AGRICULTURAL ECONOMICS PERSPECTIVES:
ISSUES AND APPLICATIONS

Agricultural Economics: A Critical Review Of The State Of The Science
By James E. Martin

Multi-Disciplinary Research: An Economist's Perspective
By Luther Tweeten

Research Needs In Agricultural Economics From The Extension Perspective
By J. Michael Sprott

Discussion Of Research Needs In Agricultural Economics
From The Extension Perspective
By J. C. Williamson, Jr.

SOUTHERN RURAL DEVELOPMENT CENTER
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FOREWORD

The work of agricultural economists has broadened considerably in scope during the past 50 years primarily as a result of improved methodologies and expansion of the number of areas considered relevant to agriculture. As scientists, agricultural economists increasingly find themselves faced with problems of determining the most beneficial direction and scope for their research and with obtaining adequate support for that research.

The four papers included in this booklet were presented at the Southern Association of Agricultural Scientists meeting held February 2-6 in Houston, Texas and reflect some prominent present-day concerns of agricultural economists. In "Agricultural Economics: A Critical Review of the State of the Science," James E. Martin presents a chronological view of the achievements of agricultural economists since the 1920's and points out that they need to implement new theories and techniques in order to retain their respected scientific status. Luther Tweeten discusses problems which have hampered multi-disciplinary research efforts and suggests ways in which these efforts can be made more fruitful in "Multi-Disciplinary Research: An Economist's Perspective." J. Michael Sprott expresses a need for improvement in the types of research done by agricultural economists and for more support for these scientists from their administrators in "Research Needs in Agricultural Economics from the Extension Perspective: Attitudes Vs. An Inventory of Needs." Finally, J. C. Williamson, Jr. responds to Sprott's paper in a "Discussion of 'Research Needs in Agricultural Economics from the Extension Perspective'" and offers his own insights into the performance of the state agricultural experiment stations.

Continued improvement is an important objective in any field of endeavor. The ideas for research and suggestions for applications of the work of agricultural economists presented in these four papers should aid in the continued improvement of agricultural economics.

William W. Linder
Director
Southern Rural Development Center
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AGRICULTURAL ECONOMICS: A CRITICAL REVIEW OF THE STATE OF THE SCIENCE

by

James E. Martin
Vice-President for Agriculture
University of Arkansas
AGRICULTURAL ECONOMICS: A CRITICAL REVIEW OF THE STATE OF THE SCIENCE

The title of this paper provides almost unlimited latitude for discussions of the contributions, or lack thereof, of the scientists engaged in the application of the body of knowledge commonly referred to as agricultural economics. In order to focus our attention more precisely, a frame of reference is needed. This frame of reference involves a definition term.

Selected Definitions

Let us begin by defining agricultural economics as the application of the social science of economics to the field of agriculture. The acceptance of this definition limits the discussion but insignificantly. First, there is the problem of defining the social science known as economics. Second, there is the problem of defining the field of agriculture.

In the first case, economics may be defined as the body of knowledge applicable to the study of how goods and services are produced and distributed. This body of knowledge is frequently sub-divided into the areas of micro-economics and macro-economics. Each of these areas of economics contains subsets of assumptions and theories associated with specific issues involving production, marketing, distribution and policy questions.

However, unlike the definition of economics, which has remained fairly constant since the time of Adam Smith, the generally accepted definition of agriculture has changed dramatically during the latter half of the twentieth century. The word agriculture was originally derived from the Latin to mean "field cultivation" and included the raising of plants and animals for food, clothing and other needs of man. However,
a more modern definition of agriculture includes many activities and firms which supply production inputs such as seed, fertilizer, fuel, capital and equipment utilized by farmers in the production process as well as those activities and firms engaged in processing, packaging, distributing and marketing food and fiber products. Thus, since the early 1900's when agricultural economics first began to be recognized as a branch of applied economics, the breadth and scope of the subject matter and issues involved have multiplied manyfold due to the broadening of the definition of agriculture. This broader definition also resulted in increased interdependence among the agricultural and non-agricultural sectors of modern society and multiplied the analytical complexities associated with the analyses of agricultural and other applied economists.

Modern transportation and storage technology which permit and encourage the increased marketing of food and fiber products in international markets have also contributed to the complexities involved in the field of agricultural economics. Today, decisions by foreign governments concerning food purchases and changes in weather patterns affecting non-domestic food supplies have a greater impact on domestic agriculture than has been the case in the past. These developments have required the introduction of international economic variables into our domestic agricultural economic thinking.

The Application of Economic Theories

Because agricultural economics as now defined is the "application of economics to the broad field of agriculture," it seems appropriate to review the conditions under which we have applied our economics before undertaking this "Critical Review of the State of the Science."
Generally, economic theory is based upon certain assumptions concerning man and his behavior, a limited set of resources and society and its institutions. Given these assumptions, various theoretical relationships are postulated to exist which explain the actions of individuals and groups of individuals for a given state of technology and a known distribution of the limited resources.

From a purely practical point of view, the agricultural economist has always had to make additional and more restrictive assumptions in his analyses in order to reduce the number of relationships and variables to an economical and manageable size. One of the first sources of error in applied economics occurs when a general economic relationship is simplified by an assumption involving a specific mathematical form for a relationship which is postulated to exist between a selected subset of variables.

Three types of error may be introduced into empirical analyses by these simplifying assumptions. Error may be introduced if the specific mathematical form of the relationship being investigated differs from that of the true structural economic relationship. Error may also be introduced because of the omission of relevant economic variables from the subset selected. And, finally, errors in the empirical analyses may be introduced by the inclusion of irrelevant variables in the analyses.

If several economic relationships are being studied simultaneously, empirical errors associated with the selection of the functional form of the economic relationships and the variables themselves tend to increase.

Another source of error in empirical economic analyses is the error associated with the actual measurement of the variables to be included in the analyses. Errors of measurement tend to be fairly
small in individual firm or farm analyses but become of increasing concern in the aggregation of observations across individuals, firms or sectors within the economy.

Until the 1950's empirical analyses were done utilizing rotary calculating equipment and statistical clerks. However, beginning in the late 1950's with the introduction of computer technology and new econometric techniques, new frontiers began to be explored. Activity analyses such as input-output models, transportation models and linear programming models began to replace budgeting and partial budgeting techniques. Linear and non-linear single and simultaneous equation systems began to replace the simple linear equations previously used. Thus, empirical models contained fewer restrictive assumptions and made greater use of empirical data, and the profession produced numerous comparative tests of empirical results generated using different forms of econometric models.

Interregional models and intertemporal analyses involving hundreds of relationships and thousands of variables have now been investigated. Results have been used in industry and for recommendations for individual farm and firm production plans, for projecting aggregate market supply and price conditions and for policy decisions.

Thus, during the last thirty years, the agricultural economist has acquired and assisted in the development of new and significantly more powerful analytical tools and theoretical capabilities with which to study and test economic theory as it applies to an ever broadening industry of agriculture.

A Brief Chronological Review

In order to divide this review for discussion purposes, I have selected three chronological periods.
The 1920's through 1949 Period:

During the early years of this period, the agricultural economics profession was an infant. However, it was during this period that the profession and its practitioners developed an identity and began to make practical contributions to agricultural production and efficiency and to the development of early agricultural policy.

During these early years, farms were practically self-sufficient, independent production units. Farmers purchased few production inputs, operated a diversified production plan and in many cases engaged in direct marketing of many products to the ultimate consumer.

During this period we observed the development of the initial stages of the processing, distribution and marketing complex which we have today.

Farm management studies received a great deal of attention from agricultural economists. These micro-analyses made use of budgeting and partial-budgeting techniques. Leading institutions in these studies included the USDA, Cornell University and Harvard. Experimental production research was oriented towards the generation of empirical data which could be analyzed in economic models involving factor-factor and factor-product relationships.

During this period macro-analyses were also undertaken in the form of cyclical price analyses which resulted in the identification of the cattle and hog cycles. Also early attempts at aggregate demand and supply analyses were undertaken.

However, these early pioneers in agricultural economics were hampered in their ability to estimate parameters of economic relationships involving more than five or six variables because of the costs and computational equipment available during the period. Despite this
limitation, the results of these empirical studies were of benefit to
farmers and policy makers alike because economic parameters were be-
ginning to be quantified in the form of estimates. The analyses were
fairly simple and straight forward, but the agricultural economy was also
much less complex.

The 1950's through 1969 Period:

It was during this period that the profession made its greatest
intellectual growth, established itself as an adult member of the
economics community and attracted numerous new economists to its fold.

The farm sector of the economy began to change rapidly during the
early 1950's as new technology moved rapidly from the laboratories to
actual production practices. Such developments as hybrid corn and new
crop varieties which responded to commercial fertilizers were developed.
New and more powerful and expensive production equipment was substituted
for labor, and the average farm size grew rapidly. Genetic improvement
in livestock and poultry, improved rations and livestock management
systems permitting concentration of numbers and improved health conditions
also contributed to increased specialization among farmers.

All of these forces contributed to the development of an agricul-
tural supply and service sector providing seed, fertilizer, equipment,
chemicals and capital inputs to the farmer through the marketplace.
The farmer became interdependent with this new supply and service sector
and almost totally dependent on the processing, distribution and marketing
sector of the economy. The definition of agriculture became so inter-
twined with historically non-agricultural sectors of the economy that
it became difficult to define clearly where agriculture begins and
where it ends. Improved transportation facilities and technology also
contributed significantly to the interdependence of agriculture and other sectors of the economy.

Modern computer technology and new analytical techniques involving optimization procedures were also introduced into the profession during this period. Thus, empirical economic analyses, for the first time, could be conducted utilizing hundreds of economic relationships and variables.

Given these new tools agricultural economists undertook literally thousands of micro-economic farm and firm management studies involving detailed budgets and complex production function estimates and incorporated these data into linear programming analyses. Factor-factor, factor-product and product-product economic relationships were investigated within the context of economics of scale.

In the area of macro-economics, aggregate and regional demand and supply functions were estimated utilizing simultaneous equation systems. Interregional and regional activity analyses involving input or factor use studies, water use studies, energy studies, employment studies, credit studies and income studies were developed. These studies are being conducted utilizing the basic analytical tools which were developed and refined during the 1950's and 1960's.

However, the industry of agriculture continues to grow more complex as domestic agricultural production and markets become more interdependent with foreign production, foreign markets and foreign governmental decisions. Thus, new and innovative analytical tools appear to be needed if we are to incorporate these important new variables of domestic concern into a more general framework for short-run and long-run analyses which include these international economic relationships.
From the author's point of view, it would appear that the profession has moved across the plateau it reached in the late 1960's applying its expertise to new areas of concern but has made less progress in developing the increased capability for conducting timely empirical general equilibrium analyses of today's complex industry of agriculture. Perhaps the complexity, data requirements and costs for such studies imply the need for a task force or consortium type approach and joint funding of such complex analyses.

Future Challenges

There will be a continuing need for empirical estimates of agricultural production functions, input supply functions and product demand functions. These new estimates must include the integration of the agricultural and non-agricultural sectors of the economy into models involving capital, labor, land use, water, energy and other agricultural production factors. These partial economic analyses should be conducted on a regional basis with sufficient internal identification to permit the results to be used in more aggregate general equilibrium type analyses.

Computerized data bases need to be developed for these standard regional models so periodic updating of parameter estimates can be made efficiently and the rate of change in structural parameters can be estimated. Modern computer technology should be utilized to generate from selected data bases individual firm, regional, interregional and inter-national economic models capable of providing both short-run and long-run estimates of the consequences of production, policy and other decisions and events on the agricultural and non-agricultural sectors of the economy.

The author is fully aware of the problems of model definition, data limitations, aggregation problems, computational problems and costs, and
interpretation problems which are associated with such analyses. It should also be emphasized that such models would not reduce the need for the partial equilibrium studies currently being undertaken. However, the macro-economic marketing and distribution analyses appear to be getting less attention relative to other types of micro-economic analyses.

Summary

Agricultural economists both individually and collectively have served agriculture and society well for the past 60 years. The profession has made significant contributions to the application of economic theory to the empirical measurement of economic parameters affecting a broad range of production, marketing, investment and policy decisions.

Since the 1950's the industry of agriculture has continued to become more complex, more interrelated with the non-agricultural sectors of the domestic economy and more interrelated with foreign markets and policy decisions. This increased complexity has generated a greater variety of analyses and increasing interest in capital, land labor, energy and rural development and other type issues.

Since the late 1960's, although computer technology has tended to lower the cost of empirical analyses, the available theoretical and empirical analytical techniques have remained virtually static.

The challenge of the 1980's will be that of developing more general economic models for empirical analyses. These models must be capable of being rapidly updated from data bases involving firm, regional, national and international data. Interpretation of these analyses must include estimates of the impact of various domestic and foreign policy, marketing, and production decisions on the regional supply, production and marketing sectors of both the agricultural and non-agricultural economy.
Additional attention should be given to the macro-economic analyses of marketing problems and the impacts of changing consumer demands on area resource requirements, employment and income distributions. Unless new, more general models of the agricultural sector can be developed, their parameters estimated and their logic tested empirically, the agricultural economists influence on economic thought and policy decisions is quite likely to diminish. If this influence does diminish, the agricultural economist will become more of a highly skilled technician rather than enjoying the respected scientist status the profession attained during the dynamic period from the 1950's through the 1960's.
MULTI-DISCIPLINARY RESEARCH: 
AN ECONOMIST'S PERSPECTIVE*

by

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*Oklahoma Agricultural Experiment Station Professional Paper 477. Comments of Gerald Doeksen and James Nelson were very helpful.
MULTI-DISCIPLINARY RESEARCH:
AN ECONOMIST'S PERSPECTIVE

To avoid confusion, I begin by defining several terms as used in this paper. A discipline encompasses a body of knowledge including theory, institutional configuration, and application in areas such as economics, sociology, statistics, or mathematics. Multi-disciplinary research refers to representatives of two or more disciplines involved at all stages of the research process including design, conduct, data processing, analysis, and interpretation. Interdisciplinary research refers to one professional performing research encompassing two or more disciplines. Cross-disciplinary research refers to one professional performing research in a discipline outside his primary interest.

Interdisciplinary research now is the rule, not the exception. The newest generation of economists is well trained in mathematics and statistics as well as economics. In addition, agricultural economists have considerable background in agricultural disciplines such as agronomy and animal science. The research problems which economists address, however, do not confine themselves to these disciplines. Research on relevant problems also entails disciplines of psychology, sociology, political science, history, demography, geography, and philosophy.

Decades, if not centuries, have passed since any scholar attempted to master all existing knowledge. To confine a degree program to manageable time dimensions in the face of an essential, expanding body of disciplinary knowledge, social scientists' graduate training must become ever more specialized while the research problems faced are becoming ever more generalized across several disciplines. The result
is increasingly irrelevant research which, to pass demanding scrutiny by disciplinary reviewers of disciplinary journals, must omit essential elements from other disciplines necessary to address relevant problems.

Like the family doctor, the social science generalist is an endangered species in this age of specialization. Yet, departments of social science formed to respond to broad problems needing attention have not been notably successful—the training has been shallow and a demand for their graduates has not materialized. Because the argument for excellence from rigorous specialization cannot be dismissed, while social science problems demand an increasing range of disciplinary excellence for solutions, multi-disciplinary research seems essential. Yet, in economics, multi-disciplinary research has fallen short of its promise.

**Impediments to Multi-Disciplinary Research**

It has been my good fortune to work in several multi-disciplinary environments. I spent a year at the Food Research Institute at Stanford University, another year at the Institute for Research on Poverty at the University of Wisconsin (Madison), and in addition served in two departments that included sociologists and economists. Experience in these settings as well as observation of other multi-disciplinary settings indicates that researchers from two or more disciplines will sometimes coordinate efforts in some phases (usually design and conduct) of research but rarely in all phases. Even in multi-disciplinary settings, sociologists tend to do their thing; economists their thing. Out of frustration, my response has been to become interdisciplinary and occasionally cross-disciplinary. But obtaining sufficient background in fields other than economics to inject their contributions into issues
of rural poverty, world food problems, etc., is no easy task. Multi-disciplinary research is the preferred approach if it can be made to work.

The failures of multi-disciplinary research trace in part to inadequate institutional administrative structures. Even where appropriate institutional structures have been present, problems of communication have been overwhelming.

Institutional Structure

Our institutions are not well organized for multi-disciplinary research. Most social scientists are in departments of economics, sociology, etc. Multi-disciplinary work seems to function well only with monetary incentives for collaboration. Since monies are allocated largely within departments by heads and within colleges by deans, opportunities for multi-disciplinary work across colleges are limited. Economists may be within the college of agriculture (or business) and sociologists within the college of arts and sciences (or behavioral sciences). Funding may be more dispersed with sources divided among grants, the agricultural experiment station and others. Few funding organizations insist on multi-disciplinary research. Johnson (1971, p. 737) has observed that, "When the multi-disciplinary demands of a problem or issue cross college or divisional lines, administrative support will be needed by someone more powerful than the competing deans or division heads involved. In the university, this means the president's office or someone working out of the president's office."

Johnson goes on to make recommendations that research personnel from various disciplines push for administrative action to organize multi-disciplinary teams to tackle current problems and issues, and recognize that assignment to such teams must be no longer than required
to make one's contribution to the solution to the problem or issue. He is particularly wary of establishing multi-disciplinary institutes or centers which may arise in response to a real need to research a problem. These institutes or centers become personal empires which continue to exist after the problem has been researched but fail to contribute to continuing disciplinary excellence or to respond to emerging real problems and issues. He suggests that several associations (e.g. sociology, psychology, economics) cooperate to provide professional awards for "distinguished public administration of multi-disciplinary issue-oriented, problem solving agrarian programs." Because professional awards are for the most part for disciplinary or interdisciplinary research, it also appears necessary to change the criteria for professional awards to recognize multi-disciplinary research.

Communication

If a species is separated, it eventually evolves into separate species unable to interbreed. Separation of social sciences into disciplines may eventually remove all chances of successful interface. Failure to communicate explains lack of success for multi-disciplinary research in favorable institutional settings. I participated some months ago on a small committee of economists and sociologists sponsored by the National Academy of Science to write a research proposal in rural development. The first issue was how to define "rural development." While almost apologizing for offering a platitude, I suggested that we define rural development as an increase in well-being of rural people. A rural sociologist quickly retorted "I couldn't disagree with you more! Rural development is defined as a class struggle!" Another rural sociologist disagreed, saying that in
his years of close observation of rural residents of eastern Kentucky no resident had shown that he perceived the low-income problem as a class struggle. Our committee was not communicating and we did not receive funding for the weak proposal submitted. The result of communication problems is a withdrawal to disciplinary research even within a multi-disciplinary setting.

In a recent article, Stanfield and Heffernan (1977, p. 57) write, "Good theorizing requires integrating knowledge on topics that ordinarily are considered separately—as economic, political or psychological. The expertise of these matters is divided among economists, agricultural economists, and a few other groups of academicians and practitioners, who too often fail to read each others' literature" [emphasis mine].

If lack of communication is the result of past lack of interaction among disciplines, continuing the old, separate ways will not help. In my judgment the key to good multi-disciplinary research lies in prior interdisciplinary understanding. I use the word "understanding" because neither formal training nor research in fields outside one's own discipline is required. What is required is a sense of capabilities and thinking going on in disciplines other than one's own. Each disciplinary paradigm must be challenged by others in workshops, seminars and other interactions. Initially, such interactions are likely to be acrimonious as disparate paradigms are compared. Administrators and researchers sufficiently conversant with other disciplines will know what and when these can contribute to the solution of a puzzle.

**Suggested Areas for Multi-Disciplinary Research**

Turning to several suggested areas of potential multi-disciplinary research cooperation, I am constrained in thinking by my background,
and apologize for any display of economic chauvinism. I realize I am asking sociologists and psychologists to help with some problems economists have long puzzled over. Most of the list requires measures of attitudes either as ends (well-being, perceived quality of life, etc.) or as means to change attitudes where these stand as obstacles to improving satisfactions in society.

Attitudes Conducive to Socio-Economic Progress

Economists are deeply indebted to sociologists (see Sewell and Hauser, 1975; Jencks et al., 1972) for understanding of the determinants of personal economic performance. In one sense, these studies raise more questions than they answer because they emphasize the overriding importance of socio-economic background and random elements in determining performance of the individual. What explains the socio-economic background and random elements? Economists tend to be economic determinists, of course, viewing economic progress as a function of the economic costs and rewards facing decision makers. They have given attention to institutions, particularly government, because these influence economic incentives through intervention in the socio-economic environment.

I have stressed three ingredients of economic progress: natural resources, institutions and attitudes. Comparatively few economists have recognized the latter ingredient, although it is probably the most important of all. Nations with similar natural resource endowments and institutions have widely different rates of savings, investment and economic growth. Among, as well as within, countries, the labor force differs in industriousness. Furthermore, it has been
argued that people receive the kind of institutions they ask for or
deserve—hence, attitudes influence institutions.

Despite the importance of attitudes to economic progress, knowledge
of what attitudes are conducive to economic progress and how attitudes
inimical to economic progress can be changed in less developed regions
of the U.S. or developing countries remains largely a mystery to
social scientists. (Man does not live by "bread" (economic progress)
alone, but few people go on to self-realization and personal fulfillment
without first having "bread.") David McClelland (1961), a psychologist,
has made impressive contributions but he stands out largely because
he is so alone. Much room remains for additional contributions in a
multi-disciplinary setting where the ideas of psychologists, sociologists
and economists can be hammered out on the anvil of each others con-
structive critique.

The Contribution of Socio-Economic Progress to Well-Being

Most economic theory rests on the presumption that the ultimate
objective of behavior is to increase human satisfaction, well-being,
quality of life or utility. But the analytical tools economists
have developed are not well suited to finding ways to increase human
satisfaction; we instead increase what we can measure—income. Since
sociologists have led the critique of such effort, I hardly need to
add to the criticism. With help from other social scientists, we
can use our tools to increase well-being and not just income.

I have attempted some incremental improvements. A number of
social-psychological scales measuring various dimensions of personal
well-being or quality of life were included in the Rural Income Main-
tenance Experiment conducted by the Institute for Research on Poverty
in the states of Iowa and North Carolina for three years beginning in 1970. Wilmer Harper and I (1977) related age, education, income and several other variables to an index of well-being made up of several scale components. Income accounted for a minority of the variance in the index of well-being, but the coefficients of the income variables were statistically very significant. The results, if confirmed by additional research in other settings, provide profound implications for the distribution of income. Well-being from income increased at a decreasing rate to approximately $40,000 per year per household, then increased no longer. The best fitting mathematical relationship indicated a straight-line marginal response of well-being to income, declining to zero at $40,000 of annual income per average household. (This income was outside the range of data, hence, the estimated point of zero marginal utility should not be taken very seriously).

On the average, an additional dollar received by a household with $5,000 of income (1970 dollars) brings twice the satisfaction of an additional dollar received by a household with $22,500 of income. Some may oppose on ethical grounds such income redistribution (requiring sacrifice, however small, by some to raise satisfactions, however large, for others). Hence, the implications for income distribution through efficiency gains are of special importance. To illustrate, a resource investment project with conventionally derived benefit-cost ratio of 4.0 providing benefits to households with annual incomes of $22,500 would contribute no more to satisfactions than a similar size resource investment project with a benefit-cost ratio of 2.0 providing benefits to households with annual incomes of $5,000. In the case of income redistribution, the size of the "pie" is given and the issue is
how to divide it. Any redistribution means there will be some losers as well as gainers. In the case of distribution of income, the size of the "pie" is expanded by economic growth and efficiency—the issue is how to distribute gains from growth. There need not necessarily be any losers.

Some social scientists might be tempted to recommend redistribution of income if the above relationship between income and satisfaction is judged valid. However, economists caution about the cost of redistribution. Redistributing income from the rich to the poor can reduce incentives, aggregate labor input, capital input and national output through lowered savings, investment and efficiency. It is possible that dissatisfaction from reduction in the economic "pie" offsets the satisfaction gained from more equal distribution of the economic "pie". Although on face value, the foregoing linear incremental well-being function argues for egalitarianism, a consideration of the economic cost of such redistribution suggests that, for welfare maximization in society, the distribution of income be less than equal but more equal than is the case currently in our society (Tweeten and Walker, 1977). Continuing multi-disciplinary work on this subject is very important.

This nation now publishes a social indicator's report, a welcome addition to the plethora of economic indicators. Still we place undue emphasis on the real Gross National Product (GNP) to measure overall progress of the nation. The GNP is highly unreliable as a measure of well-being because it examines only the level and not the distribution of income, double-counts income and presumes that dollars are directly proportional to well-being. Why not explore the possibility
for an annual, national survey of well-being based on scientific sampling techniques and well tested attitudinal scales relating to how individuals feel about their quality of life. The survey, which should contain enough detail and respondents to isolate pockets of discontent, could be responded to by public policies with as much vigor and respect as unemployment and GNP are now accorded.

**Rural Development**

Economists and sociologists have contributed much to knowledge in the field of rural development. Unfortunately, the contributions of the disciplines are being fragmented into two "schools". One school closely identified with sociologists holds that community development is a *process* whereby means are used to reach development goals. Perceiving development as a process leads to emphasis by the development specialist on helping the community identify leaders, organize committees and ascertain goals. With formation of committees and identification of community leaders and goals, the development specialist leaves town. The "process" philosophy has been accepted widely, in part because it fit with federal rural development programs emphasizing local self-help, with a minimum of outside expertise and financial assistance.

But the philosophy began to unravel. Particularly in depressed rural communities, development committees began to fall apart when members became frustrated over lack of accomplishments, and it became clear that outside expertise and financial resources were needed to accompany the first step, organizing the community, with steps of Planning and implementation. The second school of thought holds that, for the planning and implementation phases, assistance of planners and
economists is useful. Thus, rural development is inherently a multi-disciplinary activity, requiring for success the contributions of several disciplines.

Other

Economists have difficulty dealing with environmental problems in no small part because the price mechanism does not give very clear or accurate signals of costs and benefits of protecting the environment. Other social scientists have worked much more than have economists with non-price measures of costs and benefits and can provide useful insights.

Non-price elements are present in several community services. Ascriptive dimensions of schooling are an example. Do small schools promote better attitudes toward citizenship, personal adjustment, etc., than large schools? Sociologists have worked with such issues but their efforts have not been combined with those of economists to arrive at a more nearly optimal size and locational pattern for schools.

Many of these same issues arise for the small farm, now receiving substantial attention from Washington. Economists have provided rather overwhelming evidence of economics of size in farming and society seems to be willing to subsidize small farms to a considerable degree to have more of them around. What are the ascriptive advantages of small farms? Do they really produce "better" people than nonfarm residence? Or does the public romanticize the small farm with a socio-economic image at considerable variance with reality?

These by no means exhaust the opportunities for multi-disciplinary research. The list seems long enough to demonstrate the need for cooperation among disciplines to research problems that do not fall within the paradigm of any one discipline.
Summary and Conclusions

If component disciplines of the social sciences require ever greater specialization while problems require ever greater generalization among disciplines, a good case is made for multi-disciplinary research. But multi-disciplinary research has not fulfilled its promise. How many research publications have you read that have been co-authored by an economist and a sociologist? Without greater interaction among social scientists, component disciplines will become so far apart that communication among them will become all but impossible. I submit that institutional changes and greater interdisciplinary activity are the precursors of successful multi-disciplinary research. The list herein of possible areas for multi-disciplinary research ranges from small farms to national development.
References


RESEARCH NEEDS IN AGRICULTURAL ECONOMICS
FROM THE EXTENSION PERSPECTIVE:
ATTITUDES VS. AN INVENTORY OF NEEDS

by

J. Michael Sprott
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It would be presumptive of me to inject an Alabama bias into the
rank ordering of research needs which should be addressed by the agri-
cultural economist; I prefer to address the issue of how priorities
will be set and how the use of the research will be brought about.

These topics have received much attention over the last decade
in the journals of both the Southern Agricultural Economics Association
and the American Agricultural Economics Association [1, 2, 4, 5, 9, 11,
12, 16, 17, 18, 20, 22, 23, 24 and 27].

Adding new light to these issues is compounded by the problem
exposed on Figure 1 [25]. In the vast majority of the states, the
Pogoian thesis is correct insofar as extension and research endeavors are
concerned; "We have met the enemy, and he is us." Joint appointments
(faculty rank, tenure, equal treatment) allow or foster the immediate
interaction between extension and research; there the dichotomy is
normally embraced within the same scientist, in contrast to a separa-
tion between the extension arm and the research arm which remains at
only a few land grant institutions. For my introduction, it should be
evident that a professional career spent in Arkansas, Texas and Alabama
has led me to see only the separate extension-research system in opera-
tion, and that is the base from which my comments and observations must
therefore be taken. Accept, then, this paper not as an academic treatise
but as a reasoned plea for rational and relevant research from the
agricultural economist, and realistic attitudes on the part of the
administrator of these scientists.
Figure 1. States Where Cooperative Extension Service Staff Do Not Have Academic Rank, Tenure Joint Appointments (1978)*

[Map of the United States showing states with cooperative extension service staff not having academic rank, tenure joint appointments marked with shading.]

[Shaded areas indicate states that do not participate in faculty status, etc.]
As an extension administrator and earlier in the role of area farm management specialist, it is evident that extension's greatest need is for hard, relevant facts. Paraphrasing a recent statement drives this point home: "A basic fact about (the) Extension (specialist), which must not be overlooked, is that (the specialist) we can not be any better than the quality of subject matter (he) we dispense(s) educationally. Further, we must recognize that (his) our subject matter sustenance comes from applied research. Clearly (his) our role is that of interpreting applied research results in real life situations as found on the farm, in the community, in the marketing firm, and in policy making actions" [18]. This is a listing of research needs (or audiences) about which I will have more to say later.

I agree completely with Kolmer when he says: "The acceptance of the total output of the land grant university is materially affected by the creditability of the extending system attached to that land grant university. It (extension) must be responsive in the sense that it recognizes the problems facing the individual and the community are the problems they consider as high priority problems to be worked on, rather than solely working on problems that interest, stimulate, and intrigue the individual extension or research worker" [15].

Thus, the challenge for research lies "in appropriately assessing the signals received from continuing education (extension) and balancing them against research interests generated by the research staff" [8]. The very essence of the extension-research interface is present and pervasive in the above few paragraphs, stemming from a balanced research program, yielding an effective extension system, resulting in recognized impact on and support from our clientele groups.
Attitudes

Not all research will or should be stimulated by investigations into clientele needs by the extension specialist; basic research in new methodologies, such as simulation techniques, very probably sprang from the curious mind of one or more researchers, unaided or unfettered by the extension specialist performing his role of problem identification. However, it does seem myopic when members of our own discipline [7, 10, 14 and 21] address the issue of "Agricultural Economics: 1950-2000" and fail to mention even once the linking mechanism which extension performs in the equation of research-clientele needs-research. Those of us in extension are particularly wounded when we read that "researchers must, in the future, not assume that they have done their job if they supply their clientele with a random assortment of pieces of positivistic knowledge obtained from ad hoc excursion research" [10]. We contend that the urging (by research administrators) for researchers to develop appropriate organizational means and processes for interacting with our clientele for the purpose of identifying and defining its research needs is unnecessary; extension can and will do that very job provided the agricultural economist engaged in research is willing to share and to interact.

The license to operate unilaterally, whether it be the agricultural economist functioning as a researcher or functioning as an extension specialist, has been revoked, if it were ever issued at all. The new farm bill, the resultant USDA reorganization, the President's FY 1979 budget recommendations, the ever blossoming regulations from EPA, OSHA, etc., messages coming loud and clear from state legislatures regarding the level and utilization of state appropriations, the emphasis
on competitive grant research funding within USDA budgets, and the generally pervasive demand for accountability, all attest to this fact. A basic need, then is for the agricultural economics researcher to express a willingness and desire to work with, share with, and prosper with the extension specialist.

A second source of changing attitudes must be the administrators to these agricultural economists. Holding out single or senior author journal articles as a major indicator of promotability of staff seems suspect in light of the fact that our 3,000+ regular members submit about 300 manuscripts per year with about 100 ultimately published in the AJAE. Poor odds, poor decision making. Lee Kolmer reviews both this issue and the issue of multidisciplinary research and extension, with critical recommendations for administrators: "The recognition of the opportunity for effective team research and extension, and the commitment to such activity can not just come from economists. It must all come from other disciplines. This, I believe, is one of the challenges that faces administrators of agricultural colleges (and department heads), agencies, government agencies and agribusiness firms. In universities there is a great temptation for scientists to talk to each other through refereed journals. The reward system fosters this practice. This is true in too many ways at my own institution, and I am quite certain that it is true at many other institutions. However, this does not make it right or necessarily useful under today's conditions. Today's problems require the talents of numerous disciplines, and administrators must modify reward systems so that individual research and extension staff members can indeed see that commitment to teamwork will not only produce useful output for clientele but also will result in recognition of their efforts. This is a very substantial challenge
for those of us in administrative positions in universities" [16, p. 780].

This is not to say that "all faculty in economic research would maintain constant, day-to-day liaison with research counterparts in other departments, but such liaison must be encouraged and stimulated with more vigor than in the past. Economists must be more aggressive in their dealings with biological scientists. Too frequently the search for economic significance is undertaken or even considered only after the data is already in hand" [17].

Administrators within the land grant institution, be they deans, directors or department heads, must also pay attention to constructive criticism being received from another of our major clientele groups, that being agribusiness. An example would be: "The orientation of extension economists toward agricultural industries is saving the colleges of agriculture from a rather complete isolation from agribusinesses....I do not speak for myself alone when I say the majority of economists in agribusiness firms feel that agricultural economics as practiced on the university campus virtually has 'no market' for its research--other than among other university economists" [23]. One man's opinion? Possibly so, but worthy of our serious concern and attention.

A third source of changed attitudes must be the environment itself. Our region, the South, is in particular need of your attention, given the dramatic and permanent changes which are under way in this area. The South currently uses a third of the nation's cropland but we have the nation's largest reserve of potential cropland. An additional 139 million acres of Class I, II and III land could conceivably be tilled with about one-half of this reserve currently in pasture
lands and one-fourth in wooded land [26, pp. 4-6]. Between 1960 and
1975, real personal income grew in our region 50 per cent faster than
the national average, our manufacturing employment increased by twice
the percentage amount of the national average, our population growth
was twice the national rate between 1970 and 1975, we produced over one-
third of the $90 billion U.S. agriculture output and our percentage
is increasing. Further, the economic climate in the South (a function
of tax levels, government intervention, unemployment, etc.) shows that
seven of the top 10 states in the nation are in the South, with Alabama
second only to Texas insofar as overall positive economic climate sug-
gesting dramatic, positive economic growth. We are where the action is
or soon will be!

Strictly from an agricultural basis, it has been noted that:
"Important implications for the South are that the region's competitive
position in international markets may be superior to its position in
the domestic market for several important commodities. Particularly,
in the case of feed grains and soybeans, and associated livestock
activities, the South is a marginal producing area in the United States.
However, the region may have a competitive advantage over much of the
world outside the United States. Rice, peanuts, citrus, and wheat
also offer considerable potential for the South in international markets"
[19]. Equally enthusiastic statements could have been made or found
regarding natural resource economics, community resource economics,
public policy issues, and all of the other subdisciplines that the
agricultural economist finds himself involved in.

Research Needs

In terms of particular research areas, rather than the above-
mentioned attitudes on the part of the researcher or administrator,
I would offer the following suggestions, few, if any, original, but possibly ordered or emphasized differently. This listing would be ordered by decreasing usefulness to extension as we deal with our agricultural clientele:

1. Commercial agriculture, with great emphasis on energy, economic thresholds of pesticide applications, implications of the new farm bill on farm growth, continuing attention to the impact of the new tax bills on estate and personal taxes, credit planning and acquisition, small or low income farm management research, forestry management, management on non-typical commodities such as shrimp and catfish, cooperative marketing mechanisms, and others too numerous to mention.

2. Natural resource economics, giving particular attention to the "Closed Earth" concept (as espoused by Boulding and mirrored by Kelso).

3. Rural resource development, or alternatively, community development, or alternatively regional economics.

4. International trade, including input-output coefficients from foreign trade of American agricultural products.

5. Economic theory or new methodology, in comparison to mission oriented or pragmatic research.

I have not mentioned the extremely critical need for public advice and assistance of public policy economists, employed within the land grant institution and backed by the breadth of policy oriented research. A great deal of our public policy dealing with agriculture is formulated through research and extension efforts in the Midwest and interpreted in Washington, culminating in farm bills which are finally hammered into shape after exposure to the political processes of hearings and lobbying.
Objective and well grounded voices must be heard from the South from
within the land grant institutions; our present audiences deserve this,
and our future clientele groups depend to a great extent on this.
REFERENCES


DISCUSSION OF "RESEARCH NEEDS IN AGRICULTURAL ECONOMICS FROM THE EXTENSION PERSPECTIVE"

by

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DISCUSSION OF RESEARCH NEEDS IN AGRICULTURAL ECONOMICS FROM THE EXTENSION PERSPECTIVE

I identify six distinct topics which receive some attention in Sprott's paper. They are: (1) differences among land grant universities in the organizational status of the state agricultural extension service and in working relations between research and extension faculty; (2) the way in which clientele needs should be identified for use in establishing research priorities of the state agricultural experiment station; (3) multidisciplinary research, the university reward system and research priorities of faculty employed by the state agricultural experiment station; (4) the image of agricultural economics research from the agribusiness point of view; (5) effects of economic conditions in the South on research priorities in that region; and (6) Sprott's personal rank ordering of major research areas within agricultural economics. I commend Sprott for recognizing the relevance of these six topics to his subject. My principal criticism is that he did not use a few introductory paragraphs to develop an organizational framework for his paper so that the relevance of these topics to one or more central themes might be more easily understood.

Most of Sprott's paper deals with the broad question of extension's need for research results without regard to subject matter or discipline. There are two important and relevant issues which he develops. The first is performance of the state agricultural experiment stations in meeting the needs of the state cooperative extension services for research results. The second issue is the land grant university as an environment for the conduct of applied research in agriculture. I will direct my comments to those two issues rather than to a detailed
discussion of Sprott's paper. I will refer to Sprott's paper at a few points in the course of my comments.

Performance of the State Agricultural Experiment Stations

One concludes from Sprott's paper that the state agricultural experiment stations have not been responsive to the needs of the state cooperative extension services for research results. Much of this criticism is valid, but much of it is not. One of the greatest causes for erroneous criticisms of this type is failure of those in extension to distinguish between research results needed and information needed.

The cooperative extension service in a given state has need for a great variety and large volume of information and should utilize a variety of information sources. The results of recent or current research by research counterparts in the local agricultural experiment station is only one of those sources. Some other sources of information include observations on the performance of ongoing activities in industry and government; result demonstrations and development activities conducted by industry, industrial organizations and agencies of government; statutes enacted by legislative bodies; ordinances, rules and regulations established by agencies of governments; accumulated knowledge generally recorded and available in written form; extension-conducted result demonstration; and last but not least, extension program planning and development.

This enumeration of different sources of knowledge or information should remind us that the acquisition of new knowledge and further interpretation of existing knowledge is not uniquely a research activity. Rather, new knowledge and further interpretations of knowledge may be acquired by the human agent observing and interpreting any activity about him. One
may think of such observations and interpretations as occurring over a continuum extending from the most casual and incidental observations and interpretations through the most formally organized research.

In this continuum, extension result demonstrations and extension program planning and development are at the boundary of applied research, and as Sprott noted, those extension activities do interface with applied research. It is understandable that near this interface there is a gray area which might logically be classified as either research or extension. However, it is my observation that in recent years, state extension administrators, and to a lesser degree other state extension personnel, have increasingly gone beyond this gray area and have looked upon many activities as research which should be readily accepted as extension result demonstrations or program planning and development.¹

One cause for this type of criticism by extension administrators and specialists is the rapid increase in costs of performing the more sophisticated result demonstration and program planning and development work required if extension is to effectively serve an increasingly sophisticated clientele. Extension administrators appear to understand that the more sophisticated clientele require better trained specialists, but they do not seem to understand that those better trained specialists require a great deal more support if their skills are to be fully exploited. Their thought process appears to be as follows: "Historically the state agricultural experiment station has provided its scientists with sophisticated and costly equipment, supplies, facilities, services and support

¹I interpret Sprott's comment that "Extension's greatest need is for hard, relevant facts" as reflecting this type of erroneous thinking.
personnel, but extension has not. Therefore, when extension finds it necessary to pay for what have traditionally been research support items, that is prima facie evidence that extension is engaged in research." The rapid rate of inflation in recent years has aggravated this problem by putting both extension and station support budgets under pressure.

One other source of extension criticism of the state station arises because of failure to recognize that the station is not the only source of applied research results which extension should use. Some other sources are other state stations, other research units of the state land grant university and other universities, research units of the U. S. Department of Agriculture and other federal agencies, other research agencies of the state, and private research organizations. Thus, there is not and should not be an applied research counterpart within the state station for every activity in which extension is engaged. Stated differently, it would be an inefficient use of the state station's resources if it were to try to provide applied research support for each activity in which the state extension service is engaged.

In recent years, extension has moved into nontraditional areas, areas in which the state stations had little or no existing programs and little or no new funds with which to expand into those new extension areas. Moreover, some of the new and expanded extension programs, such as human nutrition, area development and housing, are areas in which other public and private organizations are already generating considerable relevant applied research results.
The Land Grant University as an Environment for Applied Research

Sprott argues that research personnel employed by the state station have no need for contact with extension clientele other than that which might arise out of their routine working relations with extension. He says: "The challenge for research lies in appropriately accessing the signals received from ... extension and balancing them against research interests generated by the staff ... resulting in recognized impact on the support from our clientele groups. ... We content that the urging by research administrators to develop means and processes for interacting with our clientele for the purpose of identifying and defining its research needs is unnecessary; extension can and will do that very job."

It appears to me that this argument is inconsistent with Sprott's plea for more applied research by the state agricultural experiment stations to provide information needed by extension's clientele. Despite the fact that the state station is only one of many information sources available to extension, it is a critically important source in many problem areas. It is the only information source which should be expected to perform applied research tailored to meet the unique needs of those within-state agricultural clientele who provide the bulk of the continuing support for both the state agricultural experiment station and the state cooperative extension service. What is badly needed is an effective means of insuring that those unique needs are identified and that resources of the station are utilized in an efficient way to attack the more important problems.

The greatest difficulty in developing such a responsive station program is the adverse climate in the college of agriculture within the land
grant university. The land grant university and college of agriculture have moved very rapidly toward the general university model and away from the land grant tradition of service to the people at large. There has been a broadening of intellectual, vocational and disciplinary interests and skills within the land grant university and college of agriculture. The land grant faculty has been given ever greater control of the faculty reward system so that the broader interests and skills have been reflected in that reward system. Station administrators have had their administrative authority eroded along with that of the academic administrators in the university, despite the nonacademic purpose of the agricultural experiment station. There has been a sharp decrease in relative weights given the more practical and applied faculty contributions as opposed to the more intellectual and theoretical when evaluating faculty performance. A majority of the station's scientists are jointly employed by the academic program of the university and the weight given academic performance is grossly in excess of the share of salary and support provided from the academic budget.

An essential element in any effort by state agricultural experiment station administrators to restore responsiveness to clientele needs is increased direct contact and interaction between station scientists and the station's and extension's common clientele. Such contact will have some direct effects on the faculty member's personal research priorities. In addition, the clientele may be encouraged to seek changes in the university system which will redress the reward system for faculty employed or supported with agricultural experiment station funds and the authority of station administrators. Extension administrators and specialists can help such efforts succeed by cooperating with station administrators to develop direct contact and interaction with clientele
groups. The future well being of both the state agricultural extension service and the state agricultural experiment station depends upon the success of those efforts.
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