

AN EVALUATIVE STUDY OF A
DISTRICT EXTENSION PROGRAM
IN MARKETING

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IN MARKETING

By
Turner H. Bond

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AN ABSTRACT

Extension education programs have as a major goal the changing of behavior of the client group. The changes sought are those which lead to better living, better incomes, and more efficient use of available resources.

This study was designed to make comparative evaluation of two separate types of extension programs, in terms of the behavior changes brought about in the marketing of agricultural products. The behavior changes to be compared were selected on advice of buyers of the products, as those changes contributing most to the desirability of the products.

The theoretical hypothesis of the study was that more producers will change one or more marketing practices in an area served by an extension district marketing agent than in an area served by an extension staff responsible for both production and marketing.

To arrive at a test of the major hypothesis, sub hypotheses were put forth that more producers would use new sources of market news; that more producers would start to wash potatoes; that more producers would change their method of grading potatoes; and that more producers would change their methods of maturing potatoes, in the area served by the district marketing agent.

Data were gathered in an area served by each of the two types of extension programs, by questionnaire and telephone interview with random samples of producers in each area. The data consisted of information from each producer on whether he had changed in each of the practices being studied. The

time period for which change was requested was the last three years.

Compilation of the data showed that a significantly larger number of producers had changed in two practices in the district marketing agent's area than in the control area. These practices were the use of new sources of market news and the washing of potatoes. In two other practices, the number of producers changing was greater in the district marketing agent's area, but the differences were not great enough to be statistically significant at the five percent level of confidence. These practices were the method of grading potatoes and the method of maturing potatoes before harvest.

Statistical test of the number of producers changing in all practices showed that the change was greater in the district marketing agent's area. The extent of the changes, however, was not great enough to be statistically significant at the five percent level of confidence.

Conclusion regarding the impact of the district marketing agent's program in bringing about changes in behavior could not be positively stated. It was indicated by the greater number of changes in all of the practices measured that the district agent's program had had the greater effect. The fact that the magnitude of change was not beyond the possibility of chance variation precluded any positive statement of greater impact.

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CHAPTER I

INTRODUCTION

Evaluation of extension effort is necessary if programs are to keep abreast of the changing needs of agriculture. This is true since any improvement in a program must be more effective than the method replaced, and effectiveness of both old and new method must be determined by some measurement. Particularly in relatively new areas of work such as agricultural marketing, evaluation is needed to get the most in guidance from pioneering types of programs on which later expansion may be based.

It will be the purpose of this study to carry out and report evaluation of a particular type of extension marketing program, that of a district marketing agent working primarily with producers and first handlers. Evaluation will be made in terms of practice change by producers. Changes will be those expressed as objectives of the marketing program, and also recognized by buyers of the commodities produced as sound marketing practices. This extent of change will be compared to change that occurs in a similar area served by the older type of extension program oriented primarily toward production.

The Place of the District Marketing Agent

The Michigan program of improving agricultural marketing through the work of district marketing agents grew out of a change in emphasis in extension marketing work dating back to about 1946. At that time added impetus was given to extension

work in marketing through passage of the Agricultural Marketing Act, that earmarked funds for new efforts on work with marketing.

Resulting efforts to increase effective work in marketing in the various states took different forms. Almost every state increased the staff of state marketing specialists to improve resources in available marketing information. The link between the broad information available and farmers or firm managers making up the specific clientele of the marketing work assumed two major directions. One direction was to increase emphasis by existing county staffs in the field of marketing. The other was to employ personnel to be responsible for the marketing phase alone, supplementing the work of existing staff.

Objectives of the extension effort in marketing were summarized by the Scope and Responsibility Committee of the Extension service in 1958 as follows:

"Paralleling efficiency in production is the necessity for developing the maximum practicable efficiency in the marketing, distribution, and utilization of agricultural products. Herein lies a challenge and a responsibility for extension to contribute to the welfare of the producer, the handler, and the general public simultaneously.

Expanded efforts are needed to:

Create greater efficiencies in processing, handling, and distribution through the application of new technology and improved marketing practices.

Expand the market for farm products through consumer information programs and by helping producers, processors, and handlers develop new products and adopt new marketing practices found through research.

Guide those performing marketing services in developing the most efficient market organization and facilities.

Develop greater understanding by consumers of the importance of timely buying and the adaptability and suitability of various products for different uses.

Get rapid adjustment by farmers, consumers, and marketing firms to change in technology, supply, and demand through improved understanding and communication."¹

In the Michigan program of dividing these objectives into workable segments that could be developed as specific programs for extension agents, three major lines of activity were developed. These include work with marketing firms, with the objective of providing relevant data to these firms to enable them to maintain optimum operating conditions with respect to competitiveness and profitability.

Work with consumers was a second major line, and the objective here was to help consumers obtain greater satisfaction from the expenditure of their food dollars.

Work with producers, as the third area, was aimed at enhancing the profit position of farmers by providing marketing information necessary in making sound buying and selling decisions.

It is the third type of extension program, that with producers and through them with first handlers, with which the present report is concerned.

The Michigan program has followed both directions as noted above, the employment of strictly marketing personnel, and greater emphasis on marketing by existing county staffs. In placing extension personnel to work especially with marketing, the work areas have been established by combining several adjoining counties into an agent's work area, and designating this as a district and the agent as a district marketing agent.

The present study will make comparison of such a district marketing agent program with the marketing work carried out by the traditional staff in the individual county.

¹ Subcommittee on Scope and Responsibility (Extension Committee on Organization and Policy) The Cooperative Extension Service Today, a Statement of Scope and Responsibility Cooperative Extension Service, Washington, D.C. 1958 p.9

Significance of the Study

District Marketing Agents have been at work in Michigan since mid 1954. Evaluation of these programs has been carried out on a continuing basis as the programs have developed, through the evaluative indicators that have been available to the workers themselves and to administrators. These indicators have in the main been specific case estimates of savings or additional income deriving to producers and handlers through marketing improvements, testimonials by program participants as to the benefits they have received, and various measures of extent of participation in programs such as attendance at educational meetings or increase in mailing lists of those receiving marketing information.

These measures have the merit of being applicable to almost every part of the extension program, and of being rather easily applied in the course of carrying on extension work, without drawing resources away from the extension effort.

The measures do not, however, commonly include means to measure programs against natural development in marketing technique over time. Especially they do not include measures against the traditional development of agricultural marketing as it is affected by the county extension staff who are not specifically assigned to marketing but who recognize this as one of several important areas of responsibility.

A more rigorous and objective type of measurement is required than is commonly available to the district extension worker, to assess these latter factors. Consequently, this study attempts to segregate a small but representative segment of a district marketing agent's program and a similar segment of an active program with marketing as carried out by the regular agricultural extension staff in a comparable area and commodity. Then through methods as objective as possible it attempts to compare progress in

these segments in terms of actual changes wrought in clientele.

Approach Used in the Study

The evaluation process measured changes in certain marketing practices in an area served by a district marketing agent and compared this to change in the same practices in a county served by the traditional type of extension staff.

Practices selected for measurement involved some problems in uniformity in the two areas. It is highly unlikely that identical marketing practices would have received equal emphasis in the same time period by extension staffs in two separate areas. Staffs could be expected, however, to emphasize over time the practices providing growers the greatest competitive advantage with buyers of a particular commodity.

Hence, for selection of practices which may be considered desirable for both areas, check was made with buyers and the factors they recognized as important were those used in measuring effect of the extension marketing program.

With determination of the practices to be measured, information on practice change was gathered from a random sample of producers in each of the two areas. Practice change over the period of the last three years was measured.

Approach to producers was made by means of a questionnaire, identical in form for the two areas. To minimize difficulty from non-return of questionnaire forms, respondents were not asked to return the forms, but were asked to mark responses and retain the form to use as base for a telephone interview at a stated time covering the information requested. The writer called each respondent by telephone, and recorded on an identical questionnaire form the responses.

From the information gained in this way statistical

analyses were applied to the information on practice changes reported, to determine by probability for the whole population the extent to which practice change in one area has been greater than the other. From this extent of change can be inferred the comparative effect of educational work in marketing through the two types of extension program.

Hypotheses of the Study

From the assumption that a district marketing agent, with less responsibilities in other areas of agriculture, will be able to carry on a more intensive program of marketing education with producers, and by such intensive program bring about greater change in marketing practices, the following is hypothesized.

General Hypothesis: More producers will change one or more marketing practices in an area served by an extension district marketing agent, than in an area served by an extension staff responsible for both production and marketing.

Sub-Hypothesis A: More producers will use new sources of periodic marketing information in an area served by a district marketing agent than in an area not so served.

Sub-Hypothesis B: More producers will adopt the practice of washing potatoes in an area served by a district marketing agent than in an area not so served.

Sub-Hypothesis C: More producers will change their grading practices for potatoes in an area served by a district marketing agent than in an area not so served.

Sub-Hypothesis D: More producers will change methods of maturing potatoes in an area served by a district marketing agent, than in an area not so served.

For clarity in showing what is under test, the hypotheses

of the study have been stated as positive predictions of the direction of practice change. In statistical tests of these hypotheses in a later chapter, each prediction will be tested in the null form. In other words, statistical test will be applied to the proposition that there is no difference between the two areas in the particular practice change being measured.

Divisions of The Study

With this brief introduction, we will move into the study. A notation of divisions to follow may guide the reader to the organization of the subject.

In Chapter II, pertinent literature outlining the framework, methods, and purposes of evaluative measurement of extension will be reviewed.

The methodology of the study will be outlined in Chapter III.

Chapter IV will include the presentation and analysis of data relating to practice changes among clientele of the two types of extension programs.

Summary and conclusions from the study, and suggestions for further study of this type, will be covered in Chapter V.

CHAPTER II

REVIEW OF LITERATURE

Search of the literature on evaluation of extension work reveals much diversity in both purpose and method in studies that have been carried out. Among these methods and purposes certain central tendencies emerge that can provide guidance to an evaluator from the experience and ideas of others.

In the literature cited on the following pages, attempt is made to show primarily the framework of ideas on which the present study is based. However, to give perspective to these ideas, some of the diversities are also cited.

Areas selected for review cover the problem of goal definition in evaluation, something of the present range in purpose and method, and practical applications of evaluation by extension workers themselves. From this area the review moves to the selection of methods for use in the present study.

The Goal of Extension Work

To measure accomplishment in extension work, it is necessary to have a clear conception of the goal to be sought, and measure what is accomplished in terms of progress toward the goal. A single, clear goal of extension work is an elusive thing, since it deals with people and their development. The development of people is of course an ongoing

process that doesn't conveniently stop to be analyzed.

Goal definition in extension starts with the statement in the Smith Lever Act that the purpose is "to aid in diffusing . . . useful and practical information . . . and to encourage the application of the same."² This statement points to the diffusion of information and encouragement of its use without setting any particular standard for application by clientele of extension work. It is of course evident that informing and encouraging is not very productive unless what is taught or advocated is actually accepted and put to use. The need to apply the use of learning as a measure of extension effect has brought about definition of extension goals in terms of changes caused by learning.

Sabrosky has defined the goal of extension work as "to bring about changes in what people do, and changes in their knowledge, interests, understandings, attitudes and skills."³ Mathews stressed change result in his goal, "to improve the quality of family and community living as it relates to agriculture and home economics."⁴

Wilson and Gallup cite a definition of education as "production of changes in human behavior."⁵ Axinn⁶ points out

² Ibid., p. 3

³ Laurel K. Sabrosky, Six Keys to Evaluating Extension Work U.S.D.A. Bulletin PA371 Washington D.C. Nov. 1958

⁴ Joseph L. Mathews, "Evaluating the Extension Program" Mimeograph of Talk, Agricultural Extension Conference, Reno, Nevada, January, 1960

⁵ M. C. Wilson. and Gladys Gallup Extension Teaching Methods Extension Service Circular 495, U.S.D.A. Washington D.C. August 1955 p. 4

⁶ George H. Axinn, "A Conceptual Framework for Evaluative Research in Extension" Mimeograph, Michigan State University, November, 1960

out that extension education involves changes in behavior of three types: thinking, feeling, and action behavior.

Since students of extension education generally accept as the goal the change of human behavior, and recognize within this goal the several types of changes that are sought, then this will be taken here as the reason for extension work and the goal toward which we can measure progress.

The Goal of Evaluation

Thus defined, the goal for extension still provides no fixed point against which to measure. Change in behavior goes on and on, whether related to extension influence or not, and will likely continue.

Raudabaugh relates this goal to a measuring process when he defines evaluation as "the process of determining the degree to which desired behavioral changes have taken place or are taking place as a result of extension effort."⁷ The most directly measurable type of behavior change is of course change that is revealed by action. Changes in thinking, feeling, or attitudes are measured in social science, but where these factors can be measured in terms of action the whole procedure can be more objective.

A measurement must have a starting point. In charting extent of behavior change, it is necessary to know what the behavior was at some point in the past. If this is known, then a measurement of present behavior will show whether

⁷J. Neil Raudabaugh, "Evaluation in Extension Education" Evaluation in Extension Ed. Darcie Byrne, Federal Extension Service U.S.D.A. Washington, D.C. 1960 p. 7

changes have been made.

For evaluation, then, we can say we will measure changes in behavior as revealed by action, that have occurred between a certain point in the past, and the present.

In accepting the definition of evaluation just stated, it should be recognized that this embraces only one of several possible types. Evaluation processes are applied continuously to extension work. The portion of the program measured, the methods applied in measurement, and the criteria used as the yardsticks will vary widely according to the needs of the particular occasion. It may be worthwhile to review some of the more preliminary types of extension evaluation, and some of the early efforts at measurement of extension, to see how the concept here stated fits into the whole problem.

The Range In Evaluation

Evaluation ranges in complexity from very simple questions of how effective a particular event or activity might have been, to surveys requiring days or weeks of effort in the most exhaustive type of interview. Frutche⁸y describes a very elementary type of evaluation as the communion of an extension agent with himself as he drives home after a group meeting. The agent in this case reached conclusions from his evaluation that helped him improve his program, though no resources were involved except his own thoughts and experience. Frutchey notes.

⁸Fred P. Frutchey, "Evaluation--what it Is" Evaluation in Extension Ed. Darcie Byrne Federal Extension Service U.S.D.A. Washington, D.C., 1960 p. 1

that from very elementary efforts such as this, evaluation may range through all degrees of thoroughness and objectivity, to the opposite pole of rigorously controlled scientific research.

Measurement studies can be applied to all, or only certain parts of an extension program. Leagans⁹ has developed a guide for county workers to use in evaluating their programs in segments such as program planning, information services, and other divisions of their total job. These separate evaluations can then be combined as a measure of effect of the whole program, or any one segment can be seen measured against the other parts. This particular plan provides for a subjective or judgment type of evaluation by the workers themselves and their administrators, such judgment being based on rating individual cases against established criteria.

Michigan State University uses an evaluative schedule¹⁰ in rating effectiveness of both extension workers and their programs by scoring the workers or programs high or low in relation to certain criteria statements. Such a criteria statement, for example, as "develops leadership by involving people in program development" would be followed by a rating of the agent as needing little, some, considerable, much, or very much improvement in this activity. The rating on this point would be combined with ratings on criteria for other parts of the program, to reach an overall evaluation of the agent and his work.

⁹ Paul J. Leagans, "Evaluative Criteria and Suggested Plan for Their Use in Appraising Extension Programs" Federal Extension Service U.S.D.A. Washington D.C. 1957

¹⁰ "Form for Evaluation of Performance of County Staff Members" Michigan State University.

This and the Leagans schedule are examples of a distinct type of evaluation approach that involves subjective ratings against certain standards that have been shown by experience to contribute to effective programs. The approach has limitations, of course, in that it is not an objective measurement, and that the criteria used may not have been directly measured as to their validity.

Moe notes that "when the criteria approach to evaluation is used, the criteria must be solidly based on research and/or experience, and the evaluator should be thoroughly familiar both with the criteria and with the program or activity to be evaluated."¹¹

On a different level of evaluation, many studies have been made on farm practice adoption, and the relating of this change in behavior to extension programs. Wilkening¹² conducted a study reaching three hundred forty farm families in North Carolina to get information on the extent to which they had adopted practices being recommended by extension workers in their area. He also gathered information on the influence that caused the adoption.

Similar studies have been carried out by Slocum¹³ in

¹¹ Edward O. Moe, "Some Principles of Evaluation" Mimeograph, Michigan State University, November 1957

¹² Eugene A. Wilkening, Acceptance of Improved Farm Practices in Three Coastal Plain Counties North Carolina Agricultural Experiment Station Tech. Bulletin No. 98, May, 1952

¹³ Walter Slocum, , Owen Brough, and Murray Strauss Extension Contacts, Selected Characteristics, Practices and Attitudes of Washington Farm Families Agricultural Experiment Station, State College of Washington, Bulletin No. 584 April 1958

Washington, by Ryan and Gross¹⁴ in Iowa, and by many other workers in other areas. These studies in the main seek to compare different channels of reaching farm people to influence them toward behavior change. From the comparison of effectiveness of the different channels or influences, the impact of the extension program can be inferred as it relates to these channels.

More objective types of evaluation studies have been carried out, usually within a narrower range of comparison of effectiveness. Coolican¹⁵ carried out a study evaluating the comparative learning resulting from use of two different message channels in disseminating home economics information. Measurement in this case involved a pretest to establish a base point, for two experimental and one control group, then presentation of information, followed by later testing of each of the groups. The method allowed for direct comparison between the groups exposed to the different message channels, and comparison of both with the untreated control group for the learning that had taken place.

Other studies could be cited to show a wide range in the factors studied and the extent and thoroughness of methods employed. For our purpose here, however, these examples will point up the diversity of the evaluation process as it has been applied.

¹⁴Bryce Ryan and Neal Gross "The Diffusion of Hybrid Seed Corn in Two Iowa Communities" Rural Sociology V. 8 No. 1 March 1943

¹⁵Patricia M. Coolican, A Study of the Effectiveness of Teaching by Television versus Teaching by the Use of an Extension Bulletin Thesis for Degree of Master of Science, Michigan State University, 1960

The Development of Evaluation

Broad scale formal evaluation in extension work dates back to 1923, when studies under the supervision of Meridith C. Wilson¹⁶ were started. These studies measured adoption of farm practices, by means of interviews with large numbers of producers. The interviewers gathered information on the farm practices being followed that were recommended by extension workers, and the types of contact producers had had with the extension service.

From the data on practices being used, conclusions were drawn as to the impact of the extension program on these producers. Correlating the practices used with the types of contact with extension resulted in conclusions on the relative effectiveness of different types of contact. Bulletins, for instance, were given a rating as compared to extension meetings, and these were compared to other types of contact as to the efficiency of the contact in getting practice adoption.

Studies of this type are reported in a summary issued in 1955¹⁷ as covering over fifteen thousand farms in twenty seven states.

These studies measured the effect of extension influence in terms of behavior change as shown by adoption of new practices. The information on practice change was secured from the producers actually affected, and the results of the studies

¹⁶ M. C. Wilson and J. E. McClintock Effectiveness of Poultry Extension Work Extension Circular No. 79 U.S.D.A. Washington, D.C. 1928

¹⁷ Wilson and Gallup, Op. Cit. p. 13

were used to compare different parts of the extension program.

Much of present day evaluation of extension has grown out of these early studies. Refinements are often added, such as control populations to check against practice change from causes other than extension influence.

A more recent formal evaluation study including control techniques is that of Nielson and Crosswhite¹⁸ in Michigan. This study aimed at measuring impact of an intensive form of extension work, an agent serving a single township. Respondents in this case were interviewed on two occasions--at the start of the experimental program and at its completion five years later. The respondents included farmers within the experimental area, and farmers in a control area as nearly matched in farming type and resources as possible. About forty farmers in each of five townships involved, and the same number in each control, made up the sample.

Changes due to the extension program were measured in this case by differences in information obtained at the two periods. In this way changes were noted in practices or practice results, such as change in production expense, change in yield, and change in method of carrying out some fifteen different practices. Summarization of results shows the measured differences to average five hundred fifty dollars per man in gross income, a difference of thirteen percent in the number of operators adopting four or more new practices during the trial period, and fifteen percent more farmers in the experimental area

¹⁸James Nielson and William Crosswhite The Michigan Township Experiment Tech. Bulletin No. 274 Michigan State University 1959

making changes in their resource organization.

This study incorporated a more precise measure of behavior change than is evident in many evaluations, through the use of two control mechanisms, a control area and a preliminary survey as a base point.

Applications of Evaluation by County Workers to Marketing Projects

Since these more formal studies vary greatly in the concept of what is needed in evaluation, it will be of interest to review some less formal types to see if the same is true. An opportunity to review a large cross section of ongoing types of evaluation is provided by the methods agents use to measure programs in marketing.

Most of the marketing programs are relatively new, and are reaching clientele in many cases outside the traditional audiences of extension. This brings into focus the need for evaluation, since there is need for guidance in establishing program direction and methods.

When extension workers see the need for frequent evaluation of program results, what do they do? How do they individually meet the need for evaluative information?

A cross section of what workers do in connection with marketing projects is shown by the tabulation that follows on page 19.

This listing is a summary of responses to a problem presented to extension people participating in a summer school course on marketing problems and extension programs presented at Cornell University in 1959 and again at University of Arkansas

in 1960.¹⁹ Instructions for the course specified that each participant should write a summary of a marketing problem on which extension work was done in his home area. A standard outline²⁰ for reporting the problem was furnished, and among nine major divisions of the discussion specified in the outline, one requested of the writer, "How was the evaluation done? What were the methods used in evaluating the success of the program?"

Sixty six extension workers, representing twenty five states, and two areas outside the continental borders, responded to the course instruction by writing papers. Responses to the question, above, have been reviewed and categorized into twelve types of information that were used in evaluation of the projects reported. Responses in the reports were in essay form, and grouping them required a degree of subjective judgment to select the one or more categories in which a reported evaluative method best fitted. Another reviewer might place some of these in different categories, or even form additional categories for some responses, but it is believed that the present grouping reflects with reasonable accuracy the type of evaluation done.

¹⁹ Robert, C. Kramer (file) "Term Papers, Marketing Problems and Extension Programs, Extension Summer School Course No. 9U. Cornell University 1959" Michigan State University 1959

"Term Papers, Marketing Problems and Extension Programs, Extension Service Summer School, University of Arkansas, 1960" Michigan State University, 1960

²⁰ Robert, C. Kramer, Mimeograph Circular Letter Outlining Course in Marketing Problems and Extension Programs. Michigan State University, 1960

TABLE 1

How Sixty Six Extension Workers From Twenty
Seven States Evaluate Marketing Programs

| <u>Evaluative Criteria Used</u> | <u>Number of Projects</u> |
|--|-------------------------------|
| 1. Statements volunteered by participants in the program | 19 |
| 2. Statements of persons receiving participant's products | 9 |
| 3. Personal opinion of extension worker carrying out the program | 32 |
| 4. Statements of extension people other than the agent | 7 |
| 5. Total number of persons contacted or involved in the program | 4 |
| 6. Measures of participation showing that it is increasing or decreasing | 11 |
| 7. Requests for additional information that are stemming from the program | 6 |
| 8. Activities similar to the project that are growing from it | 7 |
| 9. Estimates of total financial return, total volume, or total saving | 12 |
| 10. Records showing financial return to participants, before and after | 5 |
| 11. Records showing financial return, participants and non-participants compared | 3 |
| 12. Measurement of number or extent of practice changes | 5 |

States Represented

| | | | | | | | |
|-----------|---|----------------|---|------------|---|---------|---|
| Virginia | 5 | West Virginia | 2 | Louisiana | 2 | Ohio | 3 |
| Arkansas | 9 | North Carolina | 2 | Oklahoma | 2 | Iowa | 5 |
| Wyoming | 1 | Massachusetts | 2 | Maryland | 3 | Texas | 1 |
| Missouri | 4 | California | 1 | New Jersey | 1 | Vermont | 1 |
| Kentucky | 1 | Mississippi | 2 | Jamaica | 1 | Maine | 2 |
| Wisconsin | 1 | Pennsylvania | 2 | Alabama | 2 | Georgia | 2 |
| Michigan | 2 | Peurto Rico | 5 | New York | 2 | | |

In the sixty six projects evaluated, some were measured by only one type of criteria, others by two or more. A review of the categories used, and the frequency of occurrence of individual project evaluations within each category, points to some general observations regarding informal evaluations.

The largest number, twenty seven percent of the total evaluative devices used, fell in number three, evaluation by personal opinion of the worker himself. If categories one, two, and four, covering more or less informal opinions of persons other than the worker are added to the frequency of the worker's own opinion, then fifty six percent of the evaluations occur in the realm of expression of opinion.

Categories five through eight represent somewhat measurable factors of how well the program is going. Some of these, however, such as total numbers of people contacted or involved, would be difficult to relate to behavior change or other result in terms of the program objective. The thing being evaluated here seems to be the amount of interest and participation in the program, rather than its effect. This form of evaluation makes up twenty three percent of the methods used.

Category nine, total volume or total size estimates, includes ten percent of evaluations. This type of information, without comparison with a base point or parallel system, demonstrates only size or extent of a program, rather than impact of extension work in bringing about such size or extent.

The final three categories, representing about eleven percent of the evaluations used, approach more nearly the measurement of impact of extension influence. These criteria provide comparison with a base point or a control group, and point up behavior change related to specific goals for the project being carried out. Actual figures used instead of

opinions on these relationships adds to their objectivity.

One further comment may be pertinent to this classification of criteria for evaluation. In the summary presented it appears that only the final three categories use a type of information that involves advance planning by the worker for the evaluation of his work. The first nine types of measurement are those that are available through routine reports, or day to day contacts with people involved in the program. If the information is not available through these means, it may be quickly estimated in retrospect of the job after it is completed. Since eighty nine percent of the evaluations we have cited fell within this area, we might surmise that to a similar extent evaluations of programs are not being consciously planned for at the time programs are planned.

The Present Status of Evaluation

From these and earlier examples cited, some of the many variables of both formal evaluative projects and the routine of periodic evaluation by agents will be evident. Both the complexity of the evaluative job, and the fact that agents are fully occupied keeping projects going without looking back to measure them, explain why evaluation is sporadic and sketchy.

Agreement upon goals by all concerned is a further difficulty. Musgrave said in a 1955 study of evaluation, "Apparently there is no general agreement on the evaluation of county extension programs or personnel. One reason for this is the inability to sufficiently clarify what is expected of an agent so as to measure accurately enough what he accomplishes."²⁰

²⁰ B. E. Musgrave, "Problems Involved in the Evaluation of a County Extension Program" Mimeograph, Michigan State University March 1955

The Regional Supervisory Conference on extension evaluation meeting at Iowa State College in 1956 noted in a summary session, "Some evaluation is going on in all states, but it is informal, and sometimes very haphazard and opinionated. To a great extent we have been content with a trial and error type of evaluation without much experimental work."²¹

In response to some of the needs noted, for definition of goals and realistic measurement of program in terms of those goals, considerable effort has been devoted to formulating guides to evaluation. Guide to the overall process from planning of program so as to allow for evaluation, and through all the steps of setting up evaluative studies of differing intensities, has been provided by Federal Extension Service through its manual "Evaluation in Extension."²¹ Guides are available also to successful procedures through other evaluative studies that have been carried out. Analysis procedures for interpreting information gained in evaluation have been extensively charted in fields other than extension, and these procedures can be adapted to measurement of extension effort.

Establishing a Base for Evaluation

In measuring effect of an extension program one of the first considerations is the establishment of a base or starting point

²¹"Where are We in Program Evaluation" Report of Regional Supervisory Conference on County Program Evaluation, Iowa State College, November 1956 p. 19

²²Darcie Byrne, Ed. Evaluation in Extension Federal Extension Service U.S.D.A. Washington D.C. 1960

in relation to which measurement can be made. Chapin²³ analyzes three ways of handling the control factor or base point in sociological research. These are the cross sectional type, or the comparison of two populations at the same point in time; the projected type, or the measurement at the present to compare with measurement at a future time; and the ex post facto type, involving measurement of a present effect and tracing backward in time to establish causal relationships. It is the latter type that will be reviewed as an extension evaluative method.

The definition given by Chapin for this type of study describes it as "a design in which some present effect is traced backward to an assumed causal complex of factors or forces at a prior date, using for this purpose such records as are available, since no new measures of the past can be made in the present."²⁴ Examples are cited of the method, showing in one case how a group of graduates of a certain high school were rated in the present as to economic attainment. The hypothesis that the number of years completed in high school was related to level of later economic attainment was then checked by going to the records of high school graduations and learning the extent of high school training for members of the sample population.

In this case records existed from which the factor of past attendance in high school could be secured for comparison with the level of economic attainment that could be measured in the present.

²³ F. Stuart Chapin, Experimental Designs in Sociological Research Harper and Bros. New York, 1955

²⁴ Ibid. p 33

In the case of evaluating an extension program such prior records are not apt to be available for establishing earlier status. Some variation of this design then becomes necessary to provide other objective means of comparison.

The Control Group

Chapin's study provides also for this eventuality, when he outlines the substitution of a control group for the analysis of prior records. His statement of the method follows:

"The ex post facto design, then, utilizes a comparative method of analysis by defining a so-called 'experimental' group which has been exposed to some prior treatment, or to some prior condition, or factors, to be set along side of a 'control' group, not exposed to these antecedent factors, or exposed in a different manner to the antecedent factors. Such a control group serves the purpose of a reference group for possible measurement of effects and probable influence as to the operation of the factors in the past."²⁵

Riecken, in his study of summer work camps, points to the value of control groups this way:

"The primary reason for using a control group is, of course, to be able to compare the effects of an experimental 'treatment' in producing changes, with the effects of some neutral experience or at least some 'non-treatment'. We should like to be sure that the effects we observe . . . are truly the results of the experience and not simply changes that would have occurred anyway . . ."²⁶

He points out what is required to make up an adequate control group when he says "an adequate control is a group whose members are matched on relevant variables with members of the

²⁵ Ibid. p. 233

²⁶ Henry W. Riecken, The Volunteer Work Camp, a Psychological Evaluation Addison-Wesley Press, Cambridge, Massachusetts 1952 p. 10

'treated' group and who are not given the experimental treatment."²⁷

Evaluation of an extension program, then, could be structured around the concept of measuring behavior change of the audience or clientele of the program, and comparing this with measurement of the same behavior change within a control group which had not been exposed to the extension program. Caution, as indicated above, would be necessary to secure a control group very similar to the experimental group in all factors except the extension program, that might affect the behavior change to be measured.

Not many extension evaluative studies have used control groups for comparison on effect in behavior change. Of evaluative projects cited earlier in this paper, only Nielson and Crosswhite²⁸ measured changes by comparing extension clients with a group not subject to extension influence.

This comparison gave control of one variable often ignored in extension measurement, the changes in a measured behavior resulting from natural change over time, or from causes outside the extension program. Other studies have used the control group for comparison on the same basis, of establishing status before treatment and after treatment. Schaeffer's²⁹ and

²⁷ Ibid. p. 233

²⁸ Nielson and Crosswhite, op. cit.

²⁹ Annette J. Schaeffer, A Study of the Comparative Effectiveness of Three Communications Channels Used by a Cooperative Extension Agent in Teaching Homemakers. Thesis for Degree of Master of Science Michigan State University 1960

Coolican's³⁰ studies of comparison of effectiveness of different teaching channels and methods used control groups in this way.

The control group can serve in extension evaluation also without the two measurement periods noted above. If groups are to be compared at one point in time for effect of treatment known to have been applied to one and not to the other, then the control can serve as a standard to compare effect of treatment. The control thus serves as a measure of behavior outside the influence of treatment, and differences between experimental and control groups can more accurately be attributed to treatment. Since behavior change such as change in farming practices or changes in knowledge are usually measured in extension evaluations; and since these changes could well come about from influences outside extension, the use of the control group becomes a vital part of accuracy.

Collecting Information for Evaluation

When the actions to be measured for evaluation have been accurately determined, the worker must find some means to gather information on those actions, within his client group and the control group used as a standard.

Several methods of gathering information are available, including, according to Gallup,³¹ personal interviews, group interviews and check lists, case studies, direct observations, and mail questionnaires.

³⁰ Coolican, Op. Cit.

³¹ Gladys Gallup, "Methods of Collecting Data" Evaluation in Extension Ed. Darcie Byrne Federal Extension Service U.S.D.A. Washington D.C. 1960 p. 45

Selection of method among these possibilities involves consideration of the type of information needed, the geographic distribution of the sample, and the resources available for getting information.

Outside of special projects of formal evaluation to which special resources are allocated, the usual extension evaluation must be carried out in limited time and with limited resources. Of the various methods available for gathering information, the mail questionnaire offers about the widest coverage for the smallest outlay of time and expense. For this reason this device and possible supplements to it will be reviewed as to applicability to gathering information in extension evaluation.

Researchers are not generally agreed on the utility of the mail questionnaire for gathering information in research. Travers, for instance, in reviewing comments of other researchers on this tool says "The safest rule in deciding whether or not to use direct-mail questionnaires is: Don't."³² Nafziger takes a more moderate view when he points out certain difficulties in using questionnaires, and then observes, "The present author . . . also believes the method has acceptable applications in mass communications research."³³

Gallup³⁴ points out several advantages of the mail questionnaire, noting it is an easy, quick and relatively inexpensive method of obtaining data. Also it can reach groups

³² Robert M. W. Travers, An Introduction to Educational Research MacMillan Co. New York 1958 p.249

³³ Ralph O. Nafziger and David M. White Introduction to Mass Communications Research Louisiana State University Press Baton Rouge, Louisiana 1958 p. 113

³⁴ Gallup, Op. Cit.

spread widely geographically, and it is well adapted for reaching specific farm enterprise groups such as dairy farmers or poultrymen. It is useful with a relatively homogeneous group such as farmers producing one certain crop.

The main problems with the questionnaire revolve around the fact that response is practically never complete for the whole sample. Nafziger notes the difficulty as being, "People who respond often differ from non-respondents in certain known characteristics, such as education. To the extent that these characteristics are related to the variables being studied, estimates of population characteristics will be biased."³⁵

Selltiz, et al.³⁶ note that when questionnaires are mailed to a random sample of the population, the proportion of returns is usually low, varying from about ten percent to fifty percent. The same authors note in comparing questionnaires to interviews that the interview method will usually yield a better sample of the population. The reason given is that more people are willing to cooperate when all they have to do is talk.

To offset some of the difficulties of the questionnaire, and utilize strengths of the interview, some combination of the two may be possible. Selltiz³⁷ notes that for both interview and questionnaire the questions must be presented with exactly the same wording, and in the same order, to all respondents. This would indicate that interview based on a

³⁵ Nafziger and White Op. Cit. P. 113

³⁶ Claire Selltiz, Marie Jahoda, Morton Deutsch, Stuart W. Cook Research Methods in Social Relations Henry Holt and Co. Inc. New York 1959 p. 241

³⁷ Ibid.

standard questionnaire could meet this requirement.

Parten³⁸ reviews as a possible means for followup on questionnaire returns a telephone call to respondents. This author also notes that telephone interviews can be a satisfactory method of gathering information, and that losses from the sample through unavailability of some respondents is less serious than non-returns of the mail questionnaire.

It may be assumed from these characteristics of the questionnaire and the telephone interview that the two might be combined. If each respondent could receive by mail a standard questionnaire form, and then if a telephone interview could be conducted with both parties referring to written questions on the form, this could provide a practical method of securing information. Such a method would reduce expenditure of time and travel needed for interviews, and at the same time remove bias due to the self-selection process that is usually evident in return of questionnaires.

Methods For Selecting the Sample

Having selected the tool for gathering information, the extension evaluator then has the job of selecting a suitable sample of the population to be tested.

For an evaluation that involves information from a commodity group, standard extension routine provides a logical method of sampling. This routine is the assembling and updating of mailing lists for each major crop area of the county, that results in access to a reliable listing of practically all of the producers of a particular commodity. From such a

³⁸Mildred Parten, Surveys, Polls, and Samples -- Practical Procedures Harper and Bros. New York 1950

list samples can be drawn. Among several methods of selecting a sample for evaluation studies, Sabrosky says of list sampling, "This method should be used whenever a complete list of the total population is available."³⁹ She notes that random samples can be drawn from a mailing list by the use of random numbers or by taking every "nth" name in order through the list until the desired sample size is attained.

This review of literature provides a background for the problem under study, the methods used, and the information and conclusions presented in the following chapters.

³⁹Laurel K. Sabrosky, "Sampling" Evaluation in Extension
Ed. Darcie Byrne Federal Extension Service U.S.D.A. Washington
D.C. 1960 p. 40

CHAPTER III

METHODOLOGY OF THE STUDY

In this study to establish the extent of change in practices related to marketing, information was obtained from producers of the same crop in two comparable areas. This involved selection of areas having sizable numbers of producers of one particular crop. It also required areas similar enough in type and season of production and type of markets used that a uniform series of practices related to marketing could be followed in both areas.

Selection of the Trial and Control Areas

Since the field of vegetable marketing was the area of particular interest to the writer, selection of a district extension marketing agent's area was made among Michigan district agents dealing with vegetables. Three such areas are presently served by district marketing agents. In order that there could be a logical starting point for a time period over which practice change could be measured, an area was selected in which the present district agent has served for a period of three years. Change in marketing practice was measured over the three year period.

Check of production of vegetables in the selected area revealed that the only commodity produced by large numbers of producers on a uniform basis was potatoes. Hence it was decided that the change in marketing practice would be measured with this one crop. Decision on this point revealed

considerations that must be followed in selection of a comparable control area. For instance, the season of marketing potatoes, the type of markets to which the crop moved, and the numbers of producers needed to be as nearly alike as possible.

Following these considerations, a single Michigan County was selected as the control area. In this county the type of potatoes produced and the period of marketing were quite similar to those of the trial area. The urban market receiving the crop was the same for a large part of the total volume of both areas. The control area included only slightly fewer producers of potatoes than the trial area.

The extension program in the control area was carried on by agents assigned in the traditional pattern to work with all problems of agriculture, including both production and marketing. The head of the staff in this county carried out the major share of extension work with potato producers, and had been in this same position for a period longer than the three year period to be used for the measure of practice change.

Selection of Marketing Practices to Be Measured

Practice change by producers, if such change is to be a realistic measure of effective extension work, needs to apply to changes equally applicable to the two areas, and changes advocated by extension workers in both areas.

An impartial means of selecting such applicable practices is to refer to buyers of the commodity being marketed, and use practices buyers recognize as important to the desirability of the product in the market. Practices enhancing the competitive position of the product in the market can be regarded as desirable directions of change. Selection of practices by this means balances a variable that would be confusing in comparing

different extension programs---the difference in practices most emphasized during a certain period of time. By selecting practices desirable from the buyers' standpoint this is put on a comparable basis, since extension agents could be expected to be aware of the important competitive factors and to emphasize each in relation to its importance in getting the crop sold.

Following this line of reasoning, contact was made with buyers in a large urban market for potatoes from the two areas in question, to get their suggestions on producers practices to enhance the competitive position of the potato crop.

Questionnaires were sent forty eight buyers of potatoes, requesting information on the factors they felt represented actual improvement in Michigan potatoes and requesting also their suggestions on the things that producers should carry further with their potatoes to improve the competitive position of the crop in the market. This questionnaire form appears as appendix [page] 70, and summary of the twenty four responses received appears in the analysis of data, Chapter 4, page 44.

From these responses, three practices were selected as important for producers to follow in marketing potatoes, A fourth practice, important as an intermediate step in marketing, but not evident in the physical condition of the crop, was added to make up four practice categories. All categories selected were endorsed by extension agents in the two areas as being included in their marketing education programs. These four practice categories, then, were used in measuring extent of practice change with potato growers in the two areas.

The Population from Which Samples Were Drawn

Populations of potato growers in the trial area and control

area were those persons appearing on extension mailing lists of potato growers. These lists in both cases were the lists maintained from year to year for mail contacts with this commodity group by extension agents. In one case potato producers were listed alphabetically according to the post office of their residence. In the other the producers were listed alphabetically through the total list. No changes or deletions were made in the lists except to remove names of commercial representatives and extension staff members who were included in the lists to receive information sent to potato growers.

In the trial area this list included two hundred eighty seven potato growers. In the control area the list included two hundred forty three.

Drawing the Sample

A sample size between fifty and one hundred producers was decided upon as being within the range of time and resources for contacting respondents, so a random method to provide numbers within this range was set up. The method used was to select every fourth name appearing on the list.

A random starting point for selection was determined by placing numbers from one to four in a hat, and drawing one number to determine the starting name. Each name was then selected as the fourth in order following the preceding one selected. One exception to this procedure was found necessary in the case of producers listed who did not have telephone service. Since respondents needed to be telephone subscribers in order to be contacted by the method planned, a standard technique was followed to substitute for the few producers not having telephones others from the list who did have telephones.

The procedure used was to first select every fourth name as a respondent as noted above, and identify these. Then for a name occurring as a selection who was not listed as a telephone subscriber, the preceding name on the list was substituted. If the preceding listed name was not a subscriber either, the name following the original selection was substituted. If this substitution, too, failed to yield a contact available by telephone then in the same manner the name preceding by two the original selection, the second name following, the third preceding, and the third following could be substituted, in that order. In the lists used for the sample, this method provided a respondent in each block of four on the list, without further arrangement for substitution. It allowed the original selection of every fourth name to be followed throughout the list, with substitution employed only in the few cases where non-telephone subscribers fell initially into the selection.

Selection from mailing lists by this method resulted a sample in the trial area of seventy two producers, and in the control area of sixty producers.

Developing the Questionnaire for Producers

A questionnaire for gathering information on practice changes from producers was constructed around four basic practices related to marketing potatoes. These changes in practice included: 1. market information received during the marketing season; 2. washing of potatoes; 3. grading of potatoes; 4. maturing potatoes prior to harvest. In addition to these points three other questions were included to get grower reaction to whether the market quality of the crop had been improved over the past three years, the factors in which they felt there

had been improvement, and factors on which they felt attention should be centered in the future.

The last three points were included for two reasons. First, the responses to them would indicate the importance growers attached to the practices in which change was being measured, and second, the responses would be of value to extension agents as recommendation by producers as to the best direction for the marketing program.

Questionnaires were purposely kept short, for easier answering by respondents, and for ease of transmission of responses by telephone. Face data was not included, nor were names of respondents recorded on the questionnaires. Blanks were provided for answers by means of check marks in yes or no columns, or in connection with an applicable descriptive word. Questions which required ranking of certain factors in order of importance had the factors listed with a blank following in which to write the number to indicate the rank given.

Questionnaires used in the trial area and control area were identical in all respects except in the area of market information. Types of market information available to producers in the two areas differed in that a telephone answering service was available in one area and not in the other, and coverage of market news by daily newspapers was available in one area and not the other. To avoid confusion and reduce length of the questionnaire, the services listed were only those actually available to producers in the area where the questionnaire was used.

These forms appear as pages 71 and 72 of the Appendix.

Securing Producer Response to Questionnaires

Producers' responses to the questionnaire were recorded in a telephone contact with each respondent. To facilitate the gathering of information in this way, certain preparatory steps were taken.

Responses in the Trial Area

Prior to sending out questionnaires in the trial area, the district marketing agent sent a letter to all producers listed in the sample, telling them a research project was being carried out by the writer, and asking their cooperation. The day after the district agent sent this letter, the writer sent a questionnaire form to each producer in the sample, with a covering letter explaining the project.

The covering letter also stated that the questionnaire was to be filled out, but not returned, since information on it would be taken by telephone. A two day period following by five days the sending of the questionnaire was designated as the period during which the writer would call each respondent. The respondent was asked to think through and mark his responses, and to leave the form near the telephone so another member of his family might pass along the information if he were not in when called.

In the trial area, the agent's letter was sent on March 15, and the questionnaire and cover letter on March 16. March 21 and 22 the writer spent at the agent's office, calling producers for their responses to the questionnaire. In making each call the writer had at hand a blank form of the questionnaire, and recorded responses on this form as they were reported by the respondent.

Through these contacts forty eight responses were recorded

of the original seventy two who received questionnaires as part of the sample. All producers in the original sample were called, and those not available on the first call were called at intervals over the two day period. The following results show the disposition of the total sample:

| | |
|--|----------|
| Responded to questionnaire..... | 48 |
| Contacted, are not growing potatoes..... | 4 |
| No answer to telephone calls..... | 6 |
| No telephone service..... | 4 |
| Contacted family, respondent away, questionnaire not completed..... | 8 |
| Declined to give information..... | <u>2</u> |
| Total sample..... | 72 |

Responses in the Control Area

Procedure for securing producer response in the control area was quite similar to that outlined above for the trial area. The extension agent sent an introductory letter to the sample mailing list April 3, and the questionnaire and covering letter were sent by the writer from MSU the same day. Due to differences in mail connections, it was estimated that the agent's letter would reach respondents one day ahead of the questionnaires.

The covering letter in this case gave the same instructions for filling out the questionnaire and having it available for telephone contact, and specified April 7 and 8 as the days the calls would be made.

On these two days the writer went into the control area and made the contacts by telephone. Difficulty in the control area was encountered in the fact that members of the sample were parts of nine telephone exchanges, where in the trial area all had been available from one central point.

The calls were made, however, with a minimum of long distance tolls, by the writer spending about one hour at each

exchange to call the numbers listed there, and then driving on to the next exchange. Calls from so many points required the use of public pay telephones since arrangement for loan of a telephone could not be made in each place, particularly for the lunch hour and evening hours that were most productive in reaching respondents.

From the calls in this area, forty responses to the questionnaire were obtained. Repeat calls were made to numbers not answering the first call, as in the trial area. Total disposition of the original sample of sixty producers is shown in the following results:

| | |
|---|----------|
| Responded to the questionnaire | 40 |
| Contacted but are not growing potatoes..... | 8 |
| No answer to telephone calls | 7 |
| No telephone service | 2 |
| Contacted family, respondent away, questionnaire not completed | <u>3</u> |
| Total sample | 60 |

It is of interest to note in connection with this method of gathering information what the general reaction of respondents was, and what part of the questionnaires had been completed and kept ready for reference at the time of the telephone call. Of eighty eight total responses in the two areas, sixty seven were reported directly from a questionnaire in the hands of the respondent or a member of his family. Seventeen had received the questionnaire, but had not filled it out or did not have it at hand at the time of the call, so the questions were asked from the writers copy and responses recorded. Four respondents had not received questionnaires, possibly through faulty address or having misplaced it without identifying what it was. In these cases also the questions were explained from the writers copy. Such contacts required considerably more time on the telephone, but since questions

were relatively short and simple there was no serious difficulty in getting complete responses.

In general there was evidence of considerable interest on the part of respondents in the questions being asked, and even some evidence of anticipation toward being able to discuss marketing problems with an interested person. A general air of friendliness and cooperation by producers in both areas was encouraging to the writer. Only two refusals to cooperate were encountered. In one case the respondent was leaving the house and stated he did not have time to discuss the matter, and the other stated he would prefer not to pass along information by telephone, but would be glad to provide it if the caller would come to his farm.

Method Used to Analyze Data

The data were analyzed by two methods. For the test of the general hypothesis that required analysis of the total number of producers changing practices in one or more categories, the Kolmogorov-Smirnov test of cumulative frequencies, was used.⁴⁰

This test measures the greatest point of difference between two cumulative series of data from unrelated samples, as shown on the following page:

⁴⁰ Sidney Seigel Nonparametric Statistics for the Behavioral Sciences McGraw Hill Book Co. New York, 1956 p. 131

TABLE 2

Plan of Arrangement of Data for Kolmogorov-Smirnov Test

| Number of practices changed | 0 | 1 | 2 | 3 | 4 |
|--|-----------------|-----------------|-----------------|-----------------|-----------------|
| Proportion of producers changing this number of practices or less, experimental sample | $\frac{x}{n_1}$ | $\frac{x}{n_1}$ | $\frac{x}{n_1}$ | $\frac{x}{n_1}$ | $\frac{x}{n_1}$ |
| Proportion of producers changing this number of practices or less, control sample | $\frac{x}{n_2}$ | $\frac{x}{n_2}$ | $\frac{x}{n_2}$ | $\frac{x}{n_2}$ | $\frac{x}{n_2}$ |
| Difference in Proportions | D | D | D | D | D |

The largest value of difference between the cumulative frequencies as determined from the above tabulation is tested for significance by the following formula, where D = difference, n_1 = total number of the experimental sample, and n_2 = total number of the control sample.

$$x^2 = 4D^2 \frac{n_1 n_2}{n_1 + n_2}$$

This formula has a sampling distribution approximated by the chi-square distribution with $df = 2$. The level of significance for the value of x^2 obtained is determined from the table of values for x^2 .

The five percent level of significance was used to test the null hypothesis of no difference in change in practices.

For test of sub-hypotheses A,B,C, and D relating to change by producers in a single practice, chi-square was used. Number of cases of producers changing and not changing

practice for the trial area and control area were cast in a four cell table for each sub-hypothesis, as follows:

TABLE 3

Arrangement of Data for χ^2 Test

| | Change Practice | Not Change | |
|--------------|--------------------|---------------|----|
| Trial Area | | | 48 |
| Control Area | | | 40 |
| | Total | Total | |

The formula, $\chi^2 = \sum \frac{(o - e - [.5])^2}{e}$ was used to compute the value for χ^2 at 1df, for each table. In this formula o = the observed frequencies, e = the expected frequencies, and the factor .5 is the correction for continuity for the unrelated samples.⁴¹

The five percent level of confidence was used to test the null hypothesis of no difference in change of each practice.

⁴¹Ibid. p. 107

CHAPTER IV

PRESENTATION AND ANALYSIS OF DATA

Practice change in methods related to marketing potatoes was used to measure the impact of extension programs on potato growers in two areas. The extent of change was regarded as valid measure of the relative effectiveness of two types of extension programs--that of a district marketing agent, and that of an extension agent working both with production and marketing.

The data presented in the following pages will show results obtained from survey of potato growers in the two areas in extent of practice change.

As stated in Chapter 1, the selection of three of the four practices used for measurement was made on the basis of buyers' reaction to certain quality factors that affected their choice of potatoes for purchase. The practices selected by the buyers are summarized below as the basis for later discussion of what producers did in regard to these practices.

Buyers' Recommendation for Practices to Improve Quality

Twenty four buyers of potatoes responded to questionnaires regarding marketing practices for potatoes. The questionnaire form appears as appendix page 70 of this study.

Buyers were asked first whether quality improvement had occurred over the past five years. They were asked to register their opinions as a rating of quality for 1955 and 1960. Eighteen buyers indicated a higher rank for quality in 1960,

by ranking general quality as very good, good, fair, or poor for each of the years. Six buyers indicated no change.

Further questions asked reaction to specific factors of quality in two categories. One category included factors of quality of Michigan potatoes which had improved most over the past five years. The other included the factors in which further improvement was most needed. Each buyer was asked to rank certain listed factors, or others he might suggest, by number showing the importance he attached to each.

TABLE 4

Buyers Opinion of Improvement in Quality, 1955 to 1960

| Quality Factors | Number of Buyers Ranking | | | | Ranking Score* |
|---|--------------------------|-----|-----|-----|----------------|
| | 1st | 2nd | 3rd | 4th | |
| Cleaner Potatoes | 15 | 1 | 1 | | 65 |
| More Uniform Sizing | 3 | 6 | 4 | 3 | 41 |
| Less Mechanical Injury | 2 | 6 | 6 | 1 | 39 |
| Better Maturity | 3 | 3 | 3 | 5 | 32 |
| Other Factors: Better Cooking Quality, Better Packaging | 2 | | | | 8 |

*This figure reflects choices in all rankings, by assignment of points for each rank given, e. g. first rank 4, second rank 3, third rank 2, fourth rank 1.

From the rankings given by buyers, it will be noted that the factor of cleaner potatoes was the point at which they felt most quality improvement had been made over the last five years. Score

for all ranks given this factor totalled sixty five. Next in importance was more size uniformity, with a score for all rankings of forty one. Less mechanical injury and better maturity were ranked next in that order as factors where quality had been improved.

TABLE 5

Buyers Opinion of Further Improvement Needed

| Quality Factors | Number of Buyers Ranking | | | | | | Rank Score |
|---|--------------------------|-----|-----|-----|-----|-----|------------|
| | 1st | 2nd | 3rd | 4th | 5th | 6th | |
| More Washing of Potatoes | 4 | 2 | 4 | 3 | | 1 | 60 |
| Reduction of Mechanical Injury | 5 | 3 | 3 | 2 | 2 | | 65 |
| More Uniformity of Size | 10 | 7 | 2 | 1 | | | 106 |
| More Mature Potatoes | 3 | 3 | 4 | 3 | | | 58 |
| Assembly through Grower Organizations | 2 | 1 | 3 | | 1 | | 31 |
| Central Packing Shed Operations | 4 | 1 | | | | 2 | 31 |
| Extended Marketing Season By Use of Sprout Inhibitors, Better Storage | 4 | 1 | 1 | 2 | 1 | | 41 |
| Other Factors: Better Appearing Packages | 1 | | | | | | 6 |

In selecting factors needing improvement, buyers leaned heavily to more uniform sizing. Score for all ranks given this factor totalled one hundred six in table 2, by the system of assigning points for each ranking of six for first, five for second, and so on.

Second choice in further improvement of quality was reduction of injury, with a score for all rankings of sixty five. Next in order were the practices of washing potatoes and more maturing of potatoes, in that order. Lengthening the market season by the use of sprout inhibitors and better storage was ranked fifth, and setting up two types of marketing organizations were given equal ranking as seventh choice.

Rankings in categories of both table 1, of improvement over recent years, and table 2 of needed improvements, were considered in selecting practices in which producer change could be measured. The practices rated highest by buyers in both cases were the following ones: washing potatoes, more uniform sizing, reduction of mechanical injury, and better maturity. These practices were selected as those for which producer change would be determined.

In placing these in the grower questionnaire, the practices of reducing mechanical injury and more uniform sizing were combined into one question. This asked whether change in grading practice had been made in the last three years, and requested brief statement of the change made, if any. This statement of change allowed for the determination of whether narrower size ranges or closer tolerance for defects were involved in the grading change. A change in sizing method or a larger minimum size would indicate response to need for more uniform sizing. A reduction in tolerance, or a generally closer job of grading, would indicate if less mechanical injury was allowed to get beyond the grading process.

Producers were asked directly if they had started to wash potatoes during the last three years. They were also asked if they tried to get potatoes more mature before harvest, than they did three years ago. Actual statement of these questions in the producer questionnaire, and producers' responses to them, will be covered more fully in a later section.

Volume and Characteristics of Purchases of Buyers

In addition to the buyers' ranking of quality factors for potatoes, some further information was gathered to aid in interpreting their reactions. This included data on the sources, volume, and characteristics of their purchases of potatoes.

Volume Purchased In total volume purchased, the buyers responding included two who purchased less than ten carlots of potatoes annually, eleven who purchased between ten and fifty carlots annually, and eleven who purchased over fifty carlots. Though exact volume was not requested on the questionnaire, two larger buyers indicated purchases above six hundred carlots and one indicated over fifteen hundred carlots.

Percent of Michigan Potatoes Buyers indicated also the part of their purchases that were Michigan potatoes. These figures showed that buyers of over fifty cars annually secured an average of forty five percent of their supplies from Michigan. Buyers of from ten to fifty cars annually secured an average of forty two percent of their supplies from Michigan. Buyers of less than ten carlots averaged twenty six percent of supplies from Michigan. These averages would not hold true for all potato buyers in the market, since the questionnaire referred to Michigan potatoes, and buyers who did not buy Michigan potatoes did not respond. The averages are representative only

of those buyers who responded to the questionnaire.

Washed Potatoes In percent of washed potatoes purchased, five buyers indicated they bought over ninety percent of their supply washed. Eight buyers bought between seventy five and ninety percent of their supply washed, five bought from fifty to seventy five percent of their supply washed. Only five buyers took less than half of their total supply washed.

Packages The size of package in which potatoes were purchased in the largest volume was the fifty pound bag. Next in volume was the ten pound bag, with the twenty five pound bag and the hundred pound bag next in volume in that order.

Sources of Purchase of Michigan Potatoes The sources of purchase of Michigan potatoes by the respondent buyers averaged forty nine percent purchased directly from growers, eighteen percent purchased from grower organizations, and thirty three percent purchased from dealers, shippers or brokers.

Test of Hypotheses Regarding Practice Change

Practices identified by buyers as important in their selection of potatoes were used as measures of extension program influence in comparing programs. One area of extension program influence in marketing that could not be checked with buyers was also used. This was the sources of market news used by producers in making marketing decisions.

The hypothesis for test was as follows:

Sub-Hypothesis A. More producers will use new sources of periodic marketing information in an area served by a district marketing agent than in an area not so served.

Producers marketing potatoes require up to date information on prices being paid for potatoes, the amounts moving to markets,

and the position of competing areas in the current market picture. Need for periodic market information was one of the earliest areas in the marketing field recognized by extension as a place where contribution could be made.

Hence, where extension workers attempt to service marketing, there is practically always a check on available news sources used by producers. If these do not appear adequate there is usually an attempt to provide market news, either by calling attention to sources available and not being used, or by actually setting in motion a news gathering and distributing procedure.

Attention to market news was found to be part of the two types of extension programs being measured in this study. Methods differed, but both areas followed a program objective of improving adequacy of market news.

Since attention was given to market news in the two areas, it could be assumed that change in market news sources would indicate comparative impact of the programs. Consequently, change in sources of market news was measured with producers.

The question posed in the questionnaire stated: "Do you get market information on potatoes during your marketing season that you did not get three years ago?"

Reaction of producers in the two areas is given in Table 6 below.

TABLE 6

Producers Using New Sources of Market Information

| | Use New Sources | No Change | Total |
|---------------------|-----------------|-----------|-------|
| Cases, Trial Area | 36 | 12 | 48 |
| Cases, Control Area | 21 | 19 | 40 |

The number of cases of practice change in the two areas, cast in a χ^2 table as indicated in Chapter III, page 42, yielded a value for χ^2 of 3.885. Since a value of χ^2 at 1df of 3.84 would be significant at the five percent level, this larger value indicates that the null hypothesis of no difference may be rejected.

This tends to support the theoretic sub-hypothesis that more producers will use new sources of periodic marketing information in an area served by a district marketing agent than in an area not so served.

Kinds of New Market Information Used

Extension programs in both the trial area and control area had as an objective making available more adequate market news for potato growers. It is beyond the scope of this study to analyze specific activities carried out by extension staffs toward this end, but in view of the objective it is pertinent here to review what kinds of news sources were available in each area. Data was gathered from producers as to which sources they were using at the time of the study that they did not use three years before.

In the control area, an urban daily newspaper carried reports of potato markets, compiled from reports of U.S.D.A. personnel in several receiving markets. In this same area, the newspaper carried also a telephoned report from a local cooperative marketing organization. This same marketing organization would provide to any caller by telephone the daily information on potato prices.

In both areas, daily written reports were available through the mail from one shipping point and one receiving center, both near enough to reflect market conditions for the local crop.

One or both of these reports was available to any producer who requested to be included on the mailing lists.

In both areas producers had access to terminal market information carried by radio stations. These reports were broadcast by the larger radio stations, and the reports covered other commodities in addition to potatoes. In neither area were radio reports made of shipping point information from within the area.

In the trial area a market news source consisting of a telephone answering service was available by individual membership and payment of a fee. Also weekly market summary reports were available from the district marketing agent.

The sources of market information which producers have started to make use of during the past three years, and the extent of use in the two areas are shown in the following table. Since some producers have started using more than one source, the totals cannot be related to numbers in the total sample.

TABLE 7

New Use of Sources of Market Information

| Market News Sources Used | Number of Producers | |
|--|---------------------|--------------|
| | Trial Area | Control Area |
| Daily reports by mail, Benton Harbor or Detroit | 12 | 5 |
| Market News reports in local Newspaper | | 12 |
| Reports by mail from Maine | | 5 |
| Radio reports of potato markets | 7 | 3 |
| Market News by subscription to telephone answering service | 25 | |
| Weekly Market summaries by extension agent | 26 | |
| Market News by telephone from marketing organization | | 5 |

Sub-Hypothesis B. More producers will adopt the practice of washing potatoes in an area served by a district marketing agent than in an area not so served.

As noted earlier, the practice of washing potatoes was one that was rated highly important by potato buyers as a competitive factor. In ranking the quality improvements that have taken place in recent years, "cleaner potatoes" was given first rank. In ranking further efforts that should be made toward quality improvement, the practice of "more washing of potatoes" was ranked third in importance.

Therefore, the practice of washing potatoes was used as a measure of impact in comparing extension programs.

The question in the grower questionnaire testing this point asked, "Have you started washing your potatoes during the last three years?"

Reaction of producers in the two areas is given in the table below.

TABLE 8

Producers Starting to Wash Potatoes

| | Start Washing | No Change | Total |
|---------------------|------------------|--------------|-------|
| Cases, Trial Area | 22 | 26 | 48 |
| Cases, Control Area | 8 | 32 | 40 |

The cases of change in the practice of washing potatoes for the two areas, when cast in a χ^2 table, yielded a value for χ^2 of 5.388. A value for χ^2 at ldf of 3.84 would be significant at the five percent level. This larger value, then, indicates that the null hypothesis of no difference can be rejected.

This would tend to support sub-hypothesis B, that there is greater change in washing of potatoes, in the area served by a district marketing agent, than in the control area.

Other Methods of Cleaning Potatoes

Data gathered in this study determined the number of producers washing potatoes before sending them to market. To give the full story on attention to the factor of cleanliness as it affects potato marketing, another practice should be considered. This practice is one of brushing potatoes rather than washing.

Eight producers in the control area and one in the trial area used the practice of brushing potatoes with mechanical brushes to remove dirt before marketing. Information on this practice was gained through the grower questionnaire, though no specific question on brushing was asked. Producers reacted to the question regarding washing, by reporting the brushing method, which they felt served the same purpose as washing.

If brushing potatoes were considered the equivalent of washing them as a practice to improve market quality, then changes would be necessary in the figures presented on this point. In the control area, the number of producers changing practice would be sixteen, and the number not changing would be twenty four. Figures for the trial area would remain the same, as the one producer using brushing also used washing.

Since the effectiveness of these two methods is a matter of judgment and of conditions in the individual crop, no arbitrary decision on the point will be rendered here. However, since reaction of the buyers group led to the measurement of the washing practice, this has been the practice used in interpreting results of the study.

Sub-Hypothesis C. More producers will change their grading practices for potatoes in an area served by a district marketing agent than in an area not so served.

Two specific factors in grading of potatoes were cited as important competitive factors by potato buyers. These factors were more uniform sizing and less mechanical injury. In quality improvement that has taken place, buyers ranked uniform sizing second and less mechanical injury third. In suggesting further efforts to improve quality, buyers ranked uniform sizing first by a wide margin, and ranked the reduction of mechanical injury third.

Since these factors were considered important by the buyers, they were measured with producers as indicators of impact of extension education programs.

Both factors are somewhat indefinite in measurement of change, since producers always strive for uniform type and size of potatoes, and try also to hold mechanical injury to a minimum. A direct question on these points could be expected to elicit response in terms of growers' aims as well as results.

To lessen this difficulty, the question put to producers approached the point indirectly. The question was asked "Is your method of grading different now than it was three years ago? If yes, what change was made?" From responses indicating change, and description of changes that showed grading was done to closer tolerance or to different size ranges, changes were recorded that reflected one or both of the factors emphasized by buyers.

Response of producers regarding change in grading is given in the table on the following page.

TABLE 9

Producers Changing Methods of Grading Potatoes

| | Change Methods | Not Change | Total |
|---------------------|----------------|------------|-------|
| Cases, Trial Area | 17 | 31 | 48 |
| Cases, Control Area | 12 | 28 | 40 |

The number of cases of change in the two areas, cast in a χ^2 table, yield a value for χ^2 of .099. Since a value of 3.84 would be required to show significance at the five percent level, this smaller value would not allow rejection of the null hypothesis of no difference.

There is change in the direction indicated, but the extent of change is not great enough to be beyond the level of chance. Therefore, we cannot support the sub-hypothesis that more producers will change grading practices for potatoes in the area served by a district marketing agent.

Sub-Hypothesis D. More producers will change methods of maturing potatoes in an area served by a district marketing agent, than in an area not so served.

Maturing of potatoes is important to market quality both in appearance of the product and its soundness through the period required for the steps in marketing. The chief result of adequate maturing of potatoes is that the skin becomes durable and firmly attached to the tissues, so that the skin is retained as a protective layer through all steps in handling.

Buyers rated maturity as fourth in importance among quality factors affecting their selection of potatoes. Maturity was rated fourth as a factor in which improvement has been

made, and also fourth among factors in which further improvement is needed.

The question asked growers in regard to maturity was "Do you try to get potatoes more mature before harvest than you did three years ago?" It might seem that responses could be somewhat indefinite in what was actually done, since no specific methods to this end were requested. However, certain practices that producers were following to get better maturity became evident as their responses were received by telephone. These practices included earlier planting, killing vines with chemicals, using an earlier variety, or simply waiting longer before starting harvest. The responses recorded as indicating change in the maturing of potatoes were based on definite method changes in one or more of these practices.

The extent of change in practices to get potatoes more mature is indicated for the two areas in following table.

TABLE 10

Producers Changing Methods of Maturing Potatoes

| | Change Methods | Not Change | Total |
|---------------------|----------------|------------|-------|
| Cases, Trial Area | 29 | 19 | 48 |
| Cases, Control Area | 24 | 16 | 40 |

Calculating these figures through a χ^2 table shows them to be so nearly equal that the value for χ^2 equals 0. Calculated in terms of percent of producers changing practices, the results show that 60.3 percent of producers changed in the trial area, and 60 percent changed in the control area.

The value for χ^2 is too small to show significant change.

Therefore the null hypothesis of no difference between the two areas cannot be rejected. This would indicate that the sub-hypothesis that more producers will change method of maturing potatoes in an area served by a district marketing agent is not supported by the data.

General Hypothesis. More producers will change one or more marketing practices in an area served by an extension district marketing agent, than in an area served by an extension staff responsible for both production and marketing.

It has been noted that changes in four practices related to marketing potatoes would be used as measures of impact of two types of extension programs.

In measures applied separately for each of the four practices, it has been noted that two show significant change, and two do not.

Test will now be applied to change in one or more of the same four practices considered together, to indicate whether change in the aggregate of practices is significantly different for the two areas.

The number of producers changing in one, two, three, or four of the practices under study is shown in the following table.

TABLE 11

Number of Producers Changing One or More Practices

| | Number of Practices Changed | | | | | Total |
|---------------------|-----------------------------|----|----|----|---|-------|
| | 0 | 1 | 2 | 3 | 4 | |
| Cases, Trial Area | 4 | 8 | 17 | 13 | 6 | 48 |
| Cases, Control Area | 5 | 14 | 13 | 7 | 1 | 40 |

In the Kolmogorov-Smirnov test of unrelated samples, the number of cases are cast in a table of cumulative frequencies, as percents of the total sample. In the following tabulation, the cumulative percentages are expressed decimally.

TABLE 12

Cumulative Percentages of Producers Changing Practices

| | Number of Practices Changed | | | | |
|------------------------------------|-----------------------------|------|------|------|-----|
| | 0 | 1 | 2 | 3 | 4 |
| Cumulative Percentage Trial Area | .083 | .250 | .604 | .875 | 1.0 |
| Cumulative Percentage Control Area | .125 | .475 | .800 | .975 | 1.0 |
| Difference | .042 | .225 | .196 | .100 | .0 |

The K. S. test is applied to the largest difference between the cumulative percentages, in this case .225. Calculated for a value of x^2 by the formula given on page 41, this difference yields a value of 4.416.

Since a value of x^2 at 2df of 5.99 would be necessary to show significance at the five percent level, this smaller value does not indicate a significant difference.

Therefore, the null hypothesis of no difference cannot be rejected, and the general hypothesis of greater change in one or more practices in an area served by a district marketing agent is not supported.

In view of the changes in individual practices previously

noted, and the fact that these changes are all in the direction indicated by the general hypothesis, it may be of interest to determine the confidence level at which these changes would be significant.

Checking the obtained value of 4.416 with the table of values for χ^2 , we find that this value would be significant at the level of 11.5 percent.

Grower Opinion of Marketing Needs

Some indication of the validity of the areas of practice change on which the foregoing tests were based is available from grower opinion on the importance of the practices. Opinion of growers in the two survey areas was asked regarding whether improvement of general quality had occurred in their district over the past three years. Opinions were registered by a rating of general quality as very good, good, fair, or poor for 1957 and for 1960.

In the trial area, thirty nine growers expressed the opinion that quality had improved. Nine growers felt there had been no change. In the control area, twenty two growers felt there had been general improvement in quality. Eighteen growers felt there had been no change.

Growers ranked factors in which they felt improvement had occurred during the three year period. Rankings by growers in the two areas are shown in the table on the following page.

TABLE 13

Growers' Opinion Of
Quality Improvement, 1957 to 1960

| Quality Factors | Number of Growers Ranking | | | | Ranking score* |
|--|---------------------------|-----|-----|-----|----------------|
| | 1st | 2nd | 3rd | 4th | |
| Trial Area | | | | | |
| Cleaner Potatoes | 18 | 6 | 2 | 2 | 96 |
| More Uniform Sizing | 8 | 7 | 3 | 2 | 61 |
| Less Mechanical Injury | 7 | 8 | 7 | 1 | 67 |
| Better Maturity | 8 | 7 | 8 | 1 | 72 |
| Other Factors: Better Seed Closer Planting | 1 | 1 | | | 7 |
| Control Area | | | | | |
| Cleaner Potatoes | 3 | 9 | 4 | 2 | 49 |
| More Uniform Sizing | 5 | 2 | 3 | 5 | 37 |
| Less Mechanical Injury | 9 | 8 | 6 | | 72 |
| Better Maturity | 9 | 5 | 1 | 1 | 54 |
| Other Factors: Better Varieties Closer Grading | 4 | | 1 | | 18 |

*This figure reflects choices in all rankings, by assignment of points for each rank given, e.g. first rank 4, second rank 3, third rank 2, fourth rank 1.

Growers ranked factors related to marketing in which they felt further improvement was needed. The following tables show the importance given to different factors of quality by growers in the two areas.

TABLE 14

Growers Opinion of
Quality Improvements Needed, Trial Area

| Quality Factors | Number of Growers Ranking | | | | | | Ranking Score* |
|---|---------------------------|---|---|---|---|---|----------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | |
| More Washing of Potatoes | 6 | 6 | 3 | 3 | 1 | | 89 |
| Reduce Mechanical Injury | 11 | 6 | 6 | 2 | 1 | | 128 |
| More Uniformity In Size | 5 | 8 | 3 | 1 | | 1 | 86 |
| More Mature Potatoes | 10 | 9 | 6 | | | | 129 |
| Pooling Through Organizations | 1 | 1 | 4 | 3 | 1 | | 38 |
| Use Central Packing Sheds | 3 | | 2 | 1 | 1 | | 31 |
| Sprout Inhibitors, Good Storage | 2 | 1 | | 2 | | 1 | 24 |
| Use Better Seed | 10 | 7 | 4 | 3 | 2 | 1 | 125 |
| Grow Fewer Varieties | 2 | 4 | 6 | 4 | 3 | | 74 |
| Work with Shippers, Retailers | 1 | | 1 | 2 | 4 | 3 | 27 |
| Other Things: Better Grades, Supervise Truckers, Unite to Hold Prices | 6 | 2 | | 1 | 1 | 1 | 52 |

*This figure reflects choices in all rankings, by assignment of points for each rank given, e.g. first rank 6, second rank 5, third rank 4, etc.

TABLE 15

Growers Opinion of
Quality Improvements Needed, Control Area

| Quality Factors | Number of Growers Ranking | | | | | | Ranking Score* |
|---|---------------------------|---|---|----|---|---|-------------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | |
| More Washing of Potatoes | 2 | 3 | 2 | | 1 | 3 | 40 |
| Reduce Mechanical Injury | 7 | 4 | 8 | 4 | 1 | | 108 |
| More Uniformity In Size | 2 | 6 | 3 | 3 | 3 | 2 | 71 |
| More Mature Potatoes | 7 | 9 | | 4 | 2 | | 103 |
| Pooling Through Organizations | 5 | 1 | 6 | 1 | 1 | | 64 |
| Use Central Packing Sheds | | 1 | | | | 1 | 6 |
| Sprout Inhibitors, Good Storage | 1 | | 5 | | 2 | 1 | 31 |
| Use Better Seed | 6 | 6 | 4 | 10 | 1 | | 114 |
| Grow Fewer Varieties | 7 | 4 | 4 | 1 | 2 | 1 | 86 |
| Work With Shippers, Retailers | 2 | 3 | 1 | 2 | 1 | | 39 |
| Other Things: Unite To Hold Prices, Better Grades | 1 | 1 | 4 | | 1 | | 28 |

*See footnote, table 14.

Comparison of Growers' and Buyers' Opinion
of Marketing Needs

Opinions of growers as noted in the preceding tables may be compared to opinions of buyers. In questions asked the three groups, seven of the points regarding need for further improvement in marketing were the same for all.

Comparison of the ranking of each factor by each of the groups is shown in the following table. These ranks show the factors in the order of the highest total ranking scores within each group.

TABLE 16

Comparison of Rankings, Quality Improvements Needed

| Quality Factors | Rank Given Each Factor By: | | |
|---------------------------------------|----------------------------|--------------------------|----------------------------|
| | Buyers | Growers Trial Area | Growers Control Area |
| More Washing of Potatoes | 3 | 3 | 5 |
| Reduction of Mechanical Injury | 2 | 2 | 1 |
| More Uniformity in Size | 1 | 4 | 3 |
| More Mature Potatoes | 4 | 1 | 2 |
| Assembly Through Grower Organizations | 7 | 5 | 4 |
| Use Central Packing Sheds | 7 | 6 | 7 |
| Use Sprout Inhibitors, Better Storage | 5 | 7 | 6 |

It will be noted that buyers and the two groups of growers are in fairly close agreement as to the four quality factors that rank highest in importance. There is some variation in ranking within the top ranked four, but the same four factors were selected by the three groups with only one exception. This exception is the ranking by growers of the control area, that places grower organizations as more important than washing of potatoes. This difference may be partly due to emphasis on brushing potatoes rather than washing, as discussed on page 53.

Selection of these four quality factors as important by all three groups would seem to support the validity of using these factors for program measurement as has been done in this study.

CHAPTER V

SUMMARY, CONCLUSION, AND SUGGESTIONS FOR FURTHER STUDY

This study attempted to evaluate on a limited scale the comparative impact of extension work in marketing from two types of extension programs.

Work of a district agent assigned specifically to marketing for an area of several counties and work of an extension agent assigned to all phases of agriculture in a single county were the types of program under study.

For evidence of program effect, change by producers in potato marketing practices was used. The practices selected were those rated important by buyers of the product.

The general hypothesis of the study is stated below:

More producers will change one or more marketing practices in an area served by an extension district marketing agent, than in an area served by an extension staff responsible for both production and marketing.

For test of the general hypothesis, four practices were selected for measurement of change. A sub-hypothesis was stated for each practice, setting out the prediction that more producers in the marketing agents' area would make changes in each of the practices.

These practices included the use of new sources of market information, adoption of the practice of washing potatoes, changes in methods of grading potatoes, and increasing the maturity of the crop before harvest.

The data was gathered from producers in areas under the two types of extension programs. The data showed that in the use of new sources of market information and in washing potatoes there was significantly greater change in the area served by the district marketing agent. In the method of grading and in getting more maturity before harvest the change in the district marketing agent's area was greater, but not to a degree that was statistically significant.

When data on all practice changes was combined for test of the general hypothesis, it was found that change was again greater in the district marketing agent's area. However, the differences revealed were not great enough to be significant at the previously selected level of confidence of five percent.

Therefore, the general hypothesis of greater change in the area served by the district marketing agent was not supported.

For a positive conclusion from a study of this sort, one of two possible outcomes would be necessary. If the district marketing agent program has no greater effect than the regular extension program, then differences in practice change should be of a random nature, not trending in any particular direction. On the other hand, if the district marketing agent program does have significantly greater impact, the practice changes should be of great enough magnitude to attain statistical significance at a fairly high level of confidence.

Since neither of these outcomes has been revealed in the present study, it would seem desirable to make further test, or test on a broader base, before a positive conclusion could be reached.

Hence, the writer is inclined to view this study as one of a preliminary nature, and to make suggestions based on

experience from this study that may lead to more positive results.

Suggestions for Further Study

This study relied on evidence outside the extension programs for valid areas of behavior change by which to measure the programs. It is believed this procedure is sound, and that it equalizes to some extent differences in program emphasis. However, certain difficulties are created.

Practices selected in this way will be those in line with generally recognized industry aims. Change in such practices is more apt to be steady and continuous than to be of great magnitude within a short time period. This suggests that in a study measuring changes in practices, this basic characteristic of the process must be considered.

In the first place, it must be recognized that not all of the clientele of the extension program are in a position to make practice changes, even those recognized as desirable, at one time. Individual circumstances will influence the rate of change. The time period over which change can be measured is limited, so even in the most favorable circumstances the amount of change cannot be great. The other side of the picture as it affects evaluation is that some change will take place over time regardless of extension influence. This further narrows the potential range of behavior change that is available for measurement.

What this means to the evaluator is that procedures must be geared to measure small differences in a reliable and meaningful way.

Statistical procedures provide some keys to methods that will give greater precision to this type of study.

Measurement of as many areas of change as possible is one means to increase the power of definition. Establishment of degrees of change where this is possible provides a sharper measure than the dichotomous division into change and not change categories.

Probably the most positive means of increasing the precision of measurement is the size of sample. Differences between a few cases must be great to be beyond the level of chance. In the present study, differences that showed little significance with the size of sample used would have been highly significant with the same trend carried through twice the number of cases.

Of course, the collection of more items of information, and contact with more cases, requires more resources. In this type of study there appears to be an irreducible minimum of data within which reliable results can be expected. It behooves the researcher to determine this minimum and devote sufficient resources to his study to exceed it.

A P P E N D I X

POTATO BUYERS QUESTIONNAIRE

70

1. What is the approximate volume of potatoes you handle in a year? Occasional shipment.....
10 to 50 carlots.....
Over 50 carlots.....
2. What percent of your total purchases of potatoes are washed?%
3. What percent of your volume are Michigan potatoes?%
4. From which Michigan area do you draw the greatest volume? Please rank by number in the blank provided, 1, 2, 3. Edmore area.
Bay City Area
Alpena-Presque Isle Area
5. Of your purchases of Michigan potatoes, what package size do you purchase in greatest volume? Rank by a number in the blank for each package size, No. 1 for the size purchased in largest volume, No. 2 next, etc. 10 pound....
15 pound....
25 pound....
50 pound....
100 Pound....
6. What percent of your Michigan potatoes come from each of the following types of suppliers? Direct from growers%
From grower organizations.....%
From dealers, shippers, or brokers
7. What is your opinion of the general quality of Michigan potatoes? Has there been any change in the general quality over the last 5 years?
Rating of quality in 1955: (very good____)(good____)(fair____)(poor____)
Rating of quality in 1960: (very good____)(good____)(fair____)(poor____)
8. If you feel there has been quality improvement, has it improved more in one production area than in others? How would you rank the following areas in this respect? Use 1, 2, 3, in the blanks to show your rating. Alpena-Presque Isle area
Edmore area
Bay City area.....
9. If improvement has occurred, what phases of quality show the most improvement? Please rank by 1, 2, 3, etc., in the blanks to show where most improvement is. Leave blank any phases that are unchanged. Cleaner potatoes
More uniform sizing.....
Less mechanical injury
Better maturity.....
Other factors (list)
.....
10. In helping growers to improve the marketing of their potatoes, what points do you feel need the greatest emphasis? Please rank by 1, 2, 3, etc., the things that should have priority. Leave blank those you feel are unimportant.
More washing of potatoes.....
Reduction of mechanical injury.....
More uniformity in size.....
More mature potatoes
Assembly through grower organizations....
Central packing shed operations.....
Use sprout inhibitors, better storage....
Other factors (list)
.....
.....

1. The first step is to identify the problem or question that needs to be answered. This involves understanding the context and the specific requirements of the task.

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| | |
|---|---------------------------------------|
| SUBJECT: REFERENCE: DATE: | TO: FROM: BY: |
|---|---------------------------------------|

1. The first step in the process of the investigation is the identification of the problem. This is done by the investigator who is responsible for the study. The investigator must first identify the problem and then determine the scope of the study. The next step is to design the study. This involves determining the research objectives, the research questions, and the research hypotheses. The investigator must also determine the appropriate research methods and the data collection procedures. The third step is to collect the data. This involves the actual collection of the data from the subjects of the study. The fourth step is to analyze the data. This involves the use of statistical methods to analyze the data and to determine the results of the study. The final step is to report the results of the study. This involves the preparation of a report or a paper that describes the study and its findings.

1. The first step in the process of identifying a problem is to recognize that a problem exists. This involves gathering information about the situation and identifying the specific issue that needs to be addressed.

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On this 1st day of August 1941, I, the undersigned, being of legal age and sound mind, do hereby certify that the foregoing is a true and correct copy of the original as the same appears in my possession and control.

Witness my hand and seal of office this 1st day of August 1941.

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IN POTATO



MARKETING

- | | <u>YES</u> | <u>NO</u> |
|--|---|-----------|
| 1. Do you get market information on potatoes during your marketing season that you did not get three years ago? | ___ | ___ |
| Which types do you get that you did not get three years ago? | | |
| a. Daily market report by mail from Benton Harbor or Detroit..... | ___ | ___ |
| b. Market news by subscription to telephone answering service.... | ___ | ___ |
| c. Weekly market summaries from the Extension Agent..... | ___ | ___ |
| d. Radio reports of potato markets | ___ | ___ |
| 2. Have you started washing your potatoes during the last three years?. | ___ | ___ |
| 3. Is your method of grading different now than it was three years ago? If yes, what change was made? _____ | ___ | ___ |
| 4. Do you try to get potatoes more mature before harvest than you did three years ago? | ___ | ___ |
| 5. What is your opinion of the general quality of potatoes marketed from your area? Has there been any change over the last three years? | | |
| Rating of quality in 1957: (very good___) (good___) (fair___) (poor___) | | |
| Rating of quality in 1960: (very good___) (good___) (fair___) (poor___) | | |
| 6. If improvement in quality has occurred, what phases show most improvement? Please rank these by writing 1,2,3, etc. in the blanks to show where most improvement is. Leave blank things not improved. | Cleaner potatoes.....___ More uniform sizing.....___ Less mechanical injury..___ Better maturity.....___ Other factors.....___ | |
| 7. What do you feel growers should be doing to improve potato marketing? Please rank by 1,2,3,etc. the things you think are most important. Leave blank any you feel are unimportant. | More washing of potatoes.....___ Reduce mechanical injury.....___ More uniformity in size.....___ More mature potatoes.....___ Pooling through organizations...___ Use central packing sheds.....___ Sprout inhibitors, good storage. ___ Use better seed.....___ Grow fewer varieties.....___ Work with shippers, retailers...___ Other things.....___ | |

IN POTATO



MARKETING

- | | <u>YES</u> | <u>NO</u> |
|--|----------------------------------|-----------|
| 1. Do you get market information on potatoes during your marketing season that you did not get three years ago? | ___ | ___ |
| Which types do you get that you did not get three years ago? | | |
| a. Daily market report by mail from Benton Harbor or Detroit..... | ___ | ___ |
| b. Market news on potatoes from your local newspaper..... | ___ | ___ |
| c. Market news from Maine..... | ___ | ___ |
| d. Radio reports of potato markets | ___ | ___ |
| 2. Have you started washing your potatoes during the last three years?. | ___ | ___ |
| 3. Is your method of grading different now than it was three years ago? | ___ | ___ |
| If yes, what change was made? _____ | | |
| 4. Do you try to get potatoes more mature before harvest than you did three years ago? | ___ | ___ |
| 5. What is your opinion of the general quality of potatoes marketed from your area? Has there been any change over the last three years? | | |
| Rating of quality in 1957: (very good___) (good___) (fair___) (poor___) | | |
| Rating of quality in 1960: (very good___) (good___) (fair___) (poor___) | | |
| 6. If improvement in quality has occurred, what phases show most improvement? | | |
| Please rank these by writing 1,2,3, etc. in the blanks to show where most improvement is. Leave blank things not improved. | | |
| | Cleaner potatoes..... | ___ |
| | More uniform sizing..... | ___ |
| | Less mechanical injury.. | ___ |
| | Better maturity..... | ___ |
| | Other factors..... | ___ |
| 7. What do you feel growers should be doing to improve potato marketing? Please rank by 1,2,3, etc. the things you think are most important. Leave blank any you feel are unimportant. | | |
| | More washing of potatoes..... | ___ |
| | Reduce mechanical injury..... | ___ |
| | More uniformity in size..... | ___ |
| | More mature potatoes..... | ___ |
| | Pooling through organizations... | ___ |
| | Use central packing sheds..... | ___ |
| | Sprout inhibitors, good storage. | ___ |
| | Use better seed..... | ___ |
| | Grow fewer varieties..... | ___ |
| | Work with shippers, retailers... | ___ |
| | Other things..... | ___ |

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