FINAL REPORT

MEASURING THE "SPREAD EFFECTS" OF AID PROJECTS, NO. 930-0085

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PREFACE

The Agency for International Development has recognized the importance of "spread effects" for the overall success of development projects. The Agency also recognizes that to date they have not been successful at assessing the extent to which spread effects have resulted from AID-funded projects. Therefore, the Agency contracted Action Programs International to investigate the methodologies used by other organizations to determine the extent of spread in addition to what was documented within the Agency. After careful research and assessment of the efforts of the outside world as well as a study of AID evaluations we have compiled the results in the following report.

As an appendix to this report, API has prepared a Guide which represents a first effort to assist the project manager in measuring spread. This Guide is based on the review of the techniques used by researchers elsewhere to study similar problems and -- since there were major gaps in the research literature -- the invention of additional techniques. A set of recommendations has been developed which, it is hoped, will provide at least preliminary guidance to those who are charged with the difficult task of evaluating projects.

The Guide should be viewed as a companion-piece to the MANAGER'S GUIDE TO DATA COLLECTION, also distributed by the Office of Evaluation. As such this Guide can most profitably be used in conjunction with the MANAGER'S GUIDE.

METHODS FOR THE STUDY OF "SPREAD EFFECTS"

A major goal of AID projects is to influence the physical and social technologies of extended areas of the countries in which AID works. With its limited resources, it usually cannot bring innovations directly to large areas but must choose selected sites for intensive development. Nevertheless, the aim is always to test and develop the effectiveness of the demonstration projects under local conditions, and when innovations are successful, to expect them to spread to other similar localities. Bringing technological advances to a small number of villages or a few regions is not enough by itself. Successful implementation in the target sites must stimulate further adoption elsewhere, either through directed diffusion by the host government and/or other agencies, or by spontaneous adoption by the people themselves or by other means. The spread of AID projects is central to its mission.

In order to find out whether innovations that have been introduced into a country by an AID project have diffused to other locations, it is necessary to develop methods for locating and identifying "spread." The methods should be sensitive enough to identify not only direct replication, i.e., use of the same technology for the same purposes, but should also be capable of detecting modifications of the technology.

Two particular types of modifications may be of special interest. One can be called "adaptation of component features" of an innovation. Instead of adopting the new technology intact, people may select certain components of the innovation and use them in other settings and for other purposes. For example, villagers who participated in structured decision-making procedures in an AID water project may adopt similar decision-making procedures in taking action on schools. Or people who became familiar with assembly-line techniques through an AID project to produce water pumps may introduce assembly-line techniques into other production activities.

A second type of diffusion can be called "diffusion to new uses." In these cases, the specific product introduced by an AID project is used for purposes other than those for which it was originally intended. An example is solar stoves introduced for cooking, which are used by local potters for firing clay ware.

In some cases, the demarcation between these two types of adaptations is fuzzy. Local people can make minor changes in a new product and adapt it to new uses. If a distinction is useful to maintain, the main distinguishing feature is that "adaptation of component features" generally refers to the processes and procedures introduced through AID projects, and "diffusion to new uses" focuses on physical products that are applied to purposes beyond those originally planned.

The critical point is to become sensitive to the spread of AID innovations to places and uses that were unanticipated. If the true effects of AID projects are to be gauged, it is important to know more than the effects at the immediate target site. Ways have to be found to study diffusion of the products and practices introduced through AID to other localities and for other purposes.

1. Review of Diffusion Studies

In order to develop systematic methods for such AID evaluations, we reviewed the several literatures on diffusion of innovations, technology transfer, research utilization, and community studies. We were looking specifically for answers to three questions:

(1) How have researchers from the different traditions studied the adoption of innovative practices and products? What have been their general methods and approaches?

(2) Once researchers moved beyond studying adoption at an initial target site, how did they identify other locations as candidates for study? That is, what information did they rely on to specify further sites that were likely to have been influenced by innovation of the primary sites?

(3) How did they collect their data? What procedures and instruments did they use? Whom did they go to for information? What kinds of questions did they ask? Did they find "unobtrusive measures" to collect the requisite information without having to engage in original data collection?

2. Studies Examined

Several hundred books, papers and reports were examined. In addition, we talked to over a score of researchers and development experts. Abstracts of relevant studies appear on pages 23-88. The methods of data collection used in these studies, and the content areas of the innovations studied, are summarized in the four matrices on pages 19-22. The first matrix presents studies that focus on adoption of an innovation at the original target site. The second matrix presents studies that deal with replication of an innovation at secondary sites. The third matrix presents studies that look at adoption of components of an innovation rather than the total innovation ("adaptation of component features"). The fourth matrix, which is almost blank, was designed to present studies that looked at the use of an innovation for purposes different from those originally intended ("diffusion to new uses"). The bibliography on pages 90-95 gives full citations to the studies. Each entry that has been abstrated is followed by a Roman numeral that identifies the matrix into which the study falls, and an Arabic numeral or numerals that identify the cell(s) within the matrix into which we classified the study.

Most of the material we located had little of relevance to offer for our purposes. Although the literature is vast, and scholars from a wide variety of disciplines have been engaged in study of the diffusion of innovations and technology transfer, we found that much of the literature displayed the following characteristics:

(1) Much of it is concerned with theories and concepts of diffusion. Although the material is enlightening, it does not deal with methods and techniques of measurement.

(2) Empirical studies have concentrated on the adoption of the innovation at the original target site. This type of inquiry has been much more frequent than studies of the spread or contagion of innovations to other sites.

(3) When replication of innovations at other secondary sites is the subject of investigation, there has often been a directed diffusion campaign to encourage people at the secondary sites to adopt the innovation. Therefore, selection of which sites to study in order to detect spread effects has not been problematic: the researchers studied the sites exposed to the persuasion campaign. Data were collected in much the same way as in studies of original adoption. In fact, the whole research effort was very similar to studies of original adoption.

(4) In many other studies in which replication of an innovation was studied, the investigator worked from a known list of "later adoptions." This is particularly true for organizational innovations in the U.S. A government agency or private group had been promoting the innovation, and the promoters kept track of adopters through visits, information from regional staff, periodic phone calls, etc., in order to maintain an up-to-date list of users of the innovation. Again, the researcher did not have to confront the problem of selecting likely secondary sites. The identification of candidate sites had been done.

(5) The predominant mode of data collection about the adoption or diffusion of innovations has been the systematic population survey. Structured interviews have been conducted with samples of the population of interest to find out who adopted the innovation, when, and under what conditions. Sampling techniques have varied in their attention to randomness and representativeness, but sampling of some kind is common.

(6) In studies where the adopting unit has been an organization rather than an individual, the usual source of data is an informant in the organization.

(7) Perhaps most salient for AID's purposes is the surprising fact that very few studies have been concerned with comprehensive inquiry into the full scope of diffusion. Almost all of the studies that we examined were research efforts (NOT evaluations) that focused on correlates of adopting behavior. They were directed at identifying conditions or characteristics that were associated with the adoption of innovations, and therefore paid relatively little attention to documenting the full extent of spread. Accordingly, we found almost no information in the research literature about the efficacy of data collection techniques for capturing the total extent of diffusion within a population.

We concentrated on studies done in developing countries, because much of the technological and social infrastructure that makes possible alternative data collection methods in developed countries is sparse. For example, studies in the U.S. sometimes make use of telephone interviews, mailed questionnaires, compendia of published data, review of records and documents, etc.--techniques which are often less applicable to areas in which AID works. Nevertheless, we also looked at a large number of U.S. studies to see if we could identify ingenious methods that might be suitable.

Among the disciplines that have contributed most to the diffusion literature are sociology (rural sociology, sociology of education, of health, of science, and of knowledge), economics, anthropology, geography, and psychology. Also involved have been science historians, scholars of "science and society," scientists concerned with special problems (e.g. the use of basic scientific knowledge in the development of innovations), people in marketing and advertising, scholars in the management field, and of course, specialists in development.

3. Insights from These and Other Fields

Because the literature we surveyed was dominated by studies of original adoption and, to a lesser extent, replication (i.e. implementation of the same innovation for the same purpose at another site, often after the intervention of a change agent), and because the predominant modes of data collection were sample surveys and interviews with informants, we sought out any ideas that might extend the repertoire. We were particularly interested in (1) techniques for identifying locations to which innovative technologies or organizational arrangements might have spread by spontaneous contagion, and (2) ingenious means for collecting data about spread. These are some of the ideas that we found provocative. Some of them are pretty "far out," but might be worth developing.

3.1 Identifying Locations

3.1.1. Physical tracers

The ideal mode of detecting spread would be akin to radioactive isotopes. The medical researcher introduces radioactive tracers into the human system which are then observable by radiation detectors. Obviously, no such procedure is available in the social world, but this represents an ideal model. In nuclear weapons supervision, sophisticated equipment monitors radiation levels in order to detect authorized and unauthroized production and testing. During the invasion of Mediterranean fruit flies, their "diffusion" was monitored by medfly traps set at widely dispersed locations. Such procedures do not have any obvious analogs, but for some kinds of innovations under some conditions, ingenuity might develop parallel methods.

3.1.2. Communication trails

In order to hypothesize which additional sites are likely to learn/imitate/implement the focal innovation, it is possible to chart the "communication trail" of persons involved with the innovation at the original site. Geographers have developed methods to measure the "mean information field" (MIF) of people, i.e. the distance or area within which inhabitants are in contact or receive

information.* It charts the distance and direction that villagers take to market, for example, or the places at which fishermen put in to port. It seems possible that spread effects would follow the communications trails of local inhabitants.

Family contacts are another form of communication. Understanding kinship patterns and patterns of intrafamilial visiting would lead to hypotheses about spread effects. Of particular interest might be migration patterns to urban centers, and urban-to-rural communications among members of extended families.

Some people in every society move from place to place, taking information with them. Itinerant craftsmen, for example, may be a channel for spread effects or, in some societies, Buddhist monks or other clergymen. In highly developed technological societies, innovations often travel when professionals leave one job (e.g. in aerospace firms or NASA) and move to other industries. Similarly, in developing societies, workers may change locations and take along their recent knowledge of innovative projects or procedures.

Sometimes, communication trails are highly structured. Extension agents from the government agricultural ministry or the departments of education or health make scheduled visits to bring modern practices to outlying sites. Their routes provide hypotheses about the paths of spread.

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* See, for example, Richard Morrill and F.R. Pitts, "Marriage, Migration, and the Mean Information Field," Annals of the Association of American Geographers, vol 57 (1967), pp. 401-422; R. Ramachandian, Spatial Diffusion of Innovations in Rural India, Mysore: Institute of Development Studies, University of Mysore, 1975; D.F. Marble & J.D. Nystuen, "An Approach to the Direct Measurement of Community Mean Information Field," Papers and Proceedings of the Regional Science Association, vol. 2, 1964, pp. 99-109.

The introduction of radios, newspapers, and other print media to villages may be the stimulus for spread, and thus help to identify sites for study of spread effects. Visiting journalists may carry news about innovations.

3.1.3. Attendance at demonstrations, "fairs"

People can learn about innovative projects by visiting the original demonstration site. It seems fruitful to keep records of visitors who come to get information about the project. If there is a cluster of visitors from a particular locality, that may be a logical site to investigate spread effects. Similarly, attendance at fairs or other events at which the demonstration is displayed and information dispensed may suggest interest. Records of the persons who request further information may help point to sites for study.

3.1.4. Informants and snowball samples

Key informants are always a good source of information about spread. Once an informed source is located, he or she can be asked to name other people who know about the diffusion of the innovation. Snowballing from one informant to other people who he/she names extends the network of information.

In organizations, people in one organization can often name other organizations that have heard about, considered adoption of, or implemented the innovation.

3.1.5. Parallel organizations

If the innovative project is a structural/institutional arrangement or practice, the obvious sites for spread are similar organizations. Thus, if the innovation is a reorganization in a port authority, spread can be investigated in other such authorities.

3.1.6. Back-tracing from chance observations

Often the first indication of spread effects comes to notice by chance. Someone stumbles across an application of the innovation unintentionally. In such cases, it should be possible to inquire how the new user happened to hear about the innovation--the source of information and the channels of communication. This is true not only in cases of replication but also for ("adaptation of component features") and ("diffusion to new uses"), where modifications have been made in the original project.

Once such information is collected, it becomes possible to look systematically at other users of the same channels of communications and other persons in contact with the same source. By getting data from such people, it should be possible to identify other sites to which the innovation has carried.

3.1.7. Theory and speculation

Not least is the utility of theory. Scholars have developed credible theories about the pathways of diffusion for different types of innovations and these can be exploited. Economists, for example, suggest that diffusion of industrial process innovations depends on such variables as the profitability of the innovation for a firm, its slack resources, size, market share, etc. Sociological research has identified structural conditions under which diffusion is more or less likely to occur, including the costs and risks to adopters, the existence of appropriate social institutions, the nature of the benefits that are realized. Social-psychological research has developed profiles of people in different cultures who are likely to be willing to adopt innovative technologies and ideas. Geographers have developed empirically based theories about the spatial spread of innovations.

Informed speculation can also be a source. People who are knowledgeable about a sector and a region may be able to identify the most likely sites to which innovation will travel.

3.1.8. Summary

These seven techniques for identifying locations to which innovations may have spread are no doubt of differential efficacy, and they require different investments of time, money, and expertise to employ. We would like to be able to rank them in terms of their plausibility for evaluation purposes (i.e. the likelihood that they will yield comprehensive and valid information) and their cost-effectiveness for AID. Unfortunately, no firm evidence is available for making such a determination. Moreover, the diversity of conditions under which AID missions operate--divergences in social, economic, cultural, political, ethnic, ecological, and historical environments and differences in types of innovative projects--makes any single rank-ordering an exercise in speciousness.

All we can offer on this score are a few general principles and some opinions. First, it seems obvious that concern about the diffusion of innovative projects should begin at the time of project development and not be postponed until post-project development. During the initial planning stages, planners should take account of the potential for project spread, including careful analysis of the suitability of the innovation to local and regional environmental conditions; costs in terms of capital investment, maintenance, labor, and risks; the distribution of costs (who pays) and of benefits (who profits); what kinds of benefits are likely to accrue (e.g. income, security, social standing, access to service or to consumer goods) and to whom they accrue (e.g. the lowest-income groups, rural areas, women); the infrastructure needed to adopt and maintain the innovation (e.g. credit, roads, social organization); political conditions and government policies that affect the attractiveness of adoption/maintenance of the innovation. When attention to such factors is built into project planning, it becomes simpler to map the diffusion of the innovation (as well as increasing the likelihood of there being diffusion to map). Planners have a better fix on which groups are structurally equipped, with resources and motivation, to adopt or adapt the innovation.

Second, as a pragmatic rule-of-thumb, it seems sensible to look first at adoption of the project at the original site. If the extent of adoption is limited there, despite the inflow of outside resources and expertise, then it may not be worth much effort to search for spread effects elsewhere. Spread might indeed occur, but the chances seem too slim to warrant extended search. Similarly, if evalution of the project at the original site detects few benefits for adopters, search for adoption elsewhere will probably be unproductive. The time and money that search requires might be better spent in increasing the effectiveness of the innovation for its target population.

In terms of feasibility, the seven search techniques that we have listed can be roughly ordered in terms of the level of time and effort that they require. By and large, the use of informants is the easiest and least expensive search strategy. Key informants can tell a great deal about the local situation. Although they may not always be well informed, and although they are often biased by their own interests in the situation and by their own concepts and explanatory theories about social change, talking to a number of people from different groups and in different positions can often provide important leads. This is often a good place to start.

Reliance on theory and informed speculation can be a useful procedure, too, particularly if the theory and/or speculation is grounded in previous empirical inquiry. Again possibilities for bias and distortion exist (especially in the absence of solid social science investigation of the theoretical premises), but this is also a relatively inexpensive search technique. When projects have been planned on clear theoretical premises, the initial evaluation provides an immediate check on many of the assumptions involved.

In those cases where parallel organizations are potential adopters, listing of such organizations is a feasible strategy. In cases where records of visitors to demonstration sites have been maintained, this too is a relatively painless method for beginning a search.

Communication trails and back-tracing require more time and effort. They can be highly productive when other indications suggest that diffusion is probable and there are few other pointers to its location.

3.2 Means for Collecting Data

In the accompanying charts, we list the six methods of data collection that we found in the literature: sample surveys, informant interviewing, ethnography, records/documents, observation/visual inspection, and aggregate statistics. Most of these require little elaboration, and in fact, a look at the studies entered under each category gives a picture of how such sources can be used to study spread effects. (see pages 19-22)

3.2.1. Sample surveys

A random sample is drawn of the population to which the innovation is hypothesized to have spread. Then field interviews are conducted with the sample respondents to find out whether they have adopted/adapted the innovation. Considerable additional data can also be collected, including how respondents learned of the innovation, when they adopted it, why they adopted or failed to adopt it, their characteristics (ethnic, age, family composition, education, etc.), the benefits they realized, and so on.

Surveys require considerable skill and time to develop, a trained field staff to administer them, adequate knowledge and facilities for data analysis, and scrupulous attention to proper procedures to aviod bias in sampling, interviewing, and analysis. Unless surveys are informed by sophisticated understanding of the situ-

ation and appropriate theoretical assumptions, they can produce more paper then insight. Unless they are supervised by well trained people, long periods of time may elapse before data becomes available.

3.2.2. Informant interviewing

Asking knowledgeable people in the local area can provide considerable information. Asking a variety of people--people of different class, cast, gender, cultural, economic, religious, and positional characteristics--can provide a cross-check on bias.

3.2.3. Ethnography

Trained observers who live in an area for an extended period can learn a great deal not only about adoption of innovations but about the particular circumstances that foster or inhibit adoption. By immersing themselves in the local culture, they learn about communication patterns, the flow of influence, the values of particular subgroups, the subtle influences of status and fear, responses to outsiders,--the mutual adaptation of indigenous culture and imported innovation.

Although ethnography is not likely to be a suitable data collection technique for AID, libraries or universities or research centers may be able to identify anthropological studies that have been done in a region. With luck, some information of relevance to spread will surface. Even without such directly relevant information, such studies may be helpful in interpreting information collected by other means.

3.2.4. Records/documents

Records, documents and already collected data probably represent the most underexploited source of information on spread effects. Although it is impossible to give explicit guidance about which

records, documents, and previous surveys will be fruitful sources for the many different kinds of AID projects around the world, it is perhaps well to suggest that attention be given to records, including AID and mission records and that careful procedures be instituted to locate records and protect documents from "institutional memory failure."

3.2.5. Observation/visual inspection

Adoption of certain kinds of innovations is visible to an observer. For example, roads, deep wells, new health clinics, can be located. Aerial photography can map them; a vigilant visitor can examine not only their outward form but the state of repair, the level of use, the nature of surrounding activity.

Particularly for organizational innovations, site visits can collect important information about implementation. Observation of classrooms may reveal whether a new curriculum is actually being implemented. Visits to government bureaus may show whether new equipment is in use or lying idle.

3.2.6. Aggregate data

For some types of innovations, aggregate statistics provide a measure both of the effectiveness of adoption (evaluation of the project) and of project spread. For family planning projects, for example, the birth rate of a community (after an appropriate time interval) indicates whether inhabitants are using the contraceptive methods. An examination of similar statistics in other communities to which the innovation is hypothesized to have spread will suggest whether residents in those sites have begun using contraception. Over a sufficient time period, birth statistics can provide indications of the temporal and spatial distribution of the innovation.

For innovations involving hybrid seed, fertilizer, irrigation, and/or related practices that are expected to increase crop yields, statistics on aggregate yield can provide similar indicators. They suggest (without, of course, "proving") when and where the innovative practices have been implemented.

3.2.7. The "pinch point"

In order to save the time, money, and effort that large-scale surveys and searches entail, it is useful to find a pinch point through which the relevant information must travel. For example, if all irrigation pumps have to be ordered from a single supplier or a small number of distributors, then the spread of those pumps can be tracked by gaining access to the records of the suppliers.

One of the studies that we reviewed contained a clever example of the pinch point technique. Coleman, Katz, and Menzel wanted to learn which physicians in a community adopted a new drug, when they adopted it, and the characteristics that distinguished early from late adopters. Instead of undertaking a survey of physicians and relying on their (often faulty) memory about when they first prescribed the drug, they turned to pharmacists' records. From that source (through which all prescriptions must pass), they recorded the names of adopters, date of first adoption, and the frequency with which they prescribed the drug. The method was much less time-consuming than a survey and provided more reliable information. They also collected much background information about the physicians from published medical directories.

3.2.8. Summary

No one data collection method is ideal for all seasons. Each has advantages and (alas) disadvantages. Whether advantages outweigh disadvantages depends on the local circumstances and the type of innovation being studied.

In general, the least expensive techniques in time and effort are informants, records and documents, and aggregate statistics. But informants may be misleading, records may be incomplete, and no appropriate statistics may exist for the local area or on the subject of concern.

Direct observation requires more time--and unless the observer leaves the environs of the capital city and the paved road, this too can be a biased source of information. Sample surveys and ethnographies both require trained people (although of vastly different competences) and substantial periods of time. When they are done well, they yield results that are richer and more valid than other methods. But they are likely to be beyond AID missions' resources.

If fortuitously a local university is doing research of its own and is willing to accommodate some requests for information, or if students (under faculty supervision) are seeking opportunities to do research, that is a stroke of enormously good luck. Some attempts might be made to coax such opportunities into being.

Otherwise, trade-offs is likely to be the name of the game. Several data collection techniques can be tried in the hope that their weaknesses offset each other. But most important by far, when any method is employed, the user should be fully aware of the potential biases and inadequacies that attend it--and take all practicable steps to overcome them. See the "Guide for Measuring Spread Effects" for more details.

4. Purposeful Omissions

We looked very carefully at several landmark studies in two areas: (1) the scientific origins of technical innovations and (2) the use of social science research and evaluation for policy making. These are extremely interesting and provocative studies, but they do not seem relevant (or transferable) to the measurement of spread effects.

Three extensive studies (and many smaller ones) have been done on the application of scientific research to the development of new technologies. The outstanding studies are Project Hindsight (on weapons systems), the IIT Traces Study (on the contraceptive pill, matrix isolation, video tape recorder, magnetic ferrites, and electron microscope), and Battelle's study on the Interactions of Science and Technology in the Innovative Process (on the heart pacemaker, hybrid corn, hybrid small grains, Green Revolution wheat, electrophotography, input-output economic analysis, organophosphorus insecticides, oral contraceptives, magnetic ferrites, and video tape recorder). Despite the interest of the methods and findings for many purposes, they do not seem to advance our quest.

The work on the applications of social science research and evaluation to policy making has somewhat more relevance. One of the significant findings by Weiss, Caplan, Patton, and others is that, it is the generalizations and ideas from research that influence policy, much more than specific empirical findings from particular studies. This conclusion to some extent parallels Everett Rogers' recent emphasis on the "re-invention" of innovations, i.e. the many modifications that are made both in the innovation and in the adopting organization during the process of implementation. But again, the studies do not contribute directly to methods of studying spread effects.

5. Adaptation of Component Features and Diffusion to New Uses

We found extraordinarily little in the published literature about adaptation of component features or diffusion to new uses. Nor did the many experts with whom we spoke know about relevant materials. Even the NASA and NSF efforts in technology transfer, which we expected to provide important lessons, proved to have little to offer.

We have located two forthcoming studies, one in progress and one in the planning stage, that may (or may not) turn out to be relevant. The further exploration of these areas represents a task yet to be done.

I. Original Adoption

	Agriculture	Health, family planning and nutrition	Institutional managerial arrangements	Other social technologies	Other physical technologies
Sample survey	1. Sandhu & Allen (1974); Choudhary & Maharaja (1966); Rogers et al (1970)	2. Alers-Montalvo (1957); Junghare & Roy (1963); Wellin (1955); Chandrasekran & Hermalin (1976); Logan (1973); Berelson & Freedman (1964)	3. Cancian (1967); Evans & Black (1967)	4. Suchman (1967)	5. Arndt (1967); Obibuaku (1967)
Informant Interviewing	6. Rogers et al (1970)	7. Wellin (1955); Logan (1973)	8. U.S.A.I.D. (1980)	9.	10. Obibuaku (1967); Feller et al (1974)
Ethnography	11. Eisendel (1968)	12.	13.	14.	15.
Records/ documents	16.	17. Chandrasekaran & Hermalin (1976); Berelson & Freedman (1964); Guchuchi (1973)	18.	19. Anello (1966); Ching-Ching et al (1974)	20. Obibuaku (1967)
Observation/ visual inspection	21. Rogers et al (1970)	22. Wellin (1955); Logan (1973)	23.	24. Agnew & Hsu (1960)	25.
Aggregate statistics	26.	27. Chandrasekaran & Hermalin (1976); Berelson & Freedman (1964)	28.	29.	30.

II. Replication

	Agriculture	Health, family planning and nutrition	Institutional managerial arrangements	Other social technologies	Other physical technologies
Sample survey	1. Ryan & Gross (1943); Coughenour (1964); Fliegel & Kivlin (1966); Sawhney (1967; Ramachandian (1975)	2. Deutschmann, Mendez & Herzog (1967); Dubey & Choldin (1967); Coleman et al (1959a)	3.	4.	5. Raper & Tappan (1943)
Informant interviewing	6. U.S.A.I.D. (1980a)	7. Becker (1970a)	8. Yin (1978)	9. Yin (1978); Frantzlich (1979); Rogers et al (1979)	10. Mansfield (1963)
Ethnography	11. Dobyns (1962)	12. Chandra (1964)	13.	14. Chandra (1964)	15. Chandra (1964)
Records/ documents	16. Ramachandian (1975)	17. Coleman et al (1959a)	18. Simon & Golembo (1967)	19. Rogers et al (1979)	20. Mansfield (1963); Davies (1979)
Observation/ visual inspection	21.	22. Bradshaw & Mapp (1972)	23.	24. Rogers et al (1979)	25. Raper & Tappan (1943); Whyte (1954)
Aggregate statistics	26. U.S.A.I.D. (1980a); Ramachandian (1975)	27.	28.	29.	30.

III. Adaptation of Component Features

	Agriculture	Health, family planning and nutrition	Institutional managerial arrangements	Other social technologies	Other physical technologies
Sample survey	1.	2.	3.	4.	5.
Informant interviewing	6.	7.	8. World Bank (1976)	9.	10.
Ethnography	11.	12.	13.	14. King (1965)	15.
Records/ documents	16.	17.	18.	19. Anello (1966)	20.
Observation/ visual inspection	21.	22.	23.	24.	25.
Aggregate statistics	26.	27.	28.	29.	30.

IV. Diffusion to New Uses

	Agriculture	Health, family planning and nutrition	Institutional managerial arrangements	Other social technologies	Other physical technologies
Sample survey	1.	2.	3.	4.	5.
Informant interviewing	6.	7.	8.	9.	10. Hammond (1978)
Ethnography	11.	12.	13.	14.	15.
Records/ documents	16.	17.	18.	19.	20.
Observation/ visual inspection	21.	22.	23.	24.	25. Hammond (1978)
Aggregate statistics	26.	27.	28.	29.	30.

Agarwala-Rogers, Rekha, "A Family Planning Survey in Four Delhi Villages," Population Studies, Vol. 15 (2): 110-120, 1961. (I. 2).

A study of family planning attitudes and practices among 455 married women, aged 15-45, in four villages in India.

Agnew, Paul C. and Francis L.K. Hsu, "Introducing Changes in Two Mental Hospitals," Human Organization, Vol. 19: 195-198, 1960. (I. 24).

The innovation being studied was patients wearing their own clothes on the ward. Research was based on observations of the reactions of both the patients and the staff.

Alers-Montalvo, M., "Cultural Change in a Costa Rican Village," Human Organization, Vol. 15 (4): 2-7, 1957. (I. 1,2).

As part of the evaluation of a community development program conducted in the Turrialba Canton of Costa Rica, the author analyzed cultural change in one village, San Juan Norte. Forty-seven male heads of families and 45 housewives of the 60 resident families were interviewed to provide initial data on changes and failure to change certain agricultural, health, and nutritional practices. Three agricultural innovations, two which had been successfully introduced and one which had failed, were then intensively studied. A different sample and interview schedule were used to study each innovation. Each sample was random and stratified by area of residence. Using the 47 male household heads who were interviewed originally as the population, 13 men were sampled and asked about using insecticides. Thirty-five of the original 47 had heard about the importance of cultivating a vegetable garden, and 12 of these 35 were randomly selected and interviewed intensively. Finally 8 of the 27 who cultivated sugar cane were selected and interviewed about using new variety of cane.

Anello, M., "The Cure for Literacy: Adult Education in Italy," Adult Leadership, Vol. 15: 159-179, 1966. (I. 19; III. 19)

Descriptive account of the Italian government's adult literacy program which established 165,000 programs serving 3,173,000 students. "Although the general structure of the schools was directed to eliminate adult illiteracy, a number of special courses of a general cultural nature were also offered (37,000 courses with 701,000 students)." (pp. 159, 178) The Italian radio instituted a program, "Telescuola," for persons who had never advanced beyond the elementary grades. To allow people to study in private, the government also provided textbooks. Eventually, listening posts in remote communities were established where students gathered to listen to "Telescuola." This attracted an additional 66,248 registrants.

Arndt, Johan, "Role of Product-Related Conservations in the Diffusion of a New Product," Journal of Research, Vol. 4: 291-5, 1967. (I. 5).

Method was a "field experiment" in which a new brand of a frequently purchased food product was displayed in the commissary of a 495-unit apartment complex for married students (location unspecified, but obviously U.S.). Each wife was also mailed a letter and a coupon for the product at one-third of the retail price. After 16 days, personal interviews were held with about 90% of the wives.

Interviews asked about word-of-mouth comments regarding the product. Of those hearing favorable comments from other wives in the complex, 54% bought the product; of those hearing no or neutral comments, 42% bought; of those hearing negative comments, 18% bought.

Bauer, R.A. and L.H. Wortzel, "Doctor's Choice: The Physician and his Source of Information about Drugs," Journal of Marketing Research, Vol. 3 (2): 40-47, 1966. (II. 2).

Study of the diffusion of information about new drugs to physicians. Found that commercial promotion via journal advertising is used for initial screening; professional sources are used for information regarding specific prescriptions in serious cases. Method: survey; percentages reported in the following categories: physicians preferred sources of information; source of notice of recently adopted pharmaceatical; and source of information leading to prescribing new drugs.

Becker, Marshall, "Socioeconomic Location and Innovativeness: Reformulation and Extension of the Diffusion Model," American Sociological Review, Vol. 35: 267-282, 1970a. (II. 7).

Two innovations were studied: measle immunizations (high adoptive potential) and diabetes screening (low adoptive potential). Every director of a local health department in Michigan, Illinois and New York was sampled; there was a 92% response rate. Data were gathered through a mailed self-administered questionnaire and a follow-up telephone interview lasing about 1 hour. Data included communication networks as well as whether or not the two public health services were provided by the local health department.

Berelson, Bernard and Ronald Freedman, "A Study of Fertility Control," Scientific American, Vol. 210 (May): 29-39, 1964. (I. 2, 17, 27).

A study of the adoption of fertility control devices. Methods of data collection included: (1) case records of all people whose home was visited by a family planning worker or who visited the clinic, (2) a random survey of 2432 females of childbearing age, and (3) unpublished fertility statistics.

Bose, A.B. and P.C. Saxena, " The Diffusion of Innovations in a Village in Western Rajasthan," Eastern Anthropologist, Vol. 18 (3): 138-151, 1965. (cited in Fray, 1969). (I. 24).

"Adoption of agricultural innovations and the channels of communication for innovation were studied in Kitnod, considered the most progressive village in the Balotra Community Development Block, Barmer district. The study was restricted to only 85 of the 236 households, since the innovations studied pertained only to rabi (winter) crops. The data were collected by a field investigator using a prepared schedule in interviews with the head of each household. The study was carried out during late 1963 and early 1964."

Bose, Santi Priya, "Characteristics of Farmers Who Adopt Agricultural Practices in Indian Villages," Rural Sociology, Vol. 26 (2): 138-145, 1961. (cited in Fray, 1969). (I. 1).

"The author investigated the characteristics of those farmers who adopt or do not adopt the new agricultural practices. Survey research was conducted in the state of West Bengal, India. A census of households was carried out in 10 villages. These were villages in which at least 36 percent of the farmers had accepted one or more of the practices suggested by the Agricultural Extension Service in West Bengal. In all villages the heads of families were interviewed. The field survey was carried out by the local extension worker. The respondents were asked whether they had adopted some specific recommendations by the Extension Service: They were also asked questions on socioeconomic background."

Bradshaw, Barbara and C.B. Mapps, "Consumer Participation in a Family Planning Program," American Journal of Public Health, Vol. 62 (7): 969-972, 1972. (II. 22).

Research involves case histories prepared by interviewing members of a Patients Advisory Committee (PAC) and the family planning clinic it serves. The PAC was set up initially as a condition of the grants received by the family planning program, but it was found that quite a few programs got under way as a result.

Brown, Lawrence A. and Barry Letnek, "Innovation Diffusion in a Developing Economy: A Mesocale View," Economic Development and Cultural Change, Vol. 21: 280-284, 1972. (II. 1).

Adoption of commercial dairying in Aguascalientes, Mexico was the subject of this 1968 study. A spatially stratified, 0.5% random sample of the rural farm household population was taken, as well as a systematic sample of one out of every three Nestle Corporation suppliers of raw milk along selected routes.

Questions asked of the farmers included: age at time of adoption, number of years attended school (milk programs having been started at school lunch), size of family, index of contact with mass media, number of trips to a major city in a single year, proximity to market, average 1967-68 net annual income and average size of cultivated area.

Cancian, Frank, "Stratification and Risk-taking: A Theory Tested on Agricultural Innovation," American Sociological Review, Vol. 32: 912-929, 1967. (I. 3).

The innovation studied was the sale of corn to government receiving centers (rather than hoarding or selling in local marketplace). Subjects included 93 married males who were at least 27 years old and who were independent corn farmers. In addition to ascertaining whether each farmer sold corn to the receiving center, socioeconomic data was gathered.

Chandra, Prabhat, "Communication of Some New Ideas in a Madhya Pradesh Village: A Sociological Study Conducted in a Mixed Village," Eastern Anthropologist, Vol. 17 (3): 183-214, 1964. (II. 12, 14, 15).

The village of Natwara in Jabalpur district was investigated, and the tribal Gonds were compared with the nontribal Hindus. The purpose was to discover the extent to which some of the new ideas had been accepted and assimilated by the people of Natwara and the extent to which the rural society's structure, value, and norms offered resistance to them. The following were examined: (1) articles of personal use, e.g., soap, radio; (2) education; (3) scientific treatment of disease; (4) family planning; (5) smokeless chulhas; (6) filtered water; (7) sanitary latrines; (8) decimal coinage; and (9) metric weights and measures. Questions were also asked about 5-Year Plans, Panchayat Raj, Chinese aggression, etc. The survey was completed between June 1961 and May 1963.

Chandrasekaran, C. and Albert I. Hermalin, Measuring the Effect of Family Planning Programs on Fertility, International Union for the Scientific Study of Population, 1976. (I. 2, 17, 27).

In Singapore, a 50% sample study of family planning program acceptors was conducted between July 1967 and December 1970. The number of visits to the center was recorded and the crude birth rate was computed and compared to 1965 data. Papers are also included analyzing family planning acceptance in Taiwan and Washington, D.C.

Chaudhari, Haider Ali, Eugene C. Erickson and Izaz Ahmad Bajwa, "Social Characteristics of Agricultural Innovators in Two Punjabi Villages in West Pakistan," Rural Sociology, Vol. 32 (4): 468-473, 1967. (cited in Fray, 1969). (II. 1)

"An attempt was made to determine the social characteristics that distinguish adopters of innovations from nonadopters in a village in West Pakistan. Two villages in Sialkot district were selected for study: Ghazipur and Majahidpur. A total of 161 interviews were conducted in Ghazipur, and 47 in Mujahidpur."

Ching-Ching, Eleanor, Yong Jai Lee, and Mei-Yuan Lin, "Family Planning Telephone Services in Two Asian Cities," Studies in Family Planning, Vol. 5 (4): 111-114, 1974. (I. 19).

The use of telephone counseling as a means to disseminate family planning information was studied. The data were records of phone calls coming into the family planning service. One finding was that the telephone counseling service brought more than the expected number of queries from males and from young people.

Choudhary, Kalyan Mal and Madhukar Maharaja, "Acceptance of Improved Practices and their Diffusion among Wheat-growers in the Pali District of Rajasthan," Indian Journal of Agricultural Economics, Vol. 21 (1): 161-165, 1966. (I. 1).

A study of adoption of a package of improved agricultural practices by farmers in the Pali district of Rajasthan. A sample of 90 wheat-growing holdings in three villages of the Desuri block, conducted by the Agro-Economic Research Centre for the States of Gujarat and Rajasthan. Farmers with varying social and economic backgrounds were sought, in areas where the improved practices had been introduced. It was found that none of the farmers adopted the package as a whole, rather that they adopted a number of practices, their combinations differing, dependent on the villages or groups of farmers.

Coleman, James, Herbert Menzel, and Elihu Katz, "Social Processes in Physicians' Adoption of a New Drug," Journal of Chronic Diseases, Vol. 9 (1): 1-19, 1959a. (II. 2, 17).

A study of adoption of a new drug ("gammamym") by doctors in a midwestern U.S. community. Data collection techniques included (1) interviews with physicians and (2) search of prescription records of local pharmacies. The latter were used to determine the time of first use of drug by each doctor. Prescription records were checked for a 3-day period monthly for 15 months. Researchers were interested in the effects of professional communication channels on adoption of innovations.

Coughenour, C.M., "The Rate of Technological Diffusion among Locality Groups," American Journal of Sociology, Vol. 69 (1): 325-39, 1964. (II. 1).

The rate of diffusion for single innovations has been found to vary among communities and other types of sociogeographic areas, but whether an area manifests a characteristic rate of diffusion, and, if so, to what factors it may be related, has not been systematically investigated. Data obtained in personal interviews with farm operators in 12 Kentucky localities in 1950, 1955, and 1960 provide insight into these questions. It is found that the relative pace of diffusion among localities for each of five recommended farm practices is quite similar, indicating the existence of an underlying rate of diffusion for each locality. A measure of relative locality diffusion rate is found to be most closely related to the median educational level of farmers, median level of contact with communication media, and an index for localities of the integration of communication structures. The locality median scale of farming and measures of attitudes toward scientific farming, family visiting and social participation are less closely related to average diffusion rate.

Dasgupta, Satadal, "Innovation and Innovators in Indian Villages," Man in India, Vol. 43 (1): 27-34, 1963. (cited in Fray, 1969). (II. 1).

"Three hypotheses were tested: (1) Innovators own larger farms than early adopters and average farmers; early adopters in their turn own larger farms than the average farmers. (2) Innovators for the most part own the farms which they operate; smaller numbers of early adopters and average farmers own farms. (3) Innovators have higher socioeconomic status, have greater degree of outside contact, adopt more improved practices and are more socially orientated than average farmers; the position of early adopters is intermediate. In a multi-stage sample, 4 villages were selected from 25 which had been randomly selected from a list of the 594 villages in the Barasat. The family heads of all 245 farm families in the 4 villages were interviewed; they were asked which of a list of 9 recommended practices they had adopted, how long had they used it, where did they find out about it, with whom did they consult, and they were also asked about their own economic, social, and occupational characteristics. The 9 item list was as follows: (1) amaonium sulphate; (2) fertilizer mixture; (3) plant protection chemical; (4) improved jute seed; (5) improved wheat seed; (6) the Japanese method of rice cultivation; (7) drilling of jute; (8) use of pumping plant for irrigation; (9) artificial insemination."

Davies, Stephen, The Diffusion of Process Innovation, Cambridge University Press, 1979. (II. 20).

A study of adoption of a large number of industrial innovations. Data came from various sources: (1) trade and scientific publications, (2) the National Institute of Economic and Social Research and (3) independent researchers. A highly mathematical treatment of diffusion of innovations.

Desai, D.K. and B.M. Sharma, "Technology Change and the Rate of Diffusion," Indian Journal of Agricultural Economics, Vol. 21 (1): 141-160, 1960. (I. 1).

A study of the adoption of fertilizers in the village of Nanghi, India. The fertilizer was used mainly for wheat crops. Twenty-one farmers who adopted fertilizers were interviewed, as were 16 nonadopters. The sample was stratified according to the size of the area planted with wheat crops, based on information from village farm workers. Interviews took place at the farmers' homes, one day per week, for a total of 8 visits. The literacy of the entire family and availability of individual irrigation facilities were used in the analysis. It was observed that in cases of farmers who adopted fertilizer, the usage was usually modified depending on the size of his crop and his current financial situation. In general, less fertilizer was used than was suggested, and in differing combinations than recommended.

Deutschmann, Paul J. and Orlando Fals Borda, Communication and Adoption Patterns in an Andean Village. San Jose, Costa Rica: Programa Interamericano de Informacion Popular, 1962. (I. 11, II. 11).

An early study of adoption of agricultural innovations in a village in Columbia. The study documented that adoption of innovations can take a long time: in the case of a chemical fertilizer, more than thirty years passed between the first use and the complete adoption of the fertilizer in a Colombian village. Change agents can accelerate the adoption process, as can observation of the innovation in a neighbor's field: eighty percent of the peasants observed innovations on nearby farms before adopting them. Once they decided to adopt, however, most of them went directly to full-scale use, rather than beginning with a small-scale trial. The researchers argue that "taking cultural differences into account, the basic pattern of diffusion of information and adoption of new farm practices would be substantially the same" in a Colombian village or in the United States.

Deutschmann, Paul John, Alfredo Mendez, and William Herzog, Adoption of Drugs and Food in Five Guatemalan Villages, American International Association for Economic and Social Development, 1967. (II. 2).

Study of adoption of analgesic, laxatives, soft drinks, coffee and Incaparina (a low-cost food supplement) in five Guatemalan villages. One thousand and two housewives interviewed. Villages chosen to represent diversity in ethnic composition, size, and social organization.

Dobyns, H.F., et al., "A Contagious Experiment: The Vicos Idea Has Spread Throughout Peru," Saturday Review, Nov. 3: 59-62, 1962. (I. 11).

"Vicos" is a land reform experiment carried out by an American anthropologist in rural Peru from 1952 to 1956. "Since the direct intervention . . . the community development and educational program of the Peruvian government carried on in Vicos has been extended to nine other adjacent communities, primarily through the functioning of the greatly enlarged Vicos school as a nucleus for a rural peasant school system." (p. 59) "The peasant school program also reaches some Mestizos farming small properties between the large estates. Residents of these towns question the Viscosimos about details of their modern agricultural technology." (p. 59) The organizational structure of the project has been copied to a significant extent in setting up community development and Indian integration programs elsewhere in Peru.

The article is basically a non-empirical, journalistic account.

Dubey, D.C. and Harvey M. Choldin, "Communication and Diffusion of the IUCD: A Case in Urban India," Demography, Vol. 4 (2): 601-614, 1967. (II. 2).

A study of IUCD adoption. Standardized interviews with 263 husbands of women who had IUCDs inserted in the first 10 months of a program. Husbands were interviewed because of "lack of funds for female interviewers."

Eisendel, L.A., Success and Failure of Some Community Development Projects in Batangas, Community Development Research Council, University of the Philippines, 1968. (I. 11).

Description of the success of an animal immunization project in Barrio Talaga in the Philippines attributed partially to "the existence of a farmers' club which served as the vehicle for communication of the ideas and for educational information." (p. 26). Previous contacts with veterinarians and livestock inspectors were ineffective because farmers "look down on (these) profession(s)." (p. 25). The knowledge and skill of the municipal agriculturist who initiated the educational program contributed to changing attitudes, thus making farmers more receptive to immunization. The method was a mini-case study.

Evans, W.M. and G. Black, "Innovations in Business Organizations," Journal of Business, Vol. 40: 519-530, 1967. (I. 3).

"In the extensive literature on diffusion of new ideas in agriculture or in other contexts, the social unit most frequently investigated has been a community . . . Little attention has been paid to the diffusion of ideas in the context of an organization." (p. 519). When new ideas are developed, managers communicate the ideas (here, in the form of a proposal) to others in the organization. This study shows that a proposal's success is associated with the organization's competitive position, its degree of staff professionalization, its degree of formalization of rules and its degree of communication between staff and line personnel. Questionnaire data obtained from three sources: 30 graduates of a management development program, and 23 employees in 2 companies. A total of 104 descriptions of proposals were obtained. Data were analyzed using discriminant analysis.

Fairweather, G.W., D.H. Sanders, and L.G. Tornatzky, Creating Change in Mental Health Organizations, New York: Pergamon Press, 1974.

This is the report of a national experiment in the U.S. to study the adoption behavior of 255 mental hospitals (almost the entire universe of mental hospitals). Attempts were made to contact all hospitals with information about an innovative rehabilitation program, "the lodge." One-third (85) were offered attractive brochures about the lodge program, one-third (85) were offered the opportunity to have a workshop about the program, and one-third were offered the opportunity to have a small demonstration program set up. One hundred and seven hospitals refused to permit the persuasion attempt (30% of the brochure group, 20% of the workshop gorup, and 75% of those offered a demonstration ward.) One hundred and forty-eight hospitals permitted the persuasion, but only 23 decided to implement the program. In the end, adopters represented 5% of the brochure group, 12% of the workshop group, and 11% of the hospitals that had had a demonstration.

Data were collected initially by telephone in the contacts with the hospitals and later by phone and in person during the persuasion/diffusion effort.

Feller, Irwin, Donald Menzel, and Alfred J. Engel, Diffusion of Technologies in State Mission-Oriented Agencies, University Park: Center for the Study of Science Policy, Pennsylvania State University, 1974. (II. 10).

Adoption of several technologies in two functional fields, air pollution and highways-transportation, in ten U.S. states. Individuals in state agencies directly involved with the decision to adopt were questioned.

Field interviews were conducted, initial contact being made with a high-ranking official in each agency. It became evident through this preliminary questioning that division engineers and staff personnel sometimes occupied major roles in the diffusion process as well, and thus they were also questioned. Further meetings with state officials indicated it was a wise step to interview commercial entrepreneurs and manufacturers (approximately a half dozen profit and non-profit making organizations), and the interviewers felt that their input was invaluable.

Questions were asked concerning (1) the actual adoption decision (e.g., has your agency adopted this certain technology? when did the system become operational?), (2) the decision makers and funding, (3) role of the Federal agencies, (4) the professional interests of the interviewee and (5) the interviewee's particular organization (its weak points, strong points, in his confidential estimation).

Fliegel, Frederick C. and Joseph E. Kivlin, "Attributes of Innovations as Factors in Diffusion," American Journal of Sociology, Vol. 72 (3): 235-248, 1966. (II. 1).

Study of adoption of modern farm practices, including soil management, crop selection, cow breeding, machinery, and others. Interviewed 229 farm operators on 33 separate innovations.

Frantzlich, S.E., "Technological Innovation among Congressmen," Social Forces, Vol. 57 (3): 968-74, 1979. (II. 9).

Studies the willingness of individual members of U.S. House of Representatives to adopt some form of computer application as a method of improving efficiency and effectiveness. Attempts to determine whether the theories of innovativeness developed in relation to other realms of human activity are applicable to an elite political group. "While the variables used to measure needs and marginality all are related, each of them exerts an independent effect on the decision to use computer application." (p. 273). Results: average innovator is a young Republican from a marginal district who came to Congress with little previous political experience and who has only been in office a few terms. Chi square tests on: (1) computer utilization and electoral vulnerability; (2) technological innovation, occupational background and seniority; and (3) congressional seniority and technological innovation.

Gerhart, John, The Diffusion of Hybrid Maize in Western Kenya, Centro Internacional de Majoramiento de Maiz y Trigo, Mexico, 1975. (II. 1).

A study of the diffusion of hybrid maize, based on a sample survey of 360 maize farmers in Kenya in 1973. The sample was designed to include farmers from each of three different agro-climatic zones, plus a special sample of large farmers.

Gille, Halvor and R.H. Pavdaka, "A Family Life Study in East Java: Preliminary Findings," in Family Planning and Population Programs: A Review of World Developments, Bernard Berelson et al (eds.), Chicago: University of Chicago Press, 1966. (I. 2).

This study focused on demographic and socioeconomic data which were to be used in the design of family planning programs in East Java.

Data was collected through three rounds of interviews with husbands and wives in 1002 households in 10 villages in East Java.

Guchuhi, Mugo J., Family Planning in Kenya: Program and Problems, Nairobi: Institute for Development Studies, University of Nairobi, 1973. (I. 17).

Adoption of family planning programs in Kenya. Program evaluation by the Ministry of Health is based on clinical record cards used by all family planning centres and related services. A problem is reported with data collection: the card collects basic information on the client, but measures only how many people come to the clinic each day, not how well the program is actually progressing.

Hammond, Ross W., "The Oil Drum: Humble Appropriate Technology Building Block," Pictorial Monograph No. 3, Engineering Experiment Station, Georgia, Institute of Technology, 1978. (IV. 10, 25).

This short report notes the multiplicity of uses found for the oil drum by entrepreneurs and "appropriate technology" institutes in less developed countries. In addition to being excellent vessels for storing and transporting a wide variety of liquids and solids, many more innovative uses of oil drums have been observed: (1) Drums were used to mix swine feed in the Philippines. A door was added to the side of the drum, to allow ingredients to be added and feed removed. Metal mixing vanes were welded inside the drum to facilitate the mixing process; (2) Drums are used for flotation devices "in many countries of the world." An organization in Chile which is affiliated with Georgia Tech has modified the drum to serve as a paddle wheel, to generate electricity; (3) Drums were observed being used as a steam boiler in a rattan processing plant in Bangkok, to clean and reshape rattan used in furniture; (4) Drums were used to house ice-making equipment in the Institute of Technology in Indonesia; (5) Drums were used to make windmills in the Philippines, using "the Savonius rotor principle for windmill design."; (6) Drums were stacked to form chimneys in metalworking factories in Korea; and (7) A slurry of cow manure was processed in oil drums in India and Thailand to produce bio-gas for household use.

Havens, Eugene A. and William L. Flinn, Internal Colonialism and Structural Change in Columbia, New York: Praeger, 1970. (I. 1).

Study of adoption of agricultural innovations in Tamesis, a community in the department of Antioguia, Colombia. One hundred farm families were interviewed. Ten agricultural changes were studied (related to livestock, feed, and pasture improvement). In addition to questions on adoption of innovation, farmers were asked about their educational level, savings, and credit arrangements.

Junghare, Y.N. and Roy Prodipto, "The Relation of Health-Practice Innovation to Social Background Characteristics and Attitudes," Rural Sociology, Vol. 28 (4): 394-400, 1963. (I. 2).

The relationship between the acceptance of certain medical innovations by Indian villagers and their social background, their contacts with Indian Village Service (IVS) and their attitudes is examined. A random sample of 200 families living in 11 of the 12 villages in the Marehra area was selected. The 11 villages were purposively selected because they were at different stages of development. The field survey was carried out by trained interviewers from November 1960 through January 1961. Respondents' opinions regarding the nine practices promulgated by IVS were explored.

King, C., Working with People in Community Action, New York: Associated Press, 1965. (III. 14).

Members of the community were organized by an outside agent around one project; the organization later enabled them to implement other projects on their own. The process here, then, is community organization or community development. Examples: In Suh Kam Chon, a Korean village, residents used thousands of man-hours to restore their irrigation works. Previously idle land was reclaimed for a rice paddy; income from the rice crop increment was invested in a children's playground.

In the village of Chotapara, India, a village worker organized individuals to improve the town's main road. Having dealt successfully with this problem, they were encouraged to go on and untertake other community problems such as building a school and starting a credit co-operative. In Manysis, Kenya, an initial community organizational effort around improved animal husbandry led to projects involving the construction of outside stoves, building latrines and improving water supplies.

Logan, Michael H., "Humoral Medicine in Guatemala and Peasant Acceptance of Modern Medicine," Human Organization, Vol. 32 (4): 385-396, 1973. (I. 2, 7, 22).

A study of the adoption of modern medical practices. Data were collected through interviews with both patients and medical personnel and by medical tests. The introduction of modern medical procedures was linked to an understanding of the cultural concepts of "hot" and "cold."

Mansfield, Edwin, "The Speed of Response of Firms to New Techniques," Quarterly Journal of Economics, Vol. 77: 290-311, 1963. (II. 10, 20).

A study of 14 innovations in iron and steel, coal, brewing, and railroad industries.

Data based on available records and on interviews with executives in each industry. The date each firm began to use each innovation was the key adoption variable.

Obiuaku, L.O., "Socioeconomic Problems in the Adoption Process: Introduction of a Hydraulic Palm-Oil Press," Rural Sociology, Vol. 32 (4): 464-468, 1967. (I. 5, 10, 20).

Some of the factors affecting the acceptance or rejection of a farm innovation, the hydraulic oil press, in Western Nigeria are explored. The study was carried out in Gbedun, a village 20 miles southeast of Ibadan. Information was collected from the experiences and records of the Agricultural Assistant, heads of families, and from a purposive sample of all the women concerned with oil processing in the village. A total of 75 respondents were interviewed. The study was conducted in early 1966 by the Department of Agricultural Economics of the University of Ibadan, and the Ministry of Agriculture of the Western Group of Provinces.

Opare, K.D., "The Role of Agricultural Extension in the Adoption of Innovation by Cocoa Growers in Ghana," Rural Sociology, Vol. 42 (Spring): 72-82, 1977. (II. 1).

"Explores the relationship between adoption of recommended cocoa practices by growers in Ghana and the correctness of their knowledge of principles underlying the practices, the grower's sources of cocoa husbandry information and their personal and economic characteristics. Hypotheses developed from methods and adoption literature were tested with a sample of 1,191 cocoa growers. It was concluded that understanding the principles underlying a recommended practice is crucial to adaptation . . . Thus, access to formal instruction could contribute to the improved performance of growers." (p. 72). Example of hypothesis: "The 'selected practices' adaptation score for cocoa growers in Ghana is positively correlated with the correctness of grower's knowledge of the principles underlying the practices." Data analysis: stepwise regression analysis.

Pampel, F. and J.C. van Es, "Environmental Quality and Issues of Adoption Research," Rural Sociology, Vol. 42 (Spring): 57-71, 1977. (II. 1).

Diffusion of innovations research has successfully explained the adoption of commercial farm practices designed to protect the environment (innovations with the objective of preserving existing resources). Data gathered through phone interviews with Illinois farmers are used to study the adoption of soil conservation practices and commercial practices (N=340 from several counties). Findings: the adoption of commercial practices is well predicted by variables relating to size of farm business; adoption of environment practices is less successfully predicted by years farmed. Methods: Factor analysis performed on the innovativeness items (examples of commercial innovations are chisel plows, farm records, soil tests; examples of environmental innovations are: contour farming, rotation cover, terracing). Regression analysis of farm characteristics on four measures of adoption of innovations.

Panlu, Laura, H.C. Chen and L.P. Chow, "An Experimental Study of the Effect of Group Meetings on the Acceptance of Family Planning in Taiwan," Journal of Social Issues, Vol. 23 (4): 171-177, 1967. (I. 2).

The focus of this Taiwanese study is the adoption of the intrauterine device (IUD), particularly as affected by small group meetings. Data were collected from a random sample of 758 women (ages 20-44) before and after small group meetings to discuss family planning and the IUD. Another feature of the data collection approach was that coupons were given out to provide family planning services at reduced rates (50% off); researchers monitored the number of coupons redeemed.

Panse, V.G. and D. Singh, "Promotion and Assessment of Technological Change in Indian Agriculture," Indian Journal of Agricultural Economics, Vol. 21 (1): 121-131, 1966. (I. 1).

A study of the spread of improved agricultural practices that are propagated among farmers by extension agents. Two series of sample surveys were conducted: one series in districts which are part of the Intensive Agricultural Programme (IAP) and a second in other districts. The IAP consists of concentrated efforts to increase agricultural production through provision of adequate supplies, credit and extension work. The surveys were repeated in the IAP districts annually while surveys in other districts were repeated every five years. Each survey includes a sample of 800 to 1000 farmers' holdings per district. In addition to interviews with farmers, visits to fields are made occasionally as a check on information provided by farmers.

Ramachandian, R., Spatial Diffusion of Innovations in Rural India, University of Mysore, India: Institute of Development Studies, 1975. (II. 1, 16, 26).

Adoption of electrical irrigation pumps in Coimbatore City, and 190 villages located within a straight line distance 20 miles from city, Coimbatore Plateau area southern India. Data were collected concerning location and dates of installation for 18,754 pumps distributed in the area from 1933-1965 from the unpublished records of the Madras State Electricity Board. Information was obtained from the Indian population consenses for 1931 and 1961. Personal interviews were conducted with 300 farmers.

Raper, Arthur and Pearl W. Tappan, excerpt from "Never Too Old To Learn New Tricks; the Canning Program in Greene County, Georgia," (1943), Communications of Innovations: A Cross Cultural Approach, Everett M. Rogers and F. Floyd Shoemaker (eds.), New York: Free Press, 1971. (II. 25).

Observation and interview in Greene County, Georgia, of several hundred low-income farm families concerning adoption of canning process. Observed that canning became associated with prestige, and families began as a result to fill jars with food that didn't need canning and sometimes did not open jars so as to show them off.

Rogers, Everett M., Joseph R. Ascroft and Niels G. Roling, Diffusion of Innovations in Brazil, Nigeria and India, East Lansing, Michigan: Department of Communication, Michigan State University, 1970. (I. 1, 6, 21).

A study of adoption of innovations promoted by agricultural change agencies. Data gathered in 76 Brazilian villages, 71 Nigerian villages, 108 Indian villages to determine to what extent the people adopted. 10,000 personal interviews with change agents, village leaders, and peasants, from 1964 to 1968.

The following data gathering techniques were used:

(a) unstructered observation;

(b) discussion, interviews with key informants;

(c) pilot studies, small representative sample of respondents; and

(d) closed-ended interview.

Rogers, Everett M., Kathleen P. Magill and Ronald E. Rice, The Innovation Process for Dial-A-Ride, Stanford, CA: Institute for Communication Research, Stanford University, June 1979. (II. 9, 19, 24).

The innovation studied was demand-responsive transportation, wherein a traveler phones through a publicly paid system, for a bus, van, or cab. Urban Mass Transportation Administration (UMTA) of the U.S. Department of Transportation is promoting the innovation.

Ten sites were selected from a known list of 313 communities that adopted Dial-A-Ride -- one or more were demonstration sites funded by UMTA, one or more were non-demonstrator adopters, one or more were rejectors, one or more were sites that adopted Dial-A-Ride and other mass transit innovations.

Data collection involved case studies with intensive interviewing, plus observations of Dial-A-Ride in operation.

Rogers, E.M. and Wicky L. Meynen, "Communication Sources for 2, 4-D Weed Spray Among Colombian Peasants," Rural Sociology, Vol. 30 (2): 213-219, 1966. (cited in Fray, 1969). (II. 1).

"The role of communication sources at different stages in the adoption process in traditional settings was examined. A sample of 158 peasant farmers in 3 veredas about 35 miles from Bogata, Colombia, were interviewed in 1963."

Ryan, Bryce and Neal Cross, "The Diffusion of Hybrid Seed Corn in Two Iowa Communities," Rural Sociology, Vol. 8: 15-24, 1943. (II. 1).

A study of 267 farmers, all of whom adopted hybrid corn by the time of study. The farmers were asked about the original source of knowledge. A early, frequently cited classic.

Sandhu, Harjit S. and Donald E. Allen, "The Village Influence on Punjabi Farm Modernization," American Journal of Sociology, Vol. 79: 967-980, 1974. (I. 1).

Primarily a study of agricultural innovation, including seeds, irrigation, tractors, sprays, etc. Random sample of married farmers, with at least two children, 8 farmers in each of 93 villages. Questionnaires administered by inspectors from the Punjabi Agricultural Department.

Sawhney, M. Mohan, "Farm Practice Adoption and the Use of Information Sources and Media in a Rural Community in India," Rural Sociology, Vol. 32 (3): 310-323, 1967. (II. 1).

The author studied the relationship between the use of information sources and media and the stages of farm practices adoption, and the characteristics of the farmers. The investigation was carried out in 17 villages 10-11 miles from New Delhi. Of 1,570 families residing in the village, a random sample of 235 heads of households were interviewed in 1960. Information was obtained on socioeconomic background, media exposure, contact with towns, and participation in formal organizations and extension programs. The questionnaires were filled out by the author.

Seoul National University, Diffusion and Acceptance of Recommended Farm Practices, 1971. (II. 1).

A 1968 study of adoption of agricultural innovations, based on a total of 1,244 farm operators in Taiwan.

Extensive geographical coverage was achieved by interviewing all farmers with more than a minimum amount of land (.817 acres) in each of 25 villages, in 13 counties of 7 states. A total of 23 recommended agricultural practices were included in the study. An adoption score was computed for each farm operator, based on the sum of the number of techniques adopted.

Simon, J.L. and L. Golembo, "The Spread of a Cost-Free Business Innovation," Journal of Business, Vol. 40: 385-388, 1967. (II. 18).

Discusses the diffusion of the marketing technique of "January White Sale," from NYC, where it was "invented"in 1900, to other cities (replication at another site). The data were developed from retrospective inspection of newpaper advertisements, and much of the small city adoption dates are immediately explained by Montgomery Ward's initiating of a national policy of an annual white sale in 1933. One possible determinant of the spread of an innovation is geographical contiguity, whose rationale is the "two step flow of influence" in which neighbors talk to each other chainwise.

Suchman, E.A., "An Experiment in Innovation Among Sugar Cane Cutters in Puerto Rico," Human Organization, Vol. 26: 214-221, 1967. (I. 4).

Compares two methods of introducing occupational safety changes; reports percentages changing practices after use of each of these methods (community organization and education).

U.S. Agency for International Development, Kitale Maize: The Limits of Success, 1980a. (I. 8; II. 6, 26).

This report (prepared by the Studies Division) discusses two kinds of diffusion; the diffusion of hybrid corn among Kenyan farmers and the development of agricultural research potential among Kenyan agricultural scientists and institutions. The former was highly successful, the latter not successful.

In order to assess the diffusion of hybrid corn, the researchers were able to utilize a mass of published data, apparently based on surveys (one entitled the Integrated Rural Survey). These surveys revealed the amount of farmland planted to hybrid corn at particular dates. One survey also identified the source of information for farmers. The diffusion of corn was quite rapid, but apparently not through the efforts of AID or the Government of Kenya. The prime agent seemed to be the Kenya Seed Company, although it was not clear how the role of the Seed Company was discovered.

One important goal of the AID project was to create an indigenous, ongoing maize research capacity. This goal was not achieved. It is not clear how this assessment was achieved, but presumably such a research capacity, if it existed, could be lodged at only a limited number of places, and local experts were able to inform team members that this research capacity was not in fact developed.

As noted above, the hybrid corn spread rapidly, and was adopted by small holders as well as large land owners. The new corn was quite acceptable to consumers, the research station did its job of modifying the seed for different regions, the Kenya Seed Company reproduced, distributed, and promoted the seed, extension agents demonstrated how to use it, and farmers recommended it to their neighbors.

U.S. Agency for International Development, Philippine Small Scale Irrigation, 1980b. (II. 9).

This report (prepared by the Studies Division) notes (p. 7) that there seem to be no spread effect, although the nature of the information that leads to this conclusion is not mentioned. The project apparently involved creation of village irrigation associations, part of whose function would be to provide credit for farmers. Apparently the conclusion referred to above means that such associations were not formed for related purposes, as a result of these irrigation associations.

A methodological appendix records the efforts of the study team to visit five villages felt to be representative of a broad range of circumstances (financially successful vs. not; technical troubles vs. not; single crop vs. multiple; rice vs. diversified), the villages also represent a fair geographic dispersion. In all, 23 associations in 9 provinces were visited.

Wellin, Edward, "Water-Boiling in a Peruvian Town," in Health, Culture and Community, Benjamin D. Paul (ed.), New York: Russell Sage Foundation, 1955. (I. 2, 7, 22).

A study of adoption of water-boiling in Los Molinas, Peru. Rural hygiene workers and local housewives were interviewed, and their daily routines observed. Housewives were asked why they did or did not boil water; background information was also obtained.

Whyte, William H., Jr., excerpt from "Web of Word of Mouth," (1954), in Communications of Innovations: A Cross Cultural Approach, Everett M. Rogers, and F. Floyd Shoemaker (eds.), New York: Free Press, 1971. (II. 25).

This study counted visible air conditioners on Philadelphia row houses to check rate of adoption. Location of air-conditioned houses was charted to illustrate the distribution pattern. Explored the interpersonal channels through interview.

World Bank, The Diffusion of Innovations from Bank-supported Projects, 1976. (III. 8).

The report focuses on diffusion of innovations from three projects financed by the World Bank. It is of interest because the projects involve institutional and managerial innovations, and thus provide a contrast to the kind of innovations most often studied in the sense that they require a change in national policy and/or law. The innovations were selected for study partially because they had begun at least ten years before the study. The report specifically notes the long time span required for diffusion to occur in these instances.

The report is not self-conscious about its methodology; that is, there is no methodological appendix or extended discussion of methods. The report states that "three sets of lending chosen for case study were selected on the basis of . . . a much wider sample, mainly according to criteria of believed interest of issues they would raise . . ." and that "discussions were held with all the principal bodies and parties concerned and with representatives of those who might have taken up the innovations under investigation."

The most successful case studied by the team was the Urugual Livestock program, the purpose of which was "to increase pastoral . . . production and exports." One of the key ingredients in the Livestock program was the Honorary Commission which directed the effort. The Honorary Commission "is a majority-private board of directors, unremunerated, conceived in 1955 to generate more confidence among the ranchers than would a division

in the Ministry of Agriculture . . ." The report notes that "The Commission, which is very active, meeting weekly, has been a major factor in preserving the technical integrity of the Plan (Agropecuario), in acting as a semi-official and technically competent pressure group on behalf of the livestock sector . . ." In noting the diffusion of this institutional arrangement, the report states "The proven effectiveness of the Honorary Commission for the Plan Agropecuario has caused recourse to similar organization solutions elsewhere in the Uruguayan agricultural sector in recent years . . . Statutes virtually identical to those for the Plan Agropecuario Commission were given to the Honorary Commission for the Citrus Fruit Plan established in December 1970 . . . and to the Honorary Commission for Small Farming established in 1971." A similar Soybean Commission was established in 1973. The report cautions that, while the organizational form which was successful for livestock production has been applied to other agriucltural areas, it is too soon to tell (at the time of the writing of the report) whether the organization form will be as successful in these new areas.

Other innovations examined included loan indexing, establishment of a Hydraulic Studies Department (to assist in planning for construction of port facilities), commercial accounting schemes, and increasing autonomy for port authorities. These innovations seemed generally less successful.

Yin, Robert K., Changing Urban Bureaucracies: How New Practices Become Routinized, Rand Corporation, 1978. (II. 9).

This study began with 19 cities known to have adopted a particular innovation, and it conducted case histories to discover the extent to which the innovations had become institutionalized or routinized as standard practice. The 19 cities were identified from price studies on adoption of innovations. The six specific innovations studied were: computer assisted instruction and closed circuit television in education, mobile intensive care units and the Jel-Axe (an explosive device) in firefighting, police computer systems and breath testing of drivers in police services. The case studies involved a series of personal interviews with many people at the same site.

In addition, telephone interviews were conducted with a single informant in 90 additional cities that were also known to have adopted the six innovations. These calls collected information about each city's experience with the innovation, similar to the information collected through the case studies.

Where "spread" is concerned with distribution over space, this study is concerned with time and with the depth of penetration of the innovation into standard practice.

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Numbers in parentheses after each entry refer to the matrix and the cell into which the study falls. The Roman numeral indicates whether the study concerns the original adoption (I), replication (II), adaptation of component features (III), or diffusion to new uses (IV). The Arabic numeral indicates the line and column placement of the study, i.e., the type of research methodology and the subject matter studied.

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ANNEX A

INFORMATION INTERESTING

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A GUIDE FOR THE PROGRAM MANAGER: METHODOLOGIES FOR MEASURING THE "SPREAD EFFECTS" OF AID PROJECTS

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PREFACE

The Agency for International Development has recognized the importance of "spread effects" for the overall success of development projects. The Agency also recognizes that to date they have not been successful at assessing the extent to which spread effects have resulted from AID-funded projects. Therefore, the Agency contracted Action Programs International to investigate the methodologies used by other organizations to determine the extent of spread in addition to what was documented within the Agency. After careful research and assessment of the efforts of the outside world as well as a study of AID evaluations we have compiled the results into a report entitled,"Measuring the 'Spread Effects' of AID Projects, No. 930-0085."

As an appendix to this report, API has prepared the following Guide which represents a first effort to assist the project manager in measuring spread. This Guide is based on the review of the techniques used by researchers elsewhere to study similar problems and -- since there were major gaps in the research literature -- the invention of additional techniques. A set of recommendations has been developed which, it is hoped, will provide at least preliminary guidance to those who are charged with the difficult task of evaluating projects.

This Guide should be viewed as a companion-piece to the MANAGER'S GUIDE TO DATA COLLECTION, also distributed by the Office of Evaluation. As such this Guide can most profitably be used in conjunction with the MANAGER'S GUIDE.

INTRODUCTION

Development assistance funds have been, and will continue to be, scarce resources. AID funded programs and projects are often small efforts relative to the scale of the developing country problems they address. In this context, it is important for projects and programs to yield positive effects well beyond the immediate environment and time frame in which they were applied. To be fully effective, development assistance projects need to serve as examples of what individuals, communities and nations can do by and for themselves.

The questions of whether and how project ideas, practices and technologies "spread" or diffuse beyond a small number of people or a few communties is not new to AID or host governments. The idea of a project as a "demonstration" is as familiar in host government plans as it is in the programs and projects funded by donor agencies. Despite the wide spread popularity of the notion that a project can set an example or act as a catalyst by introducing new approaches and techniques, little empirical evidence concerning the ways in which spread effects occur is readily available. Only rarely have project evaluations examined the types of evidence about spread effects that could be put to use by host governments or donor organizations in plans for new projects and programs. At a point in time when the diffusion of innovative practices and technologies might be measured, donor agencies and host government entities are often too concerned with plans for funding new projects to stop and examine the spread effects from their earlier investments. When the planning process does prompt a retrospective examination of projects and programs in terms of their spread effects, researchers often find themselves at a loss as to how to begin this type of investigation.

The purpose of this volume is to supplement existing AID guidance concerning project analysis and evaluation techniques by providing AID project officers and those with whom they work with practical approaches for identifying and measuring the diffusion of ideas, practices and techniques beyond the peoples and areas directly effected by a project or program. While the main focus of this guide is on the acquisition of evidence concerning spread effects which have already occurred as a result of project or program activities, it also suggests some simple ways in which design teams can better articulate their strategies for promoting the diffusion of project ideas and approaches.

In this guide, the term spread effects is used to refer to the full range of instances in which project ideas, techniques and approaches have been or could be adopted and put to use beyond the immediate context in which they were introduced and promoted. The definition thus takes in the replication of "pilot" projects; instances in which project ideas and approaches that were not developed with replication in mind have in fact been replicated or partially adopted beyond the project environment; and all other instances in which program and project techniques or practices have been diffused to a new or larger area or population without additional public sector investments, e.g., by word of mouth or through private sector channels.

The preparation of this guide was preceded by a review of existing literature concerning the diffusion on innovative ideas, practices and technologies. This literature review considered instances of diffusion in the developing countries as well as studies concerning the developed nations. Two findings from the literature review provide a useful framework for understanding the tools and examples in this guide:

- While the organizations that design and manage projects and programs around the world often sense the importance of spread effects to their work, they have not, in general, tried systematically to measure the presence and intensity of these effects;

- The methodological tools which were used to measure spread effects in the studies and evaluations identified by the literature search are relatively common techniques -- variants of research approaches that are used quite widely for different purposes, e.g., to trace the spread of a disease, in marketing research, in examinations of migration and other social patterns and in evaluations that are concerned with the impact of projects and programs on their "target" populations and areas.

While some of the tools described in this guide may well be familiar, the sequence in which the guide recommends that various analytic techniques be used to study spread effects is somewhat novel. Measurement approaches that are often used during the early stages of an evaluation of the impact of a project on its "target population" may be of use only in the later stages of a study of project spread effects. Inversions in what may be a familiar sequence in evaluations are explained by the fact that you must locate spread effects before you can begin to measure their intensity.

"SPREAD EFFECTS:" THE WAY SMALL BEGINNINGS CAN MAKE A DIFFERENCE

If you've picked up this guide thinking "how can I possibly deal with one more requirement, one more analysis, one more treatise on how to plan projects and programs and undertake evaluations:" STOP. Before you read any further on the subject of methods for assessing spread effects, take a look at how the diffusion of ideas, practices and techniques have already made a difference that no donor funded project **and** few host government funded programs could ever make:

- Farmers all over the world are using high-yield varieties of rice seed; you didn't get that result from the few projects and programs that were funded to encourage the use of these seeds. The big payoffs came through "spread effects"

- Couples in many developing countries are limiting their fertility by using a variety of contraceptives. In many areas, these couples are doing so without benefit of AID-funded (or even host government funded) family planning clinics, simply because they have decided it is a good idea.

Why have these multiplier effects occurred? What do we know about the conditions under which small beginnings turn out to make a difference because of spread effects? The answer is "very little" today. We need to know more and to build what we learn into projects and programs around the world.

The reason for this guide, and for encouraging you to take the time to read and apply its tools has very little to do with making you a better evaluator or designer in the abstract. It has to do with results -- real results from real projects and programs; results that reach far beyond the small area and few people directly affected by projects and programs. It's worth learning all we can about how to make project and program resources more effective by learning all we can about how to spread project and program effects well beyond the areas in which we work.

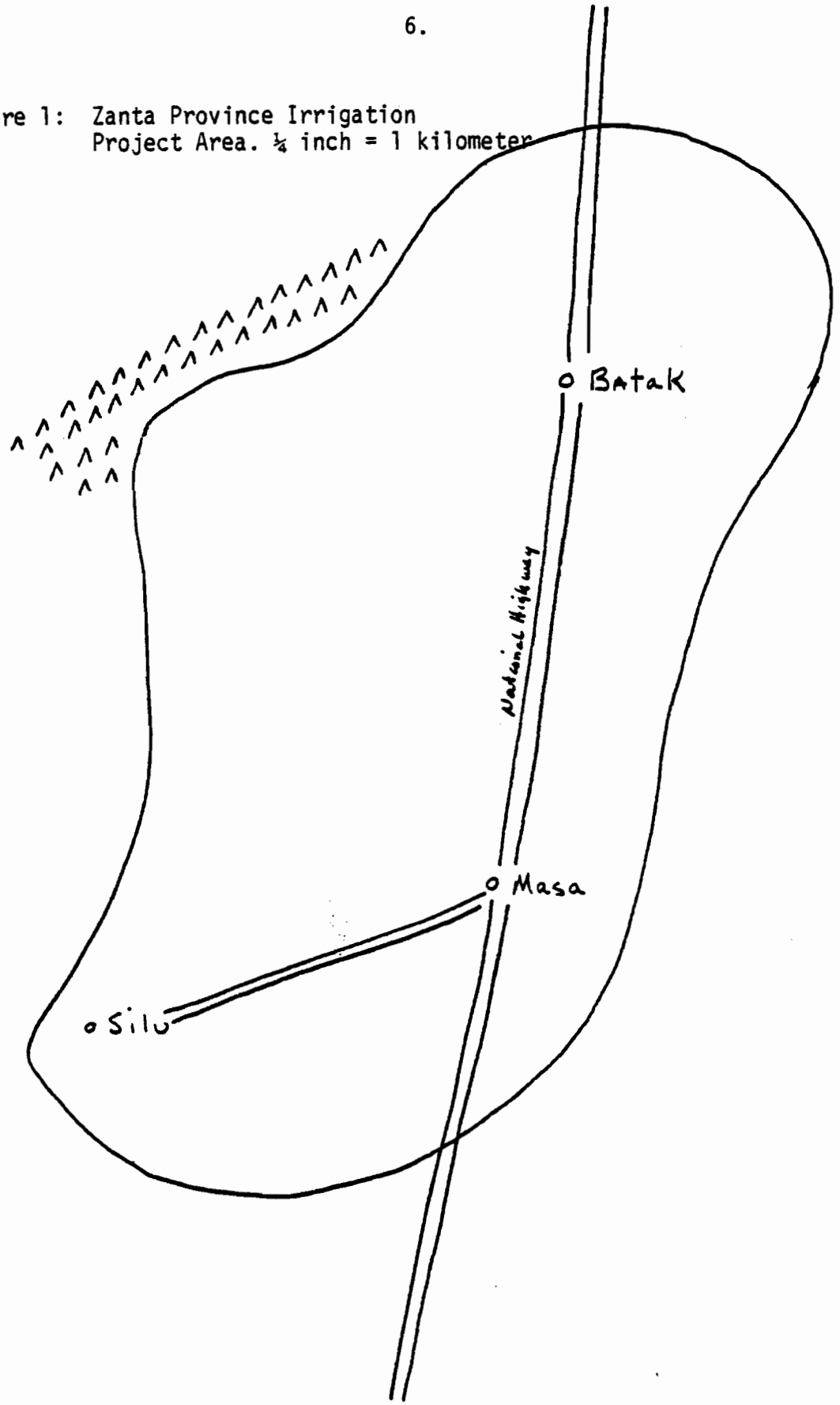
SHIFTING PERSPECTIVE: THE KEY TO ASSESSING "SPREAD EFFECTS"

When we design projects or programs we usually know which districts, farms or families we expect to reach. The notion of a "project area" or "target group" tells us a good deal about where and how to look for evidence concerning the achievement of a project's primary objectives. Evaluations which are designed to secure this information often take us back to the districts and families that a project design identified as falling within the project area or target group. While these conceptual boundaries may help us identify the effectiveness and impact of projects on the people and areas we hypothesized would benefit from a development assistance effort, they are of little help when we begin a study of project spread effects. The way in which the notion of a project area aids or impedes the planning of retrospective analyses can be illustrated through two simple diagrams.

On the following page, a project area (Figure 1) is identified by a line which demarks the boundaries within which project services are provided and project impact is expected. In some projects the project area may have spatial boundaries, such as mountains or rivers. In other projects, political boundaries, such as provincial borders may substitute for physical boundaries. In still other projects, the "boundaries" of the project will not have spatial characteristics; instead they will be defined in terms of some group of people we intend to reach, e.g., mothers with children between the ages of one and five, farmers with less than ten hectares, etc., or the institutions and systems that serve these people.

One of the first things we need to recognize when we begin to plan a study of project spread effects is that our ideas about project areas and "target populations" tend to be fictions we create in order to make our projects and programs manageable. These convenient ways in which we refer to the domain in which our project will operate often have little or no meaning to the people who live and work in the areas designated in our project design documents. People who live in a valley we have designated as a project area also travel beyond that valley; families move from one province to another, or they have cousins in the next province; women who have no

Figure 1: Zanta Province Irrigation Project Area. ¼ inch = 1 kilometer

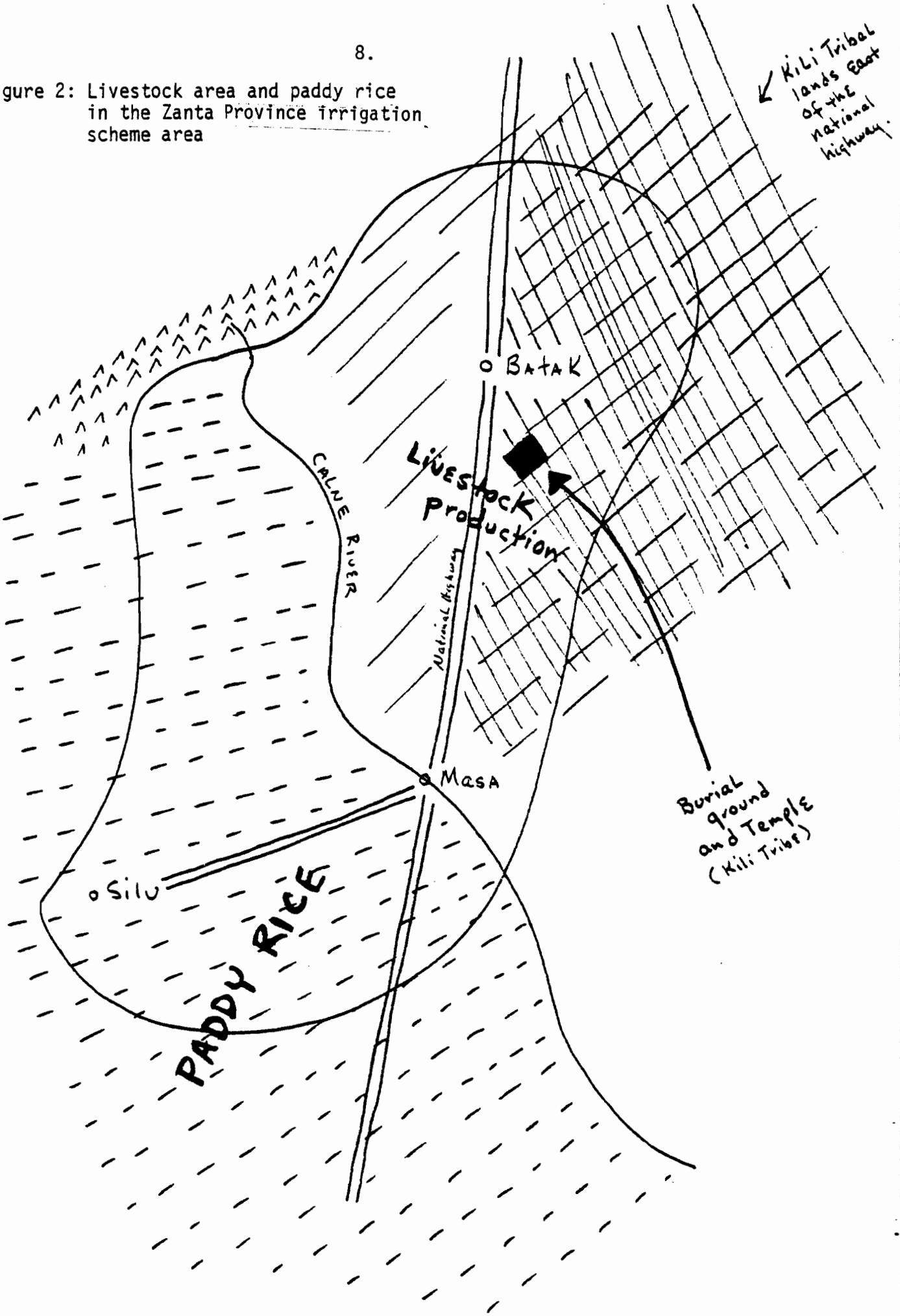


children today may have a child next year, or they may have sisters who receive and discuss project services. Because we use the terms project area and target population frequently, we come to believe that they have meaning outside of our discussions. We tend to forget that we have created the boundaries to which we refer and we may not be fully aware of the ways in which these terms fail to describe the boundaries which people in the developing countries actually respect: family ties, religion, occupational distinctions, tribes and other types of boundaries that may or may not correspond to the lines we mentally draw around project areas and target groups. In Figure 2, the simple diagram of a project area shown on the preceding page has been expanded to illustrate some of the other boundaries which may have greater local meaning than those which circumscribe our project area.

If we are to begin to understand that practices and technologies promoted by projects can "spread", we must be willing to shift our perspective and become aware of boundaries, human networks and travel patterns and other pathways that may not correspond to those contained in our definition of a project area or target group. When we are able to make this shift and add to our description of areas and peoples those social, political, religious and economic boundaries that are locally meaningful, we can begin to see the lines along which ideas and techniques might move beyond the areas in which they were introduced through project activities. Until we can see boundaries, travel patterns and other social and economic relationships in the ways they are perceived locally we may have few ideas about how instances of diffusion might be located and measured.

A second shift in perspective we need to make as we plan a study of the spread effects of a project or program deals not with where to look but with what we expect to see. The effects of a project outside the original project area may, in some cases, exactly duplicate the types of effects observed within the project area. In a study of the spread effects of a pilot project that was undertaken with replication in mind we might well expect to see exactly the same practices and technologies used inside and outside of a project area. In other cases, the nature of the spread effects of a project may bear only slight resemblence to the effects we observe in

Figure 2: Livestock area and paddy rice in the Zanta Province irrigation scheme area



the area where project services were initially introduced and promoted. For example, it might be perfectly reasonable to find that a nutrition education project which promoted the consumption of chicken in an inland community would take the form of an increase in fish consumption by cousins living outside the project area and near a source of fish. Protein, the common denominator of the "project effect" and the spread effect, would provide us with evidence of the diffusion of ideas promoted by our project. But we might not notice the spread effect if we traveled around the country looking for chickens.

Partial replications, forms of diffusion that involve some degree of adaptation or mutation and the results of fortuitous accidents often represent important instance of spread effects. Yet the very fact they they "look different" from the original project model or plan leads us to ignore them or fail to recognize that they evolved from a specific project or program. Too often we walk right past evidence of spread effects without noticing because we cannot see beyond our original ideas concerning the shape and form of tools, the "proper" applications of ideas or practices or the uses to which a problem-solving approach or technology can and should be put.

Our failure to detect spread effects when a project idea or practice has only partially been replicated or when local people have altered the size or shape of a tool before beginning to use it outside of our project area stems from an unintentional rigidity, or lack of creativity, in our nations about the ideas, tools and practices we promote. The rigidity in our views is a function of our familiarity with one way of using a tool or one situation in which a process or approach for organizing work can be applied. Familiarity, in this sense, can breed a type of narrow vision that is just as inhibiting to a study of spread effects as the concept of a project area as a boundary. Openness to alternatives and partial utilization of project ideas, techniques and practices, as well as openness concerning the nature of the boundaries and pathways that may facilitate or limit diffusion needs to be cultivated if we want to gain a full understanding of how project effects spread.

Under the direction of the ministry concerned with private sector activities, an Asian government once undertook a major effort to train small artisans and entrepreneurs in the use of motorized equipment that could turn a potter's wheel or power a sewing machine. After a good deal of effort, including the provision of demonstration motors to village enterprises throughout the country, the work was halted. Villagers, it was reported, were not interested in increasing the speed with which they worked. Motors were not being used in the small shops to which they had been provided.

Several years went by and everyone forgot the project. The attention of the government turned to other issues, particularly health related issues. Under pressure from several other ministries, the Ministry of Health became involved in an effort to identify new sources of protein that could be used to supplement the largely cereal based diet of the population. One idea that seemed attractive in the capital city was to expand the fishing industry in the south and market fish quickly and widely. A team was sent to the coastal villages to investigate the feasibility of this idea. When they arrived they saw fishermen bringing in their catch in motorized fishing boats. After several hours of interviewing the fishermen, the team understood what had happened: motors that had been brought to shops in the area had proven uneconomic in the industries for which they had been promoted. Shopkeeper "cousins" had passed the motors to their fishing "cousins" who saw how they might best be applied.

Anecdotal Example of Diffusion to New Uses

POSSIBLE DIFFUSION PATHS: THE ROLE OF THEORY AND SPECULATION

Prior to any serious attempt to locate and measure the spread effects of a project or program, or to build factors that will facilitate diffusion into project designs, it is important to identify the possible paths along which diffusion might occur for a particular idea, practice or technology. Theory, sheer speculation and the findings of prior studies of the particular innovation and the culture into which it has been introduced by a development assistance effort can provide insights into the most probable ways in which project effects might spread and where or to whom project techniques and approaches might be diffused. A review of existing information and an effort to imagine alternative ways in which the practices, ideas and techniques promoted by a project might be used can aid in the development of a rough "model" or diagram of the diffusion which might occur as a result of the examples offered through project or program actions.

In practice, we tend to make a number of speculations and to attempt to apply those theories with which we are familiar as we develop projects and as we design evaluations. While we do this with some frequency, we often use theory and educated guess work without being conscious that we are doing so. In this section, the ways in which theory and speculation can be used to enhance a project development process or an evaluation planning exercise that is concerned with spread effects are outlined in a way that is designed to make us more aware of our use of these tools and to assist us in using them more productively.

The theory of spread effects does not exist as a complete and separate body of ideas which we can conveniently tap during project development or while we are planning evaluations. Too little attention has been paid to this aspect of projects for a full-blown theory to emerge and be subjected to tests. At the same time, there is a wide range of literature which provides a partial theoretical base for investigations of spread effects and for project development exercises. Scholars have developed credible theories about

the pathways of diffusion for some types of innovations and these can be exploited. Economists, for example, suggest that the diffusion of industrial process innovations depends on such variables as the profitability of the innovation for a firm, its slack resources, size, market share, etc. Sociological research has identified structural conditions under which diffusion is more or less likely to occur, including the costs and risks to adopters, the existence of appropriate social institutions and the nature of the benefits realized. Social-psychologists have developed profiles of people in different cultures who are likely to be willing to adopt innovative technologies and ideas. Geographers have developed empirically-based theories about the spatial spread of innovations. Depending on the type of project or program we are designing or preparing to evaluate, the work in one or more of these theoretical areas may be useful.*

Where there is no theory to guide the development of a project or the planning of an evaluation, it is sometimes possible to make shrewd guesses about where to look, even in the absence of concrete knowledge about the spread of an innovation. These guesses would usually have one of two possible foundations: (1) familiarity with the innovation, or with the system in which it is embedded or (2) familiarity with the host country or region of the project. Both of these possible sources of speculation should be tapped.

A researcher who has a good deal of experience studying the adoption and effectiveness of, for example, a particular agricultural innovation (or birth control pills, solar ovens, or other devices) may have good advice to offer about who is most likely to adopt the innovation at a particular stage, and where to find them, even if the particular researcher is not familiar with the project area or even the country. If such an individual can be found, this can be a useful source of informed speculation.

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* The single most useful sourcebook for research findings on "spread effects" (or what the academics call "diffusion of innovations") is probably Rogers and Shoemaker's Communications of Innovations. This book and a few other select sources on diffusion of innovation are listed in the General References.

A second type of person who can provide shrewd speculation is the individual who understands the political and socio-economic climate of the host country. Such a person may be particularly helpful in suggesting meaningful social networks and communication patterns to look for, or in identifying key people or organizations will know if there has been any "spread" of the innovation. The person who is sufficiently familiar with the area may well provide this kind of information, even if he or she has neither great substantive expertise with the innovation nor direct contact with the project.

To be fruitful, any effort to apply theory and speculation in developing a rough model of diffusion from a project or program should be a systematic one. The need to be systematic does not suggest, however, that there is only one way to go about examining the potential for spread effects based on theory and speculation. On the contrary, there are several ways one could begin to systematically identify diffusion potential using only what is known before a project is implemented or before an evaluation is undertaken. One way to begin to develop a model is to examine the connections or relationships that exist between a project area or target group and other areas or peoples. Alternatively, one might begin by examining the specific ideas, practices and technologies inherent in a project or program and then trying to determine what other areas or types of people might find these approaches and techniques valuable. Whichever starting point is used it is important to (a) examine appropriate questions and (b) have a way of summarizing the answers generated through a process of speculation, by examining theory or by reviewing what has occurred when similar ideas and approaches were introduced.

Listed below are a set of generic questions that can serve as a starting point for an examination of where, how and to whom project and program practices and techniques might spread:

- What is it that we expect, hope or guess will "spread?"
- Why do we anticipate that this element of a project will "spread?"
- To whom might it "spread?"

Before proceeding to a detailed discussion of the implications of each of these generic questions, it is useful to consider ways in which the answers provided by theory and speculation might be summarized as a means of guiding a project development process or in the development of a specific plan for carrying out an evaluation. Table 1 presents a method for summarizing these answers in a strictly narrative form, while Figure 3 offers a diagrammatic alternative for synthesizing roughly the same information.

Table 1. Summary of Project Diffusion Potential

PROJECT ELEMENT	POTENTIAL ADOPTERS	MOTIVE	OPPORTUNITY
Farming techniques	Other farmers	Income	Information distributed by extension service
Use of gravity in irrigation systems	Other villages	Increased availability of water	Observation
Use of water for household purposes	Farmers and other members of their families where pumps are installed	Convenience and increased supply of water	Experimentation/word of mouth
Use of gravity to facilitate other "work"	??? villages that see pumps work???	Depends on use	??? Demonstrations/ experimentation???

Table 1, above, represents one approach to summarizing the information generated in the course of answering the questions raised and answered using theory and speculation about the potential spread effects of a project. A chart of this sort, once completed, can be used by evaluators to identify the types of diffusion they have the greatest likelihood of discovering in the course of their field work. Such a chart is also a useful aid for those who are developing projects with the idea of promoting the diffusion of ideas, techniques and practices. By completing a chart of this sort, design teams will be able to define targets of opportunity, i.e., areas and groups which might be high probability adopters if the project incorporates ways of providing these areas and groups with adequate information.

An alternative approach for summarizing this information is suggested in Figure 3 below. In the figure, information about the diffusion potential of a project is presented graphically. In the example, only those project elements and potential adopters which have a high probability of interacting are shown, i.e., those with a clear motive and adequate opportunities to gain the information and materials needed to adopt or adapt a project idea, technique or approach.

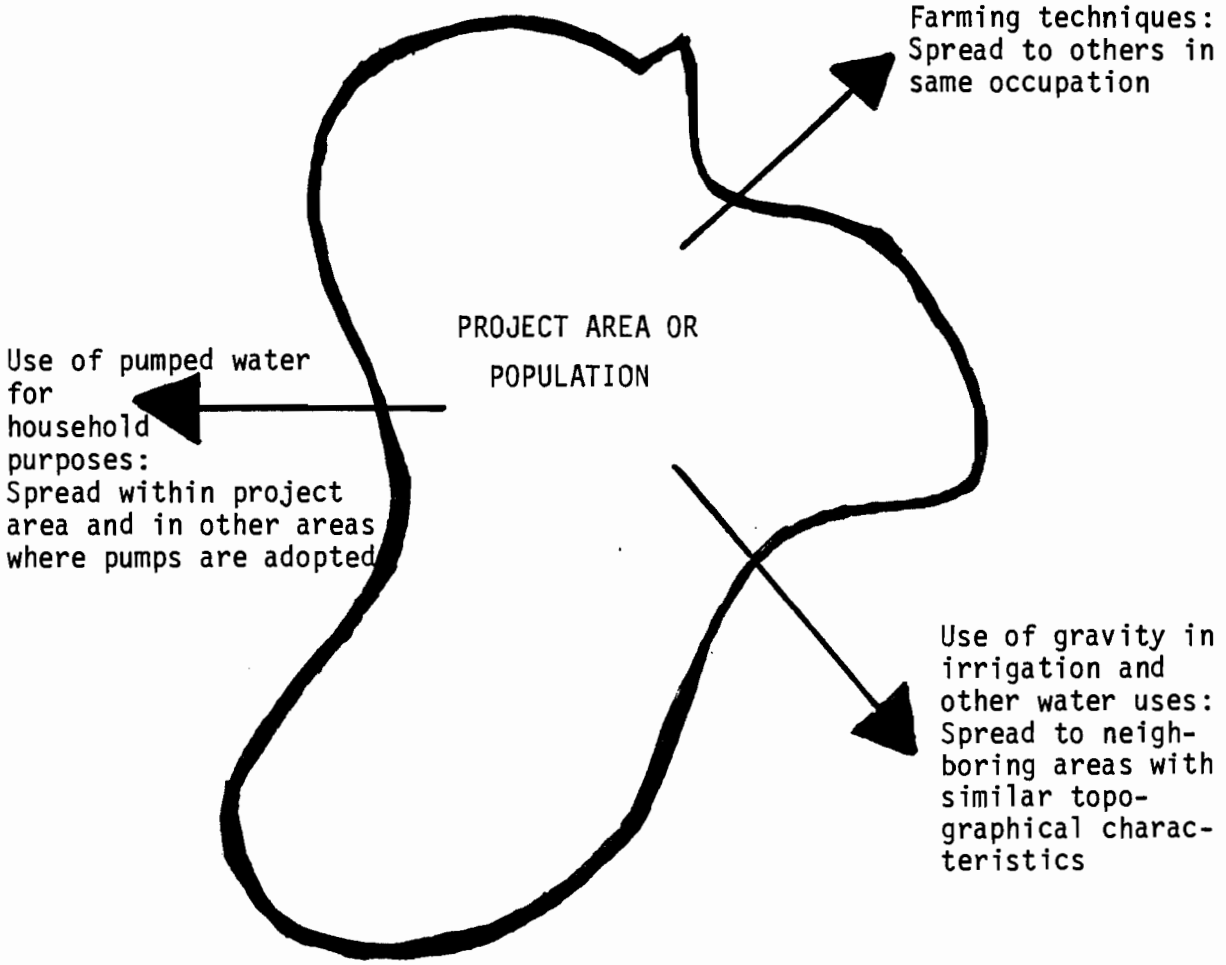

Figure 3. Ideas about the potential "spread effects" of projects are shown as vectors, indicating the direction of diffusion and its target following the logic of theory and speculation based on a knowledge of the project environment and past experience with the project elements.

1. Identifying the Aspects of a Project that have Diffusion Potential

At first glance it may appear that some projects have few elements that could spread beyond a project area or target group. Often a more detailed examination of the project will reveal that there are several ideas, approaches or techniques which might, under certain circumstances, be adopted or adapted beyond the domain of the project. While most of these will be formal elements of the project design, other factors that may have spread potential may also exist, e.g., ideas and values held by those who make up the project team.

One method of identifying the various aspects that have diffusion potential is to develop a series of lists of project elements, classified into major categories which reflect the nature of those elements, i.e., physical elements, including tools; ideas, including those presented in training programs as well as those embodied in practices and technologies; modes of behavior and methods of organizing work, people, territory, etc.

Physical aspects of a project are usually the easiest to identify, the tools, seed varieties and fertilizer, energy generating materials and devices and other material "things" associated with projects can be defined quite quickly. Less obvious, but equally important, are the ideas and approaches that must accompany the physical aspects of projects, e.g., information about when to apply fertilizer and in what amounts. In noting the information that must accompany a physical element of a project, it is important to distinguish between necessary information and supplemental advice. The fertilizer example provides a good illustration. In the case of fertilizer, information on dosage is necessary, since excessive doses can kill plants. Information about the application of fertilizer to rice production, on the other hand, is supplemental advice, since fertilizer can be used on a wide range of crops. The distinction between necessary information and supplemental advice can help us build our "model" of potential spread effects.

The distinction between types of information can help us recognize that if we have successfully conveyed an understanding of the basic rules for using fertilizer and fertilizer's effects on production, we should expect that a diffusion process might incorporate instances in which the principle is applied beyond the rice paddies, even if the container is specifically labeled "rice fertilizer."

A major category of project elements that should be listed and examined for their spread potential falls under the general rubric of practices. While we may list some practices in the course of defining the physical elements of a project and what must accompany their use, projects often promote changes in behavior that are not associated with specific physical objects. For example, when a project is effective in getting the mothers of young children to be observant about symptoms of particular diseases or the degree of balance in a child's diet, or when a project effort stimulates farmers to work together in groups to procure farm inputs, manage the local irrigation water supply or market their crops, a change in practice, of the sort implied by this term, has been achieved.

In part a change in behavior involves the acceptance of new ideas and attitudes which cannot be directly observed. Normally, however, these changes in attitudes and ideas are reflected in some behavioral change or in the form of a secondary effect that can be observed and measured, e.g., through a drop in infant mortality or an increase in the volume of a particular crop brought to market from the area that adopted an effective group approach for transporting and marketing its surplus. Practices, like tools and other physical things, differ widely in the degree to which they can be applied to alternative uses. In developing a "model" of a project's potential spread effects it is important to distinguish practices that have a narrow range of applications from those which have a very broad range. The practice of checking children for symptoms of disease is an example of a practice with a fairly narrow range of applications, e.g., it might only be extended to the point of checking baby animals in a similar way. Other practices, such as those which involve doing things in groups as opposed to individuals acting independent of each other, are more general in character.

Thus, the example set by a project that established farmer associations could be followed by the emergence of other types of collective behavior, including everything from savings and loan associations to self-help adult education groups to a community effort to build a road or install a better water system.

The third major category of project elements which should be examined for their spread potential includes those ideas, attitudes and values which do not necessarily result in the adoption of a specific practice or the use of a specific tool. Almost by definition, the category of pure ideas is most difficult to handle from an identification and measurement perspective. At the same time, changes in attitudes may be critical from a long term perspective. A good illustration of the importance of this type of project element can be found in anecdotes about villages which had for years waited for some external agent, normally the government, to come in and improve some basic element of the village infrastructure, e.g., the road, the water system, etc., and finally, as the result of some catalytic event, decided that they could and would make the improvement themselves. A sense of control over one's environment is a very difficult thing to detect through conventional evaluation procedures, yet it is often the very essence of what development assistance projects promote. The spread of a sense of confidence, at the village level, about "doing things ourselves" is exactly the kind of diffusion of a pure idea or attitude that could lead to dramatic changes and improvements in the developing countries.

The attitudes, values and ideas imbedded in a project are often so integrally a part of the culture of the project team that they are very difficult to identify. As members of the culture that is assisting a different culture through a development assistance project or program we must be extremely self-conscious if we hope to identify the kinds of ideas, attitudes and values that are projected through a project. Too often we become aware of the way in which ideas and values are part of projects only when they have undesirable consequences; i.e., when we are forced to become aware of them. Ideas, values and attidues which have positive results in the developing countries and which have a strong potential to spread often go completely

unarticulated and undetected. Project efforts associated with the term "appropriate technology" have, through negative and positive experiences, become somewhat more aware of their idea and value content than other project specialties and sectors. In appropriate technology projects, project teams found that they were being perceived as promoting "inferior" technologies and condemning developing countries to a "second-class" status until the developing countries themselves became aware of the implications of rising energy costs, the import-export balance implications of technologies that could not be manufactured using local resources, etc. When communication difficulties first appeared in projects of this type, it became very important for project personnel to realize and articulate the fact that the value they were promoting was self-reliance. Population control programs and projects have experienced similar difficulties and have become more aware of the values inherent in these efforts.

While appropriate technology and population projects have been forced to become self-conscious about the ideas, attitudes and values they promote, many other types of projects remain somewhat unconscious of these project elements. Agricultural production projects, for example, often contain a bias toward either large-scale farming or small-scale farming as a function of the types of equipment and production systems they promote. It is not always apparent from design descriptions of the project which way the bias in terms of scale runs, or whether the project is neutral as to the scale on which farming is undertaken. The scale bias in this type of project and the degree to which that bias interfaces with local perceptions concerning ideal farm size and farm production systems will influence not only the success of the project in achieving its stated objectives, it will also influence the degree to which the project approaches can and will be likely to spread beyond the immediate area and group of farms on which they are introduced.

Once the elements of a project have been identified and categorized as physical things, practices, or ideas and attitudes, it is useful to make notes concerning the costs and skills required to use these elements, either as they are used in the original project site or in alternative ways that

have been identified in the course of preparing the lists of project elements. These annotations will provide early clues concerning the level at which spread effects might occur. For example, a practice such as boiling water before drinking it requires skills, equipment and understanding at the level of a single individual. Practices of this sort, along with tools and ideas that can be implemented by individuals, might be expected to spread to other individuals. Other project elements may only be transferable at the level of a community, e.g., innovations concerning village infrastructure or practices which require that people work together to achieve an effective scale of operations. Still other project elements may be so large and complex that they could spread only if some government entity or large private sector organization decided to invest in an effort to replicate or expand them. The provision of low cost health services, to villages, using trained paramedics and traveling physicians, programs to distribute grip electricity to rural areas, etc., are examples of innovations which may not spread unless relatively large entities promote and underwrite key aspects of the diffusion effort.

2. Factors that Stimulate "Spread Effects"

As in any good detective story, and an examination of spread effects will bear some resemblence to that genre, one needs to be concerned with motive. Diffusion does not usually occur, or fail to occur, without some reason or motive. If reasons for diffusion can be found in empirical studies of the adoption of new practices and technologies, then they can also be anticipated. In building a "model" prior to commencing a search for project spread effects, it is useful to examine any list of project elements that have a potential for spread in terms of the reasons why these elements might be adopted or adapted by people or organizations that were not directly effected by a project or program.

In trying to discern the reasons why an idea, practice or technique might be adopted or adapted for use beyond the project area, the perspective of the potential adopter is important. From the perspective of the potential adopter, there are a series of criteria that any new practice or technology might be expected to meet. First, one should consider whether the new practice or technique "works," i.e., does it do what it is advertised to do. If a pump is supposed to lift water, it must actually do so. A pump that is not working cannot serve as an advertisement to those who visit the project area and observe the new tools and practices which are being introduced in that area. A second criterion, which is closely linked to the notion of "self-interest," deals with the degree to which a new idea, practice or technique is an improvement. When innovations provide something that is different, but not necessarily better, there may be little reason for people to adopt these innovations. From the perspective of a farmer who lives outside the project area, there would be little reason to pay attention to the new farming practices advocated in the project area unless they actually improved yield or cut the cost of producing a specific volume of rice or millet. In reviewing project elements that could potentially spread to determine whether they work and whether their adoption leads to some "improvement," non-economic as well as economic factors should be considered. While some practices and techniques will have clear economic

implications, the adoption of other types of changes may also be in the self-interest of the potential adoptor, e.g., improvements in infant mortality and morbidity, greater security and comfort, higher social standing, etc. As long as there is something that can be identified as having a clear appeal in terms of self-interest, there is reason to presume that a motive exists for a project idea, practice or technology to spread.

While self-interest is probably the single most important motive behind the adoption and adaptation of project approaches and techniques beyond a project area or target population, there are other factors which may operate to facilitate or hinder diffusion. The endorsement and support of individuals and organizations that are respected can have a great influence on the diffusion process. Leaders, be they local or national politicians, religious leaders, family heads or simply successful people, can easily stand in the way of diffusion. Alternatively, they can support and promote it, though their endorsement may not be sufficient to stimulate spread effects where potential adopters cannot identify a personal motive for changing their ideas and behavior.

In addition to the support of key community figures, factors such as the cost of adopting a new technique or practice, the availability of materials and training, the time and level of difficulty associated with the change, and the short and long term benefits of the new approach will all contribute to the way in which a potential adopter views a project idea or technique and his/her propensity to adopt or adapt practices and tools promoted in a project or program. By annotating lists of project elements in terms of motives for their adoption beyond the project area, we can begin to identify which elements of a project are the best candidates for diffusion.

3. Identifying the Potential Adopters

As suggested at the beginning of this section, the identification of who could adopt or adapt an idea, practice or technique is fundamental to the development of a hypothetical model for discerning where spread may have or has occurred. At times it may be more productive to begin with "who" could adopt an innovation than to start the development of a model with one of the other generic questions about spread. For example, if we are concerned with a project that provides several different ideas, practices and techniques, all of which apply only to agriculture, than a process which identifies potential adopters among the farm population could immediately circumscribe our search for spread effects. As with all generic questions, this one helps narrow the focus of a search for diffusion from projects and programs.

In the process of trying to identify "who" could adopt a technique or practice it is useful to divide potential adopters into two basic clusters: (a) logical adopters: individuals and organizations that would use the ideas, practices and techniques promoted by a project in roughly the same way and for roughly the same sorts of purposes and (b) opportunistic adopters: individuals and organizations who are different from the project's target group, however, may be connected by familial, economic, political, geographic or religious ties in a manner which would suggest that they had opportunities to examine and observe the manner in which project ideas and techniques are used, as well as their effects. A "logical" adopter will be a candidate for application of project ideas. The "opportunistic" adopter may simply become a carrier of knowledge about the project's approaches and tools. Carriers may not directly use the knowledge they have, rather we anticipate that they may take the information to individuals and organization that could put it to use.

The distinction between "logical" and "opportunistic" adopters is useful not only for distinguishing between groups of potential adopters; it also helps us to avoid the bias in our thinking that leads us to believe that ideas and tools are to be used only as they were utilized in a project.

In identifying logical adopters this bias may govern our selection process, yet by enlarging our universe of potential adopters to include the opportunistic group we are incorporating the possibility that these carriers will lead us to the existence of variants on the uses of techniques and approaches promoted by a project or program.

Individuals and organizations that should be included in the cluster of logical adopters are not necessarily all those who have the same occupation or other defining characteristics as the project's target group. In addition to having opportunities to put the project's techniques and approaches to use, these individuals and organizations must also have reasons or motives to do so and access to the materials and information required to apply project approaches. Thus, for example, if village (A) learns of a well-digging project in village (B) it may simply ignore what has been learned if village (A) has adequate water. The presence of water would suggest that no "motive" exists which would stimulate the adoption of the approaches used in village (B). Similarly, farmers who are aware of the way in which target group farmers are using high-yield seeds will not change their practices if they cannot find a source that can supply them with these seeds. In identifying potential logical adopters, it is useful to review the requirements for information and materials associated with project elements to discern whether such factors limit the number of individuals and groups that have the means as well as a reason to apply project approaches and techniques.

Normally, it takes some understanding or observation of the project area to begin to identify those who might be considered opportunistic adopters of project techniques and approaches. As the sketch in Figure 2 demonstrates, we may not always be completely aware of the familial, religious and other connections between a project target group and those who live and work in the surrounding areas. Information about the activities and results in a project area can be carried out of the area by a wide variety of people, from the visiting doctor or peddler to members of the family who are traveling for social or business purposes. The same information can be transmitted in the form of official or just friendly correspondence. Sometimes a social analysis of the project area will have been undertaken as

part of the project development process; when an analysis of this sort identifies the various connections between the project area and other areas, it can be a useful aid in planning an examination of project spread effects. Anthropological studies of the area, or marketing studies carried out by business or public service programs may be of use if they are in the local libraries or by inquiring about the existence of such research documents. Interviews within the project area are another way of establishing how the people in the project area are connected to those outside the area by social, political, economic and religious ties. At the time time they also help to establish who visits the project area on a routine basis, where they come from, why they come, and where else they are likely to go.

When combined with information on the elements of a project or program that could be spread, information about individuals and groups to whom these ideas and techniques might spread can begin to yield a reasonably clear picture of the realistic possibilities for diffusion from a project or program. Two other factors which also help in clarifying the picture of a project's potential for stimulating spread effects are: (a) information about when spread is most likely to occur and (b) information about how spread will occur. While these two factors are somewhat less important than factors discussed earlier, they can on occasion provide important clues as to where and when to conduct an examination of spread effects. For example, the spread of agricultural practices may have highly seasonal characteristics while the spread of a particular population control practice might require the intervention of a medical practitioner. In both of these cases, information about factors such as timing and procedure may help to define the nature of an examination of spread effects.

SEARCH STRATEGIES: LOCATING INSTANCES OF DIFFUSION

While theory and speculation can be of great assistance in building opportunities and incentives for diffusion into project designs and in preparaing to undertake evaluations that will examine the spread effects of projects and programs, they do not offer proof that diffusion has occurred. The first step in a process that aims at producing evidence concerning spread effects involves the identification of actual instances of diffusion. The second step in this process involves the use of procedures for determining the intensity and durability of such spread effects as have been located through the first stage of an investigation. Step two is the subject of the following chapter.

One of the knottier problems associated with the measurement of spread effects is knowing where to look. If a dike on a reservoir bursts, we can predict where the water will "spread" by referring to topographical maps of the region. If we release a thousand balloons, each equipped with an information pamphlet, we stand a pretty good chance of knowing where the balloons would "spread" by charting the prevailing wind currents in the area. But there are no tidy solutions to the problem of knowing in advance where an innovation will spread once it is introduced.

Sometimes searching for instances of diffusion will resemble looking for a needle in a haystack. In the early stages of a process that yields spread effects, there may be relatively few adopters outside the original target population. The difficulties are magnified when we consider that the techniques and practices promoted by a project may be altered as they spread. If searching for replication (i.e., exact duplication) is like looking for a needle in a haystack, searching for adaptation of component features and diffusion to new uses involves the same haystack, but we are not sure what we are looking for. We should be on the look-out not only for needles, but also for fragments of needles and for what needles can be transformed into.

It seems likely that the search for diffusion will remain more an art than a science. It is an opportunity for the practitioner to demonstrate his ingenuity. The purpose of this section is to describe a number of ways to impose a degree of order into the search.

As a result of the literature search that preceded the development of this guide, six techniques for locating instances of diffusion were devised. Each is annotated concerning its probable degree of use for AID investigations of spread effects. They are listed and described below and on the following pages:

- Snowball samples -- a widely useful technique
- Communication trails -- high, general utility
- Parallel organization review -- useful only if diffusion to other organizations is a realistic possibility
- Demonstrations and fairs -- appropriate as a locating device only if the techniques and approaches from the project lend themselves to demonstration at highly accessable sites
- Backtracing-- useful only if some project element is found to be in use outside the "project area" and the relationship between the instance of use and the project is to be examined
- Physical tracers -- a high validity, low utility technique for AID

Before describing these techniques in detail, it is important to understand that they vary not only in the degree to which they are expected to be useful under a wide range of conditions, but also in terms of the time, skills and other resources required to use them. Further, in some instances, the most cost-effective approach for locating the presence of spread effects may involve using a combination of two or three of these techniques without using any one extensively.

It seem obvious that concern about the diffusion of innovative projects should begin at the time of project development and not be postponed until post-project development. During the initial planning stages, planners should take account of the potential for project spread, including careful analysis of the following points:

1. Suitability of the innovation to local and regional environmental conditions;
2. Costs in terms of capital investment, maintenance, labor and risks;
3. Distribution of costs (who pays) and benefits (who profits);
4. What kinds of benefits are likely to accrue (e.g. income, security, social standing, access to service or to consumer goods) and to whom they accrue (e.g. the lowest-income groups, rural areas, women);
5. Infrastructure needed to adopt and maintain the innovation (e.g. credit, roads, social organization);
6. Political conditions and government policies that affect the attractiveness of adoption/maintenance of the innovation.

When attention to such factors is built into project planning, it becomes simpler for evaluators to map the diffusion of innovation (as well as increasing the likelihood of there being diffusion to map). This should assist the planners in identifying groups that are structurally equipped, with resources and motivation, to adopt or adapt the innovation.

As a pragmatic rule-of-thumb, it seems sensible to look first at adoption of the project at the original site. If the extent of adoption is limited there, despite the inflow of outside resources and expertise, then it may not be worth much effort to search for spread effects elsewhere. Similarly, if evaluation of the project at the original site detects few benefits for adopters, search for adoption elsewhere will probably be unproductive. The time and money that search requires might be better spent in increasing the effectiveness of the innovation for its target population.

In terms of feasibility, the six search techniques that we have listed can be roughly ordered in terms of the level of time and effort that they require. By and large, the use of informants is the easiest and least expensive search strategy. Key informants can tell a great deal about the local situation. Although they are often biased by their own interests in a given situation and their own concepts and explanatory theories about social change, talking to a number of people from different groups and in different positions can often provide important leads.

Reliance on theory and informed speculation can be a useful procedure too, particularly if the theory and/or speculation is grounded in previous empirical inquiry. Again, possibilities for bias and distortion exist (especially in the absence of solid social science investigation of the theoretical premises), but this is also a relatively inexpensive search technique. When projects have been planned on clear theoretical premises, the initial evaluation provides an imediate check on many of the assumptions involved.

In those cases where parallel organizations are potential adopters, listing of such organizations is a feasible strategy. In cases where records of visitors to demonstration sites have been maintained, this too is a relatively painless method for beginning a search.

"Communication trails" and "back-tracing" (described in the following pages) require more time and effort. They can be highly productive when other indications suggest that diffusion is probable and there are few other pointers to its location.

With these general guidelines in mind, each of the techniques listed on page 28 is described. Greater attention is given in this section to those techniques which are judged to have wide applicability within the AID environment.

SNOWBALL SAMPLES

Key informants are always a good source of information about spread. Once an informed source is located, he or she can be asked to name other people who may know about the spread of the innovation. Starting from a relatively small number of informants, it may be possible to identify a fairly large number of knowledgeable informants in a short period of time. The process takes its name from the observation that a snowball rolled along a snowy field quickly becomes much larger.

Snowball samples overlap with the other approaches. If an informant is aware that a certain type of communication pattern exists in the target area (e.g., a construction site was nearby, or a particular group of craftsmen periodically travelled through the area), but is hazy on some of the details, this first informant may be able to identify another informant who can provide more detailed information. Alternatively, one informant may know enough to point to more knowledgeable individuals who know the source of an accidentally discovered adoption of an innovation. An informant may know that a guest register was kept for a particular fair or demonstration, and be able to tell who has the records. Or, an informant may be able to identify what organizations have parallel interests, and may have picked up an innovation; he or she may even know the best person to contact in that organization.

The example below demonstrates the way in which the use of key informants can "snowball" into a relatively large and informative, though non-scientific, sample.

Adoption of several technologies in two functional fields, air pollution and highways-transportation, in ten U.S. states was examined. Individuals in state agencies directly involved with the decision to adopt were questioned.

Field interviews were conducted, intitial contact being made with a high-ranking official in each agency. It became evident through this preliminary questioning that division engineers and staff personnel sometimes occupied major roles in the diffusion process as well, and thus they were also questioned. Further meetings with state officials indicated it was a wise step to interview commercial entrepreneurs and manufacturers (approximately a half dozen profit and non-profit making organizations), and the interviewers felt that their input was invaluable.

Questions were asked concerning (1) the actual adoption decision (e.g., has your agency adopted this certain technology? when did the system become operational?), (2) the decision makers and funding, (3) role of the Federal agencies, (4) the professional interests of the interviewee and (5) the interviewee's particular organization (its weak points, strong points, in his confidential estimation).[1]

COMMUNICATION TRAILS

Information does not scatter randomly through space. From an original site it generally flows along relatively predictable channels, which might be called "communication trails", defined by existing social patterns. It therefore becomes important to try to identify what these communication trails might be.

> In a study in the United States it was found that the pattern of adoption of air conditioners corresponded to the pattern of interpersonal communications; when one person got an air conditioner, he would tell his friends and neighbors about it, and they became more likely to buy air conditioners.[2]

As suggested in the section on the use of theory and speculation, it is often possible to hypothesize which additional sites are likely to learn/imitate/implement the focal innovation and chart the communication trail of persons involved with the innovation at the original site.

There are a large number of social patterns that can help define communication trails. The following examples are meant to be illustrative rather than exhaustive. They are merely offered to "prime the pump," as it were to help the reader to begin to think about the kinds of communication trails which may exist in the particular context of a specific innovation. It is up to the individual investigating spread effects from a particular innovation to identify the most appropriate communication trails.

In the case of a rural-based innovation, identifying where the villagers go to market may help identify the communication trails, and hence suggest where to look for possible spread effects. Suppose that people from

all the villages in a ten-mile radius of a particular small town use the market in that town. Suppose further that an AID project with a particular innovation (e.g., pump irrigation) has been introduced into some of the villages in that ten-mile radius. It would then be reasonable to guess that the innovation may have spread to some of the nontarget villages in the area. It might well turn out that none of the villagers in nontarget villages adopted the pump irrigation technology, but it would be reasonable to look in those places.

Kinship links between villages may also provide a communication trail which will foster the spread of an innovation. For example, in some areas it is customary for young men to select brides from other villages, rather than their home village. In such cases, there may be the exchange of more than brides between villages: information about innovations may also flow from village to village.

Employment-related moves may create additional communication trails. Suppose that in a particular rural area AID has funded a vasectomy clinic. Suppose further that in this same rural area there is a major construction project which has attracted workers from a wide area (e.g., a dam or a major highway is being constructed). In this circumstance, construction workers from other areas may take advantage of the service. Upon their return home, when their male friends learn of the vasectomy, this may create a demand for such a service in that area. Given the large amount of both labor and nonlabor mobility in less developed countries, this kind of communication trail could encourage the spread of innovation.

A final example involves a "strand" of rural areas united by the movements of particular individuals. For example, itinerant craftsmen, merchants, monks or priests, government officials, or entertainers may follow a definite circuit. Such regular travellers could carry information from one rural area to another, quite independent of the explicit purpose for their travels. (Of course, even travellers who do not follow a "regular" path could transmit information, but it would be much more difficult to find out where they had been).

Examples of travellers who follow a regular route could be multiplied endlessly. Many areas which are too poor to afford a permanent movie theater nonetheless attract a travelling "movie theater," which will arrive weekly, for example, and project movies in a make-shift outdoor theater. As the movie troupe passes through a target village, the entertainers may learn, through casual conversation with the villagers, about a development project being conducted in that village. As they move on to other villages -- some of which may never otherwise receive communications from the original village -- they may pass on this information just as casually as they received it. "Did you hear about the new way they are drying cassava over in _____?" By following the path normally taken by itinerants of various descriptions, one may discover instances of the spread of an innovation.

Examples of four types of communications trails have been given. The first example of communication trails involved the generalized potential for spread of innovation within one relatively small rural area. The second example involved the potential for spread between two more specifically defined rural locations. The third example of communication trails involved spread between pairs of rural areas relatively remote from one another. The fourth example identified a trail which would provide a communication link among a "strand" of villages, some relatively near, and some relatively far from each other. Part of the challenge of identifying spread effects will be to decide which, if any, of these or other possible trails are worth pursuing.

PARALLEL ORGANIZATION REVIEW

Sometimes the innovation is actually an institutional or organizational innovation, and logical adopters are organizations of the same kind as the target organization, e.g., schools, highway departments, farm collectives. Organizations which could benefit from the new arrangement or which have responsibilities related to the innovation are obvious sites to look at for instances of spread effects. Both types of spread are important for AID's standpoint. Therefore, this approach to searching for spread of innovation is useful if organizations can be identified which would profit from the innovation or which might decide to promote the spread of the innovation.

In the case of a new organizational procedure (e.g., a new cost accounting system for port authorities), one would want to examine related organizations (e.g., nontarget port authorities) to determine whether any of these parallel organizations adopted the organizational innovation.

In the case of an innovation that could be promoted by an organization, one would want to examine organizations with parallel interests to determine whether any of these organizations were promoting the innovation. Suppose an agricultural innovation (e.g., hybrid seeds, fertilizers) is being investigated. The question would be whether any Office within the Ministry of Agriculture was promoting the innovation, or whether any other donors (e.g., other countries, multilateral institutions) were promoting the innovation.

Following are several examples of parallel organizations replicating a project idea:

Members of the community were organized by an outside agent around one project; the organization later enabled them to implement other projects on their own. The process here then is community organization or community development. Examples: in Suh Kam Chon, a Korean village, residents used thousands of man-hours to restore their irrigation works. Previously idle land was reclaimed for a rice paddy; income from the rice crop increment was invested in a children's playground.

In the village of Chotapara, India, a village worker organized individuals to improve the town's main road. Having dealt successfully with that problem, they were encouraged to go on and undertake other community problems such as building a school and starting a credit co-operative. In Manysis, Kenya, an initial community organizational effort around improved animal husbandry led to projects involving the construction of outside stoves, building latrines and improving water supplies.[3]

DEMONSTRATIONS AND FAIRS

Some project innovations may be displayed at fairs, or there may be demonstration plots or sites which are open to members of the public, whether or not they are part of the target population. It seems fruitful to plan in advance to keep records of visitors who come to get information about the project. For example, a guest book may be provided for visitors to routinely indicate where they are from and make remarks about the project, or visitors may be invited to leave their names and addresses so that additional information can be sent to them. If there is a cluster of visitors from a particular locality -- especially if additional information has been requested -- that may be a logical site to investigate spread effects.

This illustrates again that there are sometimes ways to plan ahead for the task of investigating spread effects. Of course, if plans did not include fairs or demonstrations, this search approach would not be useful.

BACK-TRACING

Back-tracing is, in a sense, the mirror image of communication trails. Sometimes, the first indication of spread effects comes to notice by chance. Someone stumbles across an application of the innovation unintentionally. In such cases, it may be possible to learn how the new user heard about the innovation. With communication trails, the question is "Where did the information about the innovation go to?" With back-tracing, the question is "Where did the information come from?"

Back-tracing provides a means to capitalize on chance discoveries. Because of this, however, back-tracing is useful only if there are such chance discoveries. That is, back-tracing is useful only if we accidentally discover instances of spread where we did not expect to find them.

Chance discoveries of spread of innovation can be exploited in three ways. First, the newly discovered site of innovation can be treated as a spread point. Second, back-tracing may identify additional spread points which were not identified by forward-tracing along communication trails. Third, back-tracing may identify new communication trails that were not originally considered. This third point needs to be elaborated.

Suppose we have identified some relevant communication trails (e.g., travelling movie theater, travelling blacksmith), and followed these trails in search of innovations. Suppose we accidentally learn of another site to which the innovation has spread. By back-tracing to learn how the innovation arrived at that point, we may learn about a new communication trail which had previously escaped our attention. We can then pursue this new trail, since the innovation may well have spread along the same trail to sites other than the one accidentally discovered. Any additional sites discovered in this way could be considered as spread points, and communication trails could be followed outward from these points.

The catch, of course, is that this whole process of back-tracing starts with an accidental discovery of a replication of the innovation of interest. How do we go about "accidentally" finding new sites? First, remain alert to the possibility of finding new sites. During the course of a project, record any chance observations or comments about nontarget sites which have adopted the innovation. Planning to find spread effects, like planning to identify other kinds of project effects, begins long before the actual search begins. Second, ask lots of people whether they have heard anything that even suggests that some nontarget group may have adopted the innovation. This involves informant interviewing, discussed in Section C., p. 54.

Back-tracing can be valuable because it offers a structured approach for capitalizing on the serendipity of accidental discoveries. Back-tracing from modifications of an innovation (i.e., adaptation of component features or diffusion to new uses) may be a particularly important application of this search strategy. At the same time, the approach is likely to be time-consuming and may, in the end, prove fruitless. Therefore, decisions as to the amount of resources to invest in back-tracing have to be made in light of time constraints and availability of resources.

PHYSICAL TRACERS

The ideal search process, in terms of ease of use and accuracy, would be a physical tracer, such as tracing radioactive isotopes in certain systems. The medical researcher introduces radioactive tracers into the human system, which are then observable by radiation detectors. In nuclear weapons supervision, sophisticated equipment monitors radiation levels in order to detect authorized and unauthorized production and testing. Unfortunately, as desirable as physical tracers would be, the procedure does not have any obvious analogs in the social world. Unless some ingenious method could be devised to apply this concept in a specific context, it is not likely to be useful in measuring the spread effects of AID projects.

SUMMARY OF SEARCH STRATEGIES

One of the big problems with measuring spread effects is knowing where to look. We cannot provide a roadmap to solve this problem, but we have provided a set of concepts which we believe will make the problem a bit more manageable. This set of concepts essentially involves various approaches, or things to think about in trying to locate the sites to which an innovation may have spread. The six approaches are not completely distinct, but by giving at least some attention to each, the odds are improved that it will be possible to find the sites to which the innovation has spread, if spread has occurred.

MEASUREMENT STRATEGIES: GAUGING THE INTENSITY AND DURATION OF "SPREAD EFFECTS"

Once the process of locating instances of diffusion has indicated that a project has produced some form of spread effect an effort must be made to determine the magnitude of that effect. If only a few individuals or communities have adopted a particular technique or practice, the increase in project results stimulated by diffusion may be trivial. On the other hand, evidence that suggests that a technique has been adopted by two or ten times as many people outside of a "project area" as exist within the "project area" would suggest a strong multiplier effect.

The literature review of prior studies of diffusion has suggested several ways of gauging the intensity of project spread effects. Each of these deserves consideration in terms of particular spread effects studies AID and host governments undertake. As in the case of methodologies for locating instances of spread effects, the techniques for measuring the intensity and longevity of diffusion should be selected to fit the particular investigation.

Each has been used in previous research on the adoption and diffusion of innovations. However, most earlier research has concentrated not so much on identifying the extent of diffusion (which is our concern here) as with locating the correlates of diffusion, i.e., the characteristics that distinguish adopters from nonadopters. Therefore, the techniques may have to be modified to fit our somewhat different purpose.

The methods which bear consideration are listed below and discussed in the following paragraphs.

- Analysis of existing data
  - -- aggregate data
  - -- decentralized records and documents
- Pinch point surveys
- Key informant interviews
- Sample survey
- Observation
- Ethnography

Each of these approaches offers opportunities to secure data on the intensity of project spread effects. Used repeatedly, or for several points in time on which existing data are available, they can help in efforts to gauge the durability or longevity of spread effects.

No one data collection method is ideal for all seasons. Each has advantages and disadvantages. Whether advantages outweigh disadvantages depends on the local circumstances and the type of innovation being studied.

In general, the least expensive techniques in time and effort are informants, records and documents, and aggregate statistics. These information sources should be exploited whenever possible, but informants may be misleading, records may be incomplete, and appropriate statistics may not exist for the local area or on the subject of concern.

Direct observation requires more time -- and unless the observer leaves the environs of the capital city and the paved road, this too can be a biased source of information. Sample surveys and ethnographies both require trained people (although of vastly different competences) and substantial periods of time. When they are done well, they yield results that are richer and more valid than other methods. But they are likely to be beyond AID missions' resources. Therefore, it is advisable to go into the field with these approaches only if less expensive techniques are not available or are deemed too unreliable.

If fortuitously a local university is doing research of its own and is willing to accomodate some requests for information, or if students (under faculty supervision) are seeking opportunities to do research, that is a stroke of enormously good luck. Some attempts might be made to coax such opportunities into being.

Otherwise, trade-off is likely to be the name of the game. Several data collection techniques can be tried in the hope that their weaknesses offset each other. But most important by far, when any method is employed, the user should be fully aware of the potential biases and inadequacies that attend it -- and take all practicable steps to overcome them.

The decision about what mix of measurement strategies to use will depend on a number of factors. In particular, it will depend on the nature of the information sources available to be tapped and on the limitations and requirements of each measurement strategy.

What kind of records or aggregate statistics can be located? How knowledgeable are the informants that one is able to contact? Wat is the location of the sites where it is suspected that diffusion has occurred?

A summary of the limitations and requirements of each strategy is provided in Table 2. Seven criteria are included in the table. Two criteria -- validity and precision -- refer to possible limitations of each methods; the remaining criteria refer to requirements of each strategy. The first three criteria will usually be regarded as the most important, with the remaining four assuming somewhat less importance.

Relevant aggregate statistics, if available, are a very useful source of information about spread effects. Validity and precision of results are high and cost is low. Results can easily be compared for different areas, and the time and skill required to utilize the information is relatively low. Decentralized records and documents also represent a potentially very useful data source. Records and documents have many of the same advantages as aggregate statistics, but the time required to utilize this information base depends on the type and availability of the records or documents. Since they are decentralized, travel to more than one site may be necessary, and it may be necessary to make extensive tabulations from the records.

Informant interviews have relatively low cost and require relatively little time. While substantial skills are required to obtain the best information from informants, it is likely that AID project officers will possess the requisite skills. Informant interviews provide the potential for finding answers to questions that cannot easily be answered through other means. For example, informants can often provide important leads about <u>where</u> to look for spread effects, and they can suggest why an innovation spread, or

Table 2 Requirements and Limitations of Six Measurement Strategies

	Realism in AID context	Cost	Validity of data	Precision of data	Ease of comparing results	Skills required	Time required
Aggregate Statistics	+	+	+	+	+	+	+
Records and Documents	+	+	+	+	+	+	variable
Informant Interviews	+	+	variable	-	-	+	+
Sample Survey	+	-	+	+	+	-	-
Observation and Inspection	+	variable	+	+	+	+	variable
Ethnography	-	-	+	+	variable	-	-

+ indicates a strength of the measurement strategy

- indicates a weakness of the measurement strategy

variable indicates there is a variability due to factors mentioned in the text

failed to spread. Informant interviews do have several drawbacks: the validity of the data from informant interviews is highly variable, depending on the biases, knowledgeability and objectivity of the informants; the data yielded by this measurement approach generally lack precision; and it may be difficult to compare results for different areas (if one informant says there has been "a lot" of adoption of the innovation in Province X while a second informant says there is "not too much" in Province Y, are the two informants using the same standard?).

The principal advantages of sample surveys are that they tend to produce highly valid, precise, quantitative measures of items of interest, such as the percent of people adopting a particular innovation, the differences between adopters and nonadopters, and so forth. However, sample surveys are not too useful in deciding where to look for spread effects and they do not always tell very much about why an innovation has been adopted. Conversly, they may not reveal why an innovation was not adopted. Sample surveys require substantial resources, including technical skills, in order to be conducted properly. They also require a fairly large amount of time before the results are available. If similar surveys have been conducted in different areas, comparison of results is often relatively straight-forward.

Direct observation and visual inspection offer a number of advantages. However, the time and cost required depends on the locations of the sites which need to be inspected. If these cover a wide area, considerable time and effort may be required to visit several such sites. If the sites are in a relatively small area near AID offices, or if site inspection can be combined with other activities, then the marginal cost and time required for visual inspection may be modest.

As a means by which AID officers can evaluate the impacts of AID projects, the ethnographic approach has a number of drawbacks. Ethnographies generally are expensive, require a great deal of time, and must be conducted by personnel with very specialized skills. Because of the time involved, ethnographies pertaining to different areas will generally have been conducted

by different individuals; the comparability of results then depends on exactly what factors each investigator concentrated on. The strengths of the ethnographic approach are high validity of the data and the fact that a more profound understanding of the reasons for the behavior of individuals acting within their social and cultural system can be obtained. The difficulty of conducting ethographies, combined with their great potential value, argues for consulting existing ethnographic studies when possible.

There are various links between search strategies and measurement strategies. Some measurement strategies cannot easily be used in conjunction with particular search strategies. For example, a sample survey is probably not an effective procedure for back-tracing; instead, we will probably want to use informant interviewing. In fact, most of the search strategies will rely upon informant interviewing at some point, demonstrating the importance of that approach.

But the search strategies -- if they are successful -- will also lay the foundation for using other measurement approaches. For example, an investigation into relevant communication trails may identify a number of areas to which an innovation has spread. At this point, we may want to take a closer look at a random sample of people in these areas. Registers from fairs or other demonstrations may also provide a sampling frame which can be utilized. Communication trails and back tracing may lead to particular sites where we will attempt to identify appropriate records or documents.

It is also important to recognize that while the search process sets the stage for the measurement process, there may also be a cycling back-and-forth between search and measurement. The search leads us to sites where we make measurements of spread effects, but we can continue the search from this site. That is, we can attempt to identify additional sites, or additional communication trails, or additional information about records that may be available elsewhere.

In the following sections, the specific approaches for measuring the intensity of spread effects during project and program evaluation are discussed.

A. EXISTING DATA

Rather than interviewing a large number of informants or collecting new data, it will sometimes be possible to obtain a good deal of information from existing data sources which indicate the extent to which spread effects have occurred for a particular project. There are two main types of existing data which may be useful: aggregate statistics and decentralized records.

1. Aggregate statistics

Where relevant statistics have been compiled, they provide very useful data pertaining to the spread of innovations. In the AID study on adoption of Kitale Maize in Kenya, for example, the evaluators were able to rely on previously published statistics on the proportions of farmers using the new hybrid maize. The presence of readily available and presumably accurate statistics made that part of the task much easier.

There are other situations in which aggregate statistics may provide useful indicators of the extent and rate of spread of innovations. The extent to which the introduction of a new cash crop has spread can be indicated by published statistics on the amount of that crop produced in each province. Published statistics on the regional distribution of IUD's inserted, or contraceptive pills distributed, provide a convenient indicator of the spread of family planning.

2. Decentralized records and documents

The most underexploited source of information on spread effects include school records, government bureau records, financial reports, newspaper accounts, purchase records, budget statements and research reports.

These represent important categories of information which should be fully utilized. Analysis of sample surveys and ethnographic reports constitute two especially important subcategories. Such reports from the libraries of universities or research institutes frequently contain extremely valuable information.

Evaluation of family planning programs in Kenya was conducted by the Ministry of Health. The data base consisted of clinical record cards used by all family planning centers and related services. A problem was reported with data collection: the card records basic information on the clients, but measures only how many people come to the clinic each day, not how well the program is actually progressing.[4]

In order to assess the diffusion of hybrid corn among Kenyan farmers, AID researchers were able to utilize a mass of published data, apparently based on previous surveys (e.g., the Integrated Rural Survey). These surveys revealed the amount of farmland used to plant hybrid corn at particular dates. The diffusion of corn was quite rapid, but apparently not through the efforts of AID or the Government of Kenya. The prime agent seemed to be the Kenya Seed Company.[5]

A study was made regarding the adoption of electrical irrigation pumps in Coimbatore City, and 190 villages located within a straight line distance of 20 miles form the Coimbatore Plateau area in southern India. Data were collected concerning location and dates of installation for 18,754 pumps distributed in the area from 1933-1965 from the unpublished records of the Madras State Electricity Board. Information was obtained from the Indian population consenses for 1931 and 1961. Personal interviews with 300 farmers were conducted.[6]

B. "PINCH POINT" STUDIES

Time, money and effort may be saved if it is possible to identify a "pinch point" -- a point through which an innovation must pass each time it is used or adopted. If such a pinch point exists, there may well be some documentation to indicate the location and/or number of adopters. For example, in Tanzania the sales to Mazai herdsmen of the chemicals used in cattle dips was a sensitive indicator of the adoption of dipping initially promoted by British and U.S. projects in the area.

The same procedure may be used to measure the spread of other innovations in developing countries if appropriate records can be identified. If the innovation is a new agricultural input -- e.g., fertilizer or insecticide -- it may be available only from a limited number of suppliers. By examining their records -- or at least interviewing the suppliers -- it may well be possible to reconstruct fairly accurate time series data on the amount of fertilizer, or other innovation, for various regions of the country. Similarly, family planning clinics can provide records to show the number of people adopting contraceptive devices that require a visit to a clinic.

The records available at a pinch point will provide only a limited amount of information. If we need to have a good deal of detailed information about the characteristics of adopters, or their reasons for adopting the innovation, then the pinch point approach may be inadequate. But if we need only an indication of the total number of adopters, and their distribution through time and space, then the pinch point approach may well prove to be a convenient source of reasonably reliable data. When records are available, it is likely that they will pertain to exact replication rather than adoption of component features or diffusion to new uses.

Researchers interested in the effects of professional communication channels on the adoption of innovations conducted a study in a midwestern U.S. community concerning doctors' adoption of a new drug (gammamym). Data collection techniques included (1) interviews with the physicians and (2) a search of local pharmacies' prescription records. The latter were used to determine the time of each doctor's first use of the drug. Prescription records were checked for a 3-day period monthly for 15 months.[7]

C. INFORMANT INTERVIEWS

Interviewing key informants can be an extremely useful approach to gathering information about spread effects. By careful questioning of knowledgeable informants, one is often able to learn things that are not documented anywhere and which could be rediscovered only after a great deal of effort. Most of the other options for information gathering provide only "raw", unprocessed information. Informants will have drawn conclusions, made extrapolations, sought the explanations for patterns, and generally imposed some structure on the available information. There are some drawbacks to this, but it suggests that informants may be the best source of information about where to look for spread effects or why an innovation is or is not being widely adopted.

There are two main disadvantages to this approach. First, informants may not be able to provide a precise quantitative indication of the extent of spread effects. Second, it is possible that one's informants will distort the information, either deliberately or inadvertently. It is important to recognize potential sources of bias, and either avoid or compensate for such bias.

Rapid reconnaissance missions (usually made in the more rural areas) rely heavily on informant interviews. Bias can emerge because of whom one talks to and what is said. However, this can be a useful procedure if one understands how to overcome some of the biases.

Robert Chambers has produced a list of biases which affect rapid reconnaissance:

1. Spatial bias: It is easier to get to places near the main roads; our perception of reality may be influenced more by what is happening there, and less by what is happening in more remote areas.
2. Project bias: We are likely to know more about places where there are projects -- particularly AID projects -- and less about non-project areas.

3. Biases of personal contact: We are more likely to have contact with the wealthier and more powerful, men rather than women, adopters rather than nonadopters, and so forth.
4. Biases of politeness and protocol: Local informants may be reluctant to tell us that an innovation failed miserably, or that it is being used for something quite different from its original purpose.
5. Failure to listen: We may do more talking than listening, and consequently acquire little new information.
6. Snapshot, not trend: We may focus our attention primarily on what conditions are at a particular point in time, rather than seeking to understand what paths led us to the current conditions, and what the future trends are likely to be.

It is hoped that by becoming aware of the biases that plague informant interviewing, it will be easier to avoid these problems in the future. One can attempt to create offsetting biases.

Proceeding in an unhurried fashion can have beneficial results. One has time to meet more people, who may present new points of view and fresh information; and one's informants may have time to remember additional pertinent facts and gain confidence to let us know the bad along with the good. Get off the paved roads; go in the rainy season; seek out the poorer people and the more remote villages.

It may also be useful to minimize -- rather than maximize -- one's apparent importance. Possession of an aura of importance may provoke politeness and deference more than useful information.

In addition to these correctives, two strategies can enhance the utility of this approach: the use of guided interviews and group interviews.

Guided interviews rely on a checklist of questions as a flexible guide. There are three main group questions one would want to ask informants in a study of spread effects:

1. How much spread has there been? How many people outside the target population have adopted the innovation?
2. Have any of the adopters modified the technology and/or used parts of the technology for different purposes than were originally envisaged?
3. Where have spread effects occurred, or, at any rate, where should one look for spread effects? (One can "brain storm" with informants, using the search strategies as a guide.) What kind of communication trails can be followed from the project area?; where do they lead?; who would know? (If chance occurences have been encountered, but the source and trail remain a mystery, the informant may be able to help.) Were there any public demonstrations of the innovation?; any records of those requesting information? What organizations might have "picked up" on the innovation? Who else might be able to help?

The greatest value will be derived from the informant interviews if one endeavors to systematically cover the points related to all three of these key group questions.

Group interviews have several advantages. The most prominent among these advantages are that (1) the body of knowledge available to the groups as a whole will surely be greater than the knowledge available to any one member of the group and (2) the confrontation of conflicting claims provides an almost automatic testing of the validity of assertions made by individuals.

The first advantage raises the possibility that the information will combine synergistically; that is, that the juxtaposition of information from different sources will trigger recollections, recombinations, or insights which otherwise might not have occurred. Thus, group interviews may yield more information than would have been obtained through separate interviews with the same individuals.

Second, it seems almost inevitable that different informants will provide conflicting information. Such inconsistencies may well be easier to resolve if both informants -- and others as well -- are present to "hash out" their differences. This may lead to a qualification of both positions, a specification of the conditions under which both statements have some validity.

A danger that exists with group interviews is that a consensus may develop prematurely. If one member of the group makes an assertion which is not correct, others may fail to challenge the assertion. They may do so either because of the prestige of the person who made the original statement, or because the inaccuracy of the assertion revolves around a subtlety which they fear they cannot express adequately, and so they say nothing. The incorrect assertion may acquire as much credibility as correct assertions: we may implicitly reason that since several people had an opportunity to challenge the assertion, but declined to do so, they must agree with it. The moral of this story is that one should not rely on group interviews <u>to the exclusion</u> of private interviews. Key findings should be tested against the perceptions of other groups and other individuals.

Who should be selected as an informant? As usual, there are no iron-clad rules to apply here. Basically, one can talk to anyone who is sufficiently close to the situation to know what is going on. This suggests, however, that a provincial governor -- or any other official whose duties keep him at his desk most of the time -- may not be the best source of information. A community development worker, who makes regular rounds through the rural areas and whose social position permits him to have contact with a more representative cross-section of rural people, may be a more fruitful informant. Social anthropologists who work in the area (in spite of being outsiders) and school teachers (in spite of their higher social standing) may both be useful informants. In some areas there may be periodic meetings in which village headmen congregate to exchange information with government officials. Such meetings provide an ideal setting to obtain information for a fairly wide area. Headmen can be canvassed to determine whether an innovation has spread to their village. This provides an opportunity for both individual and group interviews.

A useful strategy for informant selection is to deliberately gather information from relevant observers with as many different disciplinary, professional, cultural, and class perspectives and "interest group" affiliations as possible. When investigating the spread of a high-yield crop variety, for example, it might be appropriate to solicit reports from agricultural economists, agronomists, anthropologists, rural sociologists, geographers, extension agents, politicians, and merchants; landed and landless farmers; and men and women of various ages who come from differing households. It is then possible to see if there are areas of consensus in information from these disparate sources. For example:

1. Are there instances of replication or modification of an innovation reported from sources that would have been overlooked using the framework and methodology of others?
2. Are there ways of making inferences concerning the direction, extent, and magnitude of spread effects by interpreting the findings of extensive surveys in light of insights obtained from in-depth studies from sites in various regions?
3. Is it also possible to attach special importance to findings that are <u>not</u> expectable in light of the reporter's predictable biases?

In this way it is possible to verify or discount surprising findings, to check plausibility, and to evaluate discrepancies and contradictions in information about spread effects.

In sum, informant interviews provide an excellent basis to obtain information about the three key questions: What types of spread exist, where, and how much spread has occurred? The potential exists for biased results to emerge, as a function of the inevitable filtering of information through the informants. There are ways to minimize such bias. It seems likely that informants will not usually be capable of supplying precise quantitative answers to the ultimate question concerning the extent of spread effects. Information from key informants should be supplemented by information from other sources, such as records, statistics, or direct observation.

In a study of adoption of water boiling in Los Molinas, Peru, two sources were selected as informants. Housewives were asked why they did or did not boil water and rural hygiene workers were also interviewed to provide background information about the rate of adoption of this innovation and the constraints to adoption.[8]

D. SAMPLE SURVEY

A sample survey involves obtaining information from a subset of the population of interest -- preferably a representative subset. Such a survey provides one means of gathering precise information on spread effects. The sample survey is discussed at some length in a publication of the Office of Evaluation entitled Manager's Guide to Data Collection. The reader is referred to that source for additional information and literature references.

The sample survey is a rigorous information-gathering technique, one which has certain advantages over a complete census, on the one hand, and an informal, rapid reconnaissance, on the other hand. As a result, the sample survey has been an extremely popular tool in research on spread effects.

The survey will generally be considerably less expensive than a census of the entire population of interest, and yet, if done properly, it can provide information which is as reliable as that provided by the census. A sample survey is more costly than a rapid reconnaissance, but it provides more reliable and more detailed information.

When selecting the individuals (or other units) which will be in the sample, the single most important consideration is that they be selected according to a procedure that ensures that each person (or other unit) have an equal chance -- or at least a known chance -- of being included in the sample. The problem with haphazard samples which do not satisfy this criterion is that those who are eventually interviewed may constitute a biased sample; for example, poorer members of the village, or those who spend less time near the village headman's house, or those who spend more of their time in relatively inaccessible fields, may be less likely to be included in their sample. Without these groups in the sample, the survey results may be misleading.

Various approaches can be taken to satisfy the criterion that each "sampling unit" (e.g., person, household, or whatever) has an equal chance of entering the sample. Numerous books are available which describe these approaches; see, for example, the references at the end of the Manager's Guide (referred to on the preceding page). These approaches will only be summarized here.

All of the approaches rely on what is called the "sampling frame". A sampling frame consists of a list -- or a procedure for creating a list -- of all of the units in the population of interest. A map showing the location of each house in a village, or set of household registration cards, if these are complete in their representation of all households in the village, could serve as sampling frames in order to sample households. Given such a list, or sampling frame, we would select units from the list by a random procedure; the random procedure could involve a table of random numbers, the flip of a coin, the roll of a die, or some similar procedure which would ensure randomness.

It is sometimes desirable to employ a "multi-stage" sample. For example, if we have identified 200 villages as potential new sites of an innovation, in the first stage we may select a sample of villages (from the list, or sampling frame, of villages) and in the second stage select farmers in those villages (from a list, or sampling frame, of farmers in the sampled villages). The advantage of such a multi-stage sample design is that it is not necessary to compile a list of farmers in the villages which have not been sampled.

By questioning those who fall into the sample we can learn whether they have adopted the innovation of interest, or whether they may be using the innovation in a modified way which might constitute an instance of spread. If they have adopted, or modified, the innovation we could also ascertain where they learned of it, when they adopted it, and what problems they have had with it, if any. If they have not adopted the innovation, we may learn something of the reasons for the failure to adopt (although this may often be simply that they had not heard of it). Whether they have adopted the innovation or not, they may be able to indicate others who have.

One of the key advantages of the sample survey approach is the possibility of obtaining more detailed information about the circumstances of adoption of innovation than is possible with other approaches. Since we are talking to individual adopters (or nonadopters) we can obtain a good deal more information about their characteristics (e.g., amount of land, family size, age, education, attitudes on related matters, and so forth) and the reasons for their decision to adopt (or not adopt). Of course, if there are not plans to utilize such information then the potential to obtain such information hardly constitutes an advantage.

There are, of course, limitations to a sample survey. While a sample survey provides us with a "snapshot" which has fairly high resolution, it is still just a snapshot. As such, we may remain ignorant of some important dynamics in the situation. Although we can find out about some time trends -- as noted, we can reconstruct the rate at which the innovation was adopted in the population -- we may remain ignorant of certain constraints which are limiting adoption, or causing some adopters to abandon the new practice.

We have already referred to the heavy reliance we place on the respondent's ability and willingness to provide accurate information. A horde of interviewers descending upon one rural area to extract certain information through the medium of carefully prestructured questions before dashing on to the next rural area may not be a circumstance which generates the ideal amount of rapport between interviewer and respondent, and the quality of the responses may suffer accordingly.

A third difficulty is that sampling frames may not be readily available and may prove costly to construct.

A fourth difficulty is that, to be used properly, sample surveys require considerable skill and time to develop, a trained field staff to administer them, adequate knowledge and facilities for data analysis, and scrupulous attention to proper procedures to avoid bias in sampling, interviewing, and analysis. Unless surveys are informed by sophisticated under-

standing of the situation and appropriate theoretical assumptions, they can produce more paper than insight. Unless they are supervised by well trained people, long periods of time may elapse before data becomes available.

Certain other approaches, especially informant interviewing and ethnography, minimize the first two problems mentioned here, and the third does not arise at all. Like surveys, informant interviewing and ethnography require considerable skill to be conducted properly.

As part of the evaluation of a community development program conducted in the Turrialba Canton of Costa Rica, the author analyzed cultural change in one village, San Juan Norte. Forty-seven male heads of families and 45 housewives of the 60 resident families were interviewed to provide initial data on changes and failure to change certain agricultural, health, and nutritional practices. Three agricultural innovations, two which had been successfully introduced and one which had failed, were then intensively studied. A different sample and interview schedule were used to study each innovation. Each sample was random and stratified by area of residence. Using the 47 male household heads who were interviewed originally as the population, 13 men were sampled and asked about using insecticides. Thirty-five of the original 47 had heard about the importance of cultivating a vegetable garden, and 12 of these 35 were randomly selected and interviewed intensively. Finally 8 of the 27 who cultivated sugar cane were selected and interviewed about using a new variety of cane.[9]

The relationship between the acceptance of certain medical innovations by Indian villagers and their social background, their contacts with Indian Village Service and their attitudes was examined. A random sample of 200 families living in 11 of the 12 villages in the Marehra area was selected. The 11 villages were purposively selected because they were at different stages of development. The field survey was carried out by trained interviewers from November 1960 through January 1961. Respondents' opinions regarding the nine practices promulgated by International Voluntary Services were explored.[10]

Some of the factors affecting the acceptance or rejection of a farm innovation, the hydraulic oil press, in Western Nigeria are explored. The study was carried out in Gbedun, a village 20 miles southeast of Ibadan. Information was collected from the experiences and records of the Agricultural Assistant, heads of families, and from a purposive sample of all the women concerned with oil processing in the village. A total of 75 respondents were interviewed. The study was conducted in early 1966 by the Department of Agricultural Economics of the University of Ibadan, and the Ministry of Agriculture of the Western Group of Provinces.[11]

E. DIRECT OBSERVATION AND VISUAL INSPECTION

Direct observation or inspection of an area is often a useful approach. This approach can be a corrective to misinformation which may result from myth or hearsay. For example, if there are numerous reports that there has been wide-spread adoption of pump irrigation in a particular area, a journey through the area should result in observation of the pumps. A failure to find the pumps in the area, even after questioning local sources about who has them, will cast great doubt on the claim that their use is wide-spread. On the other hand, if there are good reasons to suspect that an innovation has been adopted in an area, but there have been no specific reports regarding the adoption, visual inspection may produce the needed evidence that the innovation is in use.

Direct observation is usually used in conjunction with other approaches. For example, informants may indicate areas which they suspect -- but do not know -- have adopted an innovation. Visual inspection can confirm or deny the rumors. Or, an informant may flatly state that an innovation has spread to a particular area. It is desirable to visually check at least some of these claims, particularly if they are not substantiated by other informants. Direct observation may also identify areas which should be investigated more closely, either from records, informants, or a sample survey.

There are two main disadvantages to direct observation. First, it can be time-consuming. This is particularly true if extensive travel would be required to arrive at a number of rural areas. Second, visual inspection may miss "hidden" innovation. For example: Some hybrid crops are difficult to distinguish from traditional varieties of the same crop while in the field, therefore visual inspection may fail to identify the adoption of the hybrid seeds. Also, the innovation that involves a particular type of social organization -- e.g., a committee with certain functions -- would be difficult to observe. The utility of inspection is limited to obvious physical innovations.

A study of the multiplicity of uses of the oil drum documented a number of uses which could be discovered by visual inspection, as well as some which would require the use of informants.

1. Drums were stacked to form chimneys in metalworking factories in Korea.
2. Drums were used to make windmills in the Philippines, using the Savonius rotor principle for windmill design.
3. Drums were used as a steam boiler in a rattan processing plant in Bangkok, to clean and reshape rattan used in furniture.
4. Drums were used to mix swine feed in the Philippines. A door was added to the side of the drum to allow ingredients to be added and feed removed. Metal mixing vanes were welded inside the drum to facilitate the mixing process.[12]

F. ETHNOGRAPHY

Ethnographic research is the basic model of research employed by the social anthropologist. This kind of research involves very intensive work with the study population over an extended period of time. As a result, this approach often produces a wealth of information and insights pertaining to the social and cultural system of the group under investigation.

As valuable as ethnographic research can be, it is not likely to be the method of choice for investigating spread effects. As noted, this approach is time-consuming and, in fact, will demand more time than will usually be available. The great advantage of this type of work is that it permits a very intensive examination of a particular group or community -- but the study of spread effects is more likely to require a limited amount of information about many areas rather than a great deal of information about a limited number of areas.

It seems likely that in the course of attempting to gather information about spread effects we will want to consult social anthropologists who have themselves been engaged in ethnographic research. Another source is existing ethnographies in the libraries of universities or research centers. Both of these approaches should provide valuable information. It seems less likely that we will want to engage in ethnographic research ourselves in order to study spread effects. AID will probably want to conduct or commission ethnographic research only if the necessary information cannot be obtained with any other method and only if the value of the anticipated information justifies the expenditure of the required resources.

"Vicos" is a land reform experiment carried out by an American anthropologist in rural Peru from 1952 to 1956. "Since the direct intervention . . . the community development and educational program of the Peruvian government carried on in Vicos has been extended to nine other adjacent communities, primarily through the functioning of the greatly enlarged Vicos school as a nucleus for a rural peasant school system." (p. 59) "That peasant school program also reaches some Mestizos farming small properties between the large estates. Residents of these towns question the Viscosimos about details of their modern agricultural technology." (p. 59) The organizational structure of the project has been copied to a significant extent in setting up community development and Indian integration programs elsewhere in Peru.[13]

Description of the success of an animal immunization project in Barrio Talaga in the Philippines attributed partially to "the existence of a farmers' club which served as the vehicle for communication of the ideas and for educational information" (p. 26). Previous contacts with veterinarians and livestock inspectors were ineffective because farmers "look down on (these) profession(s)." (p. 25) The knowledge and skill of the municipal agriculturist who initiated the educational program contributed to changing attitudes, thus making farmers more receptive to immunization. The method was a mini-case study.[14]

SUMMARY OF MEASUREMENT STRATEGIES

Six measurement strategies have been discussed. Existing data (including both aggregate statistics and decentralized records and documents) present the most advantageous data source if relevant information is available through these means. If a pinch point can be identified it can be a useful strategy for discovering diffusion. Informant interviewing is also likely to prove an extremely valuable strategy. Sample, surveys, direct observation, and ethnographies are additional strategies for obtaining information, but each requires a substantial investment of resources.

SUMMARY

Spread effects are important for the overall success of the AID mission, and it is important for us to be able to document the extent to which we are successful. Identifying spread effects is no easy task, but a number of suggestions have been made about how to go about the task. Once we understand what is meant by the phrase "spread effects," two problems remain: where to look for them and how to assess the extent of spread effects. Six search strategies and six measurement strategies are identified and discussed.

Not all measurement strategies will be possible or desirable in any particular situation. If records or aggregate statistics are available, they may provide an accurate source of readily-accessible information. However, such information may not be available or may not answer all of the questions that need to be answered. Surveys provide a way to gather fairly reliable and precise data, but surveys are relatively expensive and time-consuming. When pinch points can be found they become a good tool for tracing spread. Informant interviews will often prove to be extremely valuable, but the results are likely to lack precision. Direct observation of rural areas may clear up discrepancies between informants, or correct misinformation provided by informants, but direct observation is likely to be expensive in terms of travel time and costs.

Of the three types of spread identified in this Guide, exact replication is likely to present the least difficulties to identification and measurement. Modifications of an innovation ("adaptation of component features" or "diffusion to new uses") are harder to identify. In many cases the most realistic approach may be to concentrate one's effort on the identification and measurement of replication, under the assumption that one is at least as likely to discover process and product spread through this approach as through any other approach.

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