

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

EXECUTIVE SUMMARY

By

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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	

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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.

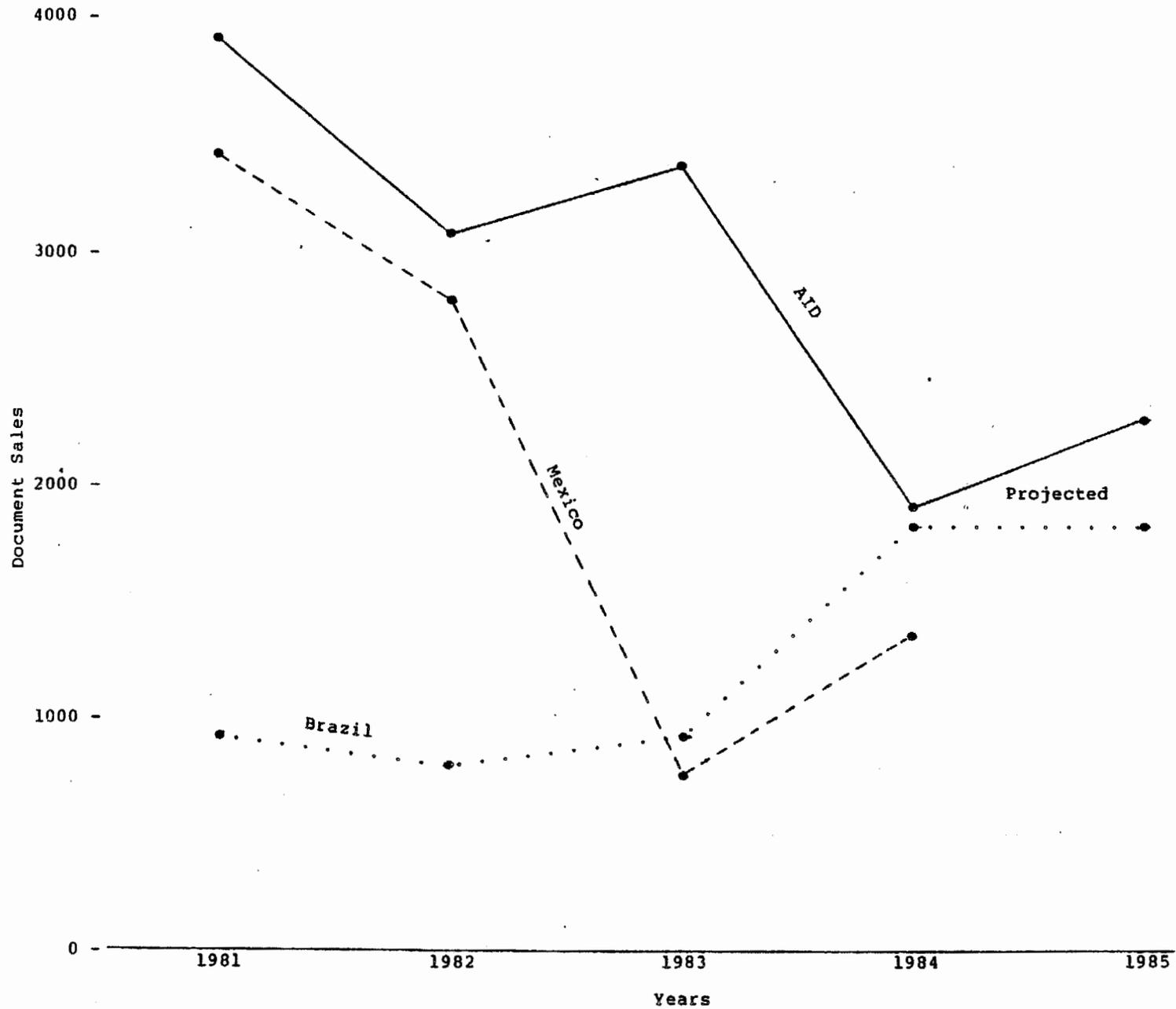
Figure 2 shows that between 1981 and 1984, in countries where project activities and subsidy were concentrated, document sales dropped 54% (from 3,993 to 1,849). For the entire region, sales dropped approximately 40% (9,932 to 5,835).

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



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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:

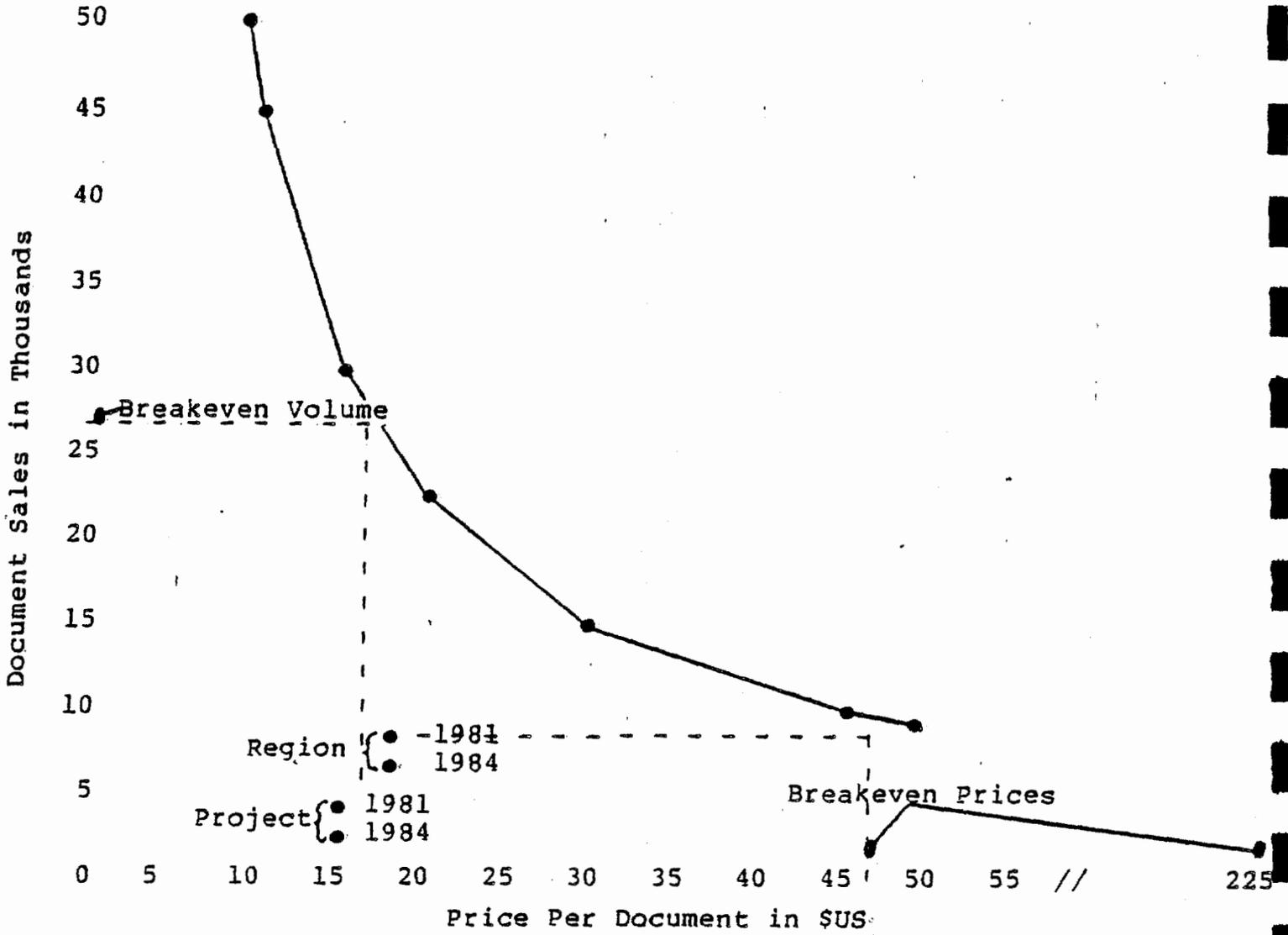
1. On-line searching requires telecommunications with packet switching which is being introduced sporadically in project countries. Countries where network agencies have a degree of access to packet switching seem to be: Barbados, Chile, Colombia, Costa Rica, Dominican Republic, Guatemala, Honduras, 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 for 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 REDIITEC, 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 LOGRAME FOR THE NTIS PROJECT

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS (OVIs)	MEANS OF VERIFICATION (MOVs)	ASSUMPTIONS
Goal			
Application of technological information to development problems.	<p>\$25,000/yr/country benefit:</p> <ul style="list-style-type: none"> - employment - innovation - exports - energy savings - excess capacity use 	Case studies of private sector hands-on users	
Purpose			
An effective, maturing system for distributing technical information	<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 Self-sufficiency: <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 LOGFRAME 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-text 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)

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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.