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ABSTRACT

This analysis of the impact of a result demonstration educational program was made in an effort to achieve the following goals: (1) identification of the objectives of the educational program; (2) description of the program; (3) assessment of awareness of the program by target clientele; (4) measurement of the amount of change that takes place; and (5) determination of the amount of observed change which can be attributed to the action-educational program and what can be attributed to other known factors. This study is unique in two aspects: (1) the sample of interviewed farmers is one of the largest of any employed in demonstration farm research and represents the universe of dairy farmers in geographical areas immediately surrounding the demonstration farms; and (2) data were collected at two points in time--a benchmark survey of surrounding farmers was completed prior to the beginning of the educational program, and a terminal survey was conducted after the end of the program. The report contains the following chapters: I. Introduction; II. Review of Literature; III. Methodological and Theoretical Orientations; IV. Collection of Data; V. Program Inputs; VI. Methodological Tools; VII. Changes in Practices Adopted; VIII. Dairymen's Knowledge of the Program; IX. Relationship of Program to Change in Practice Usage; X. Summary and Conclusions; and XI. Bibliography. (DB)

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Evaluation of a Five-year Demonstration Farm Program In Two Pennsylvania Counties

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The Pennsylvania State University, College of Agriculture
Extension Service and Agricultural Experiment Station
in cooperation with The Tennessee Valley Authority

EVALUATION OF A FIVE-YEAR DEMONSTRATION FARM PROGRAM IN TWO PENNSYLVANIA COUNTIES

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and

Emory J. Brown**

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Extension agents in -

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CHAPTER I

INTRODUCTION

The Problem

The result demonstration has a long history in agricultural education in the United States. As early as 1887 the United States Department of Agriculture employed field agents in various sections of the nation to demonstrate agricultural practices to farmers, generally disease and pest control measures. Seaman A. Knapp is recognized as having popularized the result demonstration method through his now famous boll weevil demonstrations on the W. C. Porter farm near Terrell, Texas.[1] Other educational techniques, such as lectures and bulletins had apparently failed to influence farmers to adopt adequate weevil control measures. It was probably these failures interacting with the importance of the boll weevil menace to cotton production in the South at the time that portrayed dramatically the potential effectiveness of the result demonstration as an educational technique. In any event, within a year of the Terrell demonstrations, an estimated 7,000 demonstrators were following the newly recommended practices for boll weevil control, and those practices gained wide acceptance.

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[1]For a more complete description of the role of demonstrations in agricultural education during the early 1900's, see True (1928), Gilbertson and Gallup (1957), and Sanders (1966).

It is generally recognized that the success of these early demonstrations was instrumental in the establishment of the Cooperative Extension Service. In 1914 the Smith-Lever Act, in establishing federal support for the Federal Extension Service, stated: "Cooperative Agricultural Extension work shall consist of the giving of instruction and practical demonstrations in agriculture and home economics" (Smith-Lever Act, 1962).

Purpose of Demonstrations

The obvious purpose of the result demonstration is to convince people, in this case farmers, that certain recommended practices are applicable to a local situation and that there are advantages in adopting such measures. The rationale underlying this is that although many people are not readily convinced by claims and the reporting of the results of research, they cannot argue with actual results and performance which they themselves see demonstrated. They are inclined to believe and to be influenced by what they see.

From the very beginning, however, there were at least two other important purposes in the use of the result demonstration method. It was used also as a means to increase the confidence of local farmers in the Extension Service, and most particularly in the local extension staff. It was believed that, once a local extension agent had evinced the veritableness of the knowledge at his command through demonstrations, a certain credence would automatically confer upon all else he chose to teach. Second, it has been a method of

discovering and developing local leaders. In contrast to method demonstrations, result demonstrations are conducted by farmers themselves under the supervision of the extension staff. By working closely with these demonstrators, extension educators often uncover and develop characteristics of cooperation and leadership which can be employed to advantage not only in that particular demonstration program but also in other extension and community activities.

There are recognized disadvantages to the result demonstration method. It is often difficult to find well-qualified demonstrators to carry through a demonstration program. In addition, the demand of time in planning, establishing and supervising a demonstration program is disproportionately high in comparison to other methods and in light of the many other demands on extension personnel. Along with this, the direct economic cost per practice demonstrated and per person reached is relatively high. Despite these objections, many observers of extension educational techniques claim that the result demonstration is the most effective method of persuading the least informed and the most skeptical farmers to adopt improved practices (Gilbertson and Gallup, 1957:4).

General Acceptance of Result Demonstrations

The general acceptance of the effectiveness of result demonstrations by extension workers in the years following Knapp's leadership is attested to by the fact that in the late 1920's, 17 percent of extension expenditures were chargeable to result

demonstrations (Baker and Wilson, 1929). This stood second only to method demonstrations, including leadership training, which accounted for 19.6 percent of the extension budget. Wilson and Gallup (1955) used these 1929 figures without revision or explanation in a 1955 United States Department of Agriculture publication evaluating the effectiveness of contemporary extension teaching methods, so that one must assume that these figures were still accepted by the U.S.D.A. at that time as being relatively accurate. In contrast, however, when one considers the relative frequency with which extension methods are reported as having influenced the adoption of improved practices in data gathered from 15,454 farm and home units in 27 states during the period 1923-1941, the result demonstration ranks seventh, accounting for only 8.1 percent of the practices reported having been adopted. Accordingly, the ratio of practices adopted to costs is relatively low, indicating that the result demonstration appears to be an inefficient technique with respect to cost (Wilson and Gallup, 1955:17).

It is, therefore, not surprising that the result demonstration should have received less emphasis as a method of teaching in more recent years. In fact, with respect to the stated purposes of employing the result demonstration method, successful utilization of the result demonstration should tend to reduce the need for continued use of the technique. Nevertheless, the establishment of local applicability of new experiment station and university research

finds is a continuing task of the local extension staff for which the result demonstration seems particularly appropriate. Wilson and Gallup (1955:41) report that

> the trend in the use of result demonstrations in extension teaching has been consistently downward over the years. In 1952 the average county agricultural agent reported 23 result demonstrations supervised. The corresponding figure for 1942 was 35.

But Cook (1966:128) states that

> after over half a century of cooperative extension work, the result demonstration continues to be one of its important teaching methods. . . . For the most part, result demonstrations are now used in situations that involve major changes in established enterprises, methods, habits, or facilities; evaluation of new enterprises or devices; and better selection of certain similar practices, materials, or devices.

TVA Test-Demonstration Program

The direct use of demonstration farms is exemplified in the Test-Demonstration Program conducted by the Cooperative Extension Service in cooperation with the Tennessee Valley Authority.[2]

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[2]The Tennessee Valley Authority was created by Congress in May, 1933, bringing to an end a decade and a half of strife and uncertainty about the disposition of government-owned properties at Sheffield and Muscle Shoals, Alabama. During World War I, two nitrate plants and what was later known as Wilson Dam were constructed on the Tennessee River in northern Alabama at a cost in excess of $100,000,000. Their purpose had been to supplement, if not replace, Chilean imports as the United States' sole source of nitrates for munitions. The war ended before production could begin, however, and in the ensuing years the "Muscle Shoals controversy" over the principle of government versus private ownership was fought with great intensity. For a more detailed discussion of the history of the Tennessee Valley Authority, see Selznick (1949), Hubbard (1961), Lilienthal (1953), and Ball (1939).

The Tennessee Valley Authority Act put into law President

Originally, the test-demonstration programs were all located in the Tennessee Valley area. Since 1935, however, the TVA has sponsored programs in other areas of the United States, and in recent years more than half of the test-demonstration farms are located in states outside the area of the Tennessee River basin. The major purpose has been to introduce the use of improved fertilizers and fertility practices. But a secondary purpose has been to demonstrate systems of farm operations that will increase income, level of management

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Roosevelt's recommendations for the comprehensive development of the Tennessee River basin, an area encompassing parts of seven southeastern states: Kentucky, Virginia, Tennessee, North Carolina, Mississippi, Alabama and Georgia. The Authority was created as a corporate agency of the United States government to work with federal, state, and local agencies and organizations to improve economic conditions in those areas. Section 5 of the Act instructed the Authority to initiate a comprehensive research program at the Muscle Shoals plant to develop new and better fertilizers and to provide necessary information on the effects, values, and best methods of using them.

These instructions are implemented through two programs: (1) TVA cooperates with the Cooperative Extension Service in several states to carry on an educational program in which newly developed fertilizers are introduced within a broader test-demonstration program designed to bring about improvement of demonstration farms and farming practices and demonstrate these improvements and changes to others. (2) On the basis of the results obtained on the test-demonstration farms with the newly-developed fertilizers, TVA works closely with the fertilizer industry in its distributor-demonstration program, in which the new or improved manufacturing processes developed by TVA are made available to commercial fertilizer firms.

skills, and general productivity. The general technique is to work intensively with a few selected demonstration farmers over a five-year period, encouraging them to adopt recommended practices. The assumption is that other neighboring farmers will be influenced by the example of these demonstrators. Bailey (1964:14) quotes Ito:

> It is important to give individual help to a few families who will take the lead. These early adopters are, in effect, the leaders who can interest others by telling their success story and showing the result of their management program.

Justification of This Study

Although there is a substantial body of literature on result demonstrations, most of it is more descriptive than analytical or evaluative. Very few carry their analysis farther than the changes which occur to the demonstrator and on the demonstration farm itself. Those studies which examine the impact of a demonstration program on farmers in the areas surrounding demonstration farms are characterized generally by a lack of rigorous and precise findings. Much of the evidence on diffusion is based on verbal responses collected in cross-sectional surveys. This will be discussed in more detail in Chapter II.

In recent years a higher priority has been given to programs and projects designed to effect economic and social development. This economic and social development implies a wide variety of changes: changes in attitudes and motivation, the introduction of new knowledge and concepts, the acceptance of new skills and technologies, the

reorganization and reallocation of resources, etc. The success of such projects depends on (1) how adequately it has been determined, what particular changes are most needed (2) how well designed the action program to bring about these changes is, and (3) how efficiently the program is administered.

In turn, either one, or all three, of these factors are dependent for their success on the availability of pertinent and relevant data. It would seem logical, then, to assert that the justification of this thesis is its attempt to collect and analyze, in a rigorous manner, data about the changes that a specific program has produced. The information in these data will be related to various elements in the program and its operation. It is generally recognized that our abilities in bringing about change are not highly developed. Therefore, the data presented here can add their useful testimony to a more complete understanding of the result-demonstration as an action technique in the total process of change.

All social institutions involved in public service programs, whether of the educational or of the welfare type, are concerned with proving the effectiveness of their programs. This is particularly true in recent years when a better informed public is reluctant to accept on faith alone the legitimacy and effectiveness of any given services of such agencies as the Tennessee Valley Authority and the Cooperative Extension Service. There is increasing demand for scientific proof of the effectiveness of various programs.

At the same time, if new knowledge is to find its way into new programs, current programs must be evaluated to determine where they fall short of expected or potential achievements and where reallocation of resources can be applied most effectively.

Initiation of the Impact Project

It is precisely these mandates for evaluation which furnished the rationale and the resources for this study. Because of the lack of rigorous evidence as to situations in which the demonstration farm can be used effectively as a technique in managed change, an "Impact Study of the Unit Demonstration Farm Program" was initiated in 1961 by the Agricultural Experiment Station of The Pennsylvania State University in cooperation with the Tennessee Valley Authority. Project Leader was Emory J. Brown, professor of rural sociology and extension education. The educational program to be studied was a test-demonstration program in Indiana and Susquehanna Counties, Pennsylvania. It was begun in 1962 and carried through the harvest season of 1966. County extension staffs worked intensively with 16 cooperating diary farmers in demonstrating recommended practices. Leadership in this "action" phase of the program was provided by university extension specialists, particularly from agronomy and farm management.[3]

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[3]This action program was one of a series of educational programs carried on cooperatively by The Pennsylvania State University and the Tennessee Valley Authority since 1956. It involved the

It is to be recognized immediately that this study is not basic research, which attempts to discover knowledge, by testing hypotheses. One might better designate this study "applied," or more appropriately, "evaluative" research. Its primary objective is to determine the extent to which the educational program under investigation achieved its desired result. It is the utilization of scientific research methods and techniques for providing information which will be the basis for making an evaluation. Consequently, the methodology of evaluative research is not altogether different from that generally associated with the scientific method. It is primarily research, and as such it must adhere as closely as possible to accepted standards of research methodology.

However, as is true with any kind of specialized research, certain variations must occur in the design. One of the problems peculiar to evaluative research is that the investigator usually has far less control over the research situation than does the basic researcher. The administrators of the program under study, by having already defined the objectives of the program, have imposed certain

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periodical establishment of a number of demonstration farms within selected counties in Pennsylvania. The county extension staff, with the assistance of university extension specialists, then built a five-year action educational program around the demonstration farms, with the view that knowledge and recommended practices introduced or emphasized on the demonstration farms would "filter out" to neighboring farmers.

boundaries to the research. In addition, some of the techniques which might produce useful data require a certain amount of interference with the ongoing activities of the program, which gives rise to objection and/or unwilling cooperation on the part of those administering the program. The investigator may request the keeping of extra records or the securing of additional information which is not necessary for the operation of the program but desirable for the research, which in fact was the case with the program under study. There is also the matter of "control" or comparison groups, which are often completely absent. This makes it difficult to determine what observed change can be attributed to the influence of the program. These are some of the problems which make evaluative research difficult and places limitations on the generalizability of the findings of the study.

The Specific Objectives of This Study

No research study can examine all of the pertinent aspects of a problem. The principle of parsimony must be exercised in selecting areas in which the study will be concentrated. Accordingly, this dissertation attempts to achieve the following goals with respect to analyzing the impact of a result demonstration educational program:

(1) Identification of the objectives of the educational program. It is recognized that in all but the most simple of programs there are differing levels of objectives. In many instances these varying levels

of objectives may make up an ordered, step-wise series, in which each becomes a step toward fulfilling the next higher objective, until the ultimate or final idealized objective is achieved. Therefore, one of the primary aims of the investigator is to determine both the ultimate and intermediary objectives of the educational program. The objectives serve to indicate the direction toward which progress in the program should move, and, at the same time, provide the standards by which that progress can be measured.

(2) Description of the program. Before it is possible to determine the results and effectiveness of an educational or action program, it is logically necessary to ask: "The results of what?" Who are the people involved in the program, and within what sort of organizational structure do they operate? What facilities do they have access to and take advantage of? What operational techniques do they employ? What is the educational content of the program? The answers to these questions provide the dimensions of the program which must be known if "inputs" are to be related to "output."

(3) Assessment of awareness of the program by target clientele. It is recognized that diffusion of ideas and practices from the demonstration farms may take

place among target clientele without their awareness of the source of those ideas. A farmer may pass on a new idea to his neighbor or a friend without conveying with it the fact that his own introduction to the idea was on a demonstration farm. Despite this, however, certainly one of the measures of the effectiveness of an educational program is an assessment of the extent to which target individuals are aware of and knowledgeable about the program. Knowledge about the subject matter emphasis of the educational program does not necessarily assume acceptance of that material. It does indicate, however, that the program has succeeded in publicizing itself to its potential beneficiaries.

(4) Measurement of the amount of change that takes place. Just as important as the overall design of any research effort, is the fruitfulness of the measurement techniques employed. Basic to meaningful measurement in evaluative research, however, is determining the appropriate category of effect. Two categories have been used primarily in the evaluative research on extension education programs: 1) assessment of effort, which represents an assessment of input, regardless of output; and 2) assessment of

effect, which measures the results of effort rather than the effort itself. The former is probably the easier to obtain and most frequently employed, since it can often be determined from administrative records. It assumes, however, that the specific activities engaged in are a valid means of reaching the program goals. A more difficult technique, and the one that will be attempted in this thesis, is that of measuring the results or impact of the performance of the activities in the program.

(5) Determination of the amount of observed change which can be attributed to the action-educational program and what can be attributed to other known factors. An educational program, such as the one being investigated here, is not a controlled, univariate experiment, in which the investigator manipulates the program as an independent variable and nothing else impinges upon the situation to yield an effect on the dependent variable--the desired change. Other factors, some known and many unknown, also have their effect on the change that takes place. By the use of a multiple covariance technique, known systematic variance will be isolated and their effects controlled and the amount of change which can be attributed to factors associated with the program will be measured.

Value of This Study

This study is unique in two aspects. First, the sample of interviewed farmers is one of the largest of any employed in demonstration farm research, and at the same time it represents the universe of dairy farmers in the geographical areas immediately (within four to seven miles, depending on natural boundaries) surrounding the demonstration farms. In most of the other diffusion studies of demonstration farm programs, only a sample of the surrounding farmers was interviewed in an attempt to determine the amount of diffusion from the demonstration farms.

Second, data were collected at two points in time. A benchmark survey of the surrounding farmers was completed prior to the beginning of the educational program, and a terminal survey was conducted after the end of the program. Most other studies which attempt to assess the impact of a demonstration program utilize one survey of the surrounding farmers at the end of the program, asking respondents to recall the changes they have made in the past few years. This study determines actual changes from the raw data, comparing surrounding farmers' situations at the end of the program with what they had been at the beginning of the program.

Because of these two differences, it is expected that this study will provide information not heretofore available on the effectiveness of an educational demonstration program. It is not assumed that the findings will be greatly or totally different from those of other studies, but that the findings which do proceed from the study will be based on evidence collected in a replicative design.

The area of study of this dissertation--the impact of an educational program built around a result demonstration--is but a segment of the larger general area of the diffusion of knowledge and behavioral practices. The writer is indeed fortunate that a great deal of research has been conducted on the adoption of farm practices. This previous work provides a rough outline of the range of factors possibly involved as well as suggesting certain generalizations which lend themselves to the formulating of new hypotheses. In the next chapter the results of some of the more important of this previous research will be summarized briefly. Whatever contribution this study may make toward a more complete understanding of the diffusion process in result-demonstration programs has already been made possible by the studies to be reviewed forthwith.

CHAPTER II

REVIEW OF LITERATURE

As has been pointed out, the result-demonstration has been and continues to be a basic educational technique of the Cooperative Extension Service. However, although there is an extensive body of literature on the use of result demonstrations in agricultural education, the greater portion of it is merely descriptive. Few attempts have been made to evaluate the effectiveness of such demonstrations as an educational technique or to analyze the impact of the demonstration within the total diffusion process (Bailey, 1964).

For example, Orr and Wells (1957) studied 14 test-demonstration farmers in northern Alabama for a period of 16 years, from 1940 through 1955. They looked primarily at the changes in the test-demonstration farmers themselves. Farm size increased over 40 percent, livestock on the farms increased 169 percent, the machinery inventory increased 280 percent, and capital inventory other than land increased 396 percent. These changes were accompanied by an increase in the general level of living of the demonstrators' families. They did not report examining the impact of the program on the surrounding neighborhood nor even comparing the changes on the demonstration farms with those of a control group.

The above report is typical of much of the literature available on result-demonstration programs. The primary intent

seems to be presenting a descriptive chronicle of what happens to the cooperators (demonstrators) in the program. Numerous studies have gone one step further and introduced a control factor. Adams, Taylor and Specht (1965) evaluated four years of the Unit Demonstration Farm in Pennsylvania by comparing the changes on demonstration farms during that period with the changes for the total county in which the farms were located.

A study of Farm and Home Development in North Carolina contrasted the changes made by demonstration families with those made by a control group of non-participating families (Marsh, 1962). Erickson and Graham (1967) paired and compared each demonstration farm in an Illinois program with a nearby farm to evaluate the performance of 63 Illinois test-demonstrators. In general, all these studies report that the demonstrators are significantly different at the end of the program from other farmers in the surrounding neighborhood with respect to net worth, increase in annual earnings, uses of sources of information, leadership participation, etc., if, in fact, they were not at the beginning. The latter is a fact which is taken into account in some studies, and is not in others.

The Influence of Demonstration Farms

A few studies have been concerned with the impact of the result-demonstrations on agricultural practices in the neighborhoods surrounding the demonstration farms. Erickson and Graham, in the

study mentioned above, interviewed a sample of local leaders, businessmen, and neighboring farmers to obtain an evaluation of the effectiveness of the demonstration farm program in disseminating information. The names of the neighboring farmers for their sample, however, were procured from the test demonstration farmers who provided the investigators with a population of names of other farmers in the neighborhood whom they thought had been influenced by the program.

In a Utah study of 66 demonstration farms in 23 counties of that state, the cooperators (demonstrators) themselves appraised the influence of the program (Michaelson, undated). They estimated that 12 percent of the 681 persons who viewed their demonstrations adopted the practices they observed. In the case of one kind of demonstration--the fertilizer demonstrations--they estimated that 22 percent of the 324 people observing the demonstrations adopted the practices.

One of the more rigidly designed studies on the influence of the result-demonstration program is that of Blackmore, Dimit, and Baum (1955). They interviewed 20 randomly selected neighboring farmers around each of 25 test-demonstration farms, for a total sample of 500 non-test-demonstration farmers. They found that the average number of recommended practices adopted was related to the distance of the farmer from the nearest demonstration farm, increasing from one mile to the second mile range, remaining fairly constant for the two- to five-mile range, but declining beyond that point.

Seventeen percent of the farmers interviewed indicated they had been on a tour of test-demonstration farms, and half of those who had been on one or more tours reported having adopted a practice they saw demonstrated there--usually a fertility practice. "Other farmers" was given as the most important source of information on new practices and also the most important influence leading to the trial of new practices. In that vein, test-demonstration farmers were named by 65 percent of the non-demonstrators as the "other farmers" who try new practices and succeed with them.

Rogers and Leuthold (1962) found in Ohio that members of the target audience tended to communicate personally with demonstrators in the same or earlier adopting categories, with a similar or higher social status, and with those who lived within an average of four miles. Seventy percent of his sample knew about the demonstration program.

In a North Carolina study, 52 percent of non-test-demonstration farmers gave the name of a demonstrator as one of the three or four persons visited most frequently (Wilkening and Santopolo, 1952). Sixteen percent of the farmers reported a demonstrator as a source of information about one or more recommended farm practices. But 53 percent of those who had been in contact with a demonstrator said they knew nothing about the TVA demonstration farm program.

According to Wilkinson and Bailey, of 136 Mississippi farmers living within two miles of a demonstration farm, 65 percent had adopted a demonstrated practice (Bailey, 1964:16).

The Effectiveness of Demonstration-Farm Programs

In evaluating the effectiveness of demonstration farm programs, Bailey cites four factors that contribute to its potency in inducing change: (1) characteristics of the demonstrations, (2) characteristics of the demonstrators, (3) characteristics of the audience, and (4) characteristics of the community or the total social milieu in which the demonstration program is cast.

With reference to characteristics of the demonstrations, Bailey discusses characteristics of individual practices being demonstrated, specific techniques used both in carrying out the demonstrations and in the educational program built around the demonstrations, and the relationship of these two factors on each other. The relationship of characteristics of individual practices to diffusion generally is discussed below. Bailey notes, however, that very little, if any, research has been done on the methodologies employed in demonstration programs. The literature in this area is mainly on how to conduct demonstrations and is "more common sense or subjective than empirical" (Bailey, 1964:18).

Characteristics of the target audience and of the community are also topics that are discussed below, under the topic of factors associated with the diffusion of innovations. The category "characteristics of the demonstrator" takes into consideration such factors as the fact that demonstrators, in contrast to their neighbors, usually rank higher in levels of adoption, leadership roles, use of cosmopolitan sources of new ideas, and various socioeconomic measures.

The writer is aware of no literature, however, that attempts to ascertain whether these characteristics accrue to the demonstrators by virtue of their participation in the program or whether the demonstrators are selected as such because they already possess these characteristics. In his research in Mississippi, Bailey (1964: 18) discovered that when rating each demonstrator on the basis of his influence on the farmers living near him,

> the most effective demonstrators were those who were alike or only slightly better than their neighbors. Those who were markedly higher or lower than their audience usually had a limited impact.

General Diffusion Literature

Rogers (1962:12) identifies four crucial elements in the analysis of the diffusion of innovations: (1) the innovation, (2) its communication from one individual to another, (3) in a social system, (4) over time. The "innovation" can be viewed as an idea, abstract or concrete, and/or a behavioral practice associated with the idea. "Diffusion" is the process by which the innovation spreads. All four of these elements of the diffusion process have been the subject of considerable research. Rogers (1962:4) stated that:

> over 172 different research studies dealing with educational innovations have been completed since 1938. . . . Rural sociologists have completed over 286 diffusion studies since the classic investigation of hybrid corn adoption by Ryan and Gross in 1943.

He, himself, goes on to review 506 diffusion studies in his book, examining six major research traditions in the field of diffusion. There has also been a wealth of literature appearing since Rogers' book.

It would be impossible and impractical to review here all of the literature on diffusion. Therefore, the procedure will be to review the major areas of findings with respect to those factors that are associated with the rate of adoption. Citations will be made in each case to studies which have contributed to that area of understanding. In most instances, the citations are from the field of rural sociology, not necessarily because that is the area of this dissertation, but also--and more particularly--it is the rural sociology research tradition "that has produced the greatest number of publications and studies on the diffusion of new ideas" (Rogers, 1962:31).

Characteristics of the Innovation

It has been observed that some newly introduced ideas have "taken hold like wildfire," so to speak. They have been embraced by nearly everyone within the particular social system to which they are applicable within a relatively short period of time. Other ideas have required one or more generations to receive general acceptance. Still other "new" ideas have never "gotten off the ground" with respect to being accepted generally by the population. Part of this differential in rate of acceptance among innovations

can be explained in terms of the characteristics of the innovations themselves. Numerous studies have examined this relationship (Bertrand, 1951; Coleman, Katz and Menzel, 1957; Fliegel, 1956; Fliegel and Kivlin, 1962a; Fliegel and Kivlin, 1962b; Fliegel and Kivlin, 1966; Graham, 1956; Geiger and Sokol, 1960; Griliches, 1957; Griliches, 1960; Havens and Rogers, 1961; Katz, 1961; Kivlin, 1960; Mansfield, 1961; McCorkle, 1961; Menzel, 1960; Parish, 1954; Prundeanu and Zwerman, 1958; Ryan, 1948; Silverman and Bailey, 1961; Wilkening, Tully and Presser, 1962; Wilkening and Johnson, 1961).

Compatibility. One of the characteristics of a new idea that has been found to affect positively its rate of acceptance is its compatibility to already existing ideas and practices. Is it similar to those things which are now acceptable? Is it consistent with existing "ways" that are evaluated favorably? If the answer to these questions is "yes," the innovation will have a higher acceptance rate than another innovation which is less compatible with the existing cultural structure, all other things being equal.

For example, despite the generally wide acceptance of soil fertility practices employed by modern farmers today, there is still a reluctance on the part of many farmers in isolated, traditional rural areas to use inorganic fertilizers. These farmers perceive fertilizer as "unnatural" compared to manure and believe that its use will poison the soil--as well as the animals and people who consume the products grown in that soil. On the other hand, once the use of inorganic fertilizers is accepted, the acceptance of newly

developed high-analysis fertilizers is relatively rapid, since it is consistent with already practiced procedures.

Santopolo reported the difficulty which Kentucky agricultural agents had in convincing farmers to grow cucumbers instead of tobacco, despite the higher profits to be obtained from the new crop. "Pickle-raising" was perceived by the Kentucky farmers as a feminine enterprise and not socially accepted among their peers, while tobacco-raising is a purely masculine activity (Rogers, 1962: 128).

Simplicity. Another characteristic of an innovation which is related to its rate of acceptance is its simplicity, or complexity. The simpler a new idea is to comprehend, the more readily it is accepted. Ideas, particularly procedures, which are complex and difficult to master are most likely to be by-passed with respect to consideration for acceptance. Fliegel and Kivlin (1962a) report that the complexity of farm innovations was highly related (negatively) to the rate of adoption.

Relative advantage. Most studies in this area agree that the most important factor associated with the innovation itself is that of the perceived relative advantage which a new idea has over presently accepted ways and/or other available alternative innovations. Relative advantage is most often measured in terms of cost, which may be associated with eventual economic profitability, or, more subtly, in terms of labor input or convenience, or even comfort. Fliegel and Kivlin (1962a) found the latter factors (convenience and comfort) to

be relatively more decisive in the decision to adopt than economic cost.

Communicability. Some ideas are easily observed and readily comprehended in the observation. Or, they can be intercommunicated among individuals with relative ease. Passively or actively, then, some innovations can be communicated easily in contrast to other innovations. As might be expected, those ideas which are more easily communicated diffuse more rapidly among potential adopters.

Although this matter of communicability is related somewhat to the "complexity-simplicity" factor, it involves another dimension of which visibility is a major attribute. For example, two agricultural practices of relatively equal complexity are introduced into a geographical area. One is a field practice, the other a management practice. Farmers passing by the fields of early adopters can "see the difference," and in observing can possibly "read" a great deal of information about the field practice. Management innovations, however, particularly those involving decision-making, are highly invisible to other farmers. It is also true that some practices or procedures are easily described verbally to others, and hence more communicable. This is especially true of motor skill patterns involving material items. Both Ogburn (1922) and Linton (1936) noted early that material innovations diffused and were adopted more readily than non-material ideas.

Divisibility. This is the degree to which an innovation can be tried on a limited basis. Studies show that practices which can be broken down into parts, or attempted on a small scale basis, are generally accepted at a more rapid rate than practices which do not have this attribute. Aside from the differential in cost, a farmer will be more likely to try a new strain of seed which he can plant on a few acres in a small scale trial than he will be to install a new milking system, which is an "all-or-nothing-at-all" sort of change. The evidence also indicates that this characteristic is more important with early adopters than with later adopters. This is logical, since ideas are relatively well established and "proven" by the time later adopters usually consider them.

These are not the only characteristics of innovations which have an influence on the rate of adoption. They are, however, those which are generally agreed upon by a majority of the studies to be salient. It is to be recognized also that their several effects are neither single nor unidimensional, but there is interaction among them, as well as between characteristics of the innovation and other factors associated with adoption or acceptance in the diffusion process.

Characteristics of the Potential Adopter

It is rather apparent that not all persons accept an innovation or new idea at the same time. (Otherwise there would be no justification for "diffusion" studies!) Some individuals seem

willing to try a new idea the moment they first hear of it; others seem never willing to try a new idea. The majority of people lie somewhere in between these two extreme positions. One of the most researched areas of the diffusion-adoption process is that of the characteristics of the potential adopter (Beal and Rogers, 1960; Beal, Rogers, and Bohlen, 1957; Belcher, 1958; Blackmore, Dimit, and Baum, 1955; Bowers, 1938; Bylund, 1962; Bylund, 1963; Cancian, 1967; Cohen, 1962; Copp, 1956; Copp, 1958; Coughenour, 1960; Dean, Aurbach, and Marsh, 1958; Dodd, 1953; Eisenstadt, 1953; Emery, Oeser, and Tully, 1958; Fliegel, 1957; Fliegel, 1959; Fliegel, 1960; Fliegel, 1965; Fliegel, 1966b; Goldstein and Eichhorn, 1961; Griliches, 1957; Gross, 1949; Gross and Taves, 1952; Hägerstrand, 1953; Harp, 1960; Hess and Miller, 1954; Hildebrand and Partenheimer, 1958; Hoffer, 1942; Hoffer and Stangland, 1958a; Hoffer and Stangland, 1958b; Jones, 1963a; Junghare and Roy, 1963; Kreitlow and Duncan, 1956; Larsen, 1962; Lindstrom, 1958; Lionberger, 1949; Lionberger, 1955; Lionberger, 1959; Lionberger, 1963b; Lionberger and Coughenour, 1957; Mansfield, 1961; Marsh and Coleman, 1955a; Marsh and Coleman, 1955b; Mueller, 1958; North Central Rural Sociology Subcommittee, 1955; Rogers, 1956; Rogers, 1957; Rogers, 1961; Rogers and Burdge, 1961; Rogers and Leuthold, 1962; Ryan and Gross, 1943; Sheppard, 1960; Wilkening, Tully, and Presser, 1962).

Several students of innovation and diffusion have attempted to determine identifiable stages in the diffusion process within an individual. A committee of rural sociologists, after surveying the

findings of diffusion studies conducted within their field, advanced a theorized process of diffusion which indicated five stages through which an individual proceeds from the time he first learns of a new idea until he eventually accepts (or rejects) it: (1) awareness, (2) interest, (3) evaluation, (4) trial, and (5) adoption (or rejection) (Rogers, 1956; and Rogers, 1962:148-192). Obviously, these are not discrete, or distinctly separate stages in the individual's adoption process. Nor do all people follow these five steps in every decision they make regarding new ideas. Categorizing the stages this way is merely a heuristic device which describes a relatively continuous sequence of mental events. Beal and Bohlen (1957) report that farm operators and their wives are able to recognize these five stages in the process of their own decision making, however, when questioned about them.

To the knowledge of the writer, no studies have attempted to ascertain whether early adopters are merely individuals who move through the five stages enumerated above more rapidly than late adopters, or whether they are persons who more quickly become aware of new ideas, and, therefore, enter the initial stages of the process sooner. From the empirical evidence, one could make an argument for either case, or for a combination of both.

Numerous studies have focused on identifying various factors related to innovativeness. In some instances, these studies have attempted to control for adopter categories; many others have

not. Several of the more important characteristics associated with innovative behavior are enumerated below.

Age. Although there is not universal agreement among the research findings, the majority of studies report that age is inversely related to innovativeness. Earlier adopters are younger than late adopters. As Rogers (1962:174) points out, there are adequate theoretical grounds for expecting the younger members of a social system to be quicker to accept new ideas.

> The socialization of personality occurs mainly in very early life. In a rapidly changing culture, this means that younger people learn a more modern set of cultural values than do older people, who were socialized in an earlier era. The young are less conditioned by the older culture; hence, they are more innovative.

Education. Earlier adopters have more years of formal education than late adopters. Although most studies measure this dimension by examining the relationship between innovativeness and the number of years of schooling, it is questionable whether the actual factor involved is education, per se, or a level of mentality concomitant with measurable levels of education. Certainly, education increases knowledge. But the critical relationship here may be that education creates an appreciation for, or a favorable attitude toward, new knowledge or new ideas. On the other hand, depending on the conte t of the learning, education may, or may not, "condition" an individual to accept change more readily. Another factor underlying the relationship between education and innovativeness may be that those farmers (or other practitioners) who have educational

experience are more likely to be able to adapt a new idea to their own situation before there is generally very much information available about the innovation. It is also true that education is highly correlated with other factors which are logically more directly related to adoption behavior, such as income, age, or accessibility to more direct sources of specialized and technical information. At best then, education seems to be an important but indirectly related variable to innovativeness.

Financial resources. Early adopters are characterized by higher incomes, greater available financial resources (whether actual capital or credit), and larger-scaled operations. It would seem quite logical that those individuals with a more favorable financial situation would be in a better position to assume the risk that is associated with the acceptance of any new idea. It is also a fact, however, that the converse is also true, that individuals who are willing to assume the risk and accept new ideas may thereby elevate themselves into a more favorable financial position comparatively more rapidly because they take advantage of early greater profits. Whatever the direction of the relationship, wealth and innovativeness seem to be highly correlated.

Competency. Early adopters display greater competence in their several endeavors than do later adopters. Competent practitioners are more likely to be "up" on their field; therefore, they would be more likely to learn about new ideas than less competent persons. Closely related to this is specialization. More competent

farmers, for example, are more likely to be specialists, concentrating on one farm enterprise. Specialization and innovativeness are highly correlated in many studies.

Social status. Many research studies indicate that earlier adopters have higher social status or community prestige than do late adopters. Several studies have indicated that social class values attached to the idea or innovation may affect this relationship. For example, Graham (1956) found canasta was adopted by the upper class more readily, but television was accepted more readily by the lower classes. Cancian (1967) also suggests that this relationship between innovativeness and social class may be curvilinear, that as an individual achieves greater status he reaches a point at which his innovative tendencies level off. When he occupies a low position on the social status scale he has little to lose, in the way of status, by being an innovator. As success accrues to his efforts, he continues innovative behavior. But when he reaches a certain level of achieved status, he begins to hesitate about plunging into new ventures. He is unwilling to risk his reputation as a successful person on a loser!

Social participation. Early adopters are characterized by higher levels of both formal and informal social participation than later adopters. This includes participation in community activities such as church socials, sports events, and recreational activity, as well as being active members of socially and economically oriented

organizations. They also demonstrate more leadership responsibility than do later adopters.

Communicative behavior. Early adopters generally exhibit greater accessibility to more direct sources of information than do later adopters. Although they use personal sources of information from time to time, early adopters appear to place more confidence in impersonal sources. Within agriculture, early adopting farmers read more farm magazines, consult more often with the county agent or university subject-matter specialists, are more familiar with specialized technical publications, and attend more educational meetings than do later adopters. Therefore, they utilize a greater number of different information sources. They also interact more frequently with other farmers and are named more often by other farmers as personal sources of information and advice than is true of their less innovative brethren.

Cosmopoliteness. Rogers (1962:182-183) defines "cosmopoliteness" as "the degree to which an individual's orientation is external to a particular social system." Early adopters have been found to be much more cosmopolite than later adopters. As stated above, earlier adopters use more cosmopolite information sources than later adopters. They travel much more widely and are interested in affairs beyond the confines of their own social system. Their reference groups are often outside their own social system rather than within it. As Tarde (1895:87-88) observed,

> To innovate, to discover, to awake for an instant from his dream of home and country,

> the individual must escape, for the time being, from his social surroundings.

As in the case of characteristics of the innovation, we have reviewed only those generalizations about characteristics of the potential adopter which most research studies in the area generally agree are associated with quickness to accept a new idea. Again, these variables do not operate independently, either among themselves or among other groups of factors, such as characteristics of the innovation or characteristics of the social milieu, which is discussed in the section following. There is a high level of interrelationship among several of the variables, and it would appear that there is some interaction among several others.

Characteristics of the Social Milieu

"No man is an island," as many sages have observed. Individuals are members of social groups, and together they reside in a natural and social environment. Behavior is a function not merely of one's own desires, needs, attitudes, and characteristic attributes, but also of the expectations, influences, and limiting characteristics of the environment, particularly that of the social milieu. Many studies have examined the influence of cultural and social factors on the diffusion of new ideas (Allers-Montalvo, 1957; Beal and Bohlen, 1957; Bose, 1962; Chaparro, 1955; Coleman, Katz, and Menzel, 1957; Copp, 1956; Emery, Oeser and Tully, 1958; Flugel, 1962; Hoffer, 1942; Hoffer, 1944; Hoffer and Gibson, 1941; Hoffer and Stangland, 1958a; Lionberger, 1951; Lionberger, 1954; Lionberger, 1963a; Lionberger and Hassinger, 1954; Marsh and Coleman, 1954a;

Marsh and Coleman, 1954b; Marsh and Coleman, 1954c; Menzel and Katz, 1955-56; Merton, 1949; Nielson, 1967; Nye, 1952; Pederson, 1951; Ramsey, Polson and Spencer, 1959; Rogers and Beal, 1958; Rogers and Capener, 1960; Sheppard, 1963; van den Ban, 1960; Wilkening, 1952b; Wilkening, 1956; Wilkening, 1958b; Wilkening, Tully and Presser, 1962).

The kind of farming a farmer engages in is a result not only of his own knowledge and customary ways, or of accessible channels of information, but also of the interest, expectations, and attitudes of various individuals and groups in the community. These can be expressed formally in the form of laws or regulations (such as milk sanitation codes) or informally in the form of folkways and mores, or interpersonal expectations. The differential rate of adoption among communities or geographical areas can be explained in part by these limiting factors or conditions which are characteristic of the community or social milieu.

Community values and norms. Values are the organizing themes in the thinking and behavior of individuals within groups. Norms are the standards by which individuals know and judge how things should be, and be done, properly. Therefore, values are the underlying factor of norms, attitudes, and behavior. Linton (1952:74) states:

> If we know what a society's culture is, including its particular system of values and attitudes, we can predict with a fairly high degree of probability whether the bulk of its members will welcome or resist a particular innovation.

Naturally, it depends on how sensitive a person is to these community pressures toward conformity. There is a differential awareness among individuals of the strength of various values and norms. Research studies have shown that where the values and norms of a community are oriented toward the conservation of traditional culture, i.e. stabilizing the status quo, the acceptance of new ideas is considerably slower than in a community which is oriented toward change and modernization, i.e. progressive. Pederson (1951) examined the difference in the rate of adoption of new ideas between Polish and Danish farmers in Wisconsin. The culture of the Polish farmers was oriented toward preservation of the traditional status quo, while that of the Danish farmers was oriented toward change and modernization.

Those individuals who identify themselves with values of efficiency and self-reliance are much more likely to accept new ideas that increase efficiency than those persons who identify themselves with values of security and conservatism.

Social isolation. The diffusion of an idea or practice implies communication. Therefore, it would seem logical that those people who are isolated from communicative contact with others would be far less affected by this necessary condition for acceptance of change. Studies have shown that, in truth, individuals who are relatively not accessible to media carrying new ideas--e.g., newspapers, radio, T.V., specialized technical information sources, even other people--are, in fact, resistant to change. The rate of change

among non-isolated individuals seems to be indeed higher, whether one considers geographical or social isolation.

Some rural communities are remote or "out-of-the-way," and as a result are detached from many of the ongoing social processes of the larger society--particularly communication. People in these places may have only one T.V. channel, if any, may not be served by a daily paper, and may live so distant from neighbors that communication with them exists at a minimal level. On the other hand, individuals who are not geographically isolated may be isolated socially. By their own choice they may not make themselves accessible to available communication channels, or they may lack the necessary skills (psychological or social) involved. In any event, where people have very little contact with the world around them, their lives remain much the same, despite the changes which may be going on around them. The literature shows that exposure to varied sources of new ideas is associated with change--and the rate of change is somewhat a function of the number of different kinds of contacts.

Presence of special functionaries. In interpersonal communication, facts are seldom exchanged without commentary of advice and opinion. In some instances, the new ideas and the accompanying opinions are freely offered without solicitation; in others, it is sought. Not everyone's knowledge and opinions are sought after, or accepted at face value. Some persons may occupy socially institutionalized roles in the communication process with

respect to ideas and the advisements attached to them. The presence of these special functionaries will greatly facilitate, or hinder, as the case may be, the diffusion process.

Innovators and very early adopters are one such type of functionary. They serve to introduce new ideas into the community. Although local farmers may be aware of a particular agricultural practice, for example, they may never have really thought of it in terms of local applicability. The local "innovator" tries it out. His peers are now aware of the new idea at a different level of consciousness than they had been before. The existence of the new idea has assumed a reality which did not exist before. For some members of the community the innovator is also a source of information, but, for the most part, he is considered a deviant and is not influential in their decision-making process. Certainly they will evaluate his performance in the matter, but his primary function is that of introduction locally.

Another special functionary is the key communicator or opinion leader. (A variety of terms are used by different investigators to refer to this role.) Key communicators are generally operationally defined in the literature as individuals who are mentioned frequently as personal sources of information, primarily specialized information. They seem to be more involved in the communication of ideas and information than other persons. They are characteristically more active in seeking new ideas and make more use of all information sources than do other individuals. In

most other characteristics, however, they are quite similar to their peers, although generally they enjoy higher prestige. Evidently, because they are "in the know" and, at the same time, do not depart from locally accepted standards, they are sought after for information and advice. The important factor is that as communicators of information they are in a position to selectively edit what they transmit.

Influentials are individuals who exert a determining influence on the decisions of other persons. In some cases, key communicators and influentials are the same persons, but not always. Influentials do more than communicate ideas and give advice. By approving (or disapproving) of a new idea they legitimize the adoption or rejection. Therefore, they are individuals whose opinion is respected and are viewed as being capable of determining whether a new idea is applicable locally or not. Lionberger (1960:63) reports that when influentials adopt a new practice, "the adoption curve takes a characteristic sharp turn upward," because then most people regard it as acceptable and will adopt it.

In communities which are characterized by rapid technological change, higher levels of education, more progressive views toward innovation and efficiency, it is possible that all three of these specialized roles will be played by the same persons. However, where a premium is placed on maintaining the status quo, innovators will hardly be looked upon as legitimate sources of information or advice, neither will their opinions be influential in changing the ideas or ways of others.

The presence or absence of these special functionaries within a system can affect the diffusion of new ideas. This is not to say that other persons can not or do not perform these functions. They do, to a certain extent. But for the community in general, or for a reasonably large segment of it, particular persons come to fill particular roles.

Memberships in groups. The other people with whom an individual associates exert an influence on his thinking and behavior. This is especially true of those persons with whom he has frequent, regular contact, such as fellow members of the groups to which he belongs. These groups may be informal groupings such as neighborhoods, locality groups and cliques, or they may be formal associations such as co-ops, churches, or political organizations. In each case, these functioning social groups establish norms which serve as standards and guiding principles for those in the group. In some instances, such as locality groups, for example, these norms may apply directly to the agricultural activities of farmers; in other instances, it may merely be that the other persons in the group exert pressure upon the individual to adhere to opinions or ways that are not necessarily salient to the group, but because the individual values his relationship to the group, he accepts the expectations of other group members for him.

The power of group influence in the acceptance of new ideas was reported by Siamotowe and Musonda (1968). Zambian agricultural agents were attempting to induce farmers in remote areas of that

country to raise higher grade beef cattle, the animals produced by the native farmers were "scrubs," and large herds were needed to meet family demands and provide farm income. Attempts to introduce higher grade beef cattle were met with considerable resistance, however, because prestige in the community accrued from the number of cattle killed by a host for a wedding feast or other festive occasion, not on the quality of meat or other factors. The Zambian farmers' friends and peers would ridicule the festivals hosted by the early adopters of high grade cattle, because it required only three or four head of cattle to feed the guests, whereas non-adopters "splurged" literally dozens of cattle to supply their feasts.

Programs of planned change. Another important factor of the social milieu influencing the rate of diffusion is the presence (or absence) of programs of managed or planned change. Change agents seek to induce the acceptance of new ideas, usually with the view of achieving definitive goals and objectives within the social system of their target audiences. Agricultural extension workers actively seek to educate the agricultural population of a particular area, and to introduce new ideas that will increase efficiency of farm operations and at the same time improve the farmers' standard of living. Teachers attempt to infuse new knowledge and skills into the minds and lives of their students. Not all change agents, however, represent public agencies. Many are affiliated with special interest groups or commercial enterprises. Many industrial enterprises employ market research staffs to better advise their promotional

agents how to improve the diffusion of their products among potential consumers.

Almost all of the research in this area indicates that programs of planned or managed change do play an important role in securing the adoption of new ideas. How effective such programs are, of course, depends on many factors, not the least being characteristics of the program itself.

Summary

An attempt has been made to review what is now known about the effectiveness of result demonstrations in diffusing new ideas—particularly recommended farm practices. Although the literature about demonstrations is extensive, most of it is descriptive and is concerned with changes wrought among the participators (demonstrators) in the program. Much of the evidence on the impact of demonstration programs on the surrounding farms is characterized by less rigorous and precise methodology.

Much more is known about the diffusion process generally. Research has demonstrated that the speed with which new ideas spread is a function of (1) characteristics of the innovation itself, (2) characteristics of the potential adopters, and (3) characteristics of the social milieu within which the communication about the innovation takes place. The process of diffusion, then, is a complex process. It is not certain—although often assumed—that the factors which are associated with the diffusion process, as such, are

applicable to the particular situation of the demonstration farm. However, an understanding of the interplay of the elements in this complex whole is necessary to perceive the role which an educational technique such as the demonstration farm can play.

CHAPTER III

METHODOLOGICAL AND THEORETICAL ORIENTATIONS

The Focus of Evaluative Research

This dissertation is evaluative research. According to Suchman (1967:37), the identifying feature of evaluative research is that it focuses on the goal(s) or objective(s) of the program or project being evaluated. Its purpose, then, is to measure the extent to which the goal(s) or objective(s) has been attained.

The focal point of basic research is the hypothesis. Cohen and Nagel imply that basic research begins with the formulation of an hypothesis, whatever steps or stages are necessary preludes to that formulation (Selltiz, 1963:35). The hypothesis is an assertation or a statement of a relationship between two (or more) variables. One (or more) of these variables is called the independent variable, or the "cause." The other variable is the dependent variable, or the "effect." The function of the hypothesis is to state the relationship between these variables explicitly, so that this relationship may be tested. Accordingly, the hypothesis directs the research; for the investigation then proceeds to verify whether or not this presumed or declared relationship is descriptive of reality. Operationally, this is accomplished by examining changes or variations in the dependent variable, and ascertaining whether they are concomitant with changes or variations in the independent variable(s).

Evaluative research also examines change. It begins with a statement of the "hypothesized" relationship between some programmed activity (the independent variable) and that activity's desired or proposed impact or effect (the dependent variable). The expression of this hypothesized relationship is formulated, in effect, in the stated goals or objectives of the action or educational program which is the object of the research. Therefore, the hypotheses of evaluative research are "ready-made," so to speak. If, for example, the goal of an educational-action program such as the one under study is to induce the use of a particular herbicide, as opposed to numerous other more commonly utilized herbicides, the hypothesis is, in effect: adoption of "Herbicide X" is related positively to exposure to the educational program. For the purposes of the research, the null hypothesis would be: exposure to the educational program has no effect on the adoption of "Herbicide X."

It is true, however, that the leaders or administrators of action and educational programs often do not define the goals and objectives of their programs. Persons involved in action programs are often more concerned with "doing things" than with defining precisely what it is they are attempting to accomplish (Raudabaugh, 1967). Therefore, objectives are frequently stated inadequately as being the "things to be done," or activities which the program participants will engage in. Another frequent practice is to state objectives as being the general "content" areas that will be dealt with in the program. Again, this is inadequate, and really evades

the issue of specifying definitive goals or objectives which the program activities will attempt to effect.

In light of these circumstances, one of the primary tasks of the investigator in evaluative research is to define clearly what the program objectives are. This is not necessarily an easy task. Hyman, Wright, and Hopkins (1962:7) state:

> The many difficulties suggested--the breadth of the thing subsumed under a particular objective, the multiple objectives encompassed by many programs, the ambiguity inherent in any or all of the objectives--are characteristic of many programs and are enough to stagger the imagination of the evaluator.

Therefore, one of the methodological focuses of this dissertation will be the primary objectives of the educational program built around the result-demonstrations supervised by the extension staff of Indiana and Susquehanna counties. Since these objectives cannot be formulated or even assumed a priori by the investigators, the initial task of the research will be the identification of the objectives of the educational program.

Theoretical Orientation

Although this is evaluative research, there is an underlying theoretical orientation which will provide the basis for the analysis and interpretation of the findings of the study. The orientation here is that of communications theory. There have been three principal traditions in communications theory: (1) linguistic anthropological, (2) social-psychological, and (3) mathematical.

As the name implies, linguistic communication theory is primarily concerned with the analysis of lingual signals, particularly verbal signals. With respect to the area of the diffusion of agricultural practices, very little, if anything, has been done within this approach. Perhaps this might represent a fruitful area of research concern and open another dimension of understanding in the diffusion process.

On the other hand, most of the research done in the area of adoption and diffusion has been within the social-psychological tradition. Few, if any, of the studies ever state this, but the approach is that of the social-psychological tradition as it is defined by communication theorists.[1] One of the classical statements in this tradition is Newcomb's (1953) concept of co-orientation as the basis of communication:

> Every communicative act is viewed as a transmission of information, consisting of discriminative stimuli, from a source to a recipient. . . . Thus in the simplest possible communicative act one person (A) transmits information to another person (B) about something (X). Such an act is symbolized here as AtoBreX.[2]

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[1]For a discussion of the three major traditions in communication theory and the role they have each played in research, see Smith (1966:1-10, 13-14, 64-65, 119-120).

[2]For a more complete statement of Newcomb's theory, see Newcomb (1950). For an extension of Newcomb's model to include such concepts as roles, coding, channels, and feedback, and which is oriented toward the social-psychological aspects of mass media communication, see Westley and Mackan (1957).

Viewing the farm practice adoption-diffusion process within this framework, we see, for example, the county agent or another "more-informed" farmer, A, communicating information to a potential adopter, B, about a particular recommended farm practice, X (see Figure 1). The orientations that exist between the actors and between each actor and the subject of their communication contribute to the symmetry or asymmetry of the system. If the system is asymmetrical, there is tension created toward establishing symmetry. Communicative acts, then, may be the initiators, or the results, of changes in the orientations that exist in the system and these changes may be actual or anticipated. The relationship of the majority of adoption-diffusion research to the social-psychological model is that characteristics of the innovation, characteristics of the potential adopter, and characteristics of the social milieu all impinge upon the orientations existing between the elements of the systems.

For example, in a community where progressiveness and efficiency are highly valued, a potential adopter would likely have a positive orientation toward an "early adopter" who recommends a new practice to him. The fact that the early adopter has a strong positive orientation toward the practice produces an asymmetrical situation, since the potential adopter, to this point in time, has had a negative attitude toward the practice, manifested by non-adoption behavior. However, now there is tension to achieve symmetry. This can be accomplished in three ways: (1) the potential adopter can misinterpret the early adopter's orientation toward the new

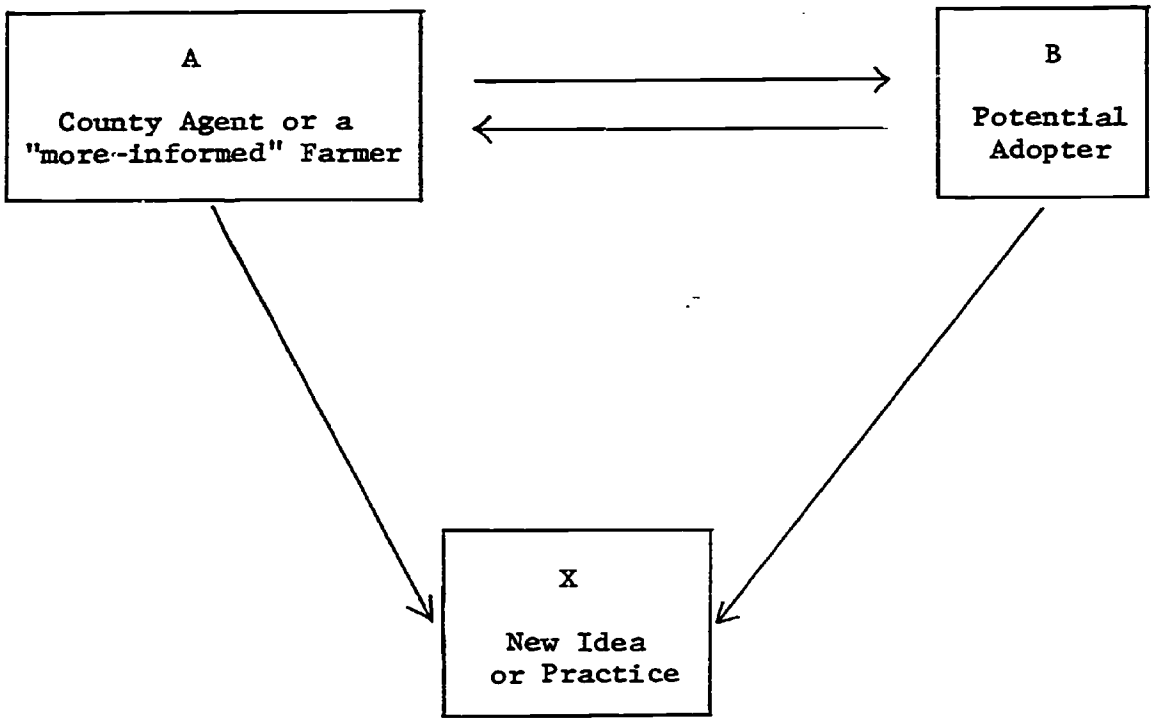

Figure 1. Representation of Newcomb's AtoBreX model of Communication. The system has a tendency to "prefer" symmetry, which results when there is a "balance" or "symmetry" among the co-orientations (represented by arrows) existing between the elements of the system.

practice as being negative; (2) the potential adopter can change his orientation toward the early adopter, i.e. view him negatively; (3) the potential adopter can change his orientation toward the practice and adopt it. For example, having viewed the practice negatively because of its high initial cost, the potential adopter might now change his view to a positive orientation because of its labor-saving or convenience characteristics.

It is to be recognized that this particular AtoBreX system is only one isolated system in operation at any one moment, and that to understand completely the changes which do occur, one must need consider a large number of simultaneously operating systems, some of which involve one or two of the same elements in combination with other elements.

The Mathematical Model

The general statement and model of the mathematical theory of the communication process was developed in 1947 by Claude Shannon and was presented by Shannon and Weaver (1949). Shannon and Weaver did not have interpersonal communication in mind when they published their model, being concerned only with the technical problem of electronic communication. However, its usefulness in analyzing human communication networks was quickly recognized, and it has since been employed widely by behavioral scientists (Berlo, 1960:23-39; Andersen, 1968; McDonough, 1963:32-49; Redfield, 1958:3-14).

The fundamental elements of Shannon's communication system are represented graphically in Figure 2. The information source

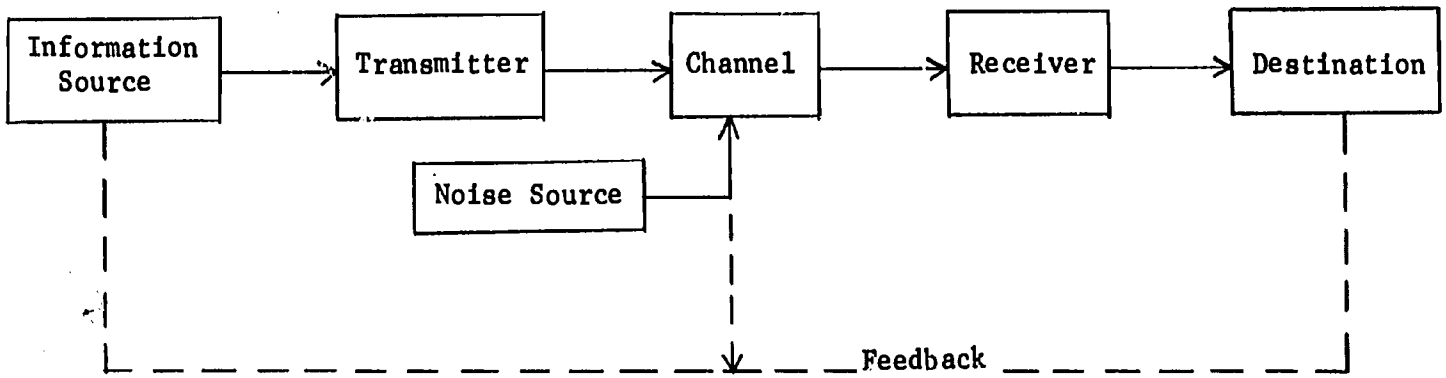

Figure 2. Symbolic representation of the fundamental elements in Shannon and Weaver's communication theory model. The information source selects a desired message from the population of possible messages. The transmitter encodes signals which are sent through the communication channel to the receiver. The receiver decodes the signals by assigning meaning to them for the destination. Noise (distortions, errors, "static," deletions, additions) is most often associated with the transmission of the signal through the channel. Semantic noise, however, may enter the system at either the transmitter or receiver.

selects the message it desires from the set of all possible messages. The message is encoded into signals by the transmitter and sent through the communication channel to the receiver. The receiver acts as an inverse transmitter, decoding the signals of the message and relays the meaning of the message to the destination.

Using the example of an Extension educational program, the county agricultural agent may be the information source. He selects, from all the sets of possible messages, that one message which he believes will impart the information he desires to convey to the farmers in his county. He formulates this message into signs and signals which he anticipates his audience will be able to understand, i.e., attach those meanings to the signals which will adequately and accurately convey what he has in mind. He selects a channel through which to send these signals, e.g., newspaper article, radio program, twilight meeting. The farmers who receive the signals interpret them according to their capabilities and background experience, and assign a meaning which is, in effect, the message they perceive.

Several observations should be made at this point. First, the process explicated by this model is occurring at several levels simultaneously. For example, one might say that the source of agricultural information is the Agricultural College of the Land Grant University, and the destination is, essentially, the total population of farmers within the State. At this level, county agricultural Extension agents, along with the University subject-matter specialists

and all other functionaires within the State Cooperative Extension Service bureaucracy, taken together, represent a rather complicated complex of sub-channels through which communicative messages are sent. The model is equally useful, whether analyzing communication networks on a gross level involving complicated systems, or on an interpersonal level, or at some intermediary level in between.

Another fact to consider is that, although for analytical purposes one views communication as a series of discrete entities consisting of a message being conveyed from a source to a destination, communication is a process, and, therefore, dynamic in nature. And, as is recognized in the concept of feedback, communication in process hardly ever occurs in one direction only. So that the county agricultural extension agent--or, if one desires to conceptualize the process at a macro-level, the state extension service--is involved in a continuous series of communicative acts, channeling a multiplicity of messages in the direction of the target audiences, and simultaneously perceiving those cues or other messages fed back by the target audiences which inform him of how his original messages have been received.

The Demonstration Farms in the Context of the Model

This thesis focuses on that part of the communication system which is directed through the channel of the result-demonstration program, which includes the demonstration farms and the education program built around them. It is obvious that communication between

the Agricultural College and the farmers of the state is multifarious, even with respect to that which travels through the Cooperative Extension Service. When one considers those messages that reach the farmer indirectly via commercial and other specialized communicators, the complexity of such a network is apparent. The farmer today is exposed to a multitude of stimuli in the form of agricultural information. Our attention, however, shall be focused on the transmission of stimuli through the particular system of the educational program built around the extension result-demonstration project in Indiana and Susquehanna Counties. This is illustrated in Figure 3.

Resolving the focus still further, it is recognized that within this model there are problems at three levels. Weaver (1949: 11) identifies these levels as (1) technical problems, which are "concerned with the accuracy of the transference of information from sender to receiver"; (2) semantic problems, which are "concerned with the intended meaning of the sender"; and (3) the problems of influence or effectiveness, which are "concerned with the success with which the meaning conveyed to the receiver leads to the desired conduct on his part."

Certainly this latter level, that of the problems of impact or effectiveness, is one of the important levels of concern for those who are involved in the process.

One might be inclined to assume that the concern of communication theory would encompass only the transferal of a message from its inception at the source to its reception at the destination, and,