Economic principle as a guide to administration and teaching in the agricultural extension service

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UMI®
ECONOMIC PRINCIPLE AS A GUIDE TO ADMINISTRATION AND
TEACHING IN THE AGRICULTURAL EXTENSION SERVICE

by

Warren H. Vincent

A Dissertation Submitted to the
Graduate Faculty in Partial Fulfillment of
The Requirements for the Degree of
DOCTOR OF PHILOSOPHY
Major Subject: Agricultural Economics

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Iowa State College
1953
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I. INTRODUCTION

A. Problem Statement

1. Purpose of the study

The purpose of this study is to make an economic analysis of the objectives and educational methods employed by the Agricultural Extension Service of the United States. Definition of the problem involves an understanding of what is meant by the Agricultural Extension Service and what is meant by an economic analysis.

The Agricultural Extension Service is the field educational arm of the United States Department of Agriculture and the Land-Grant colleges of the several states. It is cooperatively financed with Federal, state, and local funds. It engages the services of more than twelve thousand professional and more than a million volunteer workers.¹ It is now considered the largest organized out-of-school educational system in the world. The function of this

agency is stated in general terms in the Smith-Lever Act of 1914 which constituted its official birth.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That in order to aid in diffusing among the people of the United States useful and practical information on subjects relating to agriculture and home economics, and to encourage the application of the same, there may be inaugurated in connection with the college or colleges in each State . . . , agricultural extension work which shall be carried on in cooperation with the United States Department of Agriculture.

That cooperative agricultural extension work shall consist of the giving of instruction and practical demonstrations in agriculture and home economics to persons not attending or resident in said colleges in the several communities, and imparting to such persons information on said subjects through field demonstrations, publications, and otherwise . . . .

During its first thirty-nine years of life, these official statements have been given liberal interpretation, and specific activities of extension workers have ranged from the teaching of lamp-shade construction in home economics circles to the dissemination of information on foreign trade and public policy; from sheep-shearing to community recreation. The vastness of the program and the

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variety of its services has contributed to an interest in an economic analysis of its activities.

It is difficult in brief terms to draw a boundary around what is meant by economic analysis. However, for the purpose of this study, it will be defined as a science of choice between alternatives. It is concerned with alternative means which may be used to achieve certain goals or ends. Once the ends are known the problem is one of either maximizing the desired end product forthcoming, or, as its corollary, one of minimizing the cost of obtaining a given desired product. As a problem of production, a solution requires a clear understanding of the objective in mind and of the relative scarcity and productivity of the resources involved. Hence, the immediate problem for study is to ascertain the relevant ends of the Extension Service. The next is a study of the alternatives which may be employed to reach these goals.

Ordinarily, the ends are "given" to the economist. For example, a firm may be assumed to maximize profits. The household may be assumed to maximize satisfaction or utility. However, it is asserted that the ends involved in this problem are not known with certainty—that the usually cited objectives of the Extension Service have not been clearly defined, and that in some cases they
have stood in outright conflict. Hence, the main body of this study is a critical examination of the purported goals of the Agricultural Extension Service of the United States. As these objectives are gradually spelled out, attention is given to the alternative means of meeting them. At all times an attempt is made to relate the present and alternative activities to what may be loosely called the welfare of society.

2. Need for the study

A major problem facing extension forces at all times is, then, one of so distributing its available educational resources to the various problem and interest fields in such proportion that the maximum contribution may be made.¹

This statement was made in the report of one of the most important studies ever made of extension programs and activities. However, the committee under whose direction the study was made failed to present a framework of analysis which would assist the extension forces in solving this allocation problem. Therefore, the first justification for this study is based on a desire to develop a useful guide

for administrators. Those responsible for policy decisions regarding the Extension Service have found it necessary to use tradition and personal judgment as a chief guide within definite limitations prescribed by legislation. It is not contended here that administration has been bad or that the judgment of administration has been inadequate. Nor can it be claimed that a mere economic framework of the problem can provide a panacea for past difficulties.

It is not too much to hope, however, that it will provide a consistent body of logic which will condition judgment involving other considerations.

In addition to the help that may come by demonstrating that economic principles can be applied to educational processes, it should also be helpful to have the purpose of the Extension Service clarified. If the purpose is clearly defined, both professional and volunteer personnel are more likely to unify their efforts to accomplish this common end. On the other hand, if the organization's purpose must remain unclear, it becomes necessary for workers to define objectives completely in the light of their own experience.

The need for a study of objectives has been widely felt. Wilson, during an Extension Summer School, pointed out that "the two big problems confronted in extension research are: (1) the
classification of objectives and (2) the devising of methods of collecting and recording evidence of growth in educational objectives. To date, little has been done by way of an economic approach to these problems of extension evaluation. After screening the studies conducted by the Division of Field Studies and Training and reviewing all proceedings of the Land-Grant colleges and universities from 1914 to 1951, Varner found no reference to extension studies of an economic efficiency nature. Furthermore, he sent letters to all extension directors in the United States, asking their knowledge of such studies. From the forty-two responses received, "none knew of any such studies having been conducted" but "the vast majority expressed a sincere interest in and appreciation of this subject and indicated a willingness to participate in any inquiry that might lead to meaningful results."


2 This division of the Extension Service was established in 1923 to conduct research in extension evaluation.


4 Ibid.
The hope for an economic study is that it might lead to more efficient administration. As efficiency of operation is increased, society benefits with the possibility that more educational returns may be expected from the taxpayer's dollars. Society is interested in the progress of agriculture and in the financial support of agencies which further such progress. Total extension expenditure coming from Federal, state, and local sources amounted to about eighty million dollars for the fiscal year ending June 30, 1952. It would seem that a public-supported program of this magnitude deserves analysis from an economic point of view. This, then, presents another justification for the study.

Finally, a study of this type may be of benefit to those interested in the application of theoretical tools of analysis to practical problems. Economics involves relatively few relationships but has near universal application. However, each problem has its own assumptions and the solution must invariably be conditioned by

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certain restrictions. As limitations and difficulties are encountered, perhaps new principles or devices of exposition may be developed to improve the application of theory. Economic problems are sometimes classified as either of resource allocation or of income distribution. Both types are involved in this study. First, there is concern for the best use of given extension resources in the obtaining of a maximum educational product. Secondly, there is interest in the way in which education affects the distribution of income.

The approach taken is that economics is a method of analysis and that its contribution to this study does not lie in the answer it may give to a particular question, but rather how adequately it assists in the solution of any administrative problem of choice. Therefore, the justification of the study is based on the following grounds:

1. The need for a guide for administration as it is related to
   (a) the objectives of the Extension Service,
   (b) the problem of allocating resources, and
   (c) its implications to income distribution.

2. The belief that an economic analysis may provide such a useful guide.
B. Review of Literature

A vast amount of literature has been written dealing with the Extension Service of the United States. Little has been done in the specific area of this study but most of the writings may, in some way, be related to it. For example, present objectives are closely tied to the history and legislative foundation of the organization. The purpose of this review is not to reiterate the content of numerous historical reports, but rather to mention some of the more important contributors whose work may be used as a background to the immediate problem. It should be repeated that with few exceptions these studies do not mention the use of economics for evaluating education. The type of studies which have been made may be classified as historical or having to do with extension evaluation.

1. Literature dealing with extension service history

Much has been written on the historical development of the Cooperative Extension Service. True traced its development through 1923. One of the most complete descriptions of its history

up to 1929 was given by Smith and Wilson. Baker, in her "The County Agent," describes the county agent work and analyzes the functions of the county agricultural agent movement from its conception through the New Deal. Brunner and Yang presented an interesting account of the Extension Service through 1949 and an appraisal of its effectiveness from the viewpoint of a sociologist.

The conclusions they reached are as follows:

The evidence shows that the Cooperative Agricultural and Home Economics Extension Service is a democratic system of rural adult education. It has helped increase income and improved the uses of that income. It has made the home unit central in its philosophy and in much of its teaching. It has set up a unique cooperative relationship between the local people and at levels of government from federal to county. It has been interested in conserving both natural and human resources and in promoting a higher level of living for families and communities, and it has paid attention to such new challenges as education for leisure and for better health. It has based its work on facts and a respect for science. It has

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2 G. Baker. The County Agent. Chicago, Univ. of Chic. Press. 1939.

remained politically nonpartisan, though not uninterested in public policies, especially such as affect agriculture. Extension has not covered its field completely and has had to make many adaptations to its heavy load. It has not reached the illiterate and the very poor as well as it has others, though it has done far better than many think. The temptation to rest on laurels already won, and sponsor a stereotyped program, has not always been resisted in counties or some states, though as a unit it has been remarkably adaptable and dynamic. Although its local programs are not always as well integrated within the Service and in relation to other agencies as is desirable, these and other faults are no more universal throughout the Service than are its strong points.¹

These statements are representative of those made by most historians or analysts of the Extension Service.

At about the time Brunner and Yang's study was published, two other important works were brought on the scene. The first was a seventy-two page report on extension programs, policies, and goals prepared by a joint committee representing the United States Department of Agriculture and the Association of Land-Grant Colleges and Universities.² After reviewing Extension's history, its relationship to other agencies, its teaching methods, and its methods of financing, this committee concluded with the following:

¹ Ibid., p. 162.
² Joint Committee Report, op. cit.
The cooperative Extension Service can look with pardonable pride at past accomplishments. Not only rural people, but also Congress and State legislatures through increased appropriations, have given continuing votes of confidence. It is the firm conviction of this committee that extension can look to the future and see a growing need for its services; and equally, that from these services the Nation will profit. This outlook should be viewed as a challenging opportunity to extend the influence of its work and make a continuously greater contribution to the welfare of both rural and urban people.¹

Here the record of success is based on ability to obtain financial support.

A second publication which became available at the time of the above report was a textbook on extension work by Kelsey and Hearne.² This was a useful work for students interested in what the extension system is and how it operates. It did not, however, critically analyze its activities. It was developed around the central idea that the fundamental objective of Extension "is the development of the people."²

The most recent book dealing with the history and philosophy of the Extension Service was a compilation of contributions of many

¹ Ibid., p. 72.
outstanding leaders. ¹ By screening the papers in this book it is possible to trace the viewpoints held by those most responsible for the many years of service credited this organization. A part of the task involved in the present study was to isolate and classify the various opinions given by pioneers and contemporaries as to the nature and function of Extension. The book edited by Bliss and his associates was very helpful in supplying some of the opinions given consideration.

This review of literature dealing with the history of the Extension Service does not include all that has been written on the subject. It was not intended to do so. Writers in many fields including agricultural economics, agricultural education, rural sociology, agricultural statistics, and others have frequently related details of the agricultural extension movement and its influence on the development of rural America. Since the historical aspects of Extension represent such a minor part of this study, no attempt is made to cite all of these references. However, the studies

reviewed with the bibliographies found therein do comprise, in the writer's opinion, the most important works.

It bears repeating that none of the above historical studies attempt to answer the problem outlined in this thesis; that is, an economic analysis of the activities of the Extension Service. They do assist, however, by presenting the necessary background details for such an analysis.

2. Literature dealing with extension service evaluation

Vandermuelen has suggested criteria for measuring the efficiency of governmental expenditure according to the nature of the data needed for applying them. The approaches are based on (1) costs, (2) methods, and (3) results. Despite the many problems and limitations of each approach, these seem to describe the chief areas of research which have been analyzed in connection with extension evaluation.

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Baker and Wilson\textsuperscript{1} conducted one of the first studies in the area of costs. It was published as a United States Department of Agriculture technical bulletin and dealt with the relative costs of various extension methods. In the same year (1929) another bulletin was prepared by Wilson\textsuperscript{2} on the relative effectiveness of selected extension methods. The basic research techniques and conclusions described in these bulletins have been repeated many times since their publication.\textsuperscript{3}

Most research on the effectiveness of extension methods has been conducted by, or coordinated by, the Division of Field Studies and Training, a small research unit within the Extension Service. For several years Crile\textsuperscript{4} has been responsible for compiling and reporting current research in agricultural and home economics.


\textsuperscript{4} L. Crile. Review of Extension Studies. Published as U.S. Dept. Agr. Extension Service Circulars. Since 1948 they have been published biannually.
extension teaching. The various studies are classified under the following headings:

- Administration and Supervision
- Effectiveness of Individual Teaching Methods
- Progress and Effectiveness of Agricultural and General Extension Work
- Progress and Effectiveness of Home Economics Extension Work
- Progress and Effectiveness of 4-H Club Work
- Progress and Effectiveness of Extension Work with Older Youth
- Relative Influence of Teaching Methods and Other Factors

For the most part, these categories cut across all three areas of cost, methods, and results cited above. In the category of Administration and Supervision may be found studies such as Joy's where extension administration is defined as "the management of funds, staff and cooperating forces to stimulate rural people to solve their own problems." Such management, according to Joy, involves six different administrative activities:

1. Developing policy and plans of work based on changing situations and on the desires and needs of rural people.
2. Preparation of budgets and authorizing the expenditure of funds.

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2 Ibid.
3. Developing an organization, division of duties and assignment of responsibilities.
4. Selection, training and supervision and control of personnel.
5. Coordination of the efforts of the staff and the coordination of extension activities with those of other agencies.
6. Reporting accomplishment.

This fairly complex listing is essentially a breakdown of choice situations that might be faced by any public administrator. Joy's chief contribution was to emphasize the importance of knowledge before decisions were made. The use of facts was recommended in preference to administration by tradition.

Another contribution in this area is a published series of eight talks by Egger\(^1\) entitled "Public Administration and Extension Work." Here the historical and institutional aspects of administration were emphasized. Of importance was his emphasis on a clear purpose and on programming (planning). The many types of information needed for planning were stressed.

A third type of research in the area of Administration and Supervision is illustrated by Gilbertson's\(^2\) "Sources and Uses of

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Cooperative Extension Funds." It is a descriptive study with the aim to help extension directors, other administrative officers, and county extension agent supervisors appraise their situation and financing problems in relation to conditions in their own and neighboring States." It does not attempt to answer the question of what represents an optimum allocation of resources, but does give useful averages on the many different ways extension funds are used.

Research dealing with the measurement of results is difficult in the evaluation of education. The main method used by Extension has been to attempt a count of the number of persons contacted by various means of communication and the number of changes made in particular practices. The results are compiled from monthly and annual reports of county and state workers and are published annually by the Division of Field Studies and Training. Again, these reports do not suggest an optimum way of conducting extension work. They present averages of what has been done in the past.

1 Ibid., p. 1.

Rural sociologists have been especially interested in the results and methods of extension work. Hoffer and Gibson studied the effects of selected sociological factors on the responsiveness of farmers to agricultural extension programs. They concluded as follows:

It is plainly evident from the analysis and comparison of the four communities that no single factor or circumstance in a community situation determines the responsiveness of farmers to agricultural extension programs. Responsiveness is determined rather by a network of social influences among which leadership, organization and group morale among farmers are very important. These are affected, in turn, by economic conditions and community organization. To consider any single item as the sole cause of success or failure of extension work over-simplifies the problem.\(^2\)

Lionberger\(^3\) found differences in the effectiveness of personal sources of information as compared to impersonal sources. There was a higher correlation between the adoption of approved practices

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\(^2\) Ibid., p. 34.

and the use of personal sources than between the adoption of approved practices and the use of impersonal sources.

Wilkening\(^1\) found that the type of educational media used by farmers was dependent upon the association of the improved practice with previously existing farm operations and upon the length of time the particular practice had been followed in the community.

Hoffer\(^2\) has shown that "the effectiveness of the Extension Service was increased when its programs were associated with activities of groups and organizations already present in the county."

Leagons\(^3\) found that the more important factors shaping the interests of North Carolina farmers were: level of formal schooling, size of farm operated, level of living status, and age differences.


These are representative findings concerning the sociological aspects of extension evaluation. One is led to the conclusion that much is to be gained by integrating the research results obtained from several related disciplines. However, few of the hundreds of studies conducted on evaluation during the past thirty years can be considered basic or fundamental research. There is a felt need for more of this type of research. The Joint Committee summarized the situation as follows as it referred to studies of the past:

They have been largely devoted to such fields as teaching methods, program planning and determination, problems in administration and supervision, and local leadership.

The time has come when extension needs more of the so-called "fundamental" research.

While service or action evaluation studies should be continued, more emphasis and resources should be directed in the future to undertaking some pioneer, pathfinding, and fundamental research into the social, economic, and cultural factors which effect and even condition the extension program.2

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2 Joint Committee, op. cit., p. 40-41.
Fundamental research of the type described here would outline principles upon which the future course could be directed, rather than letting past action entirely prescribe the course to be taken. A study in this direction was made by Heady\(^1\) wherein he laid out some of the economic and welfare implications of agricultural advance. His analysis of the effect of different innovations under various degrees of demand elasticity is fundamental to the analysis of objectives based on maximizing the income of an industry. Some of his principles are employed in this thesis. Okanay\(^2\) applied Heady's arguments to some of the economic objectives of the Extension Service. He said, "The economic goals of the Agricultural Extension Service in the United States are not identical and without conflict."\(^3\) Based on the statements of "authorized persons," he classified the economic goals as follows: "(1) Increasing the total

\(^1\) Earl O. Heady. Basic Economic and Welfare Aspects of Farm Technological Advance. Jour. Farm Econ. 31:293-316. 1949.


\(^3\) Ibid., p. 45.
net income of the agricultural industry; (2) Increasing the total wel­
fare of farm people and (3) Maximizing economic progress."

The question of whether a transfer of income by the central
government from high income to low income areas results in in­
creased or decreased efficiency has been debated by Scott and
Buchanan. Scott contends that "transfers of government income
from place to place counteract this incentive to labour mobility and
thus prevent maximization of national production." Buchanan
counters with the conditions which are required to make the argu­
ment theoretically acceptable. Without presenting the details of
such conditions, his conclusions were as follows:

Equalizing transfers carried out by the central
government designed to relieve the fiscal plight of the
low-income states, whether in the form of differential
tax rates or in that of equalizing grants, cannot be
rejected for efficiency reasons. It has been shown
that the allocative effects vary from instance to in­
stance, allowing no universally applicable conclusions

1 Ibid.
2 A. D. Scott. A Note on Grants in Federal Countries.
Economica 17:416-422. 1950.
3 James M. Buchanan. Federal Grants and Resource Allo­
4 Scott, op. cit., p. 418.
to be drawn. In specific cases resource effects should perhaps be taken into account, but primarily the transfer policy should be based on alternative objectives: equity, national interest, and the preservation of minimum standards of the public services.¹

Such issues are relevant to this study since the Agricultural Extension Service is a government grant-in-aid type of program, and since there is interest in the resource allocation aspects of the problem.

Finally, as another study interested in the economic efficiency of the Extension Service, mention is made again of Varner's thesis.² Of interest are his reasons why more economic research pertaining to extension education has not been made. He gives these three reasons: (1) there is the school of "old-line" extensioners who hold that the objectives of Extension cannot be discussed in terms of economics--that they defy the "dollar sign" as a measure of achievement; (2) there is a total absence of a market mechanism in the traditional sense as far as the distribution of the product of Extension is concerned; and (3) there is recognized difficulty in isolating and identifying the "output" or "product" of

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¹ Buchanan, op. cit., p. 217.
² See footnote 3, p. 6.
Extension. While the presence of such difficulties is admissible, the author agrees with Varner that to exclude economic analysis because of them is to limit the scope of such analysis unduly.

With this philosophy in mind and on the foundation of previous research, an economic analysis of the objectives of the Extension Service will now be attempted. To accomplish this objective, the following topics will be discussed:

1. The effect of institutions on extension resource use.
2. Formulation and classification of extension objectives.
3. Objectives related to human learning.
4. Agricultural efficiency and income distribution.
5. Implications to extension policies and procedures.
II. THE EFFECT OF INSTITUTIONS ON EXTENSION RESOURCE USE

Men make decisions which, given the organizations and institutions of society, determine the distribution of the scarce resources among the different persons as well as the uses to which the scarce resources are put. The study of the way in which scarce resources are administered is the task of the science of economics. This study has been defined as an economic problem because it deals with the administration of scarce resources used to satisfy certain goals. The Extension Service has at its disposal resources in the form of professional and volunteer workers, funds, and technical knowledge and skills which must be used economically if the maximum contribution is to be made.

The user of extension services in the achievement of his ends also has limited resources which must be economized in production (or consumption).

We have the situation, then, where the "end" of one unit of economic decision becomes the "means" for another. The resources of Extension produce a service which in turn becomes a

productive resource to be employed by many persons in the attain­ment of their goals. At both ends of this means-end scheme, de­cisions must be made which, as Lange pointed out above, determine the distribution and uses of the particular resources involved. But, as he also suggested, such determinations are conditioned by "the organizations and institutions of society." Institutional factors play an important role in influencing administrative judgment and in de­termining the combinations of productive resources employed in the Agricultural Extension Service. It is to these factors that attention is directed as the development of and the current operations of Ex­tension are now studied.

A. Development of Extension Work

It would be a mistake to go only to the Agricultural Extension (Smith-Lever) Act of 1914 and expect to learn what extension work is all about. This act was the culmination of economic and political forces which had their roots in the first days of United States history. An understanding of extension work, as it is known today, requires some exploration of events taking place and philosophies held dur­ing those early times.
This is not the place for a detailed history, but much can be gained by gleaning a few facts from records pertaining to the first three centuries of American agriculture. This can most conveniently be accomplished by considering three fairly distinct periods with respect to agriculture's development: (1) the colonial period, (2) the transition period, and (3) the industrial revolution. ¹

1. The colonial period: 1600-1800

In a country as young as America, it is not surprising that many cultural traits and social characteristics of the first settlers still dominate rural habits and thought. In many ways, a characterization of the first farmers of this country provides an ample description of the types of individuals to whom extension workers offer their services today. For example, the small-scale farmer of the colonial period was a "jack-of-all-trades." He was a hunter, trapper, fisherman, farmer, forester, carpenter all in one. This, of course, served well in a subsistence type of economy and undoubtedly

assisted greatly in conquering the agricultural frontiers to the west.
But, even today, much of this attitude which says that cleverness in
many lines is more important than any thoroughness which may
come with specialization still persists. There is pride in self-reliance and hard work. These characteristics are all a part of
the ceremonial patterns which resist change and oppose the process
of technological development.

It is this opposition which is our primary concern, and especially as it affects the development and conduct of the industrial economy. In that process the ceremonial behavior system is opposed to technological activity in this sense, that whereas technology is of its own character developmental the ceremonial function is static, resistant to, and inhibitory of change.¹

These ceremonial patterns are sociological characteristics, but are
of concern to the educator and economist.

The business of "getting a living" includes both these functions. That is, it includes activities of a technological character, and it also includes activities of a ceremonial character; and these two sets of activities not only co-exist but condition each other at every point and between them define and constitute the total activity of "getting a living."¹ It is the problem of economic analysis to distinguish and understand these factors, and their mutual

relations, and the configurations of economic activity for which they are responsible.¹

On the positive side of heritages from early colonial development are the habits of group action which resulted in part from the New England system of land disposition.² Land was parcelled to groups rather than to individuals and these groups learned to function democratically. Within their own tract they developed a village with its meeting house, minister's house, a burial ground, market place, and school. "The town meeting, at which plans for land distribution were worked out and the officers who cared for the village property were chosen, was a vital factor in the evolution of democracy in America."³ In most parts of the country the town meeting is a thing of the past, but the collective and democratic behavior characterizing rural people through the years has been helpful to extension work in the formations of organizations and in the development of leadership. Stone⁴ estimates that on the

¹ Ibid., p. 99.
³ Everett E. Edwards, op. cit., p. 176.
average about 31 percent of a Michigan county agent's time is spent by working directly with groups of people. To say that the desire of farmers to work in groups is solely an inheritance from the colonial settlers would be an exaggeration, but this tendency must be reckoned with when analyses of resource allocation are made.

When the Pilgrims tilled their small fields by hand at Plymouth Rock, their methods were little different from those of ancient Egypt, Greece, and Rome. Even the pioneers who crossed the Mississippi some two hundred years later had only crude plows at best, and usually resorted to the axe or hoe to break the prairie sod to make a hole where it was hoped corn would grow. Except for the innovation of using animal power to plow, there was no significant change in the manner of preparing soil for seed from the time of the first plow about 6000 B.C. to 1788, when Thomas Jefferson used mathematics to improve moldboard design. Harvesting equipment, likewise underwent little change before 1800. The scythe of the early American settler was but a slight adaptation of the sickle used by the Egyptians some 1,400 or 1,500 years B.C.

The principle to be drawn here is not that modern farmers are different in learning and living habits from the early settlers, but since innovation is the result of recombining known quantities
and producing something qualitatively different, the elements of in-
novation are quite different. "The innovative union of ideas is a
complex commingling of perception, cognition, recall, and affect.
. . . An innovation is, therefore, a creation only in the sense that
it is a new combination, never in the sense that it is something
emerging from nothing."¹

The settlers of the Thirteen Colonies were predominately
English. Colonial agriculture was a product of English culture and
English technology, but the kinds of crops and manner of cultiva-
tion were unsuited to American conditions. It was not until the ideas
of the motherland and of other continental countries were combined
with the techniques of the American Indian that adequate food sup-
plies were produced.

Much progress in production has been accomplished. How-
ever, it must still be borne in mind by extension workers that in-
novation is not a describable good in itself, but is a process. The
ability to combine ideas and produce new ones varies with each
individual. The early settlers had less to start with than the modern

Inc. 1953. p. 181.
farmer, but the wide variations in the "idea-combining power" of persons today presents another problem that must be reckoned with when the theoretical framework for an economic analysis is set up.

2. The transition period: 1775-1860

This period in America's agricultural development is marked with violent reactions. The American Revolution was not only a reaction against British colonial policy, but also contained many elements of civil war within the colonies themselves. Merchants, lawyers, city laborers, mechanics, small farmers, backwoodsmen, indebted planters, and others of the less prosperous classes opposed the governing caste in America--the colonial administrators, the rich planters, the merchants whose interests coincided with England's. Included in the reactionaries were Otis, Jay, the two Adamses, Henry, Franklin, Hancock, and Washington. They wanted (1) to strike at imperial control and (2) to gain in a share of local government. The philosophies they held and the actions they took were of importance to the development of agriculture and, of course, to the rest of the nation.

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1 Everett E. Edwards, op. cit., p. 191.
After independence was won, "the leading citizens of the new country seemed resolved not only to create a Nation that had a recognized place among the countries of the world but one with distinctive rather than inherited or borrowed ways of life."\(^1\) Agricultural education and advancement was one of the first interests in national development. Two resolutions were recommended and adopted by the Second Continental Congress in 1776 proposing a Federal Department of Agriculture.\(^2\) Although the United States Department of Agriculture was not officially created until 1862, there was continuous agitation for its foundation throughout the period between the Revolutionary and Civil Wars. In Washington's last address to Congress in 1796 he said:

It will not be doubted that with reference either to individual or national welfare agriculture is of primary importance... Institutions for promoting it grow up, supported by the public purse; and to what object can it be dedicated with greater propriety? Among the means which have been employed to this end none have been attended with greater success than the establishment of boards (composed of proper characters) charged with collecting and diffusing information, and enabled by premium and small pecuniary

\(^{1}\) Ibid., p. 194.

aids to encourage and assist a spirit of discovery and improvement by stimulation to enterprise and experiment, and by drawing to a common centre the results everywhere of individual skill and observation, and spreading them thence to over the whole nation.¹

Agricultural societies developed for the purpose of improving agriculture through the dissemination of agricultural information were also influential in the establishment of the United States Department of Agriculture. The first such society was organized in 1785 in Philadelphia. In 1811 the Berkshire (Massachusetts) Agricultural Society was founded by Ekana H. Watson who is given credit for developing the agricultural fair which is employed extensively by extension people today.² Other methods of education employed by the agricultural societies, and likewise by contemporary extensioners, include meetings, lectures, circular letters, pamphlets, and bulletins. The agricultural societies resembled our present farmers' clubs which may be found in most cities and towns. They were represented by bankers, lawyers, doctors, merchants, and other non-farming people.


² Brunner and Yang, op. cit., p. 3.
The first organized drive for the education of farmers and the working class of the cities was undertaken by Josiah Holbrook who was responsible for conducting Lyceums. The National American Lyceum for the dissemination of information on the arts, sciences, history, and public affairs was founded in 1826. By 1831, Lyceums in approximately nine hundred towns served to bring distinguished and learned men as lecturers before farmer and small town audiences.

Throughout this time agitation was mounting for public support of agricultural education. A bill was introduced in 1823 to establish an agricultural college in New York State, but it did not pass. The legislature of Michigan established the University of Michigan in 1837, and finally Michigan Agricultural College in 1855. Other states at about the same time were attempting to establish agricultural colleges, but with much difficulty. Financing was the chief problem, but this was largely overcome when support finally came from the Federal Government through the Morrill Act of 1862.

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1 The term comes from the gymnasium of ancient Athens where Aristotle was accustomed to teach. Hence, it was extended to mean the Aristotle's school of philosophers, the Peripatetics. In America it referred to teaching in small groups.

2 A. C. True, op. cit., p. 31-32.
This vast educational effort gave expression to the reaction which the leaders felt against the classical forms of education. "It is easily observable that by the time the agitation for formal agricultural education had grown to effective proportions it had acquired a strong tendency to emphasize practical ends and aims."\(^1\) This attitude which stresses the "practical" as opposed to the "theoretical" has influenced not only extension teaching methods, but Land-Grant philosophy in general. The tendency has been to emphasize inductive reasoning. "There appears to be an aversion to deductive thinking in our Land-Grant system. Farmers, by contrast, appear to use deductive reasoning more than we do."\(^2\) This particular aversion presents another conditioning element on the kind of research and educational programs that are being conducted at the present time.

The following conclusions can be reached by reviewing the developments during the transition period in American Agriculture:

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(1) The educational leaders of the time were zealous in their purpose to democratize education; to challenge an education reserved for the aristocracy. The question may be raised, in contrast, whether leaders of the present time function with the same enthusiasm and with as clear a purpose before them. (2) The Cooperative Extension Act of 1914 was a formal statement of a purpose which had its birth a century earlier. The intent of the Act and the methods employed for its fulfillment found their counterpart in the transition period described above.

3. The Agricultural Revolution: 1860 to Date

In the search for important institutions affecting the development and conduct of extension work, one final period in American agricultural history will be reviewed. This is the period, 1860 to date, within which the agricultural revolution gained its full impetus. Some particulars of the agricultural revolution and certain political and sociological forces conditioning it will be of concern here.

Previous to 1860, agriculture was still in the hand-power age. Some of the key machines had been invented, but it took time for them to become established. There were few highways, and the
railroads had not yet spanned the continent. There were few large cities; therefore, few markets for farm crops (and no easy way to transport them). By the same token, there were few industries, and therefore, not much for farmers to buy. To a large extent farmers ate and wore what they could produce.

As new machines were developed and marketed, farming gradually changed from this hand-tool era to the age of horsepower, beginning about 1850. Production per man began to increase. The horse and mule population reached its peak in 1918 and then started downward as tractor population came up. By 1935, a new era of freedom and better living had come to the farm family.

Output per man is now the greatest in history. It is now two and one-third times that of forty years ago, with most of the gain having occurred during the last fifteen years.¹ This decade and a half witnessed rapid progress in farm mechanization and sharp increases in yields of crops and livestock because of widespread adoption of improved farming practices.

The agricultural revolution is usually credited with the years immediately following the Civil War and extending to the present

time. However, like most revolutions, its development was neither sudden nor simultaneous for all regions of the country. As noted above, there were progressive forces at work in colonial times and especially during what has been called the transition period. Though the agricultural revolution was taking form in these early years, it took the Civil War to bring it to full fruition. During the hectic war years, important legislative decisions were being made affecting agriculture.

The new Republican president, Abraham Lincoln, in 1862 signed into law a bill which had been previously vetoed by President Buchanan—the First Morrill Act "donating public lands to the several States and Territories which would provide colleges for the benefit of agriculture and the mechanic arts."¹

A second bill enacted the same year created officially the United States Department of Agriculture. Between 1839 and 1862 small research projects in agriculture were conducted with funds appropriated for an Agricultural Division of the Patent Office. Following creation of the department, research needs of a specialized nature were felt resulting in the formation of the Chemistry Division,

the Entomology Division, a new Statistical Division, and the Bureau of Animal Industry in that order.

Thus, 1862 was a momentous year for agriculture, the Civil War notwithstanding. The Morrill Act created an educational system that would eventually promulgate agricultural information through teaching, research, and extension in every state in the Nation, plus Puerto Rico, Alaska, and Hawaii. The effects of the United States Department of Agriculture were to be felt through teaching in its own graduate school, research in its own laboratories, and extension through a cooperative extension program with the states. In addition, it has engaged in such activities as weather and crop reporting, supervised Federal road construction, and the administration of numerous regulatory laws.¹

Following the enactment of the Land-Grant College Act, many difficulties had to be met. First of all, it was found that the public lands which were donated by the government were in many cases insufficient to provide adequate funds to establish a school. In these cases, the Federal Government again came to the aid of the states. Also, it was found that while enthusiasm was high for

agricultural teaching, they did not have trained faculty or even text books to employ in this new area. Scientific information was lacking.

The body of scientific knowledge was little more than embryonic. Many practices were sanctioned by experience and repeated observation. Others were in the realm of folklore. More than one of the early professors of agriculture took to the road and visited successful farmers as one source of material for his courses. . . . Soon the colleges began experimental farms, and in 1887, in the Hatch Act, Congress provided federal assistance to set up and maintain experiment stations in every land-grant college.¹

It is of interest to note that "more than one" of our present professors of agriculture are still taking to the road and visiting successful farmers as a source of teaching materials. Of even greater significance is the fact that the first extensioners had little training in a scientific agriculture. Instead of scientists, they were artists with "a way with people."¹¹ They could prescribe action on the basis of experience, but with very little basic principles. Typical of the attitude of the time is Seaman Knapp's stated qualifications of the extension agent. "The men who act as field agents must be practical farmers. No use in sending a carpenter to tell a tailor

¹ Brunner and Yang, *op. cit.*, p. 5.
how to make a coat, even if he is pretty well read up on coats.\(^1\)

The foundations of extension work were laid on these practical men and much credit is due them. However, it is an accepted fact that the county agents now going on the job have been afforded training far superior to their predecessors. From a theoretical point of view, this presents administrative difficulties. It is not possible to take a county agent as a unit of input because of the lack of homogeneity in the economic sense of the word. Individual agents vary widely in their productivity.

Now extension workers are equipped with new tools. They have at their disposal scientific results from many years of government sponsored research. For the most part, the confidence of the farmer has now been gained and he has learned to look to the state and Federal experiment stations for results in official tests. Once the confidence of farmers was gained, the job of disseminating information was simplified because farmers came to depend almost entirely on the county agent for help on scientific farming. The early county agent was a virtual monopolist in the field of adult

\(^1\) W. A. Lloyd. Development of the Extension Ideal in the Association of Land Grant Colleges and Universities. In Bliss, and others, eds., op. cit., p. 25.
farmer education. There have developed now new institutions making the field more competitive and thus affecting an economic analysis.

Much of the greatest work in agricultural research and experimentation has been done outside government by private individuals and corporations. Often they have had the wholehearted co-operation of Land Grant Colleges and/or Experiment Stations. But, while the primary motive of the scientists doing the work may have been science for science sake, or the salvation of humanity or the improvement of agricultural methods, or what have you, the business folks who put up the money were stimulated by the good, old American system of free enterprise where the man with the best mouse trap makes the biggest sales.¹

Business men have also learned that education is an effective sales weapon. Industries selling to farmers have become staffed with teachers, specialists, demonstrators, and service men to take over tasks formerly held by the county agent. They provide technical information, management service, and sometimes manual services; e.g., a feed salesman will cull the poultry flock without charge for the farmer who buys his feed.

Agricultural journalism is also performing some of the county agent's former function. Farm magazines not only provide timely technical information and do much to determine the values held by rural people, but they also answer individual technical or management questions.

Not among the least of the institutions which limit flexibility in administrative judgment are the relations of the Extension Service to other governmental agencies. The grant-in-aid principle itself limits administrative freedom on the national level. Although involved in cooperative undertakings, the states have been apparently reasonably free to do as they have seen fit.

The gap between policy determination and the task of administration of grants-in-aid gives rise to a peculiar set of problems of government and administration. Congress in fulfilling its national political responsibilities, lays down policies and standards and appropriates a considerable share of money to effectuate them. Yet the actual expenditure of the money and the performance of the function have been under the supervision of state agencies operating in a sphere and tradition of freedom from central control.¹

This would make it appear that policy determination is restricted on the national level and that the place for administrative

¹ V. O. Key, Jr. The Administration of Federal Grants to States. Chicago, Public Administration Service. 1937. p. 27.
flexibility is at the state and county levels. However, specific legislation, memoranda of understanding, or tradition have prevented flexibility even here. In addition to Extension, there are many governmental and private agencies rendering service or working with rural people such as state departments of agriculture, bankers' associations, commercial clubs, departments of health, departments of education, teachers of vocational agriculture, soil conservation technicians, and workers under the Production and Marketing Administration, besides numerous farmers' associations. To govern the conduct of the Extension Service in its relation to these agencies, memoranda have been drawn up which define permissible boundaries of behavior. All of these help make up the comparatively confined environment of decision-making in which extension administrators find themselves. These restrictions are a part of the many complex institutional factors affecting resource allocation in the Extension Service. Others previously mentioned are summarized below:

1. The desire on the part of farmers to be a "jack-of-all trades" and other rural ceremonial patterns which resist the process of technological development.

2. The tendency of farmers to band into organized groups and to expect to receive much of their information from them.

3. Innovation is a by-product of previous generations. While there is a vast difference between the colonial and the modern farmer in their production techniques, these differences are also wide among farmers of the present day. Distributors of the product, "extension services," must become familiar with the demand conditions for their good if "sales" are to be maximized.

4. One of the dominant revolts occurring during the transition period was the reaction of leaders against classical education. The Agricultural Extension Service is one product of the philosophy of practical and democratic education.

5. Most of the educational techniques used in extension work are about a century old in this country.

6. Past legislation does much to condition extension resource use. The Morrill Act of 1862, which established the colleges of agriculture; the Hatch Act of 1887, which provided for the establishment of agricultural experiment stations; the Adams Act of 1906
and the Purnell Act of 1925, both of which provided additional funds for agricultural research; the Bankhead-Jones Act of 1936; and the Consolidation Bill of 1953 furnish the legislative foundation for the Agricultural Extension Service created by the Smith-Lever Act of 1914.

7. The practice of learning "science" from successful farmers was widespread a century ago when practically no other agricultural information was available. The practice still persists although much has been done to develop more general principles of management.

8. Individual extension workers vary widely in their output. Like capital, it is not only the amount but the form that is important to productivity analysis.

9. While the Agricultural Experiment Stations and the Extension Service were virtual monopolists in their respective fields seventy-five years ago, they are only a part of a group of organizations all carrying on similar work today. Rather than monopoly, the situation more nearly resembles pure oligopoly where each agency bases a part of its behavior on that of its competitor and "agreements" are drawn up to insure stability.
Still other factors which may be regarded as institutional will be seen as consideration is now given to the productive resources engaged in extension activity.

B. Resource Use in the Extension Service

1. Single variable input--single product model

The simplest model for describing the technical relationships in agricultural extension activity is one assuming a single variable input and a single product. The product will be simply called "extension service," and the input will be the financial resources available for extension work. For the present, let it be assumed that the production of these services is described by a production function of increasing returns. This is to say that each successive input of extension funds adds more to the total product than the previous input. Admittedly, this is an irrational area of production but is still a plausible hypothesis. It is possible that legislators charged with allocating public funds are attempting to equate the marginal returns in the various alternative lines of service rather than forcing any one line into an area of diminishing marginal returns. It is similar to the small-time farmer who,
because of capital limitations, never expands into the well-known "stage two" of production. Any choice indicator one might wish to employ would indicate that the economic problem is to maximize the amount of financial resources available to Extension. Using this model, the extension administrator is interested in diverting as much as possible of public funds to his cause. One must consider now the manner in which funds are allocated to states.

The methods for determining the allotments of Federal appropriations to the various states for extension work vary with the different authorizations. Some involve lump-sum allocations; some are based on farm population of the states; others are based on farm population; while still others are at the discretion of the Secretary of Agriculture.

When the Federal funds from all sources are aggregated and classified according to allocative basis, it is found that farm population is the most important consideration. Using estimates for the fiscal year 1953 as a basis, such a breakdown of total Federal appropriations shows 75 percent allocated on the basis of farm population; rural population, 20 percent; specified by law, 3 percent; and according to the discretion of the Secretary of Agriculture.
2 percent.\(^1\) Since about 95 percent of the Federal funds are weighted by farm and rural population, it is evident that adjustments in allocations can be made only as dictated by a new census which occurs but once in ten years. The administrator has little opportunity to make changes even if economic principle or some other guide should suggest it.

From the viewpoint of Federal administration, the chief concern has been for the amount of total money authorized, rather than flexibility in the allotments to states. This was borne out in the recent discussion of the Extension Consolidation Bill,\(^2\) passed in the first session of the Eighty-third Congress. This bill has three major provisions: (1) It consolidates all authorizations for funds under the Smith-Lever Act.\(^3\) This dispenses with the complexities


\(^2\) S-1679 was introduced in the Senate by Senators Aiken (Vermont) and Ellender (Louisiana) and as HR-4677 in the House of Representatives by Representative Hope (Kansas). It was approved June 26, 1953.

\(^3\) However, the provisions of the Clarke-McNary and the Research and Marketing Administration Acts are not affected.
of administering several acts based on different allocative principles. (2) It contains an "open end clause" permitting upward adjustments in total authorizations without the introduction of new bills as has been the case. (3) The present apportionment among the states is to be held rigid.

The type of legislation cited here limits the application of marginal concepts of economics. For example, if, by using some acceptable criterion, it could be shown that the marginal returns to extension expenditures in the various states were unequal, this would dictate the desirability of resource transfers. Until a satisfactory method of measuring the marginal returns to educational activity is forthcoming, the legislators are evidently willing to assume that the present apportionment represents a kind of optimum.¹

There are additional legal and administrative regulations governing the allocation of Federal and state funds which have the effect of limiting administrative decisions. Take the Smith-Level Act, the Capper-Ketchan Act, and the Bankhead-Flannagan Act as examples. Each has certain explicit limitations or contains sufficient intent

¹ It could be argued that even with a satisfactory measurement of extension productivity there would still be noneconomic factors influencing the state apportionment policies.
to have warranted an administrative ruling regarding the use of such funds.

The Smith-Lever Act provides that not more than 5 percent of all Federal funds may be used for the purpose of printing and distributing allocations.

The Capper-Ketcham Act provides that these funds shall be used for the employment of men and women in "fair and just proportions." It also provides that at least 80 percent of the funds shall be used for the payment of salaries to agents in counties.

The Bankhead-Flannagan Act itself does not prescribe quantitatively how the funds shall be used, but does mention specific extension projects with particular emphasis on 4-H Club work based on comments made at the hearings. The Federal office has concluded that not less than 85 percent of the Bankhead-Flannagan funds should be used for the employment of agents in the counties.  

There are other legal limitations, mostly of a minor nature, prescribing purposes for which funds of Federal origin and offset may not be used. In addition to these limitations, some state legislatures appropriate funds for particular project work, and if not

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1 Gilbertson, op. cit., p. 27.
used for the express purpose for which appropriated, they revert back to the state treasury. While these restrictions do impose an effective limitation on complete administrative discretion, their major deterring effect is not upon allocation between interest and subject-matter fields, but rather upon types of personnel employed at point of expenditure. However, because of these legal and legislative restrictions it may be said that, in general, the economic problem becomes one of maximization rather than minimization. The aim is to maximize production with relatively fixed financial resources, rather than minimizing cost for a given product. In order to study ways of doing this, it becomes necessary to enlarge the model.

2. **Two variable inputs--single product model**

In the previous case it was assumed that the only variable resource was finances. Here, a distinction is made between labor and all other forms of extension expenditure. The problem is to ascertain the ideal combination of labor to be used in conjunction with other financial expenditures with a given budget.

The appropriate allocative principle can be stated simply. With a static framework, assuming perfect knowledge and given technology, the administrator will continue to make additional
expenditures on labor as long as the additional product forthcoming is greater than the additional product possible from the expenditure in a nonlabor form. In more concise language, the principle is to equate the value of the marginal product forthcoming from alternative lines of expenditure.

In practice there are certain difficulties one faces in carrying out this principle. They do not invalidate the principle, but in order to come closer and closer to reality, certain assumptions must be relaxed and the conclusions become less precise.

The first problem is related to institutionalism which has already been stressed at length. As stated above, certain legislative acts require a given percentage of the funds to be spent for salaries of county personnel. Also, local organizations have much to say whether adjustment in personnel will be permissible. Hence, in the short run, one is bound to these administrative rigidities.

A second difficulty is tied to the fundamental condition that "production and resource relationships are strictly meaningful only if they refer to factors and commodities which are homogeneous."\(^1\)

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\(^1\) Heady, Economics of Production and Resource Use, op. cit. p. 32.
Differences in training contributing to nonuniformity in the county agent's output have been noted. The same, of course, applies to specialists and administrators as well. There are other factors affecting labor productivity besides training; e.g., age, experience, and interests. There are also different categories of labor employed in extension work. There are approximately 12,500 county workers including county agricultural agents, home demonstration agents, and 4-H Club agents. There are about 3,030 specialists and administrators on the states' headquarters staffs. In addition, it is estimated that nearly 1.2 million volunteer local leaders participate annually in forwarding the extension program. Each labor category has a different function, and individuals within each category function differently.

A similar difficulty is faced when nonlabor resources are considered. While money spent for nonlabor uses comprises only about 4 percent of the total expenditures, there is the possibility of widely divergent uses and productivities.

It should be emphasized again that these difficulties can be overcome in part by treating a larger number of variables in the

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1 Schlup, op. cit., p. 4.
2 Gordy, op. cit., p. 9.
system. Instead of making output a function of two variables, it could be treated as a function of different forms of capital and different forms of labor. The marginal conditions could then again be applied.

In a presentation of this type there is danger of overemphasizing the influence of institutional factors on resource allocation. It is contended that there is still considerable leeway for the appropriation of some of the fundamental principles of economic logic.

The greatest difficulty to be faced at the moment is to provide a meaningful definition of the product. To this point, reference has been made only to the "services of extension." It is time to answer the question of what the purpose of Extension is and how it is formulated.
III. FORMULATION AND CLASSIFICATION OF EXTENSION OBJECTIVES

Social scientists and economists in particular have been wont to say that they are concerned with means to a given end, not with ends themselves. I make bold to assert, on the contrary, that one of the essential functions of social scientists is to search out and set forth clearly the ends toward which men and nations actually strive, the goals they work toward, the standards of living, both current and for deferred application, they seek and maintain.¹

This controversial statement supplies the point of departure for this chapter. There is no intention to set out on the ambitious journey of describing in detail what the goals of men and nations are. However, the conviction is expressed that initial concern must be shown for the ends of the Extension Service organization and its immediate constituency.

The problem has previously been defined as one of resource allocation to achieve a given end. The time has come when the questions must be answered (1) as to what extent ends are given, ¹

(2) to what extent ends are formulated, and (3) what basis extension personnel have for formulating the goals of others. By formulation it is meant that the process by which Extension's objectives are determined will be under scrutiny rather than the writer's value judgments as to what the objectives should be.

A. Function of Objectives

1. Nature and role of objectives

Economic problems are almost always defined relative to ends or goals. "Given the end which is to be maximized, a problem exists if the optimum or maximum condition has not been attained." ¹ Hence, the end is essential to the definition and solution of a problem. The economist is not usually concerned whether the ends are good or bad. Neither is he usually concerned with the origin of these ends or choice functions. "Without inquiring into its origins, we take as a starting point of our discussion a function of all the economic magnitudes of a system which is supposed to characterize some ethical belief—that of a benevolent despot, or a

¹ Heady, op. cit., p. 9.
complete egotist, or 'all men of good will,' a misanthrope, the state, race, or group mind, God, etc.\textsuperscript{1} Little\textsuperscript{2} has gone further to say that from the economist's point of view the ends (postulates) need not have origins.

The economist as deducer sometimes has difficulties, and judgments are required.

\textellipsis what if the ends turn out on examination to be inconsistent? Surely the economist has a right to mention these inconsistencies. Presumably, the economist can also tell the selecting agent that the ends given are insufficient in number for the job which he has been hired to perform. Whether or not he was the original selecting agent it thus appears legitimate for the economist to take at least a negative part in the process of formulating ends.\textsuperscript{3}

This brings one to the conclusion that the scientist interested primarily in method will be less concerned with the practical nature of the initial postulates than one primarily interested in the policy statements which follow from them. The policy-maker will be

\begin{itemize}
  \item \textsuperscript{1} Paul Anthony Samuelson. Foundations of Economic Analysis. Cambridge, Mass. Harvard University Press. 1948. p. 221.
  \item \textsuperscript{2} I.M.D. Little. The Economist and the State. Rev. Econ. Studies 17:75-76. 1949-1950.
  \item \textsuperscript{3} John Buttrick. The Economist and the State--an Addendum. Rev. Econ. Studies. 18:190-192. 1950-1951.
\end{itemize}
interested in the origin of objectives and it is found that they are inconsistent, ambiguous, or insufficient for analysis, he may conclude that something is wrong with the "objective-formulating" mechanism.

In addition to the purpose that stated objectives have in problem-solving and policy-formation, there are other functions which they serve.

Purposes or objectives serve to identify a group as a formal organization. Without purpose there is neither effort nor incentive to cooperative action.

Organization, simple or complex, is always an impersonal system of coordinated human efforts; always there is purpose as the coordinating and unifying principle; always there is the indispensable ability to communicate, always the necessity for personal willingness, and for effectiveness and efficiency in maintaining the integrity of purpose and continuity of contributions.¹

Clearly defined objectives are especially important in an organization such as Extension, where so much of labor and management comes from volunteer sources.

Barnard suggests also the contribution of concrete objectives to social satisfactions. He cites a first possibility where lack of a

variety of outlets for activity results in a feeling and also the ob-
jective behavior of being "lost." His second possibility appears
somewhat characteristic of county agricultural agent behavior.

The opposite extreme to lack of concrete objectives of action is a condition of social complexity such
that action may take a great many different forms involving the possibilities of association with many dif-
ferent groups. In such situations the individual may be unable to decide which activity he wishes to indulge in,
or what groups he wishes to be associated with. This may induce a sort of paralysis of action through in-
ability to make choice, or it may be brought about by conflict of obligations.

The charge may be unfair but many county agents, in an at-
tempt "to be everything to all people" find themselves running in
circles of indecision. Such generalized behavior may be aligned
with generalized objectives. In any case, the objective is an im-
portant element in the decision-making process.

2. Objectives defined

Up to the present, "objectives" and "ends" have been used
interchangeably despite the philosophical attachment that some

1 Ibid., p. 118.
2 Ibid.
3 See John T. Stone, How County Agricultural Agents Teach.
economists have placed on the word "end." "The most widely used meaning is 'some experience which is at once self contained and satisfies; an experience which is good in itself." 1 Obviously, many of the objectives of economic policy and extension policy are not "ends" in this sense, but means to other objectives. 2 Hence, some would prefer to call "increasing family income" an objective and the more ultimate or remote "increasing happiness" an end. The writer does not regard the distinction important for this study. Furthermore, at the risk of oversimplification, all of the following terms will continue to be used synonymously: ends, objectives, goals, wants, purpose. The important consideration is that each entails the desired outcome from the employment of available resources. To the Extension Service they represent the immeasurable end product of the educational enterprise.

Immeasurability, however, does not deter an economic analysis. Following Northrop,

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... the subject matter of economics is not the physical object or behavior itself but the desire of the individual for that object. Consequently, an economic good is not an externally observable object or behavioristic activity, but is, instead a relation between such an object or activity and an individual person.

Hence, any economic problem inevitably involves immeasurables.

The immediate problem involves the relation between the workers in Extension (professional and volunteer) and the Extension Services. Another problem involves the relation between the services of Extension and its many recipients. These services are hard to conceive as inputs or outputs. "We may, nevertheless, assume that the individual must have at least some idea of their quantitative magnitude." Whether the product of Extension is measurable or not, we assume that those who come in contact with it behave as though it were.

The conclusions are reached that (1) the ends of the Extension Service need careful definition and continued development for unified and continuous effort, and (2) the ends of the Extension

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Service are not easily measured. Measurement of the utility of the community using the service is offered as a possibility worth investigating.

B. Formulation of Objectives

1. Interpersonal comparisons of utility

A point in the analysis has been reached where a choice indicator is required. It has been established that: (1) the amount of financial resources in total available to individual states is relatively fixed, and (2) Extension engages itself in a wide variety of educational activities. It follows that the greatest opportunity for administrative discretion deals with the proportion of resources which will be used for the various activities. For now, statistics dealing with numbers of people contacted, educational techniques employed, and families influenced will be ignored. Attention is instead directed toward the realized satisfaction or utility forthcoming from these activities. If a satisfactory measure of utility is available, it may serve as the choice indicator needed for the present problem.
Most of the problems of empiricism and interpretation faced by economists interested in value theory and consumer welfare are found in this problem. The implications of these problems may be brought out by reflecting for a time on some of the developments of value and utility theory.

One of the first problems involves an understanding of the meaning of "welfare." Extension workers claim an interest in the welfare of the individual and the welfare of the community.

Now everyone knows what "happiness" means with reference to an individual, and most people have a pretty good idea what sort of change may affect the happiness of a person. But when we come to "the welfare of the community" there are great difficulties. If a person says he is interested in the economic welfare of society, we may make a similar translation as in the case of an individual, and say "he is interested in the economic causes of the happiness of the community," but that unfortunately does not make it any clearer. Is there really something called "the happiness of the community" which he is interested in, or is he just trying to create a good impression?¹

Utilitarian economists suggested an answer by postulating that the happiness of society was equivalent to the sum total of the happiness of all the individuals in society and that the welfare of an

individual was the sum total of the satisfactions he experienced. It was also assumed that each individual tries to maximize his own satisfaction. Spokesmen for this doctrine claimed the ability to evaluate the effect of social reorganizations by comparing the satisfaction of one individual with that of another. Such interpersonal comparisons of utility were made implicitly by Pigou.¹

The extension director who might attempt to apply these principles to extension policy would meet great difficulties. First, he would be unable to make objective policy decisions on the basis of the utility comparisons. He might find that a dairyman was less satisfied with his new pen-type barn than with his old conventional barn; that a potato grower is more satisfied with the variety of potatoes suggested by the county agent than the one used before; or, that another farmer shows satisfaction over his application of recommended fertilizers. However, the director would be unable to record how much the individual losses or gain might be. A unit of measure of utility is lacking which is common to all persons.

A second difficulty follows from the first. If there is no unit of measurement permitting interpersonal comparisons, then it is meaningless to talk of adding the utilities of individuals. It would be impossible, for example, to say that because of pen-type barns, the result of applying this technology was a total net increase of 400,000 "utils" for Michigan farmers as compared to a net increase of 487,241 "utils" to farmers using improved potato seed. If such measurement were possible, the director could apply the principle of making shifts in his resource outlay between activities until each gave the same marginal return of utility.

Arrow has pointed out that even if interpersonal comparisons were possible, a value judgment would be required in the selection of an appropriate mathematical form for the social welfare function. "The social utility might be the sum of the individual utilities or their product or the product of their logarithms or the sum of their products taken two at a time."\(^1\)

2. New welfare economics

Some of the difficulties in interpersonal comparisons were alleviated by the introduction of indifference curves. These were

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in keeping with an ordinal definition of utility which would have the following requirements: (1) one is able to state that an individual prefers one combination of goods, A, to another combination, B, or that he prefers B to A, or that he is indifferent between the two; (2) that preferences are transitive; and (3) that the scale of preferences be definite; i.e., no two indifference surfaces have a common point.  

These requirements may be illustrated by considering three hypothetical indifference curves of a farmer who considers two types of extension services as though they were goods (Figure 1). Let the OX axis represent amount of services in livestock production and the OY axis the amount of services in crops production. Contours I, II, and III are interpreted like contours of a map; II is valued greater than I, and III greater than II. All combinations of the two services represented by all points on I yield the same satisfaction to the farmer. For example, he is indifferent whether he receives Oa of livestock production and aD of crop production services or Ob of livestock production and bC of crop production services.

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FIGURE 1

Characteristics of Indifference Curves
services. It is also noted that his satisfaction can be increased by his receipt of larger amounts of either or both services. Starting with Ob of livestock production services and bC crop production services, he can reach Contour II by increasing crop production services to bB.

The transitivity requirement may also be illustrated by Figure 1. It illustrates that if Combination A (on Contour III) is preferred to Combination B (on Contour II) and if Combination B is preferred to Combination A (on Contour I), then Combination A is preferred to Combination C. However, nothing is said as to whether the difference in utility between B and A is greater than between B and C.

There are advantages in using this ordinal utility system over a cardinal utility system: (1) As long as one holds to a two-product analysis, it is simpler. In any case, the construction of indifference curves is not a simple matter, but a system which merely requires an ordering of preferences is simpler than one which necessitates the use of a unit of measurement; and (2) all the important conclusions of welfare economics can be made to follow from it.  

1 Little, op. cit., p. 31.
Before evaluating the shortcomings of the system, consider its application to our resource allocation problem.

Example 1. Consider two communities that are able to order their preferences between two alternative extension activities, say public policy education and crop production. Assume the intent is to make everyone as well off as possible without making anyone worse off. Suppose the first community represents the noncommercial farming group with their scale of preferences shown in Figure 2a. The slope of these curves indicates that they would be willing to give up considerable public policy information for a small increase in crop production information. Their interest in this hypothetical situation is evidently in short run gain. This undoubtedly characterizes a sizable group of farmers in reality.

Consider an imaginary group of commercial farmers who are enthusiastic about the values of public policy education with their scale of preferences shown in Figure 2b. The slope of these curves indicates that considerable crop production information would be given up for a small increase in public policy information. Commercially more profitable farmers would be expected to be more interested in public affairs.
FIGURE 2

Allocating Crops and Public Policy Information between Two Groups
The problem is to allocate the services of public policy education and crop production education in such a fashion as to yield the greatest possible satisfaction to both groups. Conceptually, the desired allocation may be achieved as indicated in Figure 2c.

Assume that if all extension resources are expended there will be a total OC crops production services offered and OP public policy services offered (Figure 2c). How much of each should go to noncommercial farmers and how much to commercial farmers? With the preference map of the commercial farmers inverted in Figure 2c, their contours are labelled I', II', III'. Since each map is theoretically composed of a large number of contours, there will be sets of contours in Figure 2c which touch as tangents. Three such sets are shown with their points of tangency connected by the Contract Curve MM'. Now the following conclusions can be reached:

1. If the original distribution gave Oa crops production service and aA public policy services to noncommercial farmers with the remainder going to commercial farmers, conditions could be improved by a reallocation. Since an indifference curve of order lower than II passes through Point A, the noncommercial farmers would be more satisfied if crops production services were
extended from Oa to Ob. This would reduce public policy services to commercial farmers, but would not reduce their satisfaction, since the new Combination B is on their same Indifference Curve II'. The conclusion is that a welfare situation is improved if movement is made from a point off the contract to a point on the Contract Curve MM'.

2. If the present distribution is described by Point B and consideration is given to a movement to another point on the contract curve such as C, one cannot say whether the situation in total has been improved or not. Noncommercial farmers would be raised to a higher indifference curve, but commercial farmers would be forced to a lower. The move would be desirable if the net gain were positive, but because of the problem of interpersonal comparisons, the solution remains unknown.

3. If the assumptions were realistic, the procedure offered here might offer some help to the extension administrator.

Example 2. The indifference curve as a choice indicator may be used to specify the proper proportions of alternative activities that should be engaged in for given resources and technology. Suppose that production and cost conditions are such that
there are numerous alternative combinations that would be possible as indicated by PC in Figure 3. This indicates that it would be possible to have OP of public policy services with no crop production services, OC of crop production services with no public policy or any combination of the two as shown by PC. Taking Indifference Curve I as the choice indicator, it shows equal satisfaction with Combination A as with Combination D. A higher level of satisfaction could be attained with Combination B because II is an indifference curve of higher order. These curves may be taken as the preference system of a particular agricultural group or some administrator. This suggests one of the big difficulties in extension administration. It is possible for a combination such as D to be out of equilibrium for one influential group, but in equilibrium (as indicated by Contour III) for another.

Though extension activities appear to contradict the argument, it is generally argued that the desired choice indicator should be that of the local people. "Programs are developed by the local people and the county staff working together. Therefore, extension programs can only be developed in the counties, and decisions about
FIGURE 3

Indifference Curves As Choice Indicators
content of the program should be made by local people. The assumption is that people know what they want. Some argue that they do not.

In all the folk-lore to which human thinking has given rise, in connection with human beings themselves, perhaps the most false and misleading single item is the common notion that men "know what they want," or that there is no arguing about tastes. It would surely be much nearer the truth to say there is no arguing about anything else, or specifically about "facts." The principal thing that men actually want is to find out what they do really want; and the bulk of what they want, or think they want, is wanted because they think that in some sense they "ought" to do so, that it is "right."

There seems to be some evidence of this with regard to the clientele of the Extension Service. Consider the results of Hoffer's study.

During the interviews farmers were questioned to find out what they expected of the Extension Service. . . . It was evident from these interviews that leaders of the Agricultural Extension Service in the county would have to take the initiative in developing programs to help the people. Their interests alone could not be relied upon

1 J. L. Matthews. How to Develop a Program. Talk given at the Tennessee and Virginia Annual Extension Conferences, August 27 and 28, 1952. (Mimeo. report.)

because on such a basis extension activities would tend to become sterile or lack perspective.\footnote{1}{Hoffer, \textit{op. cit.}, p. 17-18.}

This view is supported by Ensminger, who concludes that "extension education teaches people what to want as well as how to work out ways of satisfying these wants."\footnote{2}{Douglas Ensminger. In Edmund deS. Brunner, Irwin T. Sanders, and Douglas Ensminger. \textit{Farmers of the World}. N.Y., Columbia Univ. Press. 1945. p. 1.}

The indication is that in some cases the appropriate preference system for resource allocation purposes has been one imposed, or at least shaped, from without. "To a large extent the content of the extension program in any given state and the methods by which it is determined reflect the philosophy of extension held by those responsible for leadership in these particulars."\footnote{3}{Joint Committee Report, \textit{op. cit.}, p. 36.} The extent to which extension workers engage in imposing value systems is not a settled issue. If the practice is widespread, it, of course, disrupts the traditional principles of resource allocation. As pointed out later, the writer is willing to concede that effective education involves a change in the value structure, but is unwilling
to agree that the value systems of both teacher and learner must coincide.

In addition to the problem of changing value systems is the problem of resolving differences in preferences and interests held by various participants in extension activity. Leagons holds that there is a problem of choice from among these many interests, and the ultimate choice is a value judgment of the responsible administrator. The problem is not unlike the question of "consumers' sovereignty" versus "sellers' sovereignty" discussed by Norris. She offers the suggestion that neither consumer nor seller is sovereign.

... is the consumer sovereign? No, for so to hold would be to ignore the fact that all of his specific wants have been passed on to him by his culture. Is the producer sovereign? No, for the culture sets limits within which he can move demand. Culture is sovereign.

All that has been said about the use of indifference curves, the formulation of objectives and the selection of an appropriate

3 Ibid.
choice indicator is closely related to the work of Arrow.\textsuperscript{1} The central topic of this work is the acceptability of social choice functions, where its acceptability means that a choice function is consistent and "democratic."\textsuperscript{2}

The problem may be illustrated as follows: Suppose the extension administration decided to determine by popular vote whether the people of his state preferred the agricultural program (A), the home demonstration program (B), or the 4-H Club program (C). Further suppose that the results of the vote were: One-third preferred A to B and B to C; one-third preferred B to C and C to A; and, one-third preferred C to A and A to B. For the community this says that on the basis of majority decision, A is preferred to B, and B is preferred to C; hence, A is preferred to C. Without going further, the administrator would conclude that the agricultural program represented the choice of the people over home demonstration and 4-H Club work. However, another

\textsuperscript{1} Arrow, op. cit.

\textsuperscript{2} This is not to be confused with finding an optimum social welfare function; although, if there are acceptable social choice functions, the optimum must presumably be among them. See, William J. Baumol. Social Choice and Individual Values. Econometrica, 20:110-111. 1952.
look at the results would show that two-thirds of the voters preferred the 4-H Club program (C) to the agricultural program (A).

Adhering to his conditions for acceptability, Arrow concluded

... if we exclude the possibility of interpersonal comparisons of utility, then the only methods of passing from individual tastes to social preferences which will be satisfactory and which will be defined for a wide range of sets of individual orderings are either imposed or dictatorial.¹

It is interesting to note, as indicated above, that there is indication that the values in extension work have been imposed by persons responsible for the educational effort. The investigations of the Joint Committee revealed that

... criticisms have been leveled that in many counties the extension program is based largely on the agent's analysis of needs. Also, that in some States, despite efforts to democratize the formulation of extension programs, the tendency is for the State office to formulate a program and "make them like it."²

There is a subtle difference between the imposition of a system of values upon a person and the willful change in values

¹ Arrow, op. cit., p. 59.
² Joint Committee, op. cit., p. 36.
by the individual as a result of study or other educational processes. Taeusch has recognized this problem in adult education, but insists that "people generally can exercise good judgment, and hence the dissemination of conflicting ideas should be permitted in spite of the risk of confusion." Faith in this principle would lead one to believe that the values of individuals are the product of their own efforts and are not, in general, imposed by an outsider. In any case, they are evidently often in conflict and constantly changing.

It is this dynamic feature in the formation of values that is so damaging to the theory of welfare economics. The new welfare economics principles discussed here consider the orderings of social states to be constants rather than variables. But, the tastes of individuals are dependent on a myriad of changing and sometimes interacting effects including the actions of friends and of rivals, the social codes of behavior, the conditions of work and leisure, the assortment of goods and services immediately at hand, and others.

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There is no meaningful way, in terms of the concept of welfare that is the basis of the new welfare economics, in which the well-being of a given individual or of a society at time $t_1$ can be compared to the well-being at time $t_0$ when the preference map at $t_1$ is not the same that it was at $t_0$.\footnote{Sidney Schoeffler. Note on Modern Welfare Economics. Amer. Econ. Rev. 42:880-887. 1952.}

What is needed is an acceptable ordering of states of the world which holds over time. Theologians offer a system of absolute values which are available to all who take them on faith. The system forms the basis for the formulation of ends—ends which will hold over time. Certain questions which should be of concern to extension teachers may be raised. Is it an absolute system of values that is needed? If so, what should it be? Is it found in religion? Or should extensioners think in terms of relative values? If this is the case, what should form the basis for relativity? If neither an absolute or relative system is desired, how is the desired intermediate degree of values formulation to be achieved? Many economists would wish to elude these questions, but the conscientious educator cannot. These are questions the extension worker and administrator must give serious study.
Arrow's work has succeeded in making welfare economics ideas more general in that his social welfare function can be made to include not only the attitudes toward their own actual and possible possessions, but also their attitudes toward many other happiness-determining aspects of the world. It does not, however, treat the problem resulting in a change in the preference systems because of the application of a particular policy. Also, the restrictions which he chose to impose result in discouraging conclusions as far as policy information in a democracy are concerned. Perhaps the assumptions could be relaxed without destroying the form of analysis.

This section on the formulation of objectives has been concerned with the role of welfare economics in policy formation. Problems of interpersonal comparisons of utility are recognized by extension administrators. The following statements are taken from a recent annual report of the Extension Service in Michigan:

It is not always possible to analyze what has been accomplished by a program in an area as broad as the one in which the Cooperative Extension Service operates. How, for example, can anyone truly

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indicate in statistics the results of our teachings? Perhaps so many hundred farms showing "better farms, better livestock, better crops" are one measure. But, more likely, just one additional farm family, helped to find their own happiness and success, is a better measure.¹

There are also limitations to the indifference curve analysis even though it eliminates much of the problems of interpersonal comparisons of utility. However, the geometric constructions are useful for the orientation and understanding of many practical problems.

Likewise, limitations have been cited in studies which attempt to construct social welfare functions based on the tastes of individuals. However, with all the limitations, the writer agrees with Allen. "By accenting the limitations of welfare economics we do not wish to belittle its usefulness. Above all, we want to reject any view which would deny the economist his role as advisor on matters of economic policy."²


However, as one returns to the original questions of this chapter, somewhat discouraging conclusions are reached. Regarding the extent to which ends are given, it must be at least tentatively concluded that they are only provisionally given. The end of utility maximization suggests the use of an indifference curve as a choice indicator. Given the appropriate indifference curve and the appropriate technical relationships, solutions for maximum economic efficiency are possible.

Selection of the appropriate choice indicator (indifference curve) becomes a difficult task. As long as the extension worker is in contact with but one person, an approximation to his tastes can be made. But, when he works with groups, as is usually the case, there is the problem of aggregating community values. This brings one to the second question as to what extent values are formulated. The evidence is not conclusive but is indicative of some values being formulated. Public-supported education, charged with the propagation of socially acceptable knowledge has an important question to answer in "What values are right?" This raises again the third question as to the basis of goals formulation used by extension works. Extensioners pledge allegiance to the "needs of the people" principle, but excluding the possibility of interpersonal
comparisons, it is not easy to see how this principle can be adhered to strictly or evaluated in practice.

C. Classification of Objectives

1. Need for classification

To this point the objectives of the Agricultural Extension Service have been expressed in terms of the utility or satisfactions which the recipients of the service obtain. The concept of maximizing welfare is useful as an ultimate objective. Basic principles of welfare economics will be reconsidered when more immediate goals are evaluated. The immediate task is to classify these intermediate objectives.

The need for classification of objectives will be demonstrated by citing an oft-quoted challenge given by an early extension leader.

No one has ever given us a clearer or more commanding conception of our ultimate objective than did Seaman A. Knapp when he said --

Your mission is to solve the problems of poverty, to increase the measure of happiness, to add to universal love of country the universal knowledge of comfort, to harness the forces of all learning, and to be useful and needful in human society. The farm must be made a
place of beauty, so attractive that every passing
stranger inquires, "Who lives in that lovely home?" 1

It is evident from this quotation that extension workers
interested in purposive activity may have language difficulties. One
might reasonably ask, "What is meant by: (1) the problems of
poverty, (2) measure of happiness, (3) universal knowledge of
comfort, (4) forces of all learning, (5) to be useful and needful in
human society?" So much of the language of the social sciences
is the language of everyday conversation containing vague words
whose denotation shades off imperceptibly into the denotation of
other words. A technical language is lacking. The jargon of ex-
tension workers contains a few standardized words such as "proj-
ect," "program," "demonstration," and "exhibit," but these offer
little to the present problem. Stated objectives contain words and
if the words have vague meanings, the activity following from the
objective may lack meaning. If objectives are to be used as choice
indicators, those responsible for administration must sort, analyze,
and define until the words are clear and definite. "Generalities

may serve to create interest, but only specific statements challenge thought and facilitate action."¹

2. **Classification**

There is a great number of systems by which extension objectives could be classified. Kelsey and Hearne used the "levels of objectives" approach. The three levels considered were: (1) fundamental, all-inclusive objectives of society, (2) general but more definite social objectives, and (3) working objectives. The first level is interpreted to mean the higher precepts such as the good life, better citizenship, democracy, and community happiness. The third level refers to the specific needs of individuals. The proponents of this classification do not suggest a method for resolving conflicts between these levels where they exist.

Halcrow,² in discussing policy objectives, points out that they may be directed at the welfare of some particular or at the "general welfare of society"; that they may be general or specific,

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¹ Kelsey and Hearne, *op. cit.*, p. 122.

short-run or long-run, complementary or competing. These characteristics will be treated as subclasses of a more general classification.

The proposed classification consists of two groups (1) those objectives chiefly concerned with the changes in values and levels of knowledge, and (2) those objectives concerned with efficiency in the use of resources and in the distribution of assets. In each group is the interrelated ultimate goal of increasing human satisfactions. Further clarification of this breakdown and its application will be amplified in subsequent chapters.
IV. OBJECTIVES RELATED TO HUMAN LEARNING

A. Economic Analysis and Educational Objectives

Education includes any process shaping the potentialities of the maturing organism and may be formal or informal. Informal education results from the constant effect of environment and its strength in shaping values and habits can hardly be over-estimated. Formal education is a conscious effort by society to impart the skills and modes of thought considered essential. ¹

1. Education and changing values

The extension administrator interested in the application of economic principles is faced with a difficult problem when he considers the educational objectives of his organization. The problem is punctuated by the familiar assumptions offered for the construction of a rational economic order. "If we possess all the relevant information, if we can start out from a given system of preferences,

and if we command complete knowledge of available means, the problem which remains is purely one of logic.\(^1\)

It has already been noted that administrators lack an understanding of the productivity of the available resources. An attempt also has been made to present the relevant organizational and institutional information needed for decision-making and it was shown that once a decision is reached based on economic logic, the decision may require considerable conditioning before it can be put into effect. Then, it was found that useful conclusions could be reached which employed choice indicators made up of the preferences of individuals. The conclusions, however, were contingent upon a given static preference system and the possibility of constructing community choice from individuals.

Now, the problem is made more difficult if one accepts the above definition of education. Educators evidently are not merely concerned with allocating scarce resources within a given value system, but are also interested in changing value systems in association with given resources. Indeed, another of the

traditional "givens" becomes the object of study. Whereas, the economist chooses assumptions from which logical solutions may develop, the extension teacher-administrator is faced with the "interpretation and organization of values, which is not a problem for scientific research, but a problem of philosophy." The extensioner, in making a variety of administrative decisions, must be a composite economist, sociologist, psychologist, and political scientist, or have counselors from these disciplines at his disposal. Economics specifies how resources should be used in production while sociology, psychology, ethics, and political science specify the limitations which are placed on choice through laws, customs, and other expressions of individual and group values. If, as educator, one insists that the values and behavior of individuals must be changed, he must, as economist, lose the important assumption of given preferences. The test for success according to Kelsey and Hearne, is: "Does the activity result in changed behavior on the part of the person to whom the education is directed?"

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2 Kelsey and Hearne, op. cit., p. 118.
The writer is of the opinion that the task of the extension worker is to assist in the delineation of goals rather than deliberate molding of individual values. "The end here is not one, as many extension workers suppose, of 'establishing goals for farm people' but of providing more complete information so that families can better formulate their own scale of values." However, many hold a more extreme view. Consider the following positions held by persons of authority:

Our objective in extension work is to help people reach higher levels of living — physically, mentally, and spiritually. To reach these higher levels, people must be educated and trained to meet their responsibilities in relation to God, to their neighbors, and to themselves.

The above opinion was expressed by a State Home Demonstration Agent in 1942. Because it contains some ambiguity, consider further the specific activities she recommends. Spoken during one of the war years, it was her judgment that extension workers should "help people to save what is most worth saving."

1 Heady, op. cit., p. 434.
... it may be our responsibility to help people realize that we can do without electric refrigerators if we have to, but that we cannot spare books. We can do without tires, we can do with less sugar, but we must not forego the employment of trained teachers and the guidance of our ministers of the gospel.\(^1\)

Another statement which emphasizes the role of extensioners in the development of individual values was made by M. C. Wilson, Chief of the Division of Field Studies and Training of the Federal Extension Service:

The case for extension research rests upon three major assumptions:

1. That extension is education. That learning by farm men, women, boys and girls is expected to take place through the learning experiences provided by extension.

2. That learning consists of changes in behavior, i.e., changes in attitudes, in knowledge, in skills.

3. That studies of educational values of extension are concerned with the getting of evidence of the degree to which the educational objectives or values are being attained.\(^2\)

An economist has asserted that "changes in attitudes were among the most portentous consequences of general literacy."\(^3\)

\(^1\) Ibid., p. 173-174.

\(^2\) Wilson, op. cit., p. 221.

\(^3\) Ayres, op. cit., p. 150.
In addition to these statements, it can be noted that a most popular measuring stick for success by extension research workers has been the number of persons or families "influenced."\(^1\)

The evidence seems to support the position that many extension workers are engaged in the "establishment of the goals of farm people." This may be interpreted as changing the shape of the individual's indifference system. Ideal resource use based on a given preference map will not be ideal after the extension information is imparted if the indifference map has been changed. However, education need not require the learner to adopt the value system of the teacher. An individual may merely gain knowledge concerning production possibilities and the way in which goods and services substitute for each other. In this way he will be assisted in the attainment of new and higher levels of satisfaction but the new value system will be his own. For all cases where the individual is capable of learning, education which informs should not necessitate the imposition or dictation of the educator's own values.

Perhaps the problem can now be defined in another way. A suggestion has been made by Hayek:

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\(^1\) See Gordy, \textit{op. cit.}, p. 1.
The economic problem of society is not merely a problem of how to allocate given resources, if given is taken to mean given to a single mind which deliberately solves the problems set by these data. It is rather a problem of how to secure the best use of resources known to any of the members of society for ends whose relative importance only these individuals know, or to put it briefly, it is a problem of the utilization of knowledge not given to anyone in its totality.¹

The problem defined in this sense implies that the person's levels of satisfaction are a function of the knowledge he possesses. Knowledge is wanted both for its own sake and for use in the guidance of action. In its various aspects, knowledge has been studied for centuries by philosophers and other students of human behavior. The word takes on many meanings; so, the next step will be to define knowledge as it applies to problems of resource allocation in the Agricultural Extension Service.

2. Knowledge: The Product of Education

As a branch of philosophy, knowledge is concerned with three major problems. The first is epistemology, which deals with the origin and nature of knowledge. The second is psychology dealing with the investigation of the processes and presuppositions of knowledge

¹ Hayek, op. cit., p. 840.
and the third is logic, which is the study of the methods and validity of inquiry. Of these three, the first, epistemology, is most closely allied with the problems of this study.

The philosopher, in general, treats the origin of knowledge as either empiricism, which traces all knowledge to sense perception, or as rationalism, which insists that the mind contributes to knowledge certain general ideas not derived from experience. With regard to the nature of knowledge, from the philosopher's viewpoint, realism teaches that the object of knowledge is independently real, and idealism makes the object entirely, or in part, dependent on the mind's activity.

The economist is primarily interested in the productivity aspects of knowledge. Jevons, as early as 1879, made it clear that "we must regard labour, land, knowledge, and capital as conjoint conditions of the whole produce." Wicksteed demonstrated that intelligence and skills could not be ignored in productivity analysis. Of special significance are his examples of the substitutability of intelligence and other nonmeasurables for raw materials.

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Intelligence cannot entirely take the place of physical strength, nor one kind of trained skill for another. Nor can a building be a substitute for machinery, or machinery for a building, or one kind of machinery or one kind of tool for another. And yet, within limits, the most apparently unlike of these factors of production can be substituted for each other at the margins, and so brought to a common measure of marginal serviceableness-in-production.¹

Such a concept is particularly useful when one considers that there might be such a thing as an ideal combination of other resources in conjunction with a given level of knowledge. This idea will be explored later.

In more recent years knowledge has been regarded as a component of some other factor. Glenn Johnson has said that "learning and management are almost identical processes."² Rostow, in his recent study on economic growth, assumed that output is determined by the scale and productivity of the working force and of capital.

"Included within capital, for purposes of this analysis, is land and other natural resources, as well as scientific, technical, and organizational knowledge."³ In most cases, economists treating knowledge as

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² Johnson, op. cit., p. 3.

a component of other factors have treated it as a constant in the production process. A possible exception is Mitchell, who has formed this opinion after several years with the National Bureau of Economic Research:

Science is beyond all comparison, the greatest of resources. In trying to make economics into a genuine science, we are striving to increase the resources at the disposal of our kind. Is it not high time that we recognize this dynamic feature of our culture, cease looking forward to a stationary state or a mature economy and adopt the constructive view that our institutions must be adjusted to employ the increasing resources science has been creating decade by decade for several centuries, and never so rapidly as in our own days.¹

A similar view has been expressed by Moulton, who asserts that "without scientific discoveries and their application through engineering to the processes of production the limiting factors discussed by the early economists might well have operated to prevent any great improvement in living standards."²


In any case, whether one subscribes to the views of the economists of past or present days, technical knowledge is a resource to be reckoned with. Certainly, it is more than philosophers claim for it. Even so, like the other resources discussed in this thesis, knowledge takes many forms. Whether taken as a good in itself or as a component of some other factor, it is not homogeneous. It may be classified in several ways.

B. Classification of Knowledge

1. Scientific nature of knowledge

Returning to Hayek,\(^1\) one is reminded that knowledge may be divided according to its scientific nature. Roughly, the classes include "scientific" knowledge on one hand and "unscientific" on the other where the latter is the "body of very important but unorganized knowledge which cannot possibly be called scientific in the sense of knowledge of general rules."\(^2\) The unscientific knowledge includes information on the particular circumstances of time and place and may be very important to the manager adept in the application of

\(^1\) Hayek, op. cit., p. 842.

\(^2\) Ibid.
strategy principles. It may be the information which permits one business man to "outwit" his competitor. To gain an advantage from better knowledge of facilities of communication or transport is sometimes regarded as almost dishonest, but it may be just as important that society make use of the best opportunities in this respect as in using the latest scientific discoveries.

From the standpoint of extension education, this classification may be helpful in determining the kind of information to be disseminated. It does not specify whether the material should be of one subject matter field or another, but it does delineate between facts pertinent to a given point in time and the fundamental "laws" which have more universal application.

The labeling of the timely, sometimes unorganized, information as "unscientific" is assuredly inadequate. It is intended to include all information which cannot come under the heading of basic laws, or universal truths. However, because the word "unscientific" is employed, one should not conclude that it is undesirable. Included in unscientific knowledge as defined here may be some of the traditional outlook statements which say, for example, that the price of a particular commodity will be two dollars a bushel in the month of June. Corresponding scientific knowledge might be the logic behind prediction
so that the farmer could make his own estimate for prices in the
month of July or any other month of any year. The former is likely
to be more popular, but is more expendable. Because fundamentals
may be more abstract, they may be less popular; but they are more
enduring.

In reality, a combination of both types of knowledge would
likely provide the greatest amount of utility. This may be illustrated
by Figure 4.

Suppose that if all extension energies were expended on dis­
seminating information of the scientific kind, ON would be possible.
Suppose, on the other hand, if all resources were directed toward
providing knowledge comprised of unorganized, personalized, dated,
"unscientific" facts, that OM would be possible. Then one might
hypothesize a production possibility curve such as MN. This shows
a competitive relationship throughout, but the analytic approach is
identical if some other shape of the possibility curve is assumed.
As before, an indifference system will provide the appropriate choice
indicator and the "best" combination is specified by the indifference
curve tangent to the possibility curve. Hence, indifference curve, I,
would specify Oa of the scientific knowledge and aA of the unscientific
knowledge. An extension activity appropriate for this preference
FIGURE 4

Ideal Combinations of Knowledge
situation might be a farm and home planning program which would provide a large amount of personalized management services and a relatively small amount of broad, general principles.

Indifference Curve II might more nearly describe the preference of the better-education, higher-income farmer that is capable of translating fundamental principles into his own terms. Such a farmer might become impatient with the extension worker who presents only statistics as averages and personal judgment without the scientific basis for his opinions. It can be noted in Figure 4 that he is most content to receive a small proportion of the unscientific knowledge and a larger proportion of scientific knowledge. Since through learning, the value system undergoes change it is possible that the extension "client" as a beginner would have an indifference curve of the form, I, but after study and experience would have one of the form, II.

Little is known about the way different kinds of information substitute for each other. Nor can one accurately construct the production possibility curve in which scientific and unscientific knowledge are treated as competitive goods. Such information would be useful to the extension administrator. Indeed, "total extension contacts made" is a poor criterion of success unless it is supplemented with information on alternative uses of resources and the preference patterns
of potential recipients. To the extent that allocation might be based on such a system, the distinction between scientific and unscientific knowledge could prove a useful classification.

2. How knowledge is gained

Another means of classifying knowledge, which might be useful as one considers it as an intermediate product of extension teaching, is according to the manner by which it is gained. Admittedly, many questions concerning the ways by which human beings learn remain unsolved.¹ One must turn to the psychologist for help. For this problem, the learning process becomes another of the technical relationships which must be given the economist by appropriate authority. It is in this light that the following theory of learning is offered—not for its correctness necessarily, but as a starting point for economic analysis.

Knowledge may be considered the result from either of two types of learning behavior: (1) spontaneous and (2) adaptive learning behavior. The former is the normal, natural behavior of man. It

¹ For a discussion of conflicting theories of learning, see Boyd Henry Bode. How We Learn. Boston, D. C. Heath and Co. 1940.
consists of the spontaneous food-seeking and play activities ordinarily engaged in when no problem is presented and when no maladjustment in the person's environment occurs. It may be regarded as the gaining of information under conditions of equilibrium. Since extension activities are presumably organized around the problems of farmers, this type of behavior is of minor significance to extension workers. However, one of the principles governing spontaneous learning behavior is worthy of consideration by extensioners.

All activity of living organisms is initiated by some sensory stimulation, but the stimulation may arise from intra-organic states such as hunger, thirst, or sex cravings as well as from the presence of objects and events in the external environment. It should, however, be remembered that not all the physical energies operating within or without the body are capable of serving as successful stimuli for the release of the vital energy generated by the body. The eye, for example, is sensitive only to light rays at a certain range of length.\(^1\)

There are a few extension cooperators who attend meetings out of respect to the county agent or because of habit. These individuals may add to knowledge without experiencing a felt difficulty, but the amount of learning gained may be small in proportion to the amount of material presented. Of course, there need not be a close

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relation between the energy consumed in presenting a stimulus situation and the intensity of the resultant response. However, the likelihood of increasing knowledge in those who participate routinely is undoubtedly less than for those who participate as a result of a felt difficulty. In either case, the difference between the amount of information presented and the amount of knowledge gained may be great. McCulloch,¹ who uses a mechanistic approach toward learning, has estimated that the maximum amount of information that one can convey is one part of one hundred million of what his eyes can receive. Evidently, the loss of information in the learning process is very great indeed.

If one is to regard learning as a production process, apparently the production function for knowledge bears no exact technical relationship to the inputs involved. The exact nature of the function obviously varies among individuals and evidently varies for a given individual according to the various physical, psychological, physiological, and ethical circumstances at the time of learning. The function

may be discrete or continuous. Further complicating an understanding of this process is the lack of measurement. When one speaks of an increase in knowledge to an individual, he is at a loss to say whether the increase is greater or less for different types of information or the same information obtained under different situations. Economics-minded educators will be interested in the further enlightenment that technicians in this field can provide.

Turning now to adaptive learning behavior, one is reminded that it involves the forming of a solution to some felt difficulty. This problem situation may be the result of environmental or physiological conditions or self-stimulation through ideals and conscious purpose. A disequilibrium problem situation may be explained diagrammatically (Figure 5).

As before, Contours I and II represent successive levels of satisfaction. Knowledge is measured on the OK axis and other goods on the OR axis. Conceive of a person with Oa other goods and ab level of knowledge. In keeping with the above discussion on spontaneous learning, the higher level of satisfaction, II, could be attained by increasing knowledge to ac without any other adjustments.

Combination b represents an equilibrium position because the budget line, representing the maximum quantities of knowledge and
Knowledge in Combinations with Other Goods
goods which can be obtained in various combinations for a given ca-
pacity to obtain goods and knowledge, is tangent to the indifference
curve, I. This budget line is difficult to describe because on one
axis physical goods are measured which can be bought with money,
and on the other axis is knowledge which must be obtained at least
in part by means of nonmaterial expenditures. To accept this repre-
sentation, it must be conceded that learning has a cost, and there­
fore that knowledge is not a free good. The price for knowledge is
called \( P_K \) and the price of other goods, \( P_R \). If the budget line is
tangent to an indifference curve, both, of course, have the same slope
at the point of tangency. Hence, \( \frac{\Delta K}{\Delta R} = \frac{P_R}{P_K} \). Adaptive learning
behavior must take place for adjustment in the event these two ratios
are unequal. For example, if \( \frac{\Delta K}{\Delta R} > \frac{P_R}{P_K} \), equilibrium can be
established by an increase in the price of goods, an increase in the
quantity of goods taken, or by a reduction in the cost of learning.
If \( \frac{\Delta K}{\Delta R} < \frac{P_R}{P_K} \), adjustment can be brought about by a reduction
in the amount of goods taken, reduction in the price of goods, or an
increase in the cost of learning. It must be remembered that the
adjustment to the disequilibrium involves the following considerations:
(1) The solution to the problem must be in terms of the level of
knowledge and level of possessions of the learner and not of the
teacher (unless they are identical). (2) Knowledge is assimilated most when the cost of learning is low. This cost may be reduced by "dressing up" the extension materials or by working with organized social groups in the teaching program. It has long been argued by sociologists that extension teaching is most effective when social organizations are fully employed. (3) Providing a higher quality product for the same learning costs; e.g., teaching universal principle rather than current "facts."

In addition to the above principles of adjustment to a disequilibrium, there are other possible implications of this analysis to extension activity. Recognizing that a successful adaptive learning situation depends upon a felt difficulty, it may be the extension worker's responsibility to make such a difficulty real to his learners. This may come about by the educator making a deliberate attempt to change the preference pattern of the learner in such a way that a problem situation is created. Whether this "should be done" or not is an ethical consideration, but the possibility of doing it is clearly open.

The chief contributions from a classification of knowledge according to the manner gained are (1) that learning may occur whether a problem exists or not, but that it is likely most efficient if under an adaptive learning situation, and (2) that the educator has several
alternatives open in the correction of a disequilibrium situation in learning including (a) delineation or clarification of the wants of the learner, (b) lowering the cost of learning, and (c) improving the quality of information presented.

3. How knowledge is used

Finally, a third manner of classifying knowledge may be according to the manner in which it is used or functions it is intended to perform. Three functions may be listed: (1) to change information possessed in amount or in kind, (2) to change skills or ways of doing things, and (3) to change attitudes.

The first class is of great importance to any manager. Decisions are made in an environment of imperfect knowledge and the correctness of decisions may depend upon the ability to learn and adjust to continually occurring changes. Knowledge is always imperfect concerning the future, and is frequently very incomplete concerning existing technology. The Extension Service has evidently accepted the improvement of the level of knowledge of farm people as a major objective. The main categories of information presented are price changes, production methods and production responses, prospective technological changes, changes in the personalities and capacities of
people associated with farm businesses and, lastly, changes in the economic, political, and social situation in which a farm business operates.¹

The goal of perfecting knowledge raises some rather subtle questions to the educator-administrator. First, since knowledge is never complete, the goal is unattainable. Since all things cannot be known to all people, a problem of choice is involved as to what things should be taught and what people should receive the teaching. Secondly, since extensioners assume that the need must originate with the people, many will prefer staying in a state of imperfect knowledge rather than undergoing the task of learning. This may be frustrating to the teacher, but may be entirely rational for the learner. In no case should the farmer be expected to expend more in time, energy, and irksomeness, for additional knowledge than the additional knowledge is worth to him. These problems are again those of resolving conflicts in individual values as discussed in Chapter III, and of determining the basic relationships and choice indicators as illustrated in Figures 4 and 5 of this chapter.

This class of knowledge which is concerned with the amount and kind of information is vital to the productivity of the extension worker and is important to the decision-making (management) function of the receiver of extension services. Some implications of various levels of knowledge in combination with other resources and goods will be discussed below.

The second class of knowledge with regard to manner used is that designed to change skills or ways of doing things. It refers to increasing the technical proficiency of the individual. To distinguish it from the first group, it does not provide the basic information necessary for a particular activity, but rather, emphasizes the ease or effectiveness of doing things, thinking skills, or manual and physical skills.

Although stated objectives of extension profess to develop skills, few activities seem designed to accomplish this end. The usual approach is to present information and to trust that the farmer or homemaker has sufficient thinking skills to employ it or sufficient physical dexterity to become proficient in its application. Few programs or projects involve progressive teaching in the sense that simple concepts or practices are followed by the increasingly difficult or complex. Exceptions may be cited. Most 4-H Club projects
develop skills. Successive projects are more difficult to accomplish than those of the previous year. The advice of "practice makes perfect" is frequently heard in 4-H Club circles.

Another exception to the rule may be the attempts to teach labor simplification methods. While these programs are frequently conducted with the argument that saved labor has a high value in alternative uses, the writer believes they have their greatest appeal in their promises of "less stoop" and greater ease. In either case, those who practice the advice of simplification experts are developing skills.

It is likely that much more could be done to develop individual skills. Trials in teaching management skills have been successful in Kentucky, where farmers obtained practice in making decisions under various conditions. Possibly, education on a somewhat more organized basis whereby farmer-students received information presented at progressively complex levels would be helpful.

The third function of knowledge is that intended to change attitudes. It may be directed toward any of the following psychic features: (1) sensitiveness, (2) that involving personal or social

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1 Glenn L. Johnson, op. cit.
adjustment, (3) that concerning a "philosophy of life," or (4) appreciation. The high priority that this objective has been given by extension workers has been stressed. Little do most realize that developing a "rural philosophy of life" may be in conflict with other professed objectives. "To make rural life more satisfying and beautiful"¹ may be in direct conflict with "there is no justification for spending time and money on farm management work unless it helps farmers make more money."² Influencing the value structure of rural people such that they want to stay in the country can be a factor in preventing the outflow of labor resources from agriculture. However, such a transfer of resources is usually regarded as an essential to the raising of the average return to American farmers. Hence, the problem of conflicting values presents itself again.

It appears that each of the classifications of knowledge proposed here leads to the problems of determining social choice from individual values and of determining the basic technical relationships involved in the production of alternative extension services. However,

¹ Kelsey and Hearne, op. cit., p. 35.

the classification according to amount and kind of knowledge offers the possibility of further exploration at this time.

C. Knowledge: A Productive Resource

From the above it was concluded that knowledge has many meanings and that an understanding of each could be important to the extension worker. For the present, knowledge will be treated as the resultant information from learning. It forms the basis for decision-making, but is not the decision itself. That is to say, it is the amount and kind of facts available at the time a choice must be made. It is proposed to study the implications of various combinations of knowledge with other resources or goods and services.

1. Assumptions

   The first assumption is that knowledge is an active ingredient in production. This means that a particular production function can take a new form by changing the proportions of knowledge in the process without necessarily changing other factors. For example, it may be found that wheat will yield on the average two bushels per acre more if planted within a particular one-week period. If planted earlier or later, the yield will be less. Hence, application of this
knowledge is needed to reap the greatest product from given land, labor, and capital expenditures.

Secondly, it is assumed that knowledge is substitutable for other resources at the margin.

The unintelligent or unconscientious exercise of physical power not only wastes the material of which it works, and the tools it works with, but wastes itself also. The same physical power obviously produces widely different results according to the greater or less intelligence by which it is directed. Some intelligence is required for the efficient performance of even the simplest task, and a very high degree of trained skill will be required for others. . . . Though neither intelligence and muscular strength, nor my own intelligence and the intelligence of someone else who directs me, can be substituted for each other in totality, yet each can be substituted for the other at the margin.¹

As an example, consider a dairy farmer who feeds his cows without the knowledge of their individual productive ability. He is aware that he could save grain if he had individual production records, but at this time, he considers the cost of additional knowledge is greater than the cost of the additional grain being fed. At this margin, grain and knowledge are substitutable.

A third assumption is that an analysis can be made without measurement of knowledge in absolute quantities. It is only necessary that an increase or a decrease be possible.

¹ Wicksteed, op. cit., p. 363.
It is also assumed that in all cases resources have been restricted in use to a level less than would result in negative marginal returns. That is to say, the possibility of production in Stage Three is neglected.

Finally, it is assumed that whatever effect that the changes in resources may have on the preference system may be ignored. This is a traditional, but nonetheless spurious, assumption but the exact nature of the change is unknown. Hence, conclusions must be based on the individual's ex ante indifference system rather than the ex poste system and thus, intertemporal utility will not be maximized. It is hoped, however, that conclusions concerning the direction of change in utility or production can be reached.

2. Substitution and complementary relationship

On the basis of the above assumptions, it is possible to hypothesize certain effects on production and consumption resulting from changes in the level of knowledge of the individual.

The writer conceives of relationships between knowledge and other resources in production (or goods in consumption) as including both substitution and complementarity. The possibilities are illustrated in Figure 6. Changes in knowledge are measured
FIGURE 6

Complementary and Substitution Relationships
on the OK axis and other resources (or goods) are measured on
the OR axis. The Iso-quants, I, II, and III, show successive levels
of output (in production) or utility (in consumption). Within the
Iso-planes OA and OB, the iso-quants are convex to the origin,
indicating the possibility of having several combinations of knowledge
and other resources producing the same output. A complementary
relationship exists where iso-quants are parallel to their respective
axes.

Consider first alternatives in resource use which result in
no change in output or utility. Keep in mind that resource costs
are being ignored and that interest is in the outcome of various
combinations rather than in an "optimum" combination. The ap­
proach is to compare the positions under two points in time. Of
course, the points in time may be distant or very close, depending
on the problem.

The first case in which the person would remain on the same
iso-quant is the obvious case where the combination is identical in
time $t_0$ with that of a later time, $t_1$. Under the assumption postu­
lated, there has been no change in utility or productive output. Its
significance to extension teaching lies in the fact that refusal to
change is probably more characteristic of extension cooperators
than is the immediate adoption of suggested practices. This does not indicate lack of confidence or obstinacy on the part of farmers, but more likely, uncertainty considerations or limited capital or other resource limitations.

A second case in which the person would remain on the same iso-quant is described by a movement from Point b to Point a in Figure 6. In consumption, this involves a reduction in goods and an increase in knowledge, but no change in utility. This phenomenon is found in behavior where wisdom is supreme even at the sacrifice of physical goods. The farmer, who, at the request of his county agent, contributes a bushel of wheat to the Christian Rural Overseas Program has not diminished his utility. The knowledge that someone else's hunger has been satisfied has been substituted for a bushel of wheat. In production, this phenomenon may be illustrated by the dairyman cited above. It might be found that more complete knowledge of the production function of individual cows, e.g., by participating in the Dairy Herd Improvement Association, could provide knowledge yielding the same output of milk from less feed. In this case, knowledge could be substituted for feed.
The converse situation may be taken as a third case, i.e., movement from Position $a$ to $b$. This situation calls for an understanding of what is meant by a reduction in knowledge. Such a reduction may be regarded, either as loss of information through lack of memory or a reduction in knowledge through "misinformation." In consumption the case calls for an increase in goods and a reduction in knowledge. As an example, an individual in $t_0$ knows a poem by memory, but does not possess the book in which it is found. In $t_1$ he has forgotten the poem, but now possesses the book. The book has substituted for the information in memory. For a production example, the dairyman is again called upon. Suppose he has lost the feeding information and decides to feed an extra scoop of grain to each cow "just to be sure." Assuming no greater output is forthcoming, he has substituted grain for loss of knowledge.

For a fourth case, consider movement from Position $b$ to $c$. This calls for constant knowledge and increased resources or goods. It is illustrated in consumption by an individual who has added to a classical record collection, by gift or otherwise, but does no understand or appreciate classical music. Such knowledge must complement the records, or utility will remain the same. It
is illustrated in production by the "city-farmer" who thinks output can be increased by merely adding more expensive machines or buildings. Failure to increase output could be attributed to failure to complement the increased resources with the requisite knowledge.

The converse of case four is a movement from Position c to b. Here the person with the records can give them up without losing personal satisfaction; the city-farmer can give up extraneous resources without loss of total product. Call this case five.

For case six, consider movement from Position a to d. Now the consumer has been studying a hobby such as leather-craft, ceramics, lamp-shade construction, or model-building, but does not have leather, clay, lamp-shade material, or model parts. The home demonstration agent may have taught the value of a deep freeze to the homemaker, but without a deep freeze, her student feels no better off. A production example is found in the common situation where the farmer "knows more than he is able to apply." The need for (and difficulty of) complementing recommendations with other resources is frequently overlooked by extension workers. The following excerpt from a speech by an extension service director helps illustrate the problem:
The agronomists at our Experiment Station found more than twenty years ago that the best way to increase efficiency in the production of beef and dairy products in southwestern Virginia was to top-dress pastures with commercial fertilizers. Although they announced this through the press, through bulletins and through public meetings, the net result over a period of fifteen years was that less than five percent of the cattle growers in that part of the state were top-dressing pastures in 1933.

Southwestern Virginia is in the Tennessee River watershed, and about seven years ago representatives of the Tennessee Valley Authority came to the college and asked us to make recommendations as to the best methods of soil and water conservation in that area. We recommended the fertilization of pastures and got the TVA to give at least fifty farmers in each county sufficient quantities of high-analysis phosphate to make real demonstrations. As a result of these demonstrations more than sixty percent of the farmers there are now using phosphates and other fertilizers to top-dress pastures.

The intent of his remarks was to show the worth of demonstration, but the writer feels he succeeded also in showing the importance of complementing information about top-dressing pastures with the fertilizer to do the job.

The final case in which output or utility may remain constant although resources vary is found in the converse of case five. The

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hobbyist could forget all he knew about his hobby without loss of satisfaction if the complementary goods were not forthcoming. The farmer could forget the advice of his county agent without affecting production if the necessary capital to complement the advice was not attainable. The seven cases discussed above are summarized in Table 1.

Possibilities may be considered now where the level of output or utility is increased over a former situation. Diagrammatically this means moving from some point on Iso-quant I to some point on Iso-quant II, or a movement from II to III. The hope for increased utility or increased output is the core of extension teaching.

Reference is again made to Figure 6. There are five new combinations of knowledge and other resources which result in a higher level of production or utility. The first possibility involves an increase in both knowledge and other resources or goods (e.g., movement from a to e). To use an old example, the record collector has learned to understand classical music as his collection of records has increased. The farmer has received fertilizer as he learns the merits of pasture top-dressing. Call this Case VIII.
Table 1

Combination of Knowledge and Goods Associated with a Constant Level of Utility*

<table>
<thead>
<tr>
<th>Case</th>
<th>Knowledge</th>
<th>Goods</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Same</td>
<td>Same</td>
</tr>
<tr>
<td>II</td>
<td>Increased</td>
<td>Decreased</td>
</tr>
<tr>
<td>III</td>
<td>Decreased</td>
<td>Increased</td>
</tr>
<tr>
<td>IV</td>
<td>Same</td>
<td>Increased</td>
</tr>
<tr>
<td>V</td>
<td>Same</td>
<td>Decreased</td>
</tr>
<tr>
<td>VI</td>
<td>Increased</td>
<td>Same</td>
</tr>
<tr>
<td>VII</td>
<td>Decreased</td>
<td>Same</td>
</tr>
</tbody>
</table>

* To make the table applicable to production situations, substitute "resources" for "goods" and "output" for "utility."

Another case involving an increase in knowledge is that in which other resources or goods remain the same (e.g., movement from c to g). The city farmer, after building up a large investment has now gained sufficient knowledge to rise to a new level of output. The music-lover gains new knowledge about his
present record collection and rises to a new level of satisfaction. Call this Case IX.

A third possibility involving an increase in knowledge is that in conjunction with a decrease in other goods or resources. Here, the farmer who contributed to CROP with a bushel of wheat is better satisfied than in the first place. Call this Case X.

Two cases remain, both involving an increase of resources. If the increased output or utility is associated with constant knowledge, classify this phenomenon as Case XI. Finally, if with increased use of other resources, a larger output results despite a loss of information, this can be classified as Case XII.

These situations involving an increase in utility or output are summarized in Table 2.

It remains to be said that there is the possibility that the five situations in Table 2 may be reversible. That is to say, there may be movements which result in reduced output or utility. The conclusion is reached that there are seventeen possible outcomes from an educational experience. The seventeen possible outcomes include (a) seven situations in which production or the level of individual satisfaction remains unchanged, (b) five situations where
Table 2

Combination of Knowledge and Goods Associated with a Higher Level of Utility*

<table>
<thead>
<tr>
<th>Case</th>
<th>Knowledge at End of Period</th>
<th>Goods at End of Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>VIII</td>
<td>Increased</td>
<td>Increased</td>
</tr>
<tr>
<td>IX</td>
<td>Increased</td>
<td>Same</td>
</tr>
<tr>
<td>X</td>
<td>Increased</td>
<td>Decreased</td>
</tr>
<tr>
<td>XI</td>
<td>Same</td>
<td>Increased</td>
</tr>
<tr>
<td>XII</td>
<td>Decreased</td>
<td>Increased</td>
</tr>
</tbody>
</table>

* To make the table applicable to production situations, substitute "resources" for "goods" and "output" for "utility."

production and utility are reduced and (c) only five situations where production or individual satisfactions are actually increased.

This conclusion has important implications to extension teaching. The chief of these implications is that if an increase in production or an increase in utility is to be attained, then education must be complemented by capital or some other resource. This analysis has demonstrated that the mere increase of one or the other does not necessarily result in the desired improvement.
Educators have frequently expressed discouragement because the recipients of their services did not appear to accept their teaching. Such discouragement was based on the fact that there was no apparent change in the individual's satisfactions or physical output. This analysis implies that a part of this discouragement may be allayed since many of the educational experiences were successful in the sense that knowledge was increased. They were unsuccessful only because other resources or goods were not available to the learner at the time of his learning experience. Other implications of this capital-knowledge complement will be explored in succeeding chapters.
V. AGRICULTURAL EFFICIENCY AND INCOME DISTRIBUTION

A. Objectives Based on Maximizing Economic Progress

Yours is the basic responsibility of bringing to the farm and farm family the techniques and skills that make for greater efficiency, less waste, more fruitful use of talents, the wise use of nature's resources, and the development of better homes for better living. Upon the way you do your job depends in large measure the ability of the American farmer to play his full role in the Nation's economy and the Nation's responsibility.¹

1. Extension viewpoints toward economic progress

The above compelling statement is part of a charge given extension workers by Ezra Taft Benson shortly after taking the oath of office as United States Secretary of Agriculture. This emphasis on efficiency sets the pattern of directives currently being given employees of the Agricultural Extension Service and other agencies of the Department of Agriculture. It places a heavy obligation on

¹ Ezra Taft Benson. (Editorial.) Agr. Leaders' Dig. 34, No. 2:7. 1953.
farm people to improve their productive capacity lest Americans
and their foreign friends abroad face a declining standard of living.¹

From a long run point of view, the issue, of course, is de­
batable as to whether or not demands for food will eventually out­
run America's ability to produce. Conclusions reached in a recent
study indicate that

... based on expectations of population growth and future
technical change, it appears that innovation will allow the
growth in farm output to continue to outrun population
until the latter reaches its maximum in fifty or more
years.²

Can it be that extension administrators are mustering forces now
for a doubtful eventuality fifty years hence? Or are the leaders
on the "bandwagon" which offers the greatest assurance of long
run survival of the organization? Or is it that "extensioners"
wish to extend a philosophy of increased output, which was one of
the early cornerstones of extension teaching? The logic is not

¹ For similar expressions of official policy see Schlup, op.
cit., p. 1-2, and Byron T. Shaw, The Role of Research in Meeting
Future Agricultural Requirements. Paper presented at the forty­
fourth annual meeting of the American Society of Agronomy,
Cincinnati, Ohio, November 18, 1952. Mr. Schlup is Chief of the
Division of Extension Information, U.S. Dept. Agr., and Mr. Shaw
is Administrator of the Agricultural Research Administration, U.S.
Dept. Agr., Wash., D.C.

² Heady, op. cit., p. 796.
clear. As will be noted later, such a philosophy may be in direct
counter conflict with the purported objectives of maximum welfare for rural
people or maximum income for the agricultural industry. The reasons
are not clear, but it seems very evident that extension leaders and
workers in general hold increased agricultural production as a prime
goal.

This efficiency goal deserves careful consideration. The
analysis to follow will deal with (1) the conditions for "best" re­
source allocation, (2) suitable extension programs aimed at increased
productivity, and (3) the relation between such programs and income
distribution.

2. Conditions for maximum efficiency

When one sets about defining conditions for "best" resource
allocation, it becomes necessary to state the criterion on which the
judgment of "best" is determined. In previous discussions the basis
or choice indicator was the subjective values of individuals or groups.
In the present section the center of discussion will be the value
productivity of individual firms and of the agricultural industry.
The principles involved, however, do not deviate from those already
outlined.
A study of agricultural efficiency involves many distinct but related problems. For example, there is the production problem faced by the individual firm where profit-making is taken as the prime goal. If it is possible to reallocate given resources on farms in such a way as to increase the product forthcoming, society benefits by this reallocation. To the extent that individual farms produce at less than maximum efficiency, society loses. Therefore, with an efficiency goal directing its activities, the Extension Service has a major responsibility in insuring the efficient use of resources at the command of farm operators. This firm aspect of resource use has been of concern to extension workers. However, in many cases the emphasis has been on maximizing output without regard for economizing principles. In other words, the distinction has not clearly been made between technical and economic efficiency.

Another related aspect of the allocation problem is that having to do with resource use by different firms within the agricultural industry. If it is possible to transfer resources from certain firms within agriculture to others within the industry and as a result have a larger product forthcoming, society gains by the resource transfer. To the extent that resources are kept in areas of low productivity, society loses. This allocation problem has been given little attention.
by extension workers. Maximum efficiency in agriculture would call for the promotion of activities which induce capital investment in some of the underdeveloped areas of the country where the marginal productivity is likely very high.

Still another phase of the problem is that having to do with allocation of resources among industries. As before, if it is possible to reallocate given resources among industries in such a way that the total product is increased, society gains from the increase. Agriculture, as an industry, is regarded highly competitive in that the production or sales of an individual firm have a negligible or no effect on prices. Firms maximizing profits continue to apply resources until marginal costs equal price (average revenue = marginal revenue). Monopolistic firms, if maximizing profits, will on the other hand restrict resource use and produce at lower levels of production and still have marginal cost equal marginal revenue. Under these conditions both marginal and average productivity of resources would be greater in the monopoly than in the competitive industry. Hence, if one could assume perfect knowledge of employment opportunities and complete mobility of resources, total output could be increased by resource transfers to the monopolistic industries. This problem is related to extension activities to the extent
that they facilitate or prevent the desirable movements of productive resources between industries.

Complete ramifications of these three allocation problems are beyond the scope of this study. They are mentioned nonetheless, to emphasize that extension administrators and other workers interested in economic efficiency may find themselves dealing with a problem of firm, regional, national, or international dimensions. It is reassuring to note, however, that the principles which apply to each of these problems are identical.

If it is assumed that prices reflect consumers' preferences, the marginal conditions for maximum physical productivity of the farm with limited resources are the same as those which maximize efficiency from the standpoint of society. For a guide to maximum efficiency and resource use the following conditions may be cited: (1) Resources must be allocated within each farm in a manner so that the marginal value productivities of the resource services are equal. (2) Resources must be distributed between farms so that their marginal value productivities are equal. (3) Resources must be distributed between farming regions to allow attainment of equal marginal value productivity. (4) The various factors must be allocated between industries to bring about attainment of these identical
conditions. (5) Resources must be allocated over time such that their discounted value products are equal.\(^1\) Despite the problems of measurement in marginal terms, these conditions can assist the extension administrator in directing an extension program based on efficiency goals. An attempt will now be made to outline a few activities which might conform to such efficiency criteria.

3. An extension program to increase efficiency in agriculture

The question is sometimes raised as to whether agriculture is really inefficient. Attempts to measure the extent of agricultural efficiency have been made but the difficulties in making and interpreting such measurements are widely recognized. Usual attempts to measure agricultural inefficiency are in terms of comparisons of average returns to farm workers with the average returns of nonfarm workers.\(^2\) While such comparisons do offer interesting descriptive data on the distribution of the nation's income and estimates of average

\(^1\) Heady, op. cit., p. 708.

resource productivity, they fail to provide very accurate guides to resource allocation based on marginal principles. Marginal productivity may be high in areas where average productivity is very low (and vice versa). Another difficulty is that such averages may ignore individual work preferences. That is to say, these statistics fail to account for satisfactions that may be enjoyed by a farmer simply because he is a farmer. Such persons with a low average income may prefer this state to a position in a nonfarming industry where average incomes may be higher.

The analysis to follow is based on the assumption that agriculture is inefficient in the sense that reallocations or reorganizations of resources are possible which could result in a larger total product. For this purpose it is not necessary to say how much the output would be increased by such reallocations, it is only necessary that the sources of inefficiency be uncovered and that recommendations for their removal be specified.

Inefficiencies in agriculture may be classified in many ways. For the immediate purpose, let them fall into two general categories: (1) those that result from forces outside the agricultural industry (exogenous causes), and (2) those that may be determined within
agriculture (endogenous). An extension program aimed at increasing efficiency must consider both.

Include in the first category economic instability and its affect on the demand for agricultural products. A high level of economic activity in general is important to the welfare of farmers. Because of the relative inelasticity of demand for agricultural products very slight changes in the general economic activity can make rather violent changes in farm prices. Incomes to farmers cannot be stable if other sectors of the economy are undergoing major adjustments.

What can Extension do to alleviate the effects of economic instability? Extension is concerned with education—an activity whose results are completely felt only in the long run. Hence, it likely has little influence on short-run maladjustments. On the other hand, it is possible that educational programs designed to explain the functions and intentions of government could aid in the reduction of uncertainty—a prime cause of inefficiency in resource use. Education might also affect the demand function for agricultural products if it attempts to explain new uses of farm products. Some states have attempted such educational programs under the heading of consumer education. If such activities are successful, they could
strengthen the price for certain commodities by making them appear more desirable to the consumer.

Another closely related area which may affect the demand function for agricultural products is that dealing with marketing innovations. As new processing methods are developed such as advanced refrigeration techniques, the preference patterns of consumers may be altered. The increased consumption of fruit juices and vegetables is a case in point. Another example of this is the increased use of nonfat dry milk solids resulting from the development of the spray process of milk drying.

Population growth can be listed as another important exogenous influence affecting the demand for agricultural production. Here again, education in rural areas cannot be looked upon as either an important stimulus or deterrent to population growth.

In the exogenous category can also be included many social and political institutions. Taxation and the use to which public funds are put have an effect on the value productivity of agriculture. One of the efficiency conditions cited above was that resources must be distributed between farming regions to allow attainment of equal value productivity. On the basis of this condition, one might question the method by which extension funds are allocated among states and
localities. It will be remembered that funds are granted on a matching basis. Some states such as New York, California, Illinois, and Iowa are able to appropriate from local sources amounts far in excess of that required to match federal grants-in-aid. The present policy then allows the more wealthy regions to obtain the services of higher-paid personnel and to expend more resources in extension education than in less-wealthy states. Efficiency criteria would suggest that a higher product from agriculture might be possible if extension funds were distributed on a nonmatching basis. Prior consideration would be given those areas showing the highest marginal productivities from the standpoint of agriculture.¹ That is to say, the largest additional increments of financial aid should go to those areas which would yield the largest additional return from these expenditures. In general, these areas would not coincide with the areas most capable of matching federal appropriations. This suggests one possibility in the area

¹ It is assumed here that the areas promising a higher marginal value produce in agricultural production will also provide a higher marginal product in education. This may not be the case. The problem is closely related to the capital-knowledge complement discussed earlier. Perhaps dollars authorized for education in these areas would have to be complemented with additional appropriations to provide the financial means necessary to put the recommended practices into effect.
of exogenous factors which might be considered if the efficiency goal is to be held to by extension administrators.

Thus, there are readjustments outside agriculture which could be made if maximum farm efficiency is to be attained. Of paramount importance are measures to eliminate monopoly policy and general economic instability. These exogenous influences are of vital concern to educators but it is questionable if rural education as carried out by the Extension Service offers much assistance for their removal. Of much greater concern to agricultural extension are those causes of inefficiency found within agriculture itself.

An extension program directed toward increasing agricultural efficiency should do the following things: (1) reduce uncertainty faced by farm operators, (2) assist in the transfer of "under employed" resources in agriculture to other industries, (3) recognize that knowledge may be complementary with capital and that new measures may be necessary to facilitate the application of modern techniques and ideas, and (4) assist in the removal of resource misallocations on low-income farms. These will be considered in turn.

Farmers (as well as all individuals) must make decisions in a world of change and imperfect knowledge. The decisions made and actions taken must take place without knowledge as to the consequences.
This uncertainty has a vital influence on resource use. Without perfect knowledge, errors of judgment are inevitable and the cost of these errors are born not only by the individual producer but by the remainder of society as well. Hence, the reduction of uncertainty through education has important economic and welfare implications. Uncertainty takes many forms, but from the farmer's viewpoint they may be reduced to the following: (1) price uncertainty, (2) yield or technical uncertainty, (3) technological uncertainty, (4) uncertainty caused by institutions and social customs, and (5) uncertainty resulting from the lack of knowledge concerning individuals closely related to the farm business. An extension program designed to meet these forms of uncertainty must take on a variety of educational activities.

One of the kinds of knowledge needed by farmers for their decision-making and planning is price information. A farmer must make his own subjective estimates of expected future prices of his products and of the factors he uses in production. He is concerned with both short-run and long-run price forecasts. The United States Department of Agriculture and the land-grant colleges have in recent

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years provided outlook information to farmers to assist in their formulation of price expectations. Such outlook information undoubtedly reduces price uncertainty but to the extent that the erroneous recommendations of outlook prognosticators are followed, resources will be misallocated.

Economic predictions are considerably better than guesses. On the other hand they are far from perfect. Over a long time, of four predictions, three would be correct and one wrong. The farmer's only job is to avoid the incorrect one!

Considering the uncertainty of economic events, a score of seventy-five seems commendable. In most schools, a score of seventy-five on an examination is passing, but not much to brag about. A score of seventy-five in predicting economic events might be evaluated in the same way.1

It would appear that the extension economist has a responsibility of teaching principles along with providing absolute estimates. In addition to providing mean values and their variances, it would be helpful to the farmer to learn also the important indicators that were used in their formulation. There is room for much improvement in the methods by which price forecast information is provided to farmers.

A second important area of uncertainty of concern to extension workers is that of technical or yield uncertainty. This form of uncertainty helps explain a phenomenon which has been a mystery to many extension workers. They ask why production methods are not adopted more readily. Much of the answer lies in the fact that farmers are uncertain of the results to be expected on their own farms. Research results are ordinarily based on trials made at the experiment station which would be quite different if conducted under out-state conditions. To counteract this form of uncertainty, farmers will frequently conduct their own experiments or they will wait for their neighbors to adopt the practice in order that they may make their own observations. The implication to extension workers is that they must not merely "announce" the arrival of a new technique but they must interpret the technical data for local use in such a way as to reduce uncertainty.

The third important form of uncertainty affecting farm resource use is that of technological uncertainty. This form is important for its effect on long-run resource commitments. Farmers are hesitant to make large investments on their farms if there is a feeling that these investments will soon become obsolete. Dairy farmers will not invest a thousand dollars at present for a traditional milk
cooler if they feel they will be required to install a modern two-
thousand-dollar bulk tank cooler in the near future. Technological
uncertainty is important to extension workers in that it emphasizes
their responsibility in giving information on current research and
future technological advancements.

Institutions also have their influences on farm resource use.
Included in the considerations given by farmers in their decision-
making and planning process are the influences of the government,
local customs, and social organizations. A farmer expecting an
acreage allotment for a particular crop may increase his plantings
of this crop in order to build a large "crop history" and receive a
larger allotment when they are made. Extension is involved in this
type of uncertainty in that it may be of service through the interpre-
tation of the functions and intentions of government. Farmers look
to the land-grant colleges for such help but extensioners often regard
this type of information as being "out of their line."

Uncertainty also plays its part in certain human relationships
and legal contracts. For example, consider the effects of uncertainty
surrounding many rental situations. Frequently because the tenant is
insecure in his relations with the landlord he adopts that system of
farming which yields the greatest short-run expectations. This may
take the form of intensive cash-crop farming which has a strong depleting effect on the soil. In many cases a rental arrangement offering more security to the tenant would induce more livestock and soil-conserving crops. Actions producing highest expected short-run profits are entirely rational within the tenant's own sphere of limited knowledge. Thus, lack of knowledge and uncertainty can lead to inefficient resource use resulting in a smaller total product for society than would be otherwise possible. The Extension Service has merely perpetuated that which is customary rather than removing sources of inefficiency which may be traced to this form of uncertainty.¹

Still another form of uncertainty of concern to extension workers is that which surrounds the human contacts that farmers must make and the personalities of himself and his associates. At first thought it might appear that human relationships and individual values have little influence on decision-making in production. However, it must be concluded that:

The chances which farmers take, the managerial decisions made, the problems considered, and the results of their decisions depend upon the values which they attach to possible losses and gains in income and the value which they attach to performance of the five managerial tasks of observing, analyzing, deciding, acting, and accepting responsibility.¹

Pride of ownership may, in many cases, be of greater influence on resource use than the principle of profit maximization. Unusual breeds of poultry and livestock are sometimes grown and unadapted species of crops are sometimes planted because of the farmer's desire "to be different." This value structure is responsible for inefficient resource use in terms of the discussion above.

This form of uncertainty is closely related to the problem often referred to as the firm-household complex. Frequently the desires, goals, and standards of living of families are responsible for restricted resource use in the farm business. If the farm family values a costly level of living highly it becomes difficult for the farm operator to stabilize the consumption pattern of his family enough to accumulate savings for needed investments in the farm business. To the extent that these investments are not made, society receives a smaller total product than would be otherwise

¹ Bradford and Johnson, op. cit., p. 23.
possible. These problems are of concern to extension workers in that the value systems of individuals are influenced by extension teachings.

It is possible that Extension could open new areas of teaching activities dealing with psychological patterns of human behavior. A more complete understanding of motives and strategies characterizing managers would be helpful in the removal of uncertainties surrounding human relationships. Such new activities in Extension could entail the services of psychologists and so-called social workers.

This brief review of the forms of uncertainty faced by farmers and their relationships to resource use, must be of vital concern to educators in rural areas. If an extension program is to be directed toward increasing agricultural efficiency, it must involve activities to reduce uncertainty. The suggestions made are indicative of the kinds of activities which may be engaged in but they by no means exhaust all possibilities in this area. It should be apparent that the reduction of the above forms of uncertainty will result in more complete resource use and, in turn, a larger physical product to be enjoyed by society as a whole.

A second important requirement of an extension program directed toward increasing agricultural efficiency is that of assisting
in the transfer of "under-employed" resources in agriculture to other industries. Keep in mind that maximum efficiency requires that resources be distributed between farming regions and between industries in such a way as to allow attainment of equal marginal value productivity. This idea involves the transfer of resources from their present use to alternative uses which will yield higher marginal products. If one refers to the four traditional factors of production--land, labor, capital, and management--it becomes obvious that there is little hope in making transfers of land between industries or between agricultural regions. However, there may be some hope of increasing agricultural output by encouraging resource transfers in the forms of labor, capital, and perhaps management.

It is generally conceded that the returns to labor are low in farming. The marginal value product of labor on central Michigan dairy farms was recently estimated to be $30.19 per month. The marginal value products of other factors were estimated at much

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higher relative values. For example, the marginal value product of investments in livestock and forage was estimated at 64 percent. It was concluded that increased expenditure for livestock and forage would result in a higher marginal value product for all other categories of resource of these farms. The idea of increasing capital use in agriculture and transferring labor out, has received general acceptability in economic circles but realization of the idea has been difficult to attain. An important problem for extension workers is deciding how they can assist in these necessary resource transfers.

One step which might be taken by extension workers to assist in the movement of labor out of agriculture, would be to dispel the notion that every farmer's son should be a farmer. The practice of keeping every farm boy on the farm regardless of his interests or aptitudes has been an important factor in holding back the movement of farm workers to alternative occupations. Instead of teaching that the farm boy should remain in agriculture, the Agricultural Extension Service could very well promote activities which would introduce farmers and farm youth to nonfarm experiences. For example, Extension-sponsored trips to nonfarm industries could help to develop new interests leading to the decision to go into some line of work other than farming.
Another acceptable practice for Extension to follow if maximum agricultural efficiency is to be attained, would be to publicize nonfarm employment opportunities. The Extension Service could be a very important liaison between urban and nonurban areas. Extension could also assist with this important transfer of resources by supporting public programs which promote the migration of farm workers.

The need for greater capital use in agriculture also has important implications to agricultural education. There is growing evidence that capital use and education must go hand in hand if the greatest results from either are to be achieved. In the previous chapter the capital-knowledge complement was demonstrated. Further examples may be cited here. The FHA form of farm loan is an important example where capital and knowledge are offered together. Recipients of FHA loans must follow certain approved farming practices. Under this program farmers have not only gained from the use of capital, but also from the increased technical knowledge.

Many proponents of the Agricultural Conservation Program attest that such payments have been of value to farmers because of the increased production possible through the adoption of certain practices and also because of the education they have gained by so doing. While there may be doubt as to the justification of A.C.P.
payments on the basis of any meaningful definition of conservation, there still may be considerable educational value in such a program.\footnote{Earl O. Heady and O. J. Scoville. Principles of Conservation Economics and Policy. Iowa Agr. Exp. Sta. Res. Bul. 382. 1951.} Still another example may be found in the Tennessee Valley Authority tests in which individuals were given certain amounts of fertilizer for use on their farms.

These activities in which capital and education have been offered together should be examined closely by extension personnel. Their success indicates that if maximum agricultural efficiency is to be obtained perhaps funds should be made available in Extension for the purpose of supplementing knowledge with the needed capital. This points up the third major responsibility to extension workers—the recognition of the capital-knowledge complement.

If knowledge is treated as a factor of production, the question may be raised as to why farmers do not claim more of this no-cost factor. As explained above, this may be largely accounted for in the capital-knowledge complement and the fact that farmers, in many cases, apparently "know more than they are able to apply." Also relevant to the limited use of extension information is the matter of
subjective learning costs encountered by farm people. Farmers will seek new information only if they feel the additional knowledge has value at least equal to the subjective cost of obtaining it. Extension workers, therefore, have the responsibility of lowering the learning costs to farmers and of increasing the marginal value of such knowledge to them.

The above discussion has led through (1) interregional transfers of farm resources, (2) interindustry transfers, and (3) the knowledge-capital relations. There still remains the problem of increasing resource productivity on individual farms. This problem is particularly acute on small, low-income farms. Maximum agricultural efficiency can never be attained if these farms are unable to put their resources to most productive use. Education intended to raise farm productivity must include considerable individual management services to these low-income farmers. Activities such as extended tours and all-day extension events discriminate against the farmer who cannot afford to travel or to afford a hired man who can assume full responsibility while he is away. Extension workers have been aware of this problem, but they are the first to admit that under the present "first come, first served" policy it is difficult to do anything about it.
One possible approach to this problem has been recently undertaken in Michigan where a private foundation has provided a $270,000 grant to Michigan State College to conduct an intensive extension program in five different townships of the state.

The plan contemplates intensive experimental efforts in five widely scattered Michigan townships to stimulate agricultural production by closely supervised application of new farming techniques and scientific research findings.¹

The costs of this project are shared by the Kellogg Foundation and the townships involved. Under this intensive program nearly every farmer can expect considerable personal attention. The townships selected include both the more prosperous and the less prosperous communities. Therefore, this activity can be regarded as a community investment in farm management services. Carried out on a large scale it could have the effect of significantly increasing total agricultural output.

The problem of increasing resource productivity on low-income farms is a very real one to extension workers. There is still another similar problem, however, that is frequently, if not generally, overlooked. It is the responsibility of insuring efficient resource use on

all farms. The measures proposed above are suggestive of the type of activities which could assist in the production of a greater total product. Despite the fact that many more activities could be enacted which would assist in the attainment of this goal, it should be granted that extension workers have been zealous in their desires to assist farmers in producing a larger product from given resources. This is a necessary condition for economic efficiency but it is not a sufficient one.

In technical terms the obtaining of a larger total physical product from given resources may be called raising the production function for agriculture. This is demonstrated in Figure 7. Inputs are measured horizontally and output is measured vertically. Production function N is that before innovative change and production function M is that after such change. For a specific example, compare Output BC with Output BD. The former represents the output obtainable from Inputs OB before and the latter represents the output obtainable after technological advance. Another way of stating this definition of economic efficiency is that the same total product is obtainable with fewer resources. In this example, a quantity BC is obtainable with OB resources on Production Function N but the same amount is possible with AB fewer inputs on Production Function M.
FIGURE 7

Increased Productivity through Technological Advance
Technological advance in this form is desirable when an efficiency criterion is followed. However, extension workers cannot stop here if complete efficiency is to be realized. It becomes necessary that resources be allocated within each farm in such a manner that the marginal value productivities of the resource services are equal. Extension teachers should not be content merely to describe the new production relationships which are possible by the application of scientific methods but should also assist in locating the best combination of resources in reaching the new level of production. This requires the presenting of expected factor-cost data in conjunction with pure physical relationships. The extensioner may be personally enthusiastic about the production potentialities of a sugar beet harvester, mechanical cotton picker, or self-propelled combine, but the relationship between machine and labor cost may discourage the use of the innovation, particularly at low levels of output. Typically, agricultural research has been concerned with the determination of descriptive averages in production or in determining whether certain treatments have statistical significance. Extension workers charged with making recommendations from these data have had difficulty in identifying the relevant physical relationships involved. In addition,
the fact that a given outcome in dollar terms is dependent upon a specific set of price relationships is frequently ignored.

The above measures have been formulated on the assumption that increasing agricultural efficiency is a prime goal of the Agricultural Extension Service. The next task will be to study the implications of these measures on agricultural income and welfare.

B. Agricultural Efficiency and Welfare Goals

1. Income disparities and the Extension Service

The Extension Service is a potent force in the distribution of assets among the various people of the nation. As an educational body, it is involved in the distribution of knowledge. In addition, because of its influence on the price of products and factors on resource use, it involves the distribution of income among individuals of the agricultural industry. On the grounds that consumer's welfare is a function of income and the possession of goods, Extension plays a prominent role in determining the well being of farm people. It has the power to make some people better off than before and likewise to hurt others. It contributes to economic progress of which
increasing income disparity is a characteristic. Economic progress in the long run aids society, but in the short run, some individuals or groups may be hurt. This problem was recognized by the Joint Committee investigation which was conducted during 1947 and 1948.

Some farm families will, in a sense, be disadvantaged by expanding mechanization... Improved technology always places a premium on ability and initiative. But there will probably be a further widening in the range of farm incomes, as these farmers take advantage of rapidly developing improvements. . . . Farm families that lack the type of ability, or the capital resources, needed for successful farming will be at a growing disadvantage in the years ahead. Extension must recognize these facts and intensify its efforts to provide educational programs that will better enable farm families, not able to take full advantage of technological advancement, to make the most of the circumstances in which they find themselves.2

It should be noted that the Committee failed to specify appropriate actions by which farm families unable to take full advantage of technological advancement could make the most of the circumstances in which they find themselves. It is ironical that the goal of economic progress for extension workers if successfully met creates the

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2 Joint Committee Report, op. cit., p. 58-59.
need for additional activities to ease the pains which result from that success.

The question may now be raised as to the extent that the Extension Service does contribute to income inequalities in agriculture. An answer to this question will be sought through an examination of the attitudes of administrators and workers in Extension and of the conditions inherent in agriculture which help to widen the gap between the upper and lower income groups.

The attitude held by the administrator in selecting the persons to receive extension services has an important bearing on income distribution. If the extension administrator decides that the purpose of his organization is to increase the net income of selected individuals or groups, an important problem of choice presents itself. Several alternatives may be suggested.

First, services may be extended on a "first come-first served" basis. This could be in keeping with the principle that "people know best their own needs and interests and are competent to make decisions affecting their own welfare."¹ This is not a policy of equality. Those who are ignorant of or indifferent

¹ Matthews, op. cit., p. 805.
to the Extension Service do not share in the advantages of increased income coming therefrom. It might, however, be consistent with maximized utility if the doubtful assumption can be accepted that the preference system of extension cooperators is identical to that of the community at large. This approach to the distribution of extension services is prevalent among extension workers. A typical expression of this attitude was recently summarized from a study made in West Virginia. County agents were asked to comment on whether the good or the poor farmers should receive their service. This summarizes the survey:

For the most part, work on an individual basis with farmers is done with those who request advice on a specific problem or problems, and as you would expect, these requests usually are made by the better, more aggressive, well informed farmers of the county. These are the farmers who are interested in newer and better ways of doing things. They are the farmers who realize they must keep abreast of modern developments if they are to survive and prosper in this business of farming.¹

It seems reasonable to expect that if the better and more aggressive farmers do receive the benefits of Extension and carry out the

recommended practices, then this condition in itself would contribute to further income inequalities in agriculture.

Under certain conditions the Michigan intensive extension program cited above may contribute to widening the income gap under discussion. With maximizing agricultural output as a prime objective, one might expect the community to be chosen to be that with the highest marginal productivity. Instead, as a major consideration, the areas are being selected according to the ability of the community to match the state with local funds. This selection could conceivably agree with one based on the marginal productivity principle but it would seem to emphasize that in this case local wealth (total productivity) supercedes marginal productivity. In other words, a community with farms most nearly in adjustment would receive prior consideration over one with farms out of adjustment. Hence, this approach will tend to widen the income gap between wealthy and low income communities.

Another extension attitude influencing income distribution is that dealing with the educational objectives of adjusting the value systems of rural people. If such is the objective, it appears obvious that the logical recipients of extension service would be most easily influenced. Experience indicates that extension people have found
the wealthier, better educated persons more receptive to new ideas of production. Therefore, to fulfill this objective is to again discriminate in favor of the higher income groups.

Still another indication of favoritism in the distribution of agricultural information is found in the tendency to service certain commodity groups in preference to others. For example, in Michigan where dairying is the major source of farm income there is a tendency to concentrate research and educational activities in those areas dealing with dairying. This special attention favors dairymen at the expense of minor commodity groups such as poultry and vegetable growing.

In addition to this political aspect there is still another consideration which indicates that gains are received by some commodity groups which are greater than those received by others. That has to do with the demand elasticities of the commodity in question. For a commodity with a highly inelastic demand increased production results in a large decrease in net farm income to producers of these goods. The same proportional increase in production would be less detrimental to the producers of commodities with higher demand elasticities. Whereas agriculture as a whole produces and sells a variety of products for which the demand is
quite inelastic against income, there are important variations among farm products. The demands of some products gain substantially from increases in income, while others lose ground. It becomes important to extension workers to delineate these variations. Schultz\(^1\) has classified some of the more important retail foods according to their degree of elasticity as follows:

Inferior Foods Against Income. The following foods have negative income elasticities:

- Dry beans and peas--very negative
- Salt sides and lard--very negative
- Potatoes and sweet potatoes--quite negative
- Flour and cereal products--slightly negative as a group
- All fats and oils--slightly negative as a group
- Sugar and sirups--zero or slightly negative

Low Elasticity Foods. These foods have income elasticities of \(0.25\) and less at retail:

- Coffee, tea, and cocoa, as a group
- Meats, poultry including eggs, and fish as a group
- Vegetables and fruits other than tomatoes and citrus
- Milk products on nonfat solid basis

Upper Elasticity Foods. The following foods have income elasticities higher than \(0.25\) at retail:

- Tomatoes and citrus fruits
- Fresh cream and ice cream

Turkey
Better cuts of beef, mutton, and pork
Some tree nuts
Some fresh and canned vegetables and fruits

Extension administrators intent on raising net farm incomes would not encourage production of those commodities with a highly inelastic demand such as beans, potatoes, and cereal grains. They would encourage the production of such foods as turkeys, tomatoes, and certain other vegetables and fruits. The fact that extensioners have paid little attention to demand elasticities would indicate a lack of knowledge concerning the importance of this concept or else have preferred to continue inequities as far as net income is concerned.

Inherent within agriculture, there are apparently other conditions besides administrative attitudes related to the Agricultural Extension Service which influence income distribution. First is the condition that farmers in the best financial position are the ones most able to utilize the Extension Service. They are the ones who are able to attend all-day and week-long extension events designed for their use. This is also true for other government programs designed to aid agriculture. For example, commenting
on the distribution of benefits from the AAA programs Schultz made the following statement:

This advance in production techniques, however, was probably more pronounced on the farmers already using the better techniques than it was on those farmers most in need of changing their obsolete practices; accordingly, the differentials separating the "poor" from the "good" farmers have been widened.¹

The favoritism shown is usually unintentional but the end effect is one of furthering income disparities.

A related condition is that farmers in the best financial condition are most able to obtain the academic training necessary to study and apply the technical findings of the experiment stations. Understanding of the information is essential to decisions which will result in efficient resource use.

Many low-income farmers lack entrepreneurial ability but as a class probably little more so than their more fortunate neighbors. The latter, however, are able to make farm adjustments that not only widen the gap in their economic status, but which by pressures on product and factor prices actually reduce the economic status of the farmers who are by-passed in the technological progress. The results are the same whether farmers' failure to participate in such progress is caused by factors of topography or location, by the lack of capital, or by the improvidence and lack of management ability. In any case it becomes increasingly difficult

¹ Schultz, Production and Welfare of Agriculture, p. 145.
for them to improve their economic condition out of their own resources.¹

A majority of extension materials presented depend on a high level of intelligence to interpret findings of research and the presentations made at extension meetings. This kind of education is discriminatory in nature in that it favors those who have had the most educational opportunities. This also contributes to widening of the income gap under discussion.

Many of the factors listed above as being important in increasing income disparity among individuals in agriculture may be considered under the subject of uncertainty. Higher-income farmers through greater experience, greater knowledge, and larger financial resources, can adjust to uncertainty more readily than the low-income farmer poorly trained, inexperienced and faced with heavy indebtedness. This brings to the front once again Extension's role in the reduction of the uncertainty facing farm people. The present discussion, however, emphasizes that those needing the most assistance in this regard are those who receive the least.

The evidence is ample that extension activities do help some sectors of agriculture at the expense of others. It is appropriate to ask now whether this results in an increase of welfare to agricultural people. Modern thinking in welfare economics indicates that society is better off if the increment in utility or satisfactions to the group receiving the benefits is greater than the decrement in utility to the sacrificing group. Granting that interpersonal utility comparisons are impossible, the opportunity is still open to compensate the losers in such a fashion that all persons are better off than before. For the present purpose it becomes necessary for extension administrators to consider activities which compensate those groups in agriculture which have been the losers. Included in such activities might be (1) education that informs of nonfarm employment opportunities, (2) education that teaches skills applicable in nonagricultural lines, (3) projects which foster trips to communities away from home aimed at creating interest in new opportunities, (4) farm and home planning projects which provide intensive management service to low-income groups, (5) intensive extension programs of the type currently sponsored by the Kellogg Foundation providing such programs obtain a large portion of their finances from industry and wealthy farmers in order to assist the lower-income groups, (6) the advocacy of output-
increasing innovations especially in low-income areas, and (7) the deliberate adaptation of equipment and other specialized resources to smaller farming units. These compensating activities could be employed in conjunction with extension programs aimed at increasing agricultural output. It is possible that such a program could result in making at least some persons better off than before and leaving no persons worse off. However, even these transfers of resources within agriculture cannot insure maximum utility. The outcome depends on the nature of the interpersonal transfer of income. To the extent that increases in income are accompanied by a transfer of income, total utility will increase or decrease, depending on whether the gain and utility to individuals with augmented income is greater or smaller than the loss in utility to those whose income is lessened.\textsuperscript{1} In spite of this, it appears that programs of this type are in order.

2. \textit{Increased agricultural income and the Extension Service}

It is likely that adherents to a goal of maximizing net farm income have reference to the entire industry rather than for a select few as discussed above, although statements on purpose are not

\begin{footnote}
\textsuperscript{1} Heady, \textit{op. cit.}, p. 824.
\end{footnote}
specific. The following excerpt from an official report of Director-emeritus Wilson made before the House subcommittee on agriculture in 1952 is typical of those made by extension administrators:

The activities of the entire cooperative extension organization are directed toward the improvement of farm income through the application of science and farm mechanization. Emphasis at present is on increased production, decreased production costs, and improved marketing.¹

Note that in order to achieve improvement of farm income, increased production is made a part of the prescription. The impression is given that increased output inevitably results in a higher net farm income. To what extent is this impression true?

To analyze this question, the types of innovations propagated by extension workers will be classified according to their effects on total output and total costs. The following classes may be cited:

1. output-increasing, cost-decreasing
2. output-increasing, cost-increasing
3. output-constant, cost-decreasing

Bear in mind that reference is always to total output and total costs. In keeping with the previous definition of economic progress, any other combinations of output and costs can be ignored.

¹ U. S. Congress. Hearings, op. cit., p. 1173.
For the effects on net farm income of the different types of innovations employed under various conditions of demand elasticity, see Figure 8. With dollars measured on the vertical axis and output on the horizontal axis, let $RR'$ be the total revenue curve for the industry. As long as the curve is positively sloped, total revenue is increasing with output. That is to say, the commodities are being sold under conditions of elastic demand. The negatively inclined portions of the curve depict inelastic demand since total revenue decreases with output.

Consider first innovations which do not affect output but lower costs. Those which fall in this category are of the mechanical type which reduce total cost but are unable in themselves to increase production. The effect is one of increased net income regardless of demand elasticity. In Figure 8, net income (the difference between total revenue and total cost) increases, for example from $BC$ to $BM$ under elastic demand conditions and from $RQ$ to $RP$ under inelastic demand. Hence, the first two cases considered have the effect of increasing net revenue to agriculture. These, however, are not the innovations usually adopted as a result of extension teaching. One is reminded that constant output has never been an expressed extension goal.
FIGURE 8

Technological Advance and Industry Returns
There is but one case where increased net income is assured out of the four possibilities where output is increased. This one case is the situation under an elastic demand where total cost is reduced. In Figure 8, net income for Output OA is BC before the innovation is adopted. Since $TC_2$ represents the total cost curve for production using the innovation, it is evident that an output between OA and OS results in a total cost less than before. Net revenue within this range is always greater than at Output OA. The innovation in question is of the type usually advocated by extensioners (e.g., artificial breeding of dairy cattle), but in general the demand conditions do not apply.

There are still two possible innovations resulting in increased output which might increase income but not definitely. These are: (1) output-increasing, cost-increasing innovations under elastic demand; and (2) output-increasing, cost-decreasing innovations under inelastic demand. The first is illustrated by comparing Output OA with Output OD. Total cost has increased from AC to DE, but net revenue has increased. However, by comparing Output OA with Output OG, one can see that net income can be reduced with this type of innovation. Again, the type of innovation is common, but the demand conditions are uncommon.
The second uncertain situation from the standpoint of increased agricultural income follows the reasoning of the first, but is applied to the inelastic portion of the curve. If the decrease in total revenue is less than the decrease in total costs, the result will be increased net revenue. On the other hand, if the decrease in total revenue is more than the decrease in total cost, the result will be decreased net revenue. This situation, then, offers the possibility of increased income; but is it realistic? The inelastic demand feature is appropriate, but most agricultural innovations are of the output-increasing, cost-increasing variety, and not cost-decreasing, as considered here.

Output-increasing, cost-increasing innovations are the last to be considered. Innovations of this type always result in decreased net income. In Figure 8 this is seen by comparing the Net Revenue RQ from the original technique with the Net Revenue VW from the improved technique.

On the basis of this analysis, it must be concluded that the possibility is slight of increasing net income for the agricultural industry by adopting the typical innovations under the typical inelastic demand conditions. Of course, the RR' curve described above

1 Conceptually, the net income to farmers in a particular region could be increased by greater production under inelastic demand
representing total revenue may shift positions from time to time because of changes in the business cycle. To the extent that this takes place, the observed results in reality may differ from those presented here. The above six possible cases associated with various conditions of demand elasticity and types of innovations are summarized in Table 3.

To alleviate the problem of decreasing income resulting from expanded output, legislation has been passed for the expressed purpose of production control in agriculture. The first major steps were taken under the Agricultural Adjustment Administration during the period 1934-41, and production-control mechanisms were re-established in 1950 under the Production and Marketing Administration. This type of legislation assumes an inelastic demand for farm commodities and embodies the monopoly feature that output can be withheld for price advantage. Within the Department of Agriculture, then, is found on the one hand, the Extension Service which enthusiastically endorses increased agricultural efficiency and production and, on the other
Table 3

Change in Net Income Associated with Various Conditions of Demand Elasticity and Types of Innovations

<table>
<thead>
<tr>
<th>Demand Elasticity</th>
<th>Change in Net Income</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total Output</td>
</tr>
<tr>
<td>Elastic</td>
<td></td>
</tr>
<tr>
<td>Increasing</td>
<td>Increasing</td>
</tr>
<tr>
<td>Constant</td>
<td>Increasing</td>
</tr>
<tr>
<td></td>
<td>Increasing</td>
</tr>
<tr>
<td>Inelastic</td>
<td>Increasing</td>
</tr>
<tr>
<td>Constant</td>
<td>Decreasing</td>
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* Depends on relation between increased output and change in total cost.

On the other hand, other agencies faced with the responsibilities of administering "agricultural surpluses." To the extent that the Extension Service assists in conducting such "action" programs, its activities are in conflict with the goal of maximizing agricultural production but (assuming production control programs are successful) are in harmony with the goal of increasing net farm income. The problem is
confused by the conclusion that past and current production-control programs are more nearly of a nature to increase rather than decrease the total volume of agricultural output. The conclusion is based on the fact that such programs have not effectively restricted the use of resources in production.

The question may be asked, "What approach should Extension follow if it is interested in maximizing agricultural income?" The answer lies in activities which may be quite divergent from those followed by extensioners today. The following suggestions could be a part of such a program: (1) Monopoly practices would be recommended for agriculture. This would call for not only restricting the use of a single resource such as land, but enough of others to effectively restrict output. Resources in excess would need to be transferred to other industries. Extension workers would need to remember that (a) such a program would not attack the problem of income inequalities within agriculture and (b) it would conflict with the goal of maximum resource efficiency. (2) Extension workers would emphasize production of those commodities with the highest demand elasticity. Production of commodities with negative elasticities would not be encouraged. (3) Efforts would be directed toward
transfer of resources out of agriculture. Activities which tend to fix labor on the farm would be avoided.

In summary, it is evident that the Extension Service cannot be all things to all people. Its programs and personnel are actively engaged in redistributing wealth, but the end result of this redistribution is not easy to ascertain. Income is taken from taxpayers and placed in charge of the extension organization. This money in turn is employed in redistributing income within the agricultural industry. Extension cooperators are benefited financially over noncooperators and, to the extent that Extension work assists well-organized, commercial farmers more than small, low-income farmers, the income disparity becomes more acute. If the goal of maximum economic progress is achieved, society gains. If the goal of maximum net income to agriculture is achieved, society loses.
VI. IMPLICATIONS TO EXTENSION POLICIES AND PROCEDURES

A. Summary and Implications

1. Economic principle and extension administration

The purpose of this chapter is to summarize and integrate the conclusions of the study. The object of the study was to determine the applicability of existing economic principle to the problems of administration and teaching in the Agricultural Extension Service. In spite of difficulties, the hypothesis

The difficulties do not spell defeat, but rather define the areas in which additional information would assist in more effective conduct and evaluation of extension practices and procedures.

Cooperative Extension work qualifies as an economic problem because it involves maximizing ends relative to means. Hence, it is a resource allocation problem embodying principles of production economics. It also involves the distribution of wealth because (1) it is publicly supported and thus, through taxation causes income transfers, (2) its services are not evenly distributed which causes income redistribution within the agricultural industry, and (3) its activities
affect the prices of products and resources which affects income dis-
tribution throughout the entire economy. With both major areas of
economics, resource allocation and income distribution, represented
the economic problem is laid out.

The approach was to attempt a definition of the ends to be
maximized and the resources which are expended, and to study the
institutional environment in which these resources are allocated. The
implications from this approach can be seen by evaluating each part
separately.

Like all government functions, the Extension Service was de-
veloped in response to a felt need of the people. It was molded in
tradition, custom, and official legislation. The habits and attitudes
of farmers, urban people, and those of the extensioners who work with
them are products of past generations. Legislation has been written
in terms which tend to limit administrative flexibility. These condi-
tions cannot be ignored even though an economic appraisal might
specify the need for a redirection of effort. Does this mean that
answers must be found in the past and that institutions rule supreme?
Such need not be the case.

From the standpoint of national administration, many of the
problems which might involve choice are answered by statutory
provisions. For example, funds are apportioned to states primarily on the basis of rural and farm population. Suppose this allocation differs from one based on productivity principles. Does this mean a maladjustment exists? Alternative views may be expressed. In both cases economics are involved.

First, one can argue that the legislation represents irrationality and that adjustments should be made. In such a case, steps would need to be taken to measure or estimate the marginal productivity of regions and to distribute funds in such a way as to equate the marginal value productivities. Maximum flexibility would be desirable. Proponents of this view would wish to undertake steps to amend legislation in keeping with such a principle.

On the other hand, it may be argued that the present allocation is rational on economic grounds. The basis for the argument lies in the fact that, in a representative government, the legislative body can be regarded as a choice indicator of the people. In its deliberations it presumably discussed values such as stability, "justice," productivity, and freedom of state action. If in the final analysis, legislation is passed which fixes state allocations, the conclusion may be reached that this represents a rational allocation system based on a particular system of values. As the extension worker must know a
farmer's attitudes toward profit and leisure before giving advice, so should the economist know the substitution rates between productivity and other values before rendering the judgment of irrational action.

From the standpoint of state and local administration, institutional rigidities also exist. The relative permanence of tenure of county workers and the continuity of established programs limits the extent to which new activities can be added and old activities discarded. But the fact remains that new activities are added as old activities are discarded and economic principles are involved when the choice is made. The county agent adds a new activity when the expected returns exceed his expectations of returns in alternative existing lines. Likewise in the allocation of time, identical economic principles are involved. An average of about 23 percent of a county agent's time in Michigan is spent in the role of administrator.¹ This may be regarded largely as a fixed expenditure with the remainder of his time involving alternative functions such as consultant, salesman, organizer, supervisor, and student. Maladjustments in the allocation of time are possible when no attempt is made to evaluate the productivity of alternative functions.

Finally, from the standpoint of administration on the individual farm, the farm operator also operates in a sphere of customs and institutions. However, it would be folly to suggest that the farmer spends time and other resources on a visit to his county agent's office because it is customary for farmers to do so. The same marginal principles apply here as above.

Therefore, the effects of institutions which have been emphasized in this study do not deter the application of economics. They are, however, essential to an understanding of the environment in which economic decisions are made.

The second phase of the study was to consider the resources used in the production of extension services. As a production problem, certain conditions must exist if the product forthcoming is to be a maximum from given resources and if the final allocation is to be regarded as an economic one. Given the production relationships and an appropriate choice indicator, the necessary and sufficient conditions for economic efficiency can be specified. However, the necessity of an accurate appraisal of the technical relationships and the use of the most appropriate choice indicator cannot be overemphasized. In these two areas grave difficulties were encountered.
The production of the services of Extension involves a variety of heterogeneous factors and a multitude of different immeasurable products. Whether these various services are produced under conditions of increasing, constant, or diminishing returns to scale is not known. However, as a scale problem, it is unlikely that education functions under constant returns. If such were the case, society would leave the task of learning to the individual himself rather than organizing education on a community basis. For education, in general, increasing returns does not seem an unlikely hypothesis for two reasons: (1) Society, through its elected legislative body, allocates limited capital among a wide variety of public services. It is conceivable that such capital limitations prevent the forcing of any of the functions out of a region of increasing returns. (2) Because of the cumulative nature of learning and because of the growing complexity of society, knowledge has increasing importance through time. If such is the case, the community gains through increased appropriations for education, and administrators are acting rationally to continually ask for more.

As a problem of proportionality, there are undoubtedly many adjustments possible in resource reallocation. It was suggested above that extension workers do make decisions as though they had some
notion of the expected productivity from the various alternative endeavors. However, to the extent that they miscalculate, society loses. Miscalculations are normal in a world of imperfect knowledge, but it would seem highly desirable to study the interrelationships of various extension activities to determine the degree to which they are complementary, competitive, or supplementary. For example, how much could price and other economic information be withheld without decreasing the returns in some other line such as animal husbandry? These technical substitution rates need more accurate measurement than they have had in the past.

The third phase was an attempt to evaluate the product of Extension. It is well known that the extension organization is involved in a variety of activities but the activities themselves do not comprise a product. One is compelled to call the product, "the services of the activity." But, services are meaningful only in terms of the person receiving them. Hence, a problem of values was involved in which a price mechanism could not be of help.

The lack of a price mechanism does not, however, prevent an application of economic principle. It merely means that for a choice indicator, indifference curves must be substituted for price ratios. The problem here is to select the appropriate indifference curve.
Of course, the most desirable social welfare function would be one which satisfactorily expressed community choice based on individual value. Excluding the possibility of interpersonal comparisons of utility, no acceptable function of this type is now available. As an alternative, the choices of individuals or groups must be estimated by local expression or some other means. However, the conflicting nature of values requires a value judgment in choosing from the many indifference curves possible.

The conclusion was reached that extension workers have no uniform criterion for making this selection. The result has taken many forms with allocation being based on (1) those who call for service, (2) the wishes of organized groups, (3) the preferences of the local agent, (4) the preference of the state staff, and (5) a compromise of values. In each instance it is to be expected that attitudes toward more immediate goals would vary.

Alternative objectives were studied including (1) maximizing change in human values, (2) maximizing intelligence level of individuals, (3) maximizing economic progress, (4) maximizing net income to individuals, and (5) maximizing net income to the agricultural industry. Since these may conflict in practice, and since official actions or statements of purpose fail to delineate their relative
importance, the task of administration and evaluation is increasingly difficult.

In summary, the administration of extension resources based on economic principle requires (1) the essential technical relationships between alternative services in "production" and "consumption," and (2) a definition of output which will resolve existing conflicts in values.

2. Resolving conflicting values

Without attempting an exhaustive list, the following conflicts in values were concluded from this study:

1. Value of the past vs. values of the present.
2. Value of the present vs. values of the future.
3. Tastes of the individual vs. tastes of the community.
4. Preference of the teacher vs. preference of the learner.
5. Value of service A vs. value of service B.
6. Short-run gain vs. long-run gain.
7. Objectives to increase value of rural life vs. objectives to maximize economic progress.
8. Inductive reasoning vs. deductive reasoning.
9. Economic progress vs. increased agricultural net income.
10. Maximum welfare of agriculture vs. economic progress.

The solution to these conflicts rests on the assumption that values, themselves, are substitutable at the margin. This implies that the administration need not accept either of the extreme absolute values but may compromise. One has heard that "it is impossible to
compromise with a principle" but the hypothesis is offered that, in reality, values are subject to substitution.

Consider the example of freedom vs. security. Under certain economic conditions, farmers are willing to sacrifice some freedom to gain additional security. This explains their willingness to sanction production control measures at one time when at another time they would not tolerate the government "telling them what they could do." Thus, under different conditions, conflicting values take on different marginal rates of substitution. This may result from a movement from place to place on a given indifference curve or a change in the shape of the entire utility surface.

Having demonstrated that conflicting values can be resolved by compromise does not answer whether extension workers should actively engage in their formulation. This is one of the unanswered questions facing extension administrators.

B. Conclusions

Economic principle does not provide a magic formula which will give the desired answer for every administrative problem. Some would hope that it might, but in our uncertain world with incomplete knowledge, decisions concerning the future will never be made "once-
for-all time. However, given all the available means, economics can assist in determining the most desirable combination of means to attain a given objective. With alternative objectives, alternative means must be supplied. Such was the case in this problem.

The difficulties encountered suggest the need for additional research. The following questions are raised, but not as a priority listing, to suggest areas of study which can assist in solving the many difficult management problems which are represented by the immediate study: (1) Is it possible that education can ever be measured in sufficiently quantitative forms so that a production function can be fitted? A positive answer would provide the hope for estimates of the marginal physical productivities needed for rationalizing shifts in resource use. (2) Some work has been done to determine the best physical and environmental conditions for learning. This has to do with such factors as temperature, time of day, and state of hunger of the learner. Studies of this type should be continued and applied to extension work. They represent a form of innovation—the raising of a production function in learning. Other innovations include visual aids. Little is known about the additional returns forthcoming from additional expenditures on innovations. (3) To what extent are
individual values imposed or dictated by extension personnel and to what extent is such a practice socially acceptable?

These are to suggest but a few. The many problems concerning the aggregation of values cannot be neglected. In fact, such problems comprise the core of this study and must be solved before the task of resolving conflicting objectives in Extension can be complete.
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G. Other Material

ACKNOWLEDGMENTS

This opportunity is taken to express sincere appreciation to the many persons who were helpful during the inception, conduct, and completion of this study.

Professor Earl O. Heady of Iowa State College is credited with convincing the author of the universality of economic principle and giving the hope that it could be applied to a problem of intangibles such as are found in the work of the Agricultural Extension Service. His guidance and encouragement will be a lasting gift.

Members of the Agricultural Economics Staff of Michigan State College supplied useful ideas and materials. Of particular help were Professors Glenn L. Johnson, James D. Shaffer, James M. Nielson, and Dale Hathaway, for their suggestions concerning ideas expressed in the thesis. Special acknowledgment is given Dr. T. K. Cowden, Department Head, for providing the opportunity to complete the work with a resulting sacrifice in effort on normal assignments.

Gratitude is especially given Mrs. Charles Stanulis, who typed the manuscript in its several forms.

Finally, the encouragement and assistance given and the sacrifices made by the writer's wife throughout are affectionately acknowledged.