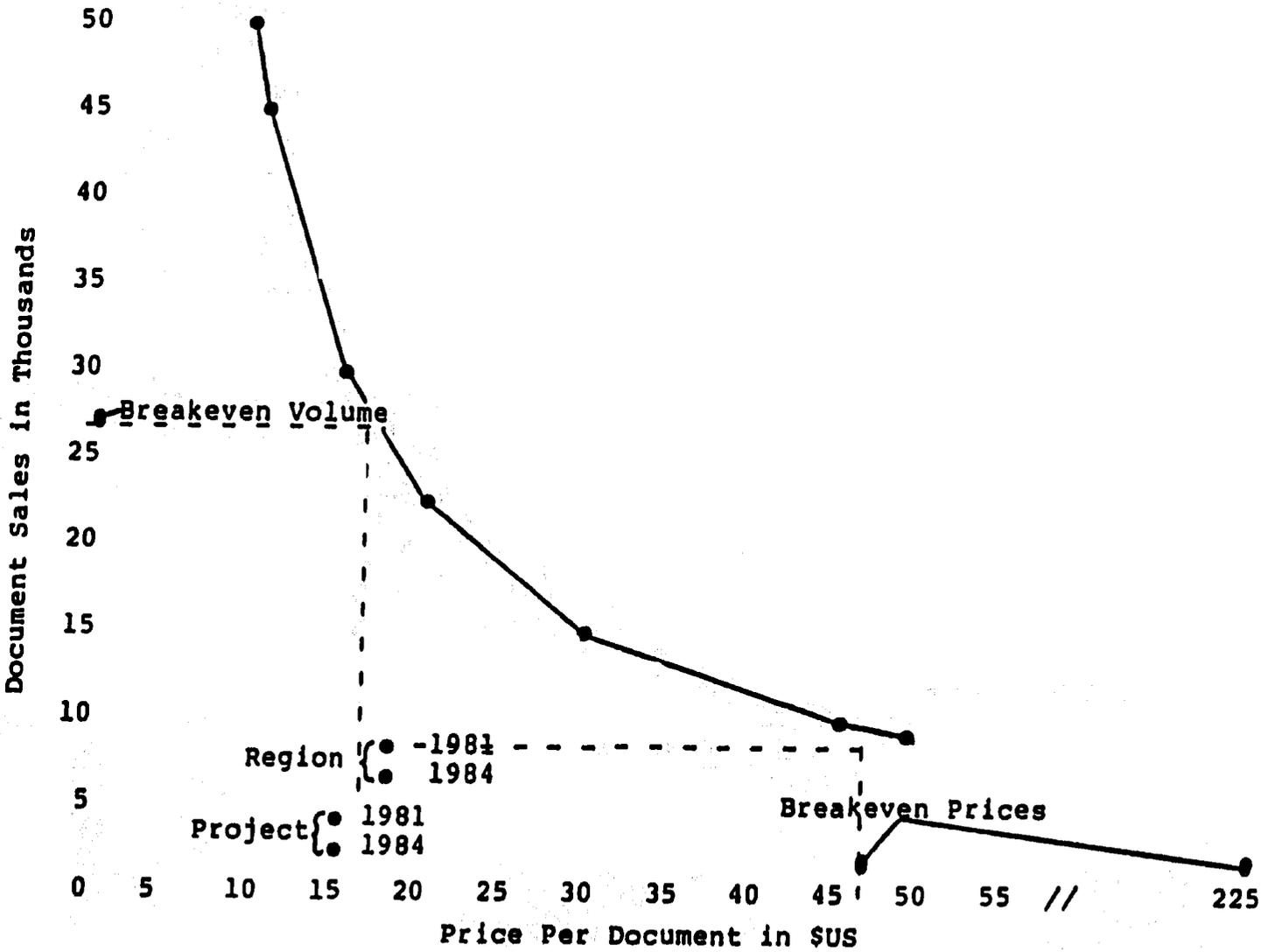
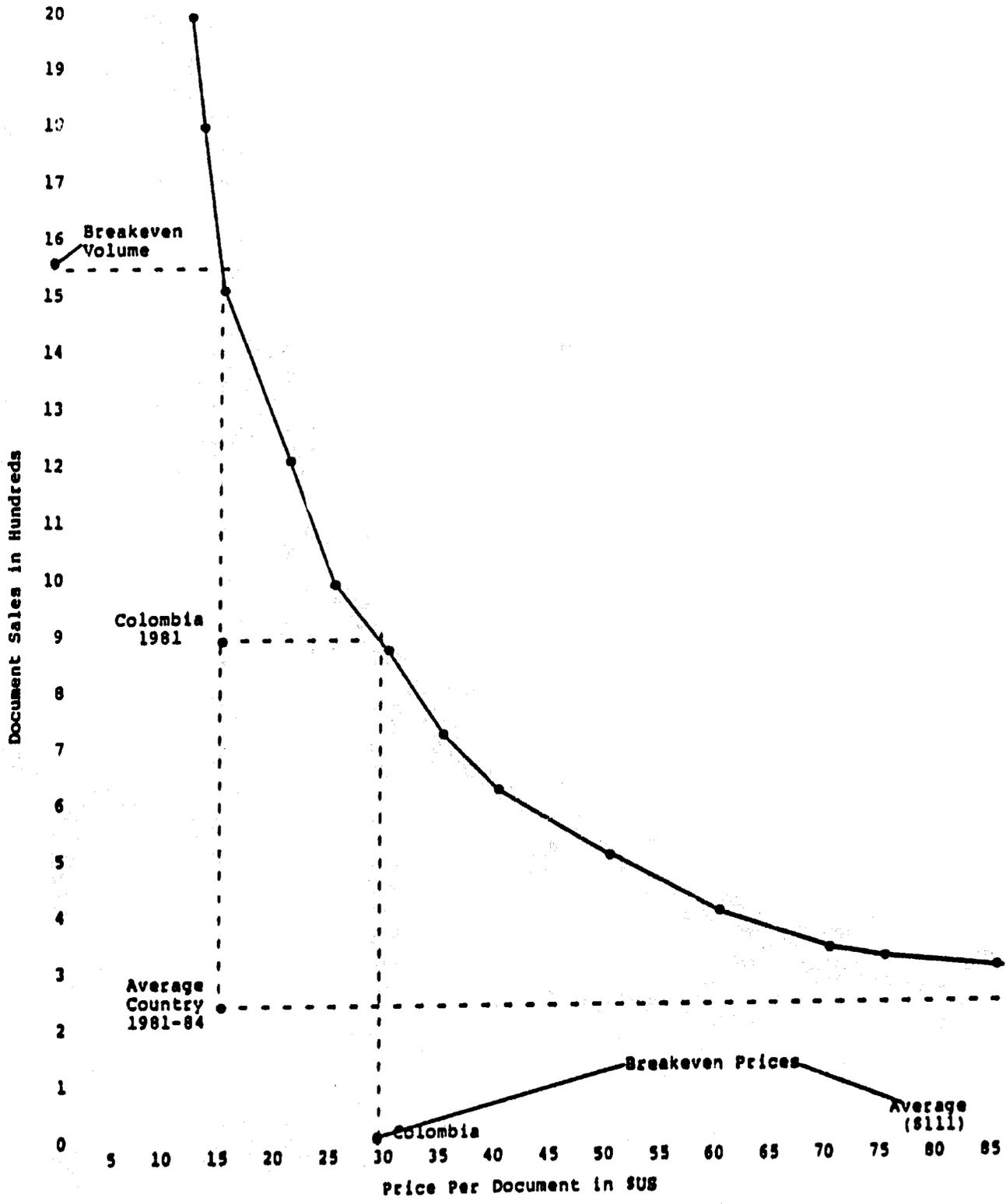


FIGURE III-7

BREAKEVEN ANALYSIS FOR INDIVIDUAL COUNTRIES

Breakeven Curve
Price X Volume = \$25,000



2. Current sales volume is between 2,000 and 10,000 depending on year, and whether the project is given credit for "ambiguous" countries including Mexico and Brazil. (See Chapter III-A on Sales Volume).
3. At current volume, prices would have to be between U.S.\$46 and U.S.\$225. This means they would have to increase between 3 and 15 times depending on whether you are amortizing within the project proper or throughout the entire region.

Self-sufficiency Performance of Individual Agencies

For individual countries (Figure III-7):

Breakeven = Sales Volume x Price per Document = \$25,000.

\$25,000 is the approximate sum of money spent on ongoing activities for an individual country; \$450/16 countries = \$28,125; however, some subsidy, such as SRIM, goes to projects outside the project proper.

Figure III-7 compares sales performance to the breakeven curve for the best performing country over the last four years (Colombia in 1981), and for an average country. For example:

1. Over the last four years, the best sales performance was in Colombia in 1981 where 861 documents were sold. To break even it would have had to sell more than 1,600 documents, or increase prices from approximately \$15.40 per document to \$29 per document.
2. An average country between 1981 and 1984 sold 225 documents. To break even it would have had to sell 1,600 documents, or increase prices from approximately \$15.40 per document to \$110 per document.

Obviously, the best performing country in its best year comes closer to breakeven than does an average country or the system as a whole.

Conclusions Regarding Financial Self-sufficiency

NTIS revenues for the whole continent were approximately \$170,000 in 1981, and dropped to \$97,896 in 1984. For countries where the project is concentrated, revenues dropped from approximately \$61,000 in 1981 to \$28,479 in 1984.

Subsidy for ongoing activities is approximately \$450,000. Thus, for a \$450,000 outlay, revenues have been between \$28,000 and \$170,000 depending on:

- Whether the project takes credit for "ambiguous" countries such as Mexico, Brazil, and Puerto Rico.
- Which year is selected.

For every dollar spent, this project is getting back between 6 and 16 cents (depending on the year) in countries where the project is concentrated. If you give the project credit for the whole region, the project is getting back between 22 and 38 cents (depending on the year) on the dollar.

The message is that either sales volume or prices must increase severalfold for breakeven to be reached. Volume and/or prices must increase by between 7.3 and 15.8 times (depending on the year) if you look at just countries central to the project. And they must increase by between 2.6 and 4.6 times (depending on the year) if the project is given credit for the whole region.

Financial self-sufficiency in any traditional sense is out of reach, and will be out of reach for the foreseeable future.

WHY IS THE NTIS PROJECT IN LATIN AMERICA AND THE CARIBBEAN NOT SELF-SUFFICIENT?

Operator Hypothesis:

"Given current pricing strategy and the cost of promotional activities, full financial self-sufficiency is an unreasonable goal over the foreseeable future." (MSI Revised Implementation Plan, 1985)

The Operator Hypothesis posits two culprits: pricing policy and promotion costs. It is the view of this evaluator that both pricing policy and promotion costs exacerbate NTIS' non-self-sufficiency in Latin America and the Caribbean, but are not the fundamental causes of it. If one discounted promotion costs, and had an "ideal" pricing policy (whatever that might be), the operation would still not reach self-sufficiency.

Reasons for believing that NTIS sales in Latin America and the Caribbean are inherently not self-sufficient are:

1. Information services are only rarely self-sufficient in the United States.
2. NTIS barely covers costs in the United States where promotion and delivery costs are low, and user sophistication is high.

Information Services Are Only Rarely Self-sufficient in the United States

(Based on conversations with Nancy Green Maloney of DIALOG)

In the United States, where promotion costs are lower and user sophistication is high, information services only rarely cover costs. In general, in the U.S. libraries and information centers are not required to cover costs because they operate within parent organizations whose needs they serve. DIALOG, for example, was formed to serve the needs of Lockheed, and was subsidized for a long time.

Occasionally, as was the case with DIALOG, an information service develops a product line of such utility to customers that it becomes not only cost-covering, but profit-making. This is rare, and for bibliographic information, a recent phenomenon. Such cost-covering information centers must have access to a ready market, as does DIALOG. Promotion as NTIS requires it overseas is not a major concern for DIALOG.

NTIS is barely cost-covering in the U.S. Last year it lost money and has had to raise prices. U.S. users have questioned the wisdom of requiring NTIS to cover costs even for the national market: "Reexamination of NTIS' current policy of recovery of

costs through user charges is also urged." (Perspective on NTIS. The Intermediary's View. 1977, Committee on Information Hang-ups, Washington, D.C., p. 53). In Latin America, DIALOG offers training, educational materials, and technical assistance free of charge, as well as a volume discount. DIALOG does not expect Latin America to be cost-covering at this point in time. Why does NTIS?

Pricing Policy and Self-sufficiency

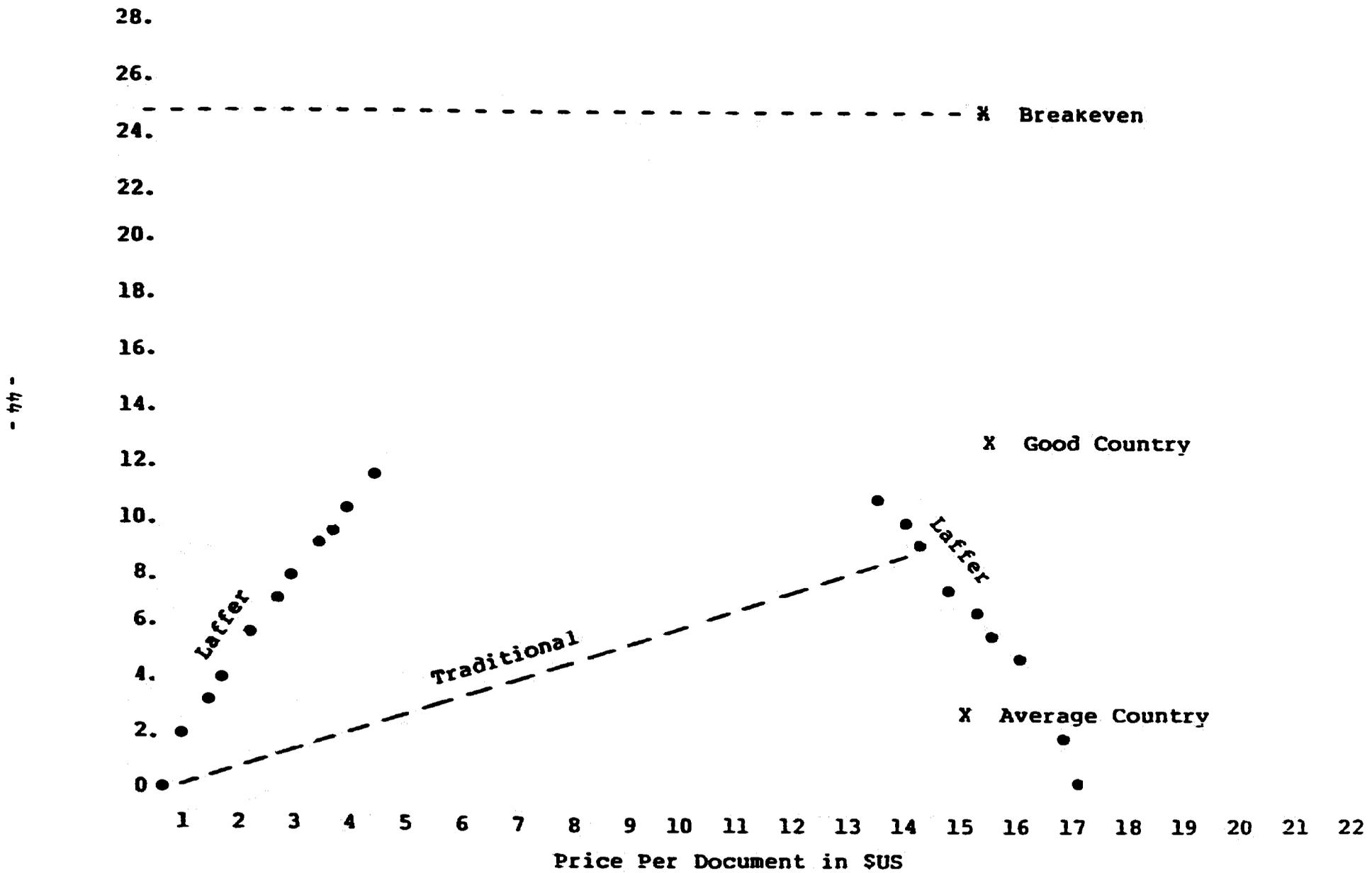
The breakeven game is very difficult using price as the only equipment:

1. In general, when prices are raised, demand and volume are damaged. With volume on a slide, as has been the case since 1981, increasing prices would seem to risk destroying demand altogether.
2. In general, when prices are decreased, revenues decrease. To increase revenues through decreased prices, one would need to rely on an extreme "Laffer phenomenon", that is, an increase in volume so large that it produces more revenues even though prices are lower (See Figure III-8). An educated guess is that we are dealing with a moderate Laffer phenomenon—we are driving revenues down as we raise prices, but there is no price at which we would have broken even.

Conclusion Regarding the Relation between Price and Self-sufficiency

The probability that a pricing policy exists which would produce breakeven and self-sufficiency is very low. Pricing policy is damaging volume, which exacerbates the self-sufficiency problem. But pricing policy is not a fundamental reason why the project is not self-sufficient. There is no pricing policy which would produce self-sufficiency, or even approach it.

SALES AND REVENUES: LAFFER VS. TRADITIONAL



CHAPTER III. ACHIEVEMENT OF IMPLEMENTATION TARGETS

C. EXPANSION OF SERVICES OFFERED BY NETWORK AGENCIES

AN EVOLVING PLAN

The current phase of the project has always included "expansion of the range of services" as a component. Exactly how services would expand, however, has changed over time. Between the August 1982 Project Paper Amendment and the June 1983 Implementation Plan, there seems to have been a shift away from license brokering and technological brokering by DEVELOP and WORDTECH and Control Data Corporation. Also since the Implementation Plan, the CARINET electronic mail has been included, connecting NTIS agencies to NTIS and to each other.

In the following pages, NTIS initiatives to expand and improve services offered to agencies and clients in Latin America and the Caribbean will be discussed in the following order. The initiatives are ordered approximately according to the promise they have shown for improving and expanding NTIS services.

1. CARINET electronic mail
2. On-line access of bibliographic data
3. Creation and distribution of self-contained databases
4. Creation and maintenance of local, indigenous databases
5. RTAC: introduction of Mexican Spanish language materials into the NTIS collection
6. Purchase of microcomputers for network agencies
7. DEVELOP and WORLDTECH information services and technology brokering

CARINET ELECTRONIC MAIL

What is "CARINET Electronic Mail"

Computer Conferencing (also possible using "dumb" terminals) is a low cost, international information management system. Computer Conferencing can be used for:

1. Coordination and management
2. Reducing travel and communication costs
3. Technology transfer requests and delivery
4. Supply and market information
5. Accessing other electronic mail systems.

A prerequisite to cost-effective use of international electronic mail is access to a telecommunications mode with packet switching (see Appendix C).

Electronic Mail Progress

CARINET electronic mail has been introduced by NTIS in Costa Rica, Honduras, and Panama in the form of a "Silent 700" Texas Instruments "dumb" terminal, a modem for connecting the modem to telephones, and training in how to use electronic mail. Mexico and Guatemala also use electronic mail, but are not connected to the CARINET system.

The original objectives for installing CARINET electronic mail were:

- Coordination and management.
- Accessing other electronic mail systems, in particular the DIALOG on-line database search service.

Using electronic mail for submission of document requests was not an original intention. Very quickly, however, the network began submitting document requests via electronic mail to the surprise, and perhaps annoyance, of NTIS International Division personnel. The electronic mail submissions put NTIS' International Division personnel in the information search loop, which is not normal procedure, adding to their work load.

Quotes from network employees:

- "CARINET is a quicker, less expensive, more convenient replacement for telex."
- "CARINET is a fabulous improvement."
- "CARINET gives us the image of immediate access to the world of information."

Two Potential Obstacles

Thus far, the NTIS International Division has adapted well, and probably can handle the situation as long as there are only several member countries in the system. As the CARINET system grows, however, the search load will increase and a permanent solution will have to be found.

It also appears to this evaluator that CARINET is about to force the International Division into a new work function it is not capable of handling, even on a limited basis. So far, the agencies have used CARINET to send in accession numbers, creating minor work load problems. Recently, at least one agency has begun submitting key words and research problems, which will soon overload the system, even with just several client countries.

Quote: "CARINET replaces the GRA&I. Rather than do a tedious search, it is much easier to call and have her do it."

ON-LINE ACCESS TO BIBLIOGRAPHIC DATA

Objective: "At least one Network member will have inaugurated, operated for a one-year time period, and evaluated a publicly accessible on-line search service of bibliographic databases in the U.S."

Theoretically, on-line searches of bibliographic databases can be accomplished via conventional international long-distance telephone and international "value-added" networks. For practical purposes, only international value-added networks (Telenet and Tymnet) offer the possibility for cost-effective on-line searching.

Among the 16 countries directly involved in this project, seven had "packet switching" (Barbados, Chile, Costa Rica, Dominican Republic, and Panama). Current possibilities for on-line access may be limited at present, but packet switching and on-line access are a significant part of Latin America's immediate future.

PROGRESS AT CARRYING OUT ON-LINE SEARCHES

Because of its newness, on-line searching, at least in the countries visited during the evaluation, has been carried out primarily in an experimental or demonstration mode. In Costa Rica, approximately 40 DIALOG on-line searches had been carried out, 30 of them by MSI during a promotion visit. In Ecuador, one DIALOG search had been carried out, for which this evaluator was present, using "unenhanced" telecommunications. In Honduras and Jamaica no on-line searches had been carried out by the NTIS representatives.

The Centro de Informacion Technologica (CIT) in Costa Rica has been making search requests of DIALOG since 1979, and since 1981 by means of an on-line terminal provided by the United Nations. Demand for the service, until recently, has averaged three or four searches per year. Until recently the on-line service received little promotion, and most clients were those with on-line experience acquired in the U.S.

Packet-switching was installed in Costa Rica in 1984, and in March and April of 1984 MSI carried out approximately 30 free DIALOG searches as part of a promotional demonstration. During May and June, 12 searches were carried out and charged for.

Clients appear to have been charged approximately U.S.\$70 per search, which includes consultancy, telecommunications, and database access costs. To date, approximately \$1,000 in document sales seems to have been generated, including DIALOG print-outs and NTIS documents.

LESSONS LEARNED FROM THE COSTA RICA EXPERIENCE WITH ON-LINE SEARCHES

The Utility of On-line Searches

1. Provision of information service requires completion of two tasks: a) identifying the publications which solve the information need; and b) delivery of the publications. On-line searches significantly improve performance of the first task, but much less the performance of the second task.
2. It is clear that on-line access to bibliographic databases will increase sales of information in general, but the effect on sales of NTIS documents in particular is not so clear, and will depend on clients' needs and tastes. On-line searches such as DIALOG have access to more than 200 databases, of which NTIS is just one.

3. On-line bibliographic data searches are a magnificent promotional tool as well as an efficient, wide-ranging method for identifying and locating valuable information. Participation in or observation of on-line searches are exciting and entertaining, and draw attention to an agency and its services, including those which are not on-line.
4. DIALOG is one among many data sources accessible once a country acquires packet switching. One of CARINET's selling points is access to "supply and market information", in particular to a service called FRESHNET, Inc. Interviews with agency personnel and clients who have tried to use FRESHNET show less than satisfactory results.

Several experts suggested that NTIS should comparison shop among electronic mail systems to find the one that is priced the best, and connected to the most powerful bibliographic and marketing information sources.

Management of an On-line Search Service

1. There is more to effective on-line searching than mastery of the software and acquisition of the appropriate equipment. One also must be skillful at determining client information needs, and at managing an information service. In particular, one must be competent at:
 - Discovery of a client's information needs
 - Translation of those needs into key words and an effective, focused search
 - Establishing a pricing policy which covers costs but does not inhibit demand.
2. Once an agency has access to international telecommunications with packet switching, start-up costs for putting an agency on-line pay primarily for training. Personnel must be trained in the software for communicating with the system (such as DIALOG). Training in DIALOG lasts between 2 and 4 days, and requires only that travel to and from California, and per diem of the instructor be paid by the students' organizations. Instruction, passwords, materials, and 30 hours of on-line time are provided free.
3. Once start-up costs are invested, on-line searches can easily become a self-sufficient cost center because recurring, invariable costs are low. The Director of CIT in Costa Rica estimates that maintenance costs for equipment and documentation amounts to approximately \$1,200 per year, coverable by approximately 40 searches per year--a very low number in view of demand which has surfaced so far.

On-line Search Equipment

1. Equipment costs for acquiring access to on-line searches are low. "If an information center has a terminal device such as a 'dumb' terminal, a word processor, or a microcomputer with modem, regular international telephone service can be used to gain on-line database

access, either through direct dialing or through operator-assisted calls." (A study of Access to On-line Databases from Latin America and the Caribbean, Lauffer and Anderson, AED, pp. 48,49)

Either with or without this project's assistance, most NTIS agencies either have, or will soon have, microcomputers which perform administrative and data indexing tasks as well as on-line access. Among those countries visited during the evaluation, Costa Rica, Ecuador, and Honduras had microcomputers. Only the Ecuador computer was acquired through the NTIS project. In addition, "dumb" terminals, (Texas Instruments, Silent 700) which cost between U.S.\$400 and U.S.\$1,000, have been acquired by several NTIS agencies, in particular those who are members of CARINET--Ecuador, Chile, and perhaps others.

2. The advantages of a microcomputer over a "dumb" terminal are:

- Requests can be preprocessed, leading to more focused, efficient searching.
- Telecommunications time for ordering is vastly reduced.
- Responses can be down-loaded into the microcomputer, printed out as frequently as desired, and even processed.

3. The advantages of a "dumb" terminal are that it is portable--it can be taken to a client's office, for example, where the client can participate directly in the on-line search process and see the response immediately.

The weaknesses of a "dumb" terminal are:

- The response to the search is not saved within the machine. This means a break-down in the printer can be disastrous.
- There may not be a Texas Instruments office in the particular country, meaning that repair and maintenance may be a problem.

4. In all probability, any organization sufficiently sophisticated for conducting on-line searches regularly will have both a microcomputer and a "dumb" terminal.

CREATION AND DISTRIBUTION BY NTIS OF SELF-CONTAINED DATABASES

Objective: NTIS will have developed five subject-specific bibliographic databases and distributed one each to those facilities with appropriate equipment. These databases are distinct from the complete NTIS Bibliographic Database.

Progress According to NTIS Reports

Self-contained database progress, as reported in the 1984 Project Annual Report, is as follows:

1. A full-text microfiche library of the appropriate technology reports listed in the 1983 Appropriate Technology Bibliography has been placed in Costa Rica, Haiti, Honduras, and Ecuador.
2. Production of the 1985 edition of the Appropriate Technology Bibliography, which is a supplement and update of the volume produced and distributed in 1983 under a previous phase of this project, is underway.
3. According to the terms of the project paper, four additional databases will be developed and disseminated in the region. Some delay will occur in this portion of the project as NTIS develops a program to prepare such databases on a more regular basis.

Of the above three initiatives to create and distribute self-contained databases, only #1 (microfiche library of 1,200 full text appropriate technology reports) is far enough along for progress to be evaluated.

Obstacles to Use of Self-contained Databases in Microfiche Form

Included in the sample of countries visited by this evaluator were three of the four countries where the appropriate technology microfiche libraries were placed--Costa Rica, Ecuador, and Honduras. In two of the three instances--Costa Rica and Honduras--use of the microfiche to read full-copy texts was very light for the reasons already presented in the discussion of microfiche technology.

Progress in Appropriate Technology Sales in Ecuador

In Ecuador, where a Xerox 740 microfiche-to-paper copy printer has been rented, success of the self-contained library has been considerable. Between March and July of 1985, 50,000 pages of appropriate technology material were sold in paper copy form. It is difficult to interpret this progress exactly, since 30,000 pages on water treatment were sold to a single organization in one batch.

The arrangement under which the the Centro de Informacion Tecnica (CIT) at the Escuela Nacional Politecnica in Ecuador made the sales is as follows:

- Users are charged 15 suces, or U.S.\$.15 per page copied.
- Users are allowed to copy individual pages from articles, and are not required to copy entire articles.
- 7 suces per page, or U.S.\$.07, goes to the Xerox agency, leaving 8 suces per page, or U.S.\$.08, to NIT.
- Microfiche searches are carried out and published on behalf of users.

Additional factors are: arrival of an aggressive salesperson on the CIT team; and presence of an ex-Peace Corps Volunteer under contract to NTIS who has particular interest in and experience with appropriate technology information.

Conclusions Regarding Self-contained Databases

Appropriate technology microfiche sales in Ecuador merit close study because they may represent part of NTIS' future in Latin America and the developing world.

NTIS is operating on three technological tracks simultaneously in its attempt to distribute self-contained databases: paper copy catalogues, microfiche, and machine (computer) readable indexes. Further progress will depend on solutions to the following technical problems:

1. Paper copy catalogues work well, as shown by the worn appearance of all the Appropriate Technology bibliographies found in the countries visited by the evaluator. Searching through paper copy catalogues, however, is slow and haphazard, and will become more so as the databases grow.
2. Microfiche work fairly well as indices, but poorly for full-copy text, unless complemented by an inexpensive, reliable microfiche-to-paper copy printer which uses regular bond rather than the thermal paper which is difficult to obtain. Canon and Minolta are reputed to offer "blowback" machines which meet these requirements.
3. Self-contained bibliographic databases in the form of computer-readable indices must await solution to technological problems within NTIS. Issues to be solved appear to include:
 - Software
 - Hard disc vs. floppy disc
 - How to protect discs from electronic contamination as they pass through airport metal detectors.

Ecuador is currently creating its own database of recent appropriate technology titles and abstracts as they arrive in microfiche from NTIS.

LOCAL DATABASES

Objective: "At least three local databases will be created in machine-readable form under joint sponsorship of this project and a local institution."

"This project will coordinate the specifications for hardware, software, and database format, as well as evaluation procedures with other organizations active in this field, specifically UNESCO/UNISIST, IDRC, and OAS."

Progress as Presented in the Project Annual Report

1. Technical assistance was provided to Peru, Panama, Costa Rica, and Chile in their efforts to build local databases.

2. The project includes a provision for purchasing hardware and software for the creation and maintenance of these databases as part of the broader effort toward automation.
3. The schemes for development of local databases are strictly within the program plans of the local agencies.
4. CIT/ICTR, with NTIS assistance, purchased the software to download what CIT/ICTR has on its mainframe computer. BRS was chosen because it was immediately available. CIT/ICTR will make results of this work available to other members of the NTIS network, and is negotiating an agreement with BRS to act as a demonstration center for BRS search.

Local Databases Are Not an NTIS Priority

As a practical matter, NTIS contribution to local databases has been small, and has consisted primarily of providing several computers. Because of support, not from NTIS, but rather from OAS, IRDC, and local initiatives, however, there has been considerable progress over the years in creation and maintenance of local databases. Among the countries visited by this evaluator, Costa Rica and Honduras have made good progress in putting indexes to their technical libraries in machine-readable form. Costa Rica has approximately 11,000 documents abstracted and indexed in its database, and Honduras has approximately 4,500. For indexing the titles and abstracts and conducting key word searches, both Costa Rica and Honduras use a Spanish Language Technical/Industrial Thesaurus developed seven years ago by Silvia Roble at ICAITI in Guatemala with OAS financing.

be provide NTIS's eventual contribution to local database creation and use may eventually provide the organization (REDIITEC) and the communications (CARINET) for giving the network agencies access to each others' local databases.

PURCHASE OF MICROCOMPUTERS FOR NETWORK AGENCIES

Computer Purchase Policy

Quote from the 1984 Project Annual Report:

"The project paper allocated a total of \$5,000 over five years to be given to each qualifying cooperating agency for the purchase of computer hardware, software, or technical assistance The paper stated that the interested cooperating organizations would provide matching funds or related services. Before disbursing the funds NTIS requires a proposal listing:

1. What equipment will be purchased.
2. A description of where it would be used and by whom.
3. A description of what tasks the agency anticipates performing.

"It was stipulated that the computer should be directly applied toward information services, such as bibliographic database creation, and not general staff work, such as word processing, managing accounts, etc.

"We have subsequently determined, in part from experience and in part from meetings such as the NTIS/OAS December 1983 microcomputer seminar in Miami, that most local microcomputer distributors in the developing world will not service micros if they are not purchased through them. The local agencies are therefore required to purchase the equipment locally or have a prior agreement that any equipment purchased directly in the U.S. will be serviced by the local distributor. In addition training is an absolute necessity, and NTIS will not approve a proposal if there is no indication that the staff handling the computer will have sufficient training to handle it."

Progress at Purchasing Computers

Quote from the 1984 Project Annual Report:

"To date, NTIS has granted project funds to GTA of Panama for the purchase of a Hewlett-Packard 900 microcomputer, to CIT/ITCR of Costa Rica for the acquisition of BRSearch bibliographic software, and to EPN of Ecuador for the acquisition of a Kaypro microcomputer and EPSON printer."

Conclusion

NTIS has adopted a wise policy for buying computers on behalf of network agencies, and has followed it judiciously. Of the countries visited by this evaluator, only Ecuador had a computer purchased under the NTIS contract, and it was being used entirely for project activities, albeit primarily by an ex-Peace Corps Volunteer rather than by Ecuadoran staff. In one country there had been an inappropriate computer purchase by a network agency, but not with NTIS-AID money.

NTIS' wise policy of allowing availability of service and training to determine brand of computer purchased implies a non-uniformity among computers eventually purchased by the network agencies. A summary carried out by this evaluator of data collected by The Academy for Educational Development in 1983 reveals availability of computer brands among 21 Latin American and Caribbean countries as follows:

- IBM: 18
- Radio Shack: 10
- Wang: 10
- Borroughs: 7
- Texas Instruments: 3.

When and if network agencies share local, indigenous databases via telecommunications, apparently there is software called COMPAT which can solve many compatibility problems.

DEVELOP AND WORLDTECH INFORMATION SERVICES AND TECHNOLOGICAL BROKERING

Experience with Control Data Corporation, DEVELOP, and WORLDTECH was brief and occurred well before this evaluation. Therefore, this section relies on excerpts from reports written by NTIS and The Academy for Educational Development (AED).

What is DEVELOP?

Quote from the AED study of on-line data access in Latin America:

"Control Data's DEVELOP database is an information resource designed to meet the information needs of developing agricultural and industrial economies. For users with no on-line capability Control Data has instituted the DEVELOP search service. Clients can mail or telex requests to Control Data, which conducts the necessary search and mails the response to the client."

What is WORLDTECH?

Quote from the Project Paper:

"Relating to the fields identified for the DEVELOP search service . . . grants for WORLDTECH consultancies will be limited to the fifteen countries of the Caribbean Basin Initiative - one \$10,000 per country per year. Details of the case will be presented to CDC's WORLDTECH organization, where a technically competent specialist will be assigned to the project. His job will be to gather the needed data and counsel the LDC user . . . to the point of assuring implementation of the technology."

What Was the Project's Experience with DEVELOP and WORLDTECH?

Quote from the NTIS 1984 Annual Report for this project:

"A first step, it was decided, would be to test the Develop Search Service. In the course of this test, it was shown that the cost of Develop Search Service was higher than the market would bear (\$75-\$125) in project countries. By extension, the WORLDTECH service, which ranged from \$20,000 to \$50,000, was prohibitively expensive."

CHAPTER III. ACHIEVEMENT OF IMPLEMENTATION TARGETS

D. PROMOTION OF NTIS SERVICES

AN EVOLVING PLAN

The 1982 Fanning study had the following to say regarding promotion of NTIS products and services in Latin America:

"From data gathered, both from end-users and staff of the distribution centers, it was found that very little active promoting of NTIS publications or services takes place beyond the AMTID (now ALERTEC) bulletins."

"On the average, there is only about one full-time person in each distribution devoted to NTIS-related activities, including time devoted to processing orders as well as outreach."

"Users" expressed frustration in not knowing what the universe from which they could draw included, and there was practically no awareness of the range of NTIS services.

"The 1983 Implementation Plan" proposed the following with regard to promotion of NTIS products and services:

"Initially, activities will center in two countries which have volunteered for this purpose: Jamaica, Costa Rica. Colombia also has been selected for its size and diversity. The activities will be designed to test the feasibility, cost, and impact of various marketing approaches which will include:

- increasing the number of outlets of distributors in at least one of the three above mentioned countries;
- developing promotional audiovisual materials for use in the region;
- designing and conducting user education seminars; and
- installation of "book-of-the-month" mass-marketing campaign for TIS documents or other services.

"A total of \$120,000 has been budgeted for experimental marketing promotion in the three pilot countries."

The Work Plan for the Pilot Promotion Project

"The objectives of the pilot strategies are ambitious. The project intends over a one-year period to at least double the number of users in Colombia and to increase the number of users tenfold in Costa Rica and Jamaica." Specific strategies tried in the three countries are detailed in various MSI documents. Key elements of the strategies seem to be:

- Costa Rica: development and marketing of a subscription package consisting of a combination of searches, documents, and some technical assistance; mass market publicity campaign.
- Colombia: establish 10 additional outlets or distribution points for NTIS information and documents.
- Jamaica: industrial visits, space advertising in newspapers and magazines, human resource development.

SALES PROGRESS IN PILOT COUNTRIES

Comments in various documents by NTIS and MSI

"The expanded sales and distribution of NTIS documents in Latin America and the Caribbean has been much more difficult than originally anticipated."

"The most significant dollar increase in demand occurred in Jamaica where pilot project activities spurred the demand up 68% over 1983 Pilot projects in Colombia and Costa Rica were less successful than Jamaica in increasing sales from 1983."

"Demand for NTIS reports increased markedly in Jamaica (68%) but only with a relatively high investment by the project."

Graphs Comparing 1983 and 1984 Sales for the Pilot Countries

Figure III-9 shows a comparison of 1983 and 1984 sales data for the three pilot countries. The graph tracks the speed during 1984 with which the countries approach their sales total for 1983. The diagonal line is the slope which must be followed (approximately) to arrive in 1984 at 1983's total. Obviously, no group will follow the line exactly, but may wander above and below it. The advantage of this graphic treatment is that it allows:

- Simultaneous comparison of countries of widely varying sizes, since each country is compared to its own past performance.
- Assessment of progress towards a goal long before the deadline for reaching it.

Note that in 1984 Jamaica far exceeded its 1983 performance on the basis of a low sales base, and that Costa Rica and Colombia fell short of their 1983 performance.

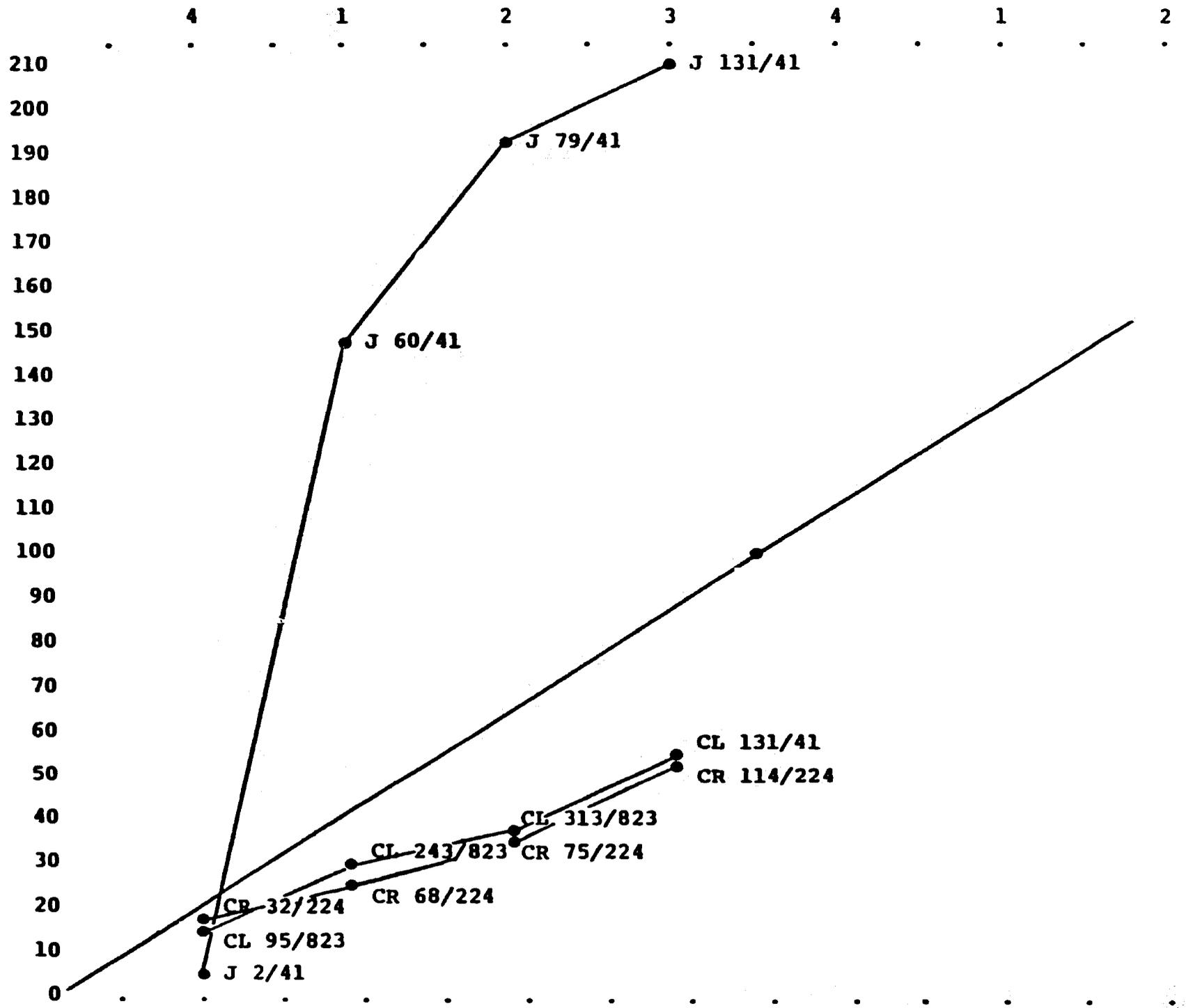


FIGURE III-9

PROGRESS AT DEVELOPING AN EFFECTIVE PROMOTION STRATEGY

Quote from MSI report:

"The most effective techniques appear to be face-to-face industrial visits and direct mailings of annotated title listings."

As a result of the promotion experiment, and the 1984 NTIS seminario in Colombia:

1. Network agencies inside and outside the promotion experiment are aware of the necessity of face-to-face promotion. The incentive and the wherewithall for carrying it out are another matter.
2. Network agencies inside and outside the promotion experiment have published promotional bulletins focused on local information needs. So far such materials have been published in Costa Rica, Jamaica, Guatemala, Honduras, and Nicaragua.

OBSTACLES TO EFFECTIVE PROMOTION OF NTIS DOCUMENTS

Quotes from Various NTIS and MSI Documents

"Adverse economic factors overrode positive effects of promotional activities and, as a result, the countries suffered a decrease in demand of 31% and 22%, respectively."

"Efforts to disseminate new strategies are unlikely to be effective without on-site technical assistance."

"Opening new outlets was more difficult than originally envisaged."

Obstacles to Effective Promotion Observed by This Evaluator

The promotion experiments are being thoroughly studied and documented by MSI. This evaluator's opinions regarding obstacles to effective promotion of NTIS include:

1. Economic conditions must be factored into planning. In Costa Rica, during the two years preceding the pilot experiment, the currency was devalued from 8.50 to 60.00 colones per dollar before it settled at 45 colones per dollar. This means that the experiment introduced more expensive projects directly following an effective base-price increase of severalfold.
2. Promotion is the area of least institutional self-sufficiency. People cannot be expected to sell aggressively someone else's product without attractive incentives.
3. Face-to-face sales is obviously more effective than passive sales, but it is costly and requires motivated agency personnel.

4. Selling and promoting NTIS documents is a perfect job for a Peace Corps Volunteer with modern training in the information sciences, and provides a partial solution to problems #2 and #3.
5. On-line searches are a powerful tool for advertising all of a network agency's services, not just its own on-line services.
6. Network agencies have no vehicles for outreach, and budgets for gas and other travel expenses are small or nonexistent.
7. Promotion strategies must be coupled with powerful incentives to work well.

CHAPTER III. ACHIEVEMENT OF IMPLEMENTATION TARGETS

E. INSTITUTIONAL STRENGTHENING

According to project documents, there are two areas of institutional strengthening: 1) training of network agency personnel, and 2) an organization for the interchange of technical information among network agencies.

TRAINING OF NETWORK AGENCY PERSONNEL

Project Documents on Training of Network Agency Personnel

The 1982 Project Paper Amendment mentions the following requirements for the training of network agency personnel:

- One introductory Information Systems Workshop each year at NTIS, Springfield.
- Two days of technical training during annual meeting of directors of network representatives.
- Two user education seminars for the public in each country.
- Personalized orientation for new organizations affiliating with the network as intermediaries.

1983 Implementation Plan

"... training of the staffs of the cooperating agencies in the operation and management of technical information dissemination centers. Principal among these training strategies is the NTISeminario meetings which provide the fora for the interchange of information, experiences, and ideas among member agencies, as well as the setting for the provision of training and the development of marketing plans and strategies."

Training Progress

Training of network agency personnel consists of a two-week training course conducted at NTIS in Springfield, Virginia, and an annual two-week seminar conducted somewhere in Latin America. Normally one or two employees participate from each agency.

According to network agency personnel, NTIS training has evolved since 1978 from consisting of an English language presentation of how NTIS operates, to inclusion in Spanish of marketing training and training in information technologies such as: on-line access and computers.

Recently MSI and Marina Fanning have taken over a large portion of the training. Fanning's judgment of the training, as expressed in a recent document, is: "NTIS's U.S.-based training is necessary, but is in need of substantial improvement. Employ technical assistance to analyze and improve the quality of the course. This may involve some contracting out of the training activity."

Recent seminars (the NTISeminario) have taken place in Medellin, Colombia, and in Puerto Rico. The NTISeminarios are dedicated not only to training, but also to discussions, planning, and decision-making. The NTISeminarios are well documented in reports prepared by participants.

A criticism of the seminars is that the participants are sometimes poorly selected.

ORGANIZATION FOR THE INTERCHANGE OF TECHNICAL INFORMATION AMONG NETWORK MEMBERS (Horizontal, South-South Communications)

The 1983 Implementation Plan states the following regarding an organization for the interchange of technical information among network members:

"A recurring theme at the last two NTISeminario meetings has been institutionalization for the informal group of agencies cooperating with NTIS on this project. The project will further explore this concept to determine the degree of interest and commitment for such an undertaking on behalf of the member agencies, as well as possible roles and functions it might serve."

PROGRESS AT FORMING AN ORGANIZATION FOR THE INTERCHANGE OF TECHNICAL INFORMATION AMONG NETWORK AGENCIES

At the November 1984 NTISeminario at Medellin, Colombia, the first steps were taken toward establishing an "organization for the interchange of technical information among network agencies".

The organization is called "Red Interamericana de Informacion Tecnologica" (REDIITEC). So far:

- Representatives from Guatemala, Honduras, Costa Rica, Panama, Colombia, Dominican Republic, Haiti, and Ecuador have committed their network agencies to membership.
- A corporation with legal status in Costa Rica has been established (SRI: Sistemas y Redes de Informacion).
- A \$50,000 grant from NTIS project funds has been approved for REDIITEC.
- Two REDIITEC representatives have been hired--Gerardo Mirabelli in Costa Rica, and Jim Huddleston (an ex-Peace Corps Volunteer who had worked with the project) in Ecuador.

Objectives of REDIITEC

Objectives of REDIITEC appear to include:

- Interchange of databases, and specialists.
- Sharing of training and technological resources.

- Aquisition of funding from international sources on behalf of network agencies.
- Publication of educational and promotional material.

The major vehicle for communication is currently CARINET electronic mail which currently connects Costa Rica, Honduras, Panama, and Ecuador.

NTIS' CATALYTIC ROLE IN PROMOTING INFORMATION ACCESS AND USE IN GENERAL

Network agency personnel in Latin America claim that over the years NTIS has evolved from a narrow emphasis on sale of NTIS documents toward a broader "catalytic" orientation.

Latin America and perhaps the Caribbean are on the verge of an information breakthrough in the following areas:

- Telecommunications with packet switching, the major prerequisite for on-line database access, is being introduced in one country after another.
- Some government ministries and some development projects are including funds for information purchase and access in their budgets.
- Governments are embarking on design and installation of national automized information systems which include access and interchange of marketing as well as bibliographic data.
- Self-contained databases and widespread fiche-to-paper copy distribution may be imminent, if information from Canon and Minolta is accurate.

NTIS' role in history may reside in the leadership it exerts in the above areas. In some countries, the network agency is seen not only as a seller of information, but as an expert in how to join the information community. Some requests are not for documents, but rather in how to get documents, how to automize, and how to index databases. In short, some clients want to become self-sufficient members of the information community.

An Opposite Point of View

Once clients can use on-line access, the need for NTIS search services will diminish. Concomitantly, demand for NTIS documents may increase. It is also possible, however, that demand for NTIS documents will remain the same or even drop as on-line access allows easy access to technical databases other than NTIS. By promoting on-line access--such as DIALOG--NTIS may be reducing its own role.

PORTRAIT OF A "TYPICAL" NETWORK AGENCY

The characteristics in the following list describe a typical network agency. The characteristics are typical in the sense that some agencies have many of them and many agencies have some of them.

The Agency

- Connected with the engineering department or technical institute of a university, a ministry, or other part of the public sector.

The Agency's Image

- Medium, not high, prestige in the national information community.
- Considered peripheral to private sector initiatives, especially by USAID.
- Association with NTIS displayed prominently in office and brochures.
- Prominent display of NTIS' GRA&I, Appropriate Technology Bibliography, and ALERTEC.
- Locally produced and focused materials (boletines) promoting NTIS services have become common as a result of the project.

Employees

- Approximately four employees.
- Most employees are engineering students or engineering graduates.
- Most employees have received some information service training, either through NTIS or OAS.

Equipment

- One microfiche reader (12 of 14 agencies at the 1982 NTISeminario).
- Either no microfiche printer, or one that does not work or is too expensive to operate with regularity (7 of 14 have one, 4 of 14 use it occasionally or frequently).
- One photocopier.
- One microcomputer.
- No vehicle for outreach, perhaps an arrangement where gas or mileage will be paid on use of personal vehicle.

Information Services

- Several other information services are offered.
- A small technical library accessed by a card catalogue.
- Widely varying sophistication and completeness of procedures for processing and indexing documents, and for processing requests for information.

Dependence on NTIS

- Would exist with or without NTIS support.
- Above all, derives much of its image from NTIS.
- One "slot" is temporarily paid for by NTIS in the pilot, promotional experiment countries (Costa Rica, Honduras, Jamaica).

Public vs. Private Sector Agencies

Most of NTIS' network agencies are in the public sector. Certainly a more balanced mix of public and sector agencies would be preferable because of the private sector's agility, and incentive structure. Public sector agencies do, however, have some features to recommend them:

- Subsidized office space and basic equipment.
- A captive clientele of students and professors.
- Graduates that can be users and promoters.

Rewards and Incentives, an Obstacle to Institutional Strengthening

It makes little difference to the agency, and no difference to individual employees if they do or do not sell NTIS products and services aggressively, and go on face-to-face visits to clients.

Rewards and incentives are the weak link in the entire organizational structure. The project's formal reward and incentive program is as follows: "NTIS provides its agencies with a 25% discount off the North American selling price. This latter subsidy is to be used by these agencies to handle costs directly related to their NTIS operations. Such costs could include salary, room space, equipment, postage, etc."

A successful agency sells approximately \$13,000 worth of NTIS documents, which amounts to \$3,250 for the agency. An average agency sells approximately \$4,000 worth, which amounts to \$1,000 for the agency. The agencies are grateful for the commissions; however, there are easier ways to earn the same amount of money.

The operative incentives for participating in the NTIS project are the prestige of being the NTIS representative, and opportunities for seminars, training, and travel, which are not linked to sales performance.

CONCLUSIONS

1. NTIS has access to a technical information distribution infrastructure throughout Latin America and the Caribbean which is being underused. The only ways to make important progress in developing it are:
 - Institute attractive incentives.
 - Increase the flow of information through the system, such as through lower prices, and additional non-NTIS services.
2. NTIS' major role in Latin America may be the leadership it exerts in making organizations self-sufficient in information, rather than in selling NTIS documents. Problems with this "catalytic" approach are:
 - It has not been formalized into a set of objectives and activities for which the project can take credit.
 - It is not clear whether agencies and REDIITEC can and should go into the business of selling technical assistance and consulting in information technology and services.
 - It is not clear the effect teaching on-line access will have on NTIS sales.

CHAPTER III. ACHIEVEMENT OF IMPLEMENTATION TARGETS

F. PROJECT MANAGEMENT

Sound performance, and then weak performance are discussed in the following areas: policy, information services, technology, institutional strengthening, promotion, and reporting.

NTIS POLICY TOWARDS LATIN AMERICA AND THE CARIBBEAN

Sound Policy

NTIS has gracefully survived a change in orientation within AID from "poorest of the poor", and appropriate technology toward a private sector emphasis. This has been accomplished without losing the strengths offered by the appropriate technology approach.

Over the years, NTIS has evolved from a narrow emphasis on sales volume toward a broader, more enlightened interest in Third World technical information services in general. This is especially apparent in NTIS' relations with the network agencies.

Poor Policy

Self-sufficiency was proposed as an objective without any calculations of volume, prices, objectives, and breakeven curves. There was no clear idea of what could and could not be phased out with what consequences.

There has been insufficient recognition of and reaction to economic crisis in Latin America and the Caribbean. Economic conditions have been used to explain why sales went down after the fact, but not factored into planning. There has been no policy or program which recognizes that:

1. Effective prices were going up drastically as developing world currencies lost an average of more than half their value against the dollar.
2. Since 1981 over half the Latin American and Caribbean market for NTIS documents has disappeared.

The economic crisis in Latin America and the Caribbean should have been the subject of emergency meetings at the highest levels, and should have been reflected in policies, plans, and objectives.

DECISIONS REGARDING WHICH INFORMATION SERVICES TO OFFER

Sound Decisions Regarding which Information Services to Offer

When it became clear that CDC's DEVELOP and WORLDTECH information and technology brokering services were not working, NTIS promptly eliminated that component from the project.

When it became clear that users' interests were too varied for translation of best sellers into Spanish, NTIS eliminated the Spanish translation program.

In place of the Spanish translation program, at the instigation of MSI, NTIS has embarked on inclusion of the RTAC Spanish language materials from Mexico into the NTIS collection.

Weak Decisions Regarding Information Services

The proposal that NTIS carry out and coordinate local database activities was not well thought out. OAS and network agencies had already done a lot in the area, and NTIS has had little to offer.

TECHNICAL DECISIONS

Sound Technical Decisions

NTIS has instituted a policy of having network agencies purchase computers locally. NTIS recognizes that locally available service, maintenance, and training must be the primary criteris for determining what computer equipment to buy.

Very wisely, NTIS has introduced the CARINET electronic mail system on a pilot basis for administrative purposes. Also, NTIS has allowed CARINET to be used for ordering documents in hopes that delays in document delivery can be shortened.

Since there is uncertainty about what technological mode works best for distribution of self-contained databases, NTIS has maintained a three-track strategy of catalogues, microfiche indices, and development of computer-readable indices.

Technical Weaknesses

Microfiche:

NTIS's success in the developing world depends in large part on the acceptability of documents in microfiche form. The key to the acceptibility of microfiche is fiche-to-paper printer which is inexpensive, reliable, and uses regular bond paper. Attention to developments in this area must be much more aggressive. NTIS should be more expert than anyone in this area, and should be lobbying companies and technologies with the ability to help (Canon, Minolta, Xerox, etc.).

When and if an inexpensive, reliable fiche-to-bond paper printer is available, provision of the machines should take precedence over provision of microcomputers.

On-line Searches:

In the Project Paper Amendment (1982) AID posed the question: "Does CDC have a comparative advantage for this type of work? Should that contract be competitive?" AID should have been listened to.

On-line searching was proposed and embarked on before it was technically feasible, before telecommunications with packet switching was a reality. The AED on-line study should have been undertaken before proposing on-line searches, not after. The AED study points out clearly the importance of packet switching.

INSTITUTIONAL STRENGTHENING

Sound Institutional Strengthening

NTIS has encouraged the formation of the REDIITEC network connecting network agencies with each other.

Improvements which have been introduced in the training of network agency personnel include:

- Training now carried out in Spanish.
- Training has evolved from a narrow focus on NTIS to a focus on marketing, and on-line searching has been added.

Institutional Strengthening Weaknesses

A criterion is lacking for deciding when to continue, and when to end support for a network agency.

Rewards and incentives are weak for encouraging network agencies to actively promote and sell NTIS products and services.

According to network agency personnel, NTIS must be tougher on network agencies in selection of trainees.

PROMOTION OF NTIS SERVICES

Sound Promotion Decisions

The charge for ALERTEC was removed when it became clear that the charge inhibited demand for NTIS' other products and services.

Promotion materials in Spanish have been introduced.

Locally produced and oriented Spanish language materials have been introduced.

Formulation of the pilot strategy in Jamaica was flexible, resulting in sales success there.

Poor Promotion Decisions

Exorbitant claims were made for the effect of promotion experiments. Subsequent lack of sales success has resulted in discouragement and puzzlement among network agencies.

Costa Rica was selected as a pilot promotion country directly following a drastic devaluation, and during economic contraction. This situation, however, was reflected neither in analysis nor in the promotion strategy undertaken.

MANAGEMENT REPORTING

Management Reporting Strengths

There has been a concerted effort to use the categories in the Project Paper as the organizing principle in reports to AID. This has made them much more readable and useful.

Management Reporting Weaknesses

The progress reports point out decreases and increases, but not multiyear trends.

There has been a woeful lack of statistical analysis of sales trends to support decisions and management. This project is very rich in data, but very little management and policy use has been made of them. Whether sales are going well or poorly is known only annually, belatedly, and partially. The data are available to do a much more frequent, prompt, and complete job.

Summary volume and sales tables (Figure III-10) do not provide the reader with usable cost-benefit information because:

1. It is not clear in the tables which figures represent sales, and which represent subsidy with AID and taxpayer money. Sales and subsidy are added together to amount to something called "demand". SRIM, Selected Research in Microfiche, is made to look like a sale and a benefit rather than a subsidy and a cost.
2. It is not clear in the tables which countries are getting what subsidy. Countries which are not in the project are mixed in with those that are in the project.

There seem to be no systems for knowing: 1) what types of documents are sold where; 2) how the budget and subsidy vary with volume of documents sold.

Figure III-10

**VALUE OF NTIS SCIENCE & TECHNOLOGY REPORTS
DISTRIBUTED IN LATIN AMERICA AND THE CARIBBEAN DURING FY 1984**

	<u>Value of AD HOC Documents</u>		<u>Value of</u>		<u>FY 1984</u>	<u>FY 1983</u>	<u>Change Demand</u>
	<u>Paper Copy</u>	<u>Microfiche</u>	<u>Subscriptions**</u>	<u>SRIM***</u>	<u>Total Demand</u>	<u>Total Demand</u>	<u>From FY 83 To FY 84</u>
Argentina	\$ 5,276.00	\$ 873.00	\$ 1,289.00	\$ 206.00	\$ 7,644.00	\$ 8,323.00	\$ (679.00)
*Barbados	1,085.00	9.00	657.00	915.00	2,666.00	2,261.00	405.00
*Bolivia	125.00	--	525.00	915.00	1,565.00	1,949.00	(384.00)
*Brazil	12,523.00	17,496.00	3,252.00	87,962.00	121,233.00	82,123.00	39,110.00
*Chile	4,222.00	222.00	2,343.00	870.00	7,657.00	11,051.00	(3,394.00)
*Colombia	7,983.00	310.00	1,377.00	915.00	10,585.00	15,003.00	(4,418.00)
*Costa Rica	1,865.00	44.00	848.00	915.00	3,672.00	4,692.00	(1,020.00)
*Dom. Republic	1,081.00	7.00	525.00	915.00	2,528.00	3,764.00	(1,236.00)
*Ecuador	353.00	112.00	1,305.00	1,695.00	3,465.00	6,723.00	(3,258.00)
*El Salvador	947.00	--	200.00	915.00	2,062.00	2,902.00	(840.00)
*Guatemala	1,369.00	108.00	689.00	915.00	3,081.00	3,052.00	29.00
*Guyana	53.00	--	--	915.00	968.00	900.00	68.00
*Haiti	159.00	5.00	525.00	915.00	1,604.00	2,354.00	(750.00)
*Honduras	1,241.00	514.00	789.00	709.00	3,253.00	11,312.00	(8,059.00)
*Jamaica	2,091.00	23.00	498.00	915.00	3,527.00	2,098.00	1,429.00
*Mexico	18,699.00	973.00	4,999.00	915.00	25,586.00	23,160.00	2,426.00
*Nicaragua	1,389.00	442.00	498.00	915.00	3,244.00	4,115.00	(871.00)
*Panama	1,528.00	17.00	534.00	1,011.00	3,090.00	4,805.00	(1,715.00)
*Paraguay	584.00	--	498.00	915.00	1,997.00	1,696.00	301.00
*Peru	545.00	99.00	1,100.00	3,447.00	5,191.00	7,360.00	(2,169.00)
*Puerto Rico	9,541.00	78.00	1,648.00	915.00	12,182.00	8,466.00	3,716.00
Suriname	--	--	--	--	--	186.00	(186.00)
Trinidad/Tobago	211.00	--	75.00	--	286.00	193.00	93.00
Uruguay	396.00	100.00	146.00	--	642.00	1,260.00	(618.00)
*Venezuela	692.00	250.00	273.00	--	1,215.00	8,687.00	(7,472.00)
West Indies	2,256.00	--	1,042.00	--	3,298.00	2,865.00	433.00
Total	\$76,214.00	\$21,682.00	\$25,635.00	\$108,710.00	\$232,241.00	\$221,300.00	\$10,941.00

CHAPTER IV. CONCLUSIONS

A. THE FUTURE ROLE OF NTIS IN LATIN AMERICA AND THE CARIBBEAN

Four factors will determine NTIS' role in the future:

1. NTIS' ability to design a mechanism for lowering prices and accepting payment in local currencies.
2. NTIS' ability to put together a complete microfiche system, including an inexpensive, reliable paper-to-fiche printer, and distribute it throughout the region.
3. Ability of network agencies to take the lead in on-line activities in each country and act as broker between network agencies and non-NTIS sources of information.
4. NTIS' ability to justify itself to donors in economic impact, rather than information dissemination, terms and thereby acquire subsidy.

A CONFLICT BETWEEN NTIS OBJECTIVES OVERSEAS AND PRICING POLICY

"A major goal of the United States' National Technical Information Service, as expressed by President Joseph H. Caponio, is to "achieve appropriate dynamic leadership in the worldwide technical information community, increasing the nation's competitiveness and stimulating productivity and economic growth." (Information Retrieval & Library Automation, Lomond Publications, April 1985, Vol. 20, No. 11.)

The Project Annual Report states that: "Questions have arisen whether there is a direct conflict with the interests of encouraging self-sufficiency and the widest possible dissemination of technical information to the developing world."

This evaluation goes a long way toward converting the conflict between cost coverage and "leadership" and "widest possible dissemination" from a question into a fact. Volume of information disseminated by NTIS has decreased by approximately 50% since 1981, almost certainly due to high, rigid pricing. In addition, money accruing from the high prices is covering only a trivial portion of costs (between 6% and 16% in the countries where the project is concentrated.)

The appropriate pricing policy for the immediate future depends on assumptions regarding NTIS' medium and long-term future in Latin America and the Caribbean. Assumptions of: 1) long-term subsidy, 2) desubsidization after 1987, and 3) uncertainty regarding future subsidy (the correct attitude at present) lead to different pricing policies.

Pricing Policy under the Assumption of Long-term Subsidy

If it is assumed that distribution of NTIS information in Latin America and the Caribbean deserves and will receive subsidy over the foreseeable future, a policy is needed that:

- Cuts costs to the user.
- Increases volume.

- Decreases subsidy per document (because volume increases).
- Does not try to use prices paid to decrease the overall subsidy.

To "cut costs to users" does not mean to give the documents away free. It means rather to charge a nominal fee which prevents users from abusing the service, but does not inhibit demand based on true need for technical information.

Pricing Policy Under Conditions of Certain Desubsidization

If, on the other hand, the operation will definitely be desubsidized at the end of this project (1987), then the decision is more difficult:

- Should prices be raised gradually to accustom the market to paying what Europeans pay?
- Should prices be lowered to increase demand and convince buyers of the value of the product before desubsidization?
- Should prices be raised immediately?

Pricing Policy under Conditions of Uncertainty

As a point in fact, subsidy is in doubt. AID is unsure of the project's future (one reason for this evaluation), and other sources of subsidy have not been approached.

If subsidy is in doubt but hoped for, then the correct policy is similar to that under the assumption that subsidy is certain--cut prices, increase document volume. Right now the project looks tattered because devaluations against the dollar have been allowed to eat away at demand and volume.

Some Facts

1. Telecommunications with packet switching, which is the major prerequisite for on-line database access, is being introduced in one country in the region after another.
2. On a country-by-country basis, the NTIS network agency may or may not be the focal point for on-line activities.
3. From the client's point of view, the differences between DIALOG and the NTIS traditional service are that DIALOG is faster and wider ranging.
4. On-line searches have access to many databases, and give no preference to NTIS.
5. NTIS' current clients are precisely those who can and will opt for on-line services such as DIALOG when it is made available and known.

Some Predictions

1. On-line searches will increase information sales in general, but not necessarily NTIS sales.
2. Based on DIALOG's experience in Mexico, on-line searches will increase agency sales rapidly, then level off as users acquire their own terminals.
3. An archive or resource database such as NTIS will not be the focal point for information activities in the future. An information service offering access to many databases, perhaps on-line, will become the focal point.
4. By promoting "on-line" access such as DIALOG, NTIS may be stimulating network agency sales, but hastening the day when NTIS ceases to play a central role in the region's information activities.
5. Increasingly, NTIS agency clientele may be those without on-line access, those with bad telecommunications. NTIS may have to concentrate more and more on the lesser developed countries, countries where on-line is less feasible.
6. On-line searches will be introduced in the region, with or without NTIS' help. The extent to which on-line searches help NTIS will depend on whether network agencies take the lead in on-line activities. Network agencies are by no means the only organizations in the region with the desire and capacity to offer on-line services.

THE SIGNIFICANCE OF MICROFICHE FOR NTIS' ROLE IN LATIN AMERICA AND THE CARIBBEAN

1. The difference between the potential of microfiche technology to open up access to technical information for the developing world, and actual performance is tragic.
2. The key to unlocking the potential of microfiche for delivering large bodies of technical information to large numbers of people in the developing world may be a fiche-to-paper printer which is inexpensive to buy and use, reliable, and uses regular bond paper.
3. Widespread fiche-to-paper copy distribution may be imminent if news from Canon and Minolta is correct.
4. A complete microfiche system, including printers, means decentralized, fast, inexpensive access to bibliographic data, and full-text articles. So far, except in Ecuador, the inexpensive reliable printer has been missing.
5. With the advent of on-line searching, NTIS' role as an active participant rather than a mere information source in Latin American and the Caribbean may depend on its unique ability to distribute self-contained databases of microfiche.

6. Microfiche meet volume, development, and local incentive objectives, but not NTIS self-sufficiency objectives. Agencies can copy and sell as many documents at whatever price they want once they have the fiche and printer, without sending money to NTIS over and above the original fiche price.
7. If NTIS does not introduce full microfiche systems to the region, in all probability, no one will.

SELF-CONTAINED, COMPUTER-READABLE DATABASES

There is a line of thinking which believes that on-line searches are "overkill" in many instances. Many information needs can be met without a full on-line search of a wide range of databases

Computer-readable, self-contained databases may soon be available for microcomputers. One of the databases made available may be NTIS, or subsets of it. The obstacle seems to be software for down-loading from NTIS mainframes.

Eventually, self-contained, computer-readable indexes may compete with on-line searches in specialized markets, or those with difficult telecommunications. Once its software problems are solved, NTIS could be a large provider of computer-readable, self-contained databases.

AN ECONOMIC IMPACT STUDY TO JUSTIFY SUBSIDY

Undertaking an impact study when NTIS overseas operations are suffering may seem like a luxury. NTIS' future overseas, however, may depend on it. NTIS cannot justify future subsidy by virtue of volume of information disseminated, nor by promising eventual financial self-sufficiency. It is this evaluator's guess that in the future NTIS in Latin America and the Caribbean will have to:

- Justify itself on its merits in producing concrete technology transfer and economic progress; or
- Undertake work on a contract-by-contract basis.

Below is a partial list of potential subsidizers of NTIS, and NTIS-like, activities:

- USAID Regional Bureaus
- USAID Missions
- U.S. Department of Commerce
- U.S. Private Sector
- Microfiche Machine Manufacturers
- Trade Development Program
- U.S. Information Industry
- Hardware Vendors
- Databases Vendors
- Information services Vendors

CHAPTER IV. CONCLUSIONS

B. PROGRESS, OBSTACLES, AND ADJUSTMENTS TO PROJECT DESIGN

Figure IV-1 presents a summary of:

- The progress made by the NTIS project in reaching project objectives--in the left-hand column.
- Obstacles to achieving progress--in the middle column.
- Suggested adjustments to project design over the next two years--in the right-hand column.

Details on progress and obstacles to progress have been presented in Chapter III. Details on the suggested adjustments to project design over the next two years are the topic of this chapter.

Figure IV-2 applies Victor Martinez' vicious circle to the future of the NTIS project, and shows how project objectives are causally related to each other. A them for the next two years might be to "break out of Martinez' vicious circle". Suggested adjustments to project design so that objects will be reached are discussed as follows:

1. Self-sufficiency
2. Sales volume
3. Expansion of services
4. Promotion
5. Institutional development
6. The role of the technical information broker.

ADJUSTMENTS TO SELF-SUFFICIENCY OBJECTIVES

Three adjustments to self-sufficiency objectives are suggested:

- A limited definition of financial self-sufficiency.
- The "cash cow" concept
- An impact study which qualifies the project for future subsidy on its merits at producing technology transfer and economic development.

1. A Limited Definition of Self-sufficiency

Obviously, self-sufficiency cannot mean cost-coverage via sales income. Such an interpretation has failed, and risks suffocating demand as Latin American and Caribbean currencies slide against the dollar. An achievable financial self-sufficiency objective might be: fund one person per agency out of the 25% commission (Costa Rica's idea).

FIGURE IV-1

SUMMARY OF EVALUATION FINDINGS

PROGRESS

Recovery of only 6-16 cents per dollar.

Agencies would suffer little if subsidy were dropped.

NTIS document sales would suffer if subsidy were dropped.

Sales down about 50% 1981-84: 9932 to 5835, Region; 3993 to 1949, Project.

Just starting

Shows promise of cutting turnaround by

Good start in Costa Rica.

Great promotional as well as information service.

OBSTACLES

SELF-SUFFICIENCY

Information services in LAC inherently not financially sufficient.

EXPAND SALES VOLUME

Economic crisis

-Devaluation
-Agency budget shrinkage
-Currency exchange problems

NTIS product

-Sophisticated
-Expensive
-In English

Technology

-7 week turnaround
-People reluctant to use fiche readers

SERVICE EXPANSION

Electronic Mail

Most countries do not yet have packet switching.

NTIS does not have procedures to handle orders by electronic mail.

On-line Search

Most countries do not have packet switching.

Price to user is high and uncertain.

May make NTIS and agencies less necessary.

ADJUSTMENTS

One "cash cow" per agency.

Limited view of self-sufficiency; fund one employee per agency out of commission.

IQC arrangements.

Impact study which earns permanent subsidy.

Design price lowering mechanism:
"Dummy" corporation;
Two-tier pricing
Widen product line via parallel arrangements with ERIC, ARICOLA, Magazine Index.

See service expansion.

Lobby for packet switching.

Establish procedures for handling orders by electronic mail.

Introduce on-line with purpose of putting network in forefront on-line activities in each country.

PROGRESS

OBSTACLES

ADJUSTMENTS

Self-contained Databases in Microfiche

Low sales except in Ecuador.

People do not like to use fiche readers.

Shop for inexpensive, reliable printer.

No inexpensive, reliable fiche-to-paper printers.

Test it, then use automation budget to buy one for all agencies.

Self-contained Databases in Computer-Readable Form

Some progress researching software.

Lack of a mainframe to micro down-load program.

Solve software problem. Parallel deals between network agencies and other databases.

Local Indigenous Databases

Computer bought for Panama, Ecuador.

NTIS little to offer.

Deliver local database area to REDIITEC.

Introduction of Mexican materials (RTAC) NTIS collection.

OAS, local action sufficient.

Continue RTAC effort.

PROMOTION

Little effect on sales.

Economic crisis.

Active promotion strategy developed.

Little incentive to sell aggressively.

NTIS/MSI job is to set up formal arrangements with AID projects, Missions.

AID Missions and projects have not been marketed until recently.

AID private sector focus and lack of attention to centrally funded projects.

INSTITUTIONAL STRENGTHENING

Network is adequate.

Little incentive for aggressive sales.

Design incentives along with price lowering.

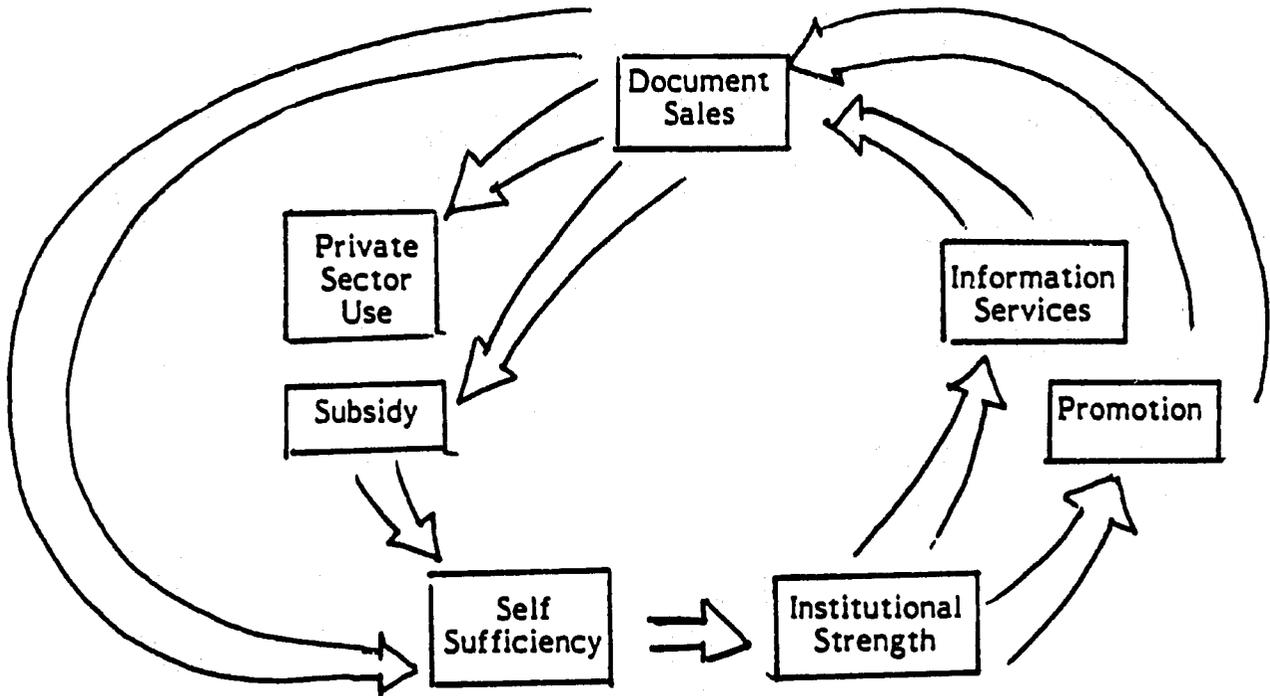
NTIS product line under-uses network.

Have PCV train agency staff in information science, technology.

Promotion area of least self-sufficiency.

FIGURE IV-2

MARTINEZ' VICIOUS CIRCLE: THE FUTURE



2. The "Cash Cow" Concept

Cultivate one "cash cow" per agency. A "cash cow" would be a client or set of clients which buys in bulk periodically, and requires little marketing. Examples of "cash cows" discovered in the course of this evaluation are:

- Combine packets of focused technical information as automatic components accompanying credit (the Panama model). The information is chosen in areas which insure that the loan is invested well and therefore repaid.
- Have money for information budgets written into development projects funded by AID and other donors.
- Keep ministry collections of norms and requirements up to date. Some ministries, in Costa Rica for example, use U.S. health and safety norms and requirements.
- Charge a consulting fee for setting up information systems and local databases.

3. An Economic Impact Study to Justify Future Subsidy

Undertaking an impact study when NTIS overseas operations are suffering may seem to be a luxury. However, NTIS' overseas future may depend on it. NTIS cannot justify future subsidy by virtue of volume of information disseminated, nor by promising eventual financial self-sufficiency.

The purpose of the impact study would be to compare the success of an investment in technical information to an equal investment in expert people at producing innovation, employment, income, income distribution, energy savings, excess capacity utilization, exports, new products exports, etc.

A statistical survey will not do the job. The right approach is to study in depth a number of cases from a given year whose economic impacts have a high probability of amortizing the investment in technical information for that year.

A procedure is presented below:

- a. Concentrate on users who received documents during a one-year period between two and five years ago. Time must have passed to allow for use of the information and economic impact.
- b. In several countries, interview members of the cohort which received information in the year chosen until those in the "private sector, hands-on utilization" group have been identified.
- c. Conduct in-depth case studies of the "private sector, hands-on utilization" users. Variables to measure include: innovation, employment generation, income, income distribution, energy savings, excess capacity utilization, exports.

- d. Compare the amounts and types of economic impacts to AID's economic objectives. Are they worth the approximately \$25,000 invested in each country per year by the NTIS-AID project?

ADJUSTMENTS TO SALES VOLUME OBJECTIVES

Three adjustments to sales volume objectives are suggested:

- Reasonable sales targets
- A mechanism for lowering prices users pay
- A broader product line through addition of parallel relationships with non-NTIS databases.

Additional adjustments which affect sales volume are included in the "Service Expansion" section of this chapter.

1. Reasonable Sales Targets

Sales volume objectives must be modest and reachable, such as the following:

- Do not allow the current economic crisis to destroy past sales progress.
- Get sales volume back to 1981 levels (approximately 5,000 where the project is concentrated, and 10,000 in the region).

2. Design a Mechanism for Lowering Prices

It seems to be legally and bureaucratically unfeasible for NTIS to lower prices; however, high prices are covering only a trivial portion of costs while they destroy the market. Therefore, NTIS should:

- a. Work on setting up a "dummy" corporation which buys from NTIS at NTIS prices, receives the subsidy, and sells at low prices which do not stifle demand. REDIITEC and OAS may collaborate in this regard.
- b. Explore "two-tier" pricing where a government or ministry pays a yearly access fee, and users pay a nominal fee per document.
- c. Accept payment in local currencies.

The worst result of lowering prices would be expenditure of the whole \$600,000 per year instead of only \$550,000. And the best that could be done would be to increase demand and perhaps get a little more back on the investment.

3. Broaden the Product Line

The network developed largely through NTIS effort is adequate but underused. To use the system better, NTIS has made efforts to include non-government reports in its database to widen its product line.

The advent of on-line searching and self-contained databases makes possible more

efficient modes. Brokers direct relationships between network agencies and non-NTIS information sources, using either on-line connections or self-contained database. Strong candidates for such relationships include AGRICOLA, ERIC, and magazine indexes.

ADJUSTMENTS TO SERVICE EXPANSION OBJECTIVES

1. Electronic Mail

Electronic mail must be used for more than just handling administration. Electronic mail must be used to solve NTIS' most serious operational problem--long turnaround time between client placement of an order and reception of the document.

- a. An objective might be to cut turnaround time by 1/3 for documents ordered from agencies which belong to CARINET.
- b. Procedures must be set up for handling volume orders as CARINET countries increase.
- c. Policy must be set regarding the form in which orders will be accepted. Will just accession numbers be accepted, or will title, author, and key word orders also be accepted.
- d. Measure the effect of CARINET on turnaround time.
- e. Expand CARINET to include all agencies with access to packet switching.
- f. Comparison shop for the best electronic mail. Criteria include price, and other worthwhile members on the system.

2. On-line Searching

Conduct on-line search demonstrations, with the purpose not only of selling NTIS documents, but also of making network agencies the focal point in each country for such services. On-line demonstrations must be used to advertise all the network agencies, not only on-line searches.

Training is needed, not just in on-line software, but also in management, budgeting, and pricing of on-line searches. A pricing policy must be worked out for on-line searches.

3. Self-contained Databases with Full-text Libraries

Success at marketing self-contained bibliographic databases and full-text libraries may define NTIS' identity in the developing world after on-line searching becomes common.

Success depends on testing a full microfiche system. So far (except in Ecuador) experience has been with a partial system. A full system includes fiche indices, full texts in fiche, fiche readers, and an inexpensive, reliable fiche-to-paper printer. The inexpensive, reliable printer is the element which has been missing so far. Rumors are that such a printer now exists. If the rumors are wrong, then this whole objective is moot.

"Complete microfiche systems" will be introduced through NTIS or not at all, as is not the case with on-line searching. Perhaps the printer manufacturers would help subsidize the experiment, since they would get publicity and marketing out of it.

Steps for Microfiche System Demonstration

- a. Determine whether satisfactory models exist (Canon, Minolta, Xerox).
- b. If models do exist, then the best one must be tested in several locations, building on the experience in Ecuador with a rented Xerox 740.
- c. If the experiment gives positive operational and sales results, then one should be purchased for every network agency.
- d. Network personnel must be taught, or re-taught, how to use the microfiche indices and libraries to do local published searches, and for focused information packets.
- e. If all of the above works, every agency will have a full-text, updated, appropriate technology library, which can be converted to paper documents to sell.

4. Self-contained Computer-readable Databases

- a. Solve the software problem for transferring databases from mainframes to micros.
- b. Determine who else would give or sell computer-readable databases to agencies--AGRICOLA, Magazine Indexes?
- c. Perform an experiment comparing self-contained computer-readable databases to on-line searches.

5. Local Indigenous Databases

Deliver this area area to REDIITEC. The need is enormous, and REDIITEC is perfectly placed to assume up the cause, probably with OAS assistance.

Key ideas and phrases are:

- Unlock the intellectual wealth of the region.
- Connect Latin America to its own brain and nervous system.
- Revive moribund libraries and repositories with computerized databases.
- Employ students to write abstracts.
- Continue the work of the 1979 Declaracion de Taitelco, and OAS.

ADJUSTMENTS TO PROMOTION OBJECTIVES

1. Orchestrated Sales of NTIS Documents to AID Projects

AID projects should be the biggest "cash cow" of all. There must be an orchestrated attempt to sell documents to AID projects (not just to the Missions proper). This becomes one of NTIS/MSI's major jobs. Network agency people do not have the clout, confidence, or desire. Sales to AID projects must be pursued first in D.C., then in each country. A campaign must be mounted. Angles are: a) include information budgets in projects and technical assistance contracts, and b) make IQC-type arrangements.

2. Include a "15 Years Ago Today" feature in ALERTEC to test Victor Martinez's theory that developing world needs are 15 years behind current developments in the US.

ADJUSTMENTS TO INSTITUTIONAL STRENGTHENING OBJECTIVES

Training and equipment alone can make only marginal improvements in institutional strength. The only ways to make important progress at strengthening the network of NTIS agencies are:

1. Design an incentive mechanism to reward agencies for sale of NTIS documents. Incentives not only increase sales, but they attract and keep good people. Ideally, the way to introduce incentives is: lower prices; NTIS charges, let agencies charge what they want. In the paragraph on pricing policy is an idea on how to accomplish this.
2. Try to resuscitate the relationship between the NTIS project and the Peace Corps. This time, the Volunteers' job should be to serve the information needs of all the agency's clients, not just those of other Volunteers.
3. Increase the flow of information through the system. Two alternatives are lowering prices, and adding non-NTIS products such as Magazine Indexes, AGRICOLA, ERIC. Can relationships parallel to that with NTIS be established with other sources of technical information?

THE ROLE OF TECHNICAL INFORMATION BROKER

A major conclusion of this evaluation is that an adequate structure for distributing technical information throughout Latin America has been developed, but it is underused. The purpose of several of the adjustments suggested in this section is to make better use of the structure by "brokering" relationships between network agencies and non-NTIS information sources.

The language necessary to allow brokering already exists in the Project Paper. In fact, it appears that brokering was part of the original project plan. Objectives need not be changed, but simply reinterpreted in practice. They include:

1. "Increase sales of relevant services offered by local distributors" should be expanded to include sales of documents for which agencies act as a broker as well as of NTIS documents.

Note that "relevant services" already implies such expansion.

2. In the Project Paper, the self-contained database objective is already described as follows: "NTIS will have developed five subject-specific bibliographic databases and distributed one each to those facilities with appropriate equipment. These databases are distinct from the complete NTIS Bibliographic Database."

Possible partners whose information resource might be brokered in Latin America and the Caribbean include: AGRICOLA, ERIC, The Foundation Center, and magazine indexes. AGRICOLA and ERIC are logical because they, like NTIS, are funded by the U.S. Government; however, what the product line really needs is a technical magazine index.

Feasibility questions which must be answered before embarking on the brokerage route are:

- Does NTIS want to become a broker?
- Do non-NTIS information sources want to be brokered?
- What should AID's role be in helping NTIS to become a broker?
- How long before on-line self-sufficiency makes brokerage irrelevant?
- Division of labor: problem analysis and identification of document vs. location and delivery of document.

Brokerage entails:

- Identification of databases for which there is demand.
- Making an arrangement in principle on behalf of the network agencies.
- Helping to develop a transportable index, or other ordering mechanism.
- Education of network personnel on the characteristics, markets, services, problems addressed by the database, how to use the database, and so forth.

PROS AND CONS

Pros

1. NTIS has contacts throughout Latin America and the Caribbean.
2. NTIS has helped build a distribution system, in the form of network agencies, throughout the region.
3. NTIS has a training program in place which could easily be expanded to teach about information products and services other than NTIS.

NTIS has proposed a goal of: "achieve appropriate, dynamic leadership . . . in the worldwide technical information community. On the basis of its database alone, NTIS cannot do so.

5. Provision of U.S. technical information is a "softsell" of U.S. technical products and services.

Cons

1. Other information sources may have their own marketing efforts in the region with which they are satisfied.
2. NTIS by law is to be cost-covering. Sales of non-NTIS documents would bring no revenues to NTIS.
3. NTIS would be promoting its own competitors in some cases.
4. Other sources may not have a subsidized price, and therefore, their prices may be too high for the market.

SOME ADDITIONAL INFORMATION SERVICES WHICH MIGHT BE BROKERED BY THE NTIS PROJECT

National Agricultural Library (AGRICOLA)
10301 Baltimore Blvd.
Beltsville, Maryland 20705
(301) 344-3604
(301) 344-3044

Department of Commerce
Caribbean Basin Business Information Service

Post-Harvest Institute

U.S. Book Exchange
335 V Street, N.E.
Washington, D.C. 20081

Universal Serial and Book Exchange

Patents Unlimited

Volunteers in Asia
Appropriate Technology
Stanford, California

American Management Association

Harry Dewey AGIES Project
AID-UPDATE AID
AID-Update Service

APPENDIX A

TECHNOLOGIES FOR DATA BASE ACCESS

By

Douglas Goldschmidt

Technologies For Data Base Access

There are a number of ways of accessing data bases, varying according to cost, speed, and level of sophistication. The review below gives a range of possibilities, with the requirements for each.

Probably the major variable among the choices is time. Clearly, a computer allows a user quicker access to a large part of a data base than does a printed index. However, the computer also requires greater information sophistication by the user and is more expensive. The greater expense should be balanced against the value of the user's time. In making this review, no assumptions are made about the value of time - users will have to make that analysis for themselves.

1. **Hard Copy/Mail** - This is the most basic, and ancient, of the possibilities. It requires the mailing of indices, the ordering of articles or books through the mail, and then the mailing of the articles or books. While this procedure is by far the slowest, it requires no special equipment, and is accessible by anyone who knows how to use a basic library index.
2. **Microfiche** - This is only one step removed from hard copy, but does require more equipment. The microfiche is far less expensive than printed materials, diminishes the amount of paper which must be stored, and allows enormous numbers of documents to be stored in small places. These factors allow even remote libraries to maintain a large document collection. Microfiche also diminishes the problem of rot due to humidity. However, it does require the user to have a microfiche reader, which limits its usefulness to libraries.
3. **Facsimile** - Facsimile machines offer a rapid means of transmitting printed documents, circumventing the slowness of the mail, or the expense of couriers. The facsimile machine allows a user to identify a document via a index, either hard copy or microfiche, and send the request via a facsimile machine to a document center which is similarly equipped. The article can be transmitted in the same manner. There are two types of facsimile machines now in use - analogue and digital. The analogue machines, or CCITT Standard I and II, generally transmit at between 3 and 6 minutes per page. These are the oldest types of facsimile machines and have the major advantage of being able to transmit over relatively noisy lines. The digital machines, or CCITT Standards III and IV, operate at far greater speeds. Operating with good telephone lines, these can transmit and receive at less than 30 seconds per page.

However, digital machines are far more susceptible to line noise, and are also more prone to electronic and software problems than are the analogue machines.

Most machines have the capability of transmitting and receiving in the older modes. This is important as one cannot assume that all document centers will use the same standard machine.

In all cases the user will want a machine which has some basic automatic functions. First, the machines must have automatic answer capability. This permits a foreign location to call into the machine and have the machine turn on without an attendant. This feature minimizes telephone bills and allows documents to be sent at anytime of day or night.

Second, the machine should utilize an automatic paper feed, minimizing the possibility of office space jamming the machine with improper feeds.

All machines with automatic answer must be connected to its own telephone line with a discrete telephone number. This will allow document centers to call into the machine automatically. Digital machines can be connected via dedicated lines to Telenet if they will be sending and receiving a large volume of documents.

3. Computer retrieval - This is by far the most complex, and most rich, form of information retrieval. The use of a computer attached to a packet network, like Telenet, allows the inexpensive transmission and reception of data. Thus, the user can go through indices, retrieve abstracts, and even articles, rapidly. This form of retrieval requires far more advanced information search skills to make economical use of the data bases, which charge on the basis of connect time.

There is a broad range of equipment which can be used for this type of retrieval, depending largely on budget, storage requirements, and need to manipulate data. At the simplest level a "dumb" terminal permits access to the data bases, but does not permit storage.

Given the rapidly diminishing price for small business and residential machines, it is probably most useful to purchase a machine with some memory and storage, like an Apple, Commodore, and the like. These permit the data base indices and documents to be stored on floppy disks for later use.

However, the use of floppy disks restrict the size of any particular data base which is retrieved for storage, unless the user wants to constantly search through many floppy disks.

The next step up would be with a hard disk storage. This permits very large accumulations of data on one disk, permitting random searches quickly, without searching through many floppy disks.

Any computer system will require the addition of a modem to connect the system into the telephone system, as well as communications software. In addition, if data and indices are to be stored on the disk, a data base program which allows sorting of the data will be required.

Finally, either system will require a printer for hard copy. Unless high quality printouts are required, the most economical and problem-free printer will be a dot-matrix. These can print rapidly, and are inexpensive to purchase.

II. The Telephone Company Interface

While facsimile and data transmission may meet communications needs, they do require certain minimal infrastructure to work properly. First, all technologies which utilize the telephone line are susceptible to some extent to noise. The older analogue technologies tend to have a higher noise tolerance than the digital technologies. The operating assumption should be the greater the noise level, the lower the transmission reliability.

Second, the basis of all transmissions is the telephone line between the user's office or document center and the central telephone exchange. These lines tend to be problematic in many developing nations due to extreme noise line generated by poor insulation, corroded contacts, and congestion, among other factors. Dial-up lines tend to be the worst possible means of connecting to a central office. The worst aspects of line noise may be avoided with a private line which connects the user's premises directly to Telenet or to an international access channel. Private lines may be conditioned to minimize noise. However, not all countries offer private lines, they are often expensive when offered, and they may still be noisy and difficult to "clean-up".

Third, the cheapest means of transmitting digital information is via Telenet or a similar packet switched network. Such networks allow the user to share the data transmission channel with many other users, lowering the overall cost. Also, as the packet network consists of leased lines which have been

conditioned for data transmission, the transmission quality will be higher. Unfortunately, the user must access Telenet via local telephone lines, with the problems discussed above.

Computer and digital facsimile users might wish to acquire dedicated Telenet access lines. These will permit the user to receive data calls from others. Also, direct access lines can minimize the problems of the local telephone line. In particular, the dedicated line obviates the various clicking noises caused at the central telephone switching office.

III. Future Developments

Developments in digital satellite transmission may soon minimize many of the problems and costs of accessing US or other data bases. A number of earth station suppliers in the U.S. are now introducing spread spectrum transmission techniques in earth stations. These permit a number of users to share a satellite channel using very small earth stations. For example, Equatorial Communications C-200 earth station is only 2 meters in diameter and costs \$6,000. It is capable of 2-way transmission at speeds up to 19.6 kbps. This price should diminish as competition becomes more intense and as production grows to more efficient levels. Obviously, such inexpensive earth stations could permit the development of data base networks using dedicated earth stations. These networks could be very fast, inexpensive, and of high quality.

VITA (Volunteers in Technical Assistance) is planning to launch a small store and forward satellite which will allow users to transmit data to the satellite as it passed overhead, and then have the data forwarded to another computer when it is in the appropriate position. This system, which will only be useful for development, as opposed to commercial, users, will be in place by 1987. It is expected that the earth stations for use will be very inexpensive as the satellite is based on the Amateur Radio Operators satellite.

Transmission Technologies for Data Base Access

<u>Technology</u>	<u>User skills</u>	<u>Support Required</u>	<u>Affect of Telco Quality</u>	<u>Telco needs</u>	<u>Operational Constraints</u>	<u>Operating Costs</u>	<u>Capital Costs</u>	<u>Benefits</u>
Hard Copy	none	librarian	none	none	none	postage	none	most user accessible
Microfiche*	none	librarian	none	none	none	postage/machine	\$1100-1500	least costly to user
Facsimile:								
analogue	none	librarian/operator	moderate	dedicated line	few	telephone charges	\$2000-3000	rapid reception of hard copies of documents
digital	none	same	critical	same or Telenet access	maintenance intensive	telephone charges	\$3000-6000	same
computer basic	good info skills	librarian	critical	same	some maintenance	telenet & telco charges	\$3500*	most rapid means of accessing and retrieving from data bases
hard disk	same	same	same	same	more sensitive & maintenance intensive	same	\$4500*	same plus extensive storage and processing capabilities

* cost includes microfiche reader and printer

* cost include computer with either 2 disk drives or 1 disk drive and hard disk, printer, modem, communications software ware, and data base program.

APPENDIX B

INTRODUCTION TO THE ON-LINE DATABASE SYSTEMS

From a report entitled "A Study of Access to On-line Databases from Latin America and the Caribbean" by Sandra Lauffer and Margaret Anderson.

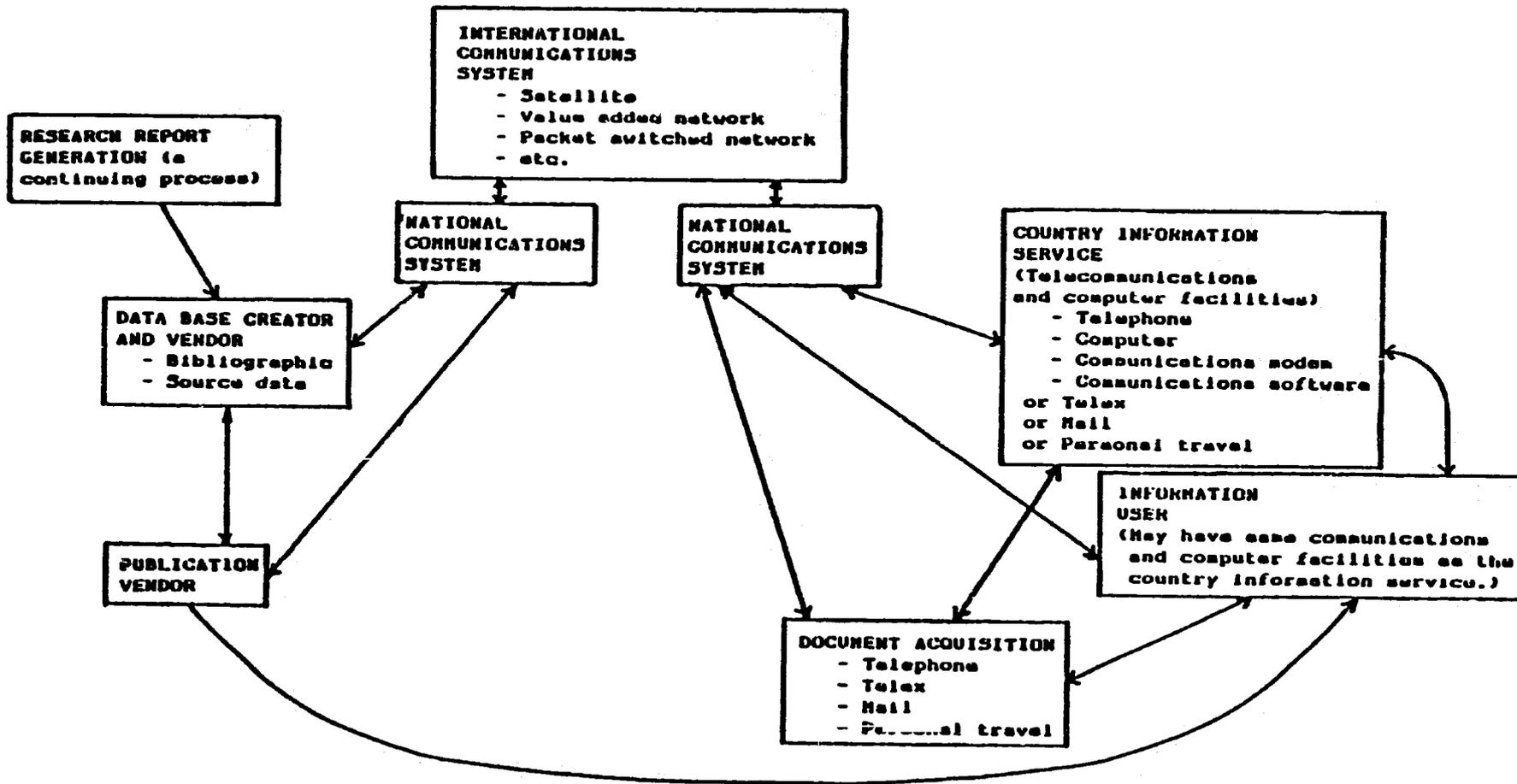
A. An Introduction to the On-line Data Base System

In order to proceed from a common ground of understanding, it is necessary to articulate the structure of the information system under discussion, the on-line data base system. (See Figure 1.) The present study focuses on the delivery of scientific and technological information to end users in Latin America. The typical end-user is characterized as a researcher from the industrial, governmental, or university environment. That end-user goes to an intermediary—a librarian, an information broker, a professional in an information center—with a request for information about an industrial process, a market, a supplier, a patent, a statistic. The intermediary searches the resources at hand in his own center, in other national centers, and possibly in regional centers.

If the information is not available, the intermediary must then consult resources outside of the region, generally by searching a data base. Data bases are characterized as either reference data bases, which refer users back to a primary source such as a periodical; or source data bases, which contain either numeric data or the full text of a primary source. Reference data bases are also referred to as bibliographic data bases.

The most efficient way to search a data base is through the on-line process, a kind of interactive computerized "conversation" between a remote computer terminal and a central computer. In order to engage in this process the user needs a telephone, a computer terminal with a display unit (either a screen or a printer), a modem, and communications software. Using this equipment, the user connects into the national or international telecommunications system, which in turn connects to the central computer. The central computer in this case is generally that of a data base vendor, a company that brokers multiple data bases. The information that is accessed is actually produced or provided by yet another entity, a data base producer,

Figure 1



SCHEMATIC OF INTERNATIONAL ON-LINE DATA-BASE ACCESS SYSTEM

911

which may be a private company, a government agency, or a research center such as a university.

Once connected to the central computer, the remote computer user searches for the information he needs. This search is a real-time, interactive process, during which the user poses questions, receives answers, and gradually refines his request so that, in the end, the information he receives is as directly relevant as possible.

Lacking any portion of the technology necessary for a computerized on-line search, users can still obtain information from data bases, using mail, telex, and other communications media. These options are, however, time-consuming and limiting to the interactive process, and the results of such searches are usually not satisfactory.

The main obstacles to on-line access are the lack of suitable telecommunications channels, particularly, in developing countries, for locations outside of the national capitals; the costs of transmission; lack of computer equipment; and, to some extent, the shortage of trained staff to plan and sustain the operation and maintenance of electronically-based systems. A major associated problem pertaining to searches of reference data bases is gaining access to the full copy of the document itself.

APPENDIX C

TELECOMMUNICATIONS WITH PACKET SWITCHING

TELECOMMUNICATIONS WITH PACKET SWITCHING

Packet Switching and the CARINET Electronic Mail Service

"The international telecommunications networks of TELENET and TYMNET (via switch to TELENET), and UNINET access the CARINET main computer in New Jersey. These low-cost data relay networks are called "Packet Switched Networks," because they "package" your transmission into little packages of data and "switch" it up to the international satellite networks. Your message might take one or two minutes to send from your computer, but since your message is packaged or condensed by packet switching, it goes over the satellite in just seconds, saving you satellite cost time." (CARINET Users Manual, p. 3)

Comparison of Conventional and "Value Added" Networks

"If, as the DIALOG literature indicates, a typical search takes 10 to 15 minutes, and the cost of a five-minute telephone call from Mexico to the U.S. is 12.50, the telecommunications costs for a data base search are virtually prohibitive for most developing countries, especially when combined with the on-line access charges, royalties, and other data base costs. In addition, telephone service in some countries is inadequate to the task of data communication." (AED, p. 49)

"Value added networks add computers to existing transmission links to provide new transmission services such as data networks which move bursts (packets) of data rapidly and inexpensively. The major intercontinental value-added networks are TELENET and TYMNET."

("A Study of Access to On-line Data Bases from Latin America and the Caribbean, Lauffer and Anderson, AED, p. 51)

According to the AED report (March 1984) countries with "packet switching" in Latin America and the Caribbean included Argentina, Barbados, Brazil, Chile, Costa Rica, Dominican Republic, Mexico, Panama, and Trinidad. According to the CARINET brochure (January, 1985) Bermuda and Nicaragua also have "packet switching", and Guatemala and Honduras have since been added to the system (see p. for details on Honduras).

APPENDIX D

MAJOR ACTORS IN ON-LINE SEARCHING

AND

PLANNING AN INFORMATION SEARCH ON BEHALF OF A CLIENT

By

Nancy Green-Maloney

APPENDIX D

Compiled from Telenet 1984 directory and the TYMNET 1983 directory.

TELENET Hosts (many also be on TYMNET)

Primary: On-line Search Services (bibliographic). May also offer full text on-line document ordering and electronic mail

BRS

DIALOG

Mead Data Central LEXIS, NEXIS, REFERENCE

National Library of Medicine MEDLARS

Pergamon INFOLINE

SDC Search Service ORBIT

West Publishing WESTLAW (legal)

Chemical Abstracts CAS ONLINE

Secondary: Specialized Search Services

COMPUSERY (financial; electronic mail)

Dow Jones (banking)

I.P. Sharp (economic and business information)

NEWSNET (full text newsletter)

OCLC (on-line library catalog information)

Source Telecomputing (consumer oriented)

VU/Text (full text of U.S. newspapers)

Electronic mail only:

ITT DIALCOM (also newswires and a gateway service).

GTE Telenet TELEMAIL.

New Jersey Institute of Technology (EIES/CARINET) (not on TYMNET).

TYMNET Only

DATA RESOURCES, INC. (DRI): secondary resource, econometric system, has done some marketing in LAC.

European Space Agency ESA/QUEST: primary, European host.

QL Systems: primary, Canadian information only.

ONTYME: Tymshare's Email system (= Telemail).

PLANNING AN INFORMATION SEARCH ON BEHALF OF A CLIENT

User Service: Processing of Request (and other questions regarding a search service)

1. How is the request received? (phone, mail, walk-in)
Who receives initial request? (clerk, information professional, searcher)
How is it registered? (in log, on printed request form)
What information is gathered from client? (name, location information, method of payment, timeframe for response, definition of information need)
Who determines method of response? (user, information professional)
To what extent are options explained to client?
2. How is the client interviewed? (in center, on site, phone)
Who interviews? (service coordinator, search specialist)
How is interview recorded? (search request form, separate strategy worksheet)
How well is information need defined? (key words, time, language, # docs)
3. Who performs actual search? (subject specialist, medium specialist--on-line, manual, etc.--interviewer)
How many sources are searched? (one, as many as necessary, depends on cost, depends on client)
Is client present during search? (yes, no, varies)
Who develops search strategy? (interviewer, searcher, client)
When is search performed? (on demand, by appointment, varies)
4. Does service include document delivery? (yes, no)
What document delivery methods are used? (local collections consulted, ordered regionally, ordered from abroad, sought through ILL, purchased)
What is the usual timeframe for delivery?
Does the center retain a copy of the document? (yes, no)
5. Is there a post-search interview? (yes, no, varies)
Who interviews? (service coordinator, searcher)
Are results reviewed/explained to client? (yes, no)
Is client's satisfaction evaluated? (yes, no)
How is evaluation performed? (interview, printed evaluation form, informal conversation)
Is evaluation recorded at center? (yes, no)

6. **What is the pricing policy for searches? (basic fee + direct costs, direct costs only, flat fee)**
Does the fee vary based on method used? (manual search free? on-line search charged? document delivery charged?)
Does fee vary based on identity of client?
Does the client pay in local currency?
Is fee paid in advance? (yes, no, partially)
May a client establish a deposit account? (yes, no)

7. **What statistics are maintained regarding the service? (number of searches/month, number of clients, number of individual requests, other)**
What logs/archives are kept of searches performed? (log of system/database usage, log of subject areas searched, archive of searches by topic, archive of searches by user, other)
What printed forms are used during a search? (interview sheet, strategy sheet, evaluation)
Are these forms kept? (yes, no) Analyzed? (yes, no)

8. **Are completed searches available for later consultation by other searchers? (yes, no)**
Is identity of client kept confidential? (yes, no, up to client)

9. **Is a current-awareness service (SDI) offered?**
Through what mechanism? (local, at source service)
Is the information provided secondary (bibliographic) or primary (source documents)?

10. **How is the search service promoted? (brochure, newsletter, posters, advertisements, demos)**
Is there a program for staff training? (in-house, attendance at seminars, user group meetings, none)
Does the search service have a budget? (yes, no)
Are costs recorded? Analyzed?
Does the service interact with other local services? (local user group, informal communication, personal contacts)
Is a request ever referred to another center/search service for response?

11. **Staffing: number of professionals, number of clerical help, administrative structure.**

12. **Search systems and databases used (on-line).**
Equipment used (on-line).

APPENDIX E

EXPANSION OF DOCUMENT SALES VOLUME

**EXPANSION OF DOCUMENT SALES VOLUME:
OBSTACLES AND ADJUSTMENTS**

<u>Obstacles</u>	<u>Adjustments</u>
1. Difficult, limited - demand product	← Broker NTIS-like deals with other data, resource bases.
2. Limited "real" access	← On-line searches (price problem?)
3. High prices	← Mechanism to allow price lowering - Dummy corporation - 2-tier pricing
4. Document quality weaknesses	?
5. 7-week turnaround time	- Expand electronic - Electronic mail ordering procedures
6. People don't like microfiche readers	← Test, buy inexpensive, reliable fiche-to-paper printers
7. English language documents	} Out of project control
8. Economic conditions	

