Establishing Agribusiness Research Priorities and Coordinating Agribusiness Research*

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Improved agribusiness research priorities could help to expand research in this area and produce other benefits, but it will be difficult to channel agribusiness research into one or a few priority areas. This is so since considerations relating to usefulness and feasibility call for maintaining agribusiness research in a number of distinct areas. US and Canadian researchers propose to establish an agribusiness research coordinating committee which will emphasize research on competitiveness. Prescriptions for coordinating the competitiveness research and other agribusiness research are discussed together with commandments for carrying out agribusiness research effectively.

INTRODUCTION

Academic work in agribusiness has achieved a prominent profile during the 1980s. This high profile has been reflected in developments such as the launching of *Agribusiness: An International Journal* in 1985; the staging of a White House Conference on Agribusiness in 1987; establishment of chairs in agribusiness in universities in the US, Australia, and New Zealand; increased action on the part of committees of the American Agricultural Economics Association (AAEA) dealing with agribusiness research and teaching; the formation of a

*This article is based partly on material developed by the authors for a meeting of agribusiness researchers held in Las Vegas, Nevada on June 13–14, 1988 where a proposal to form a Western Regional Coordinating Committee for agribusiness research was considered. The research appearing in the article was supported by the Purdue University School of Agriculture and the Agricultural Experiment Station, Purdue Journal Paper No. 11873.

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Agribusiness, Vol. 5, No. 4, 315–333 (1989)

CCC 0742-4477/89/040315–19$04.00

Center for Agricultural Business at Purdue University in 1986; and the launching of MS and PhD programs in Agribusiness at the University of Nebraska in 1988. Indeed, the activities of the researchers whose views on agribusiness research priorities appear later in this article represent a manifestation of this new, high profile.

This activity reflects many developments, including those that have accompanied efforts by academic agricultural economists to diversify teaching, research, and extension programs into perceived growth markets, concerns about the quality of the product being generated by new entrants into agribusiness instructional programs, and innovations in research. The research and conceptual innovations include Porter's writings on *Competitive Strategy*[1] and *Competitive Advantage*[2] which have made strategic management more prominent in business and academic circles, including those relating to agribusiness. Porter's use of industrial organization (I/O) concepts to show how businesses can gain competitive advantage has made I/O economists hot properties in business schools, business-oriented agricultural economics departments, and as consultants.

In these efforts, agribusiness research may be receiving inadequate emphasis. Babb, for example, pointed out that the decline in agribusiness research which has undergirded teaching programs does not bode well for the quality of collegiate teaching.[3] He added that if such developments cause agricultural economics departments to lose students interested in agribusiness employment, those departments will face substantially lower enrollments. Davan, in a study used to define research priorities for agricultural economics, asked farm suppliers, banking/finance officials, farmers, farm retailers, consumers, academics and government officials to rank in terms of importance 13 areas of research which might be carried out by agricultural economists.[4] Agribusiness management research was ranked fourth among the 13 categories in terms of importance by the respondents. However, funding by agricultural experiment stations in the North Central region of the US for such economic research ranked 11th among the 13 categories in fiscal 1985, and received only 2.2% of the research dollars administered by the experiment stations.[4]

This article represents an effort to identify important agricultural business research priorities. The findings are directed mainly toward agricultural economists who plan to increase the amount of research they do in agribusiness. Following a well accepted convention, agribusiness is defined using the Davis-Goldberg terminology as the ". . . sum total of all operations involved in the manufacture and distribution of farm supplies; production operations on the farm; and the storage, processing, and distribution of farm commodities and items made from them".[5] It is assumed that research on the full range of subjects encompassed by this definition is fair game for the agricultural economist who possesses modern economic tools and a knowledge of agribusiness. It is recognized, of course, that research on "agribusiness" and research on "agribusiness management" are not synonymous.[6] Sonka has correctly pointed out that research in the latter area deals with a smaller set of issues.[6] The questions addressed in this article are "What are high priority areas for agribusiness research?" and "How can this high priority research be coordinated to increase its value to the customer?" The article concludes with 10 commandments which should be useful for carrying out agribusiness research.

PREVIOUS WORK ON AGRIBUSINESS RESEARCH PRIORITIES

A long list of high priority research areas could be generated by defining the range of subjects as broadly as proposed. Fortunately, recent surveys and articles help to narrow the choices. As noted below, suggestions made at an AAEA Agribusiness Workshop held in Reno, Nevada in 1986 and by Davan in his report on identification and prioritization of researchable questions in agricultural economics[4] represent rich sources of important research areas. The list of 10 agribusiness research areas appearing below was developed primarily from those sources.

Agribusiness Research Area	*Identified as an Important Research Area by*
• Management Information Systems	AAEA Workshop Participants[7]
• Financial Analysis	AAEA Workshop Participants[7]
• Marketing Management	AAEA Workshop Participants[7]
• Business Performance Evaluation	AAEA Workshop Participants[7]
• Business Competitiveness, Emphasizing International Competitiveness	Sporleder,[8] Davan[4]
• Impact of New Technologies	Sporleder[8]
• Strategic Management	Rogers and Caswell;[9] Westgren, Sonka, and Litzenberg[10]
• International Trade	Davan[4]
• Managing Innovation, Change, Risk, and Organizational Design in an Uncertain Environment	King and Sonka[11]
• Problems of Small Agricultural Businesses	Dobson and Matthes;[12] Scott and Dobson;[13] Schuh[14]

The above list is by no means exhaustive; nor are these areas mutually exclusive. However, the areas are frequently mentioned in the literature and have been identified by persons in addition to those cited in the schedule as important agribusiness research areas. But even this ostensibly manageable list of 10 items exhibits more of the characteristics of a laundry list than a set of research priorities, especially if one considers all the research that might be carried out under topics such as "strategic management" or "financial analysis". Davan[4] suggests that agricultural economists frequently fail to develop clear, concise, and prioritized research questions. There are no good excuses for failure to develop clear and concise research questions. But, as noted below, prioritizing agribusiness research questions is complicated by the multiple uses made of such research and the feasibility of funding and conducting the research.

SURVEY OF AGRIBUSINESS RESEARCHERS

In an effort to establish priorities, 17 researchers from 14 universities in the US and Canada who met in Las Vegas, Nevada on June 13–14, 1988 to consider forming a regional committee on agribusiness research were asked to assign a

Table I. Ratings for Agricultural Business Research Areas in Terms of Potential Usefulness and Feasibility by 17 Agribusiness Researchers.

Potential Usefulness and Feasibility of Research in Areas	Agricultural Business Research Areas[a] (1) Management Information Systems	(2) Financial Analysis	(3) Marketing Management	(4) Business Performance Evaluation
Potential Usefulness of Research for:				
(1) Providing Knowledge Base for Undergraduate Courses	2.4	1.7	1.6	2.2
(2) Providing Knowledge Base for Graduate Courses	2.1	1.9	1.9	2.1
(3) Providing Information for Use in Management Workshops	1.9	1.6	1.6	1.9
(4) Providing Information for Use in Extension Programs	2.1	1.8	1.8	2.3
(5) Supporting Economic Development Initiatives of the State	3.2	2.8	2.3	2.5
(6) Providing Information for Use in Decision Making by Firms	1.6	1.6	1.5	2.0
(7) Generating Useful Public Policy Implications	3.6	3.0	3.3	2.8

(8) Creating Opportunities for Major Scientific Advances	2.7	3.3	2.8	3.1
Average	2.4	2.2	2.1	2.4
Feasibility of Research				
(9) Financial Support for Conducting the Research Can be Obtained from Firms	2.1	2.4	1.9	2.7
(10) Experiment Station, Other Government and Foundation Support is Available for Carrying Out the Research	2.4	2.5	2.5	2.7
(11) Needed Data Can be Obtained from Firms and Other Sources	2.2	2.4	2.4	2.4
(12) Opportunities Exist to Carry Out the Research as a Cross-Disciplinary Effort	2.0	2.6	2.5	2.4
Average	2.2	2.5	2.4	2.6

[a]Meaning of scores entered in body of table: 1 = Strongly Agree; 2 = Agree; 3 = Neither Agree nor Disagree; 4 = Disagree; and 5 = Strongly Disagree.

[b]Emphasizes international competitiveness.

[c]Emphasizes studies which would help businesses to expand exports or compete effectively against imported products.

Table I. (*Continued*)

Agricultural Business Research Areas[a]						
(5) Business Competitiveness[b]	(6) Impact of New Technologies	(7) Strategic Management	(8) International Trade[c]	(9) Managing Innovation, Change, and Risk	(10) Problems of Small Businesses	Average
2.6	2.6	1.7	2.3	1.9	1.9	2.1
2.1	2.4	1.7	2.1	1.9	2.1	2.0
2.2	1.9	1.6	1.9	2.1	2.1	1.9
2.5	2.2	2.0	2.6	2.5	2.1	2.2
2.0	2.2	2.2	1.8	2.8	2.0	2.4

2.2	2.3	1.8	2.0	2.3	2.0	1.9
1.9	2.0	2.8	2.1	2.4	2.4	2.6
3.0 / 2.3	2.2 / 2.2	2.6 / 2.0	2.8 / 2.2	2.4 / 2.3	3.3 / 2.2	2.8 / 2.2
2.6	2.2	2.1	2.3	2.5	3.1	2.4
2.5	1.9	2.7	1.9	2.2	2.3	2.4
2.9	2.8	2.4	2.6	2.6	2.5	2.5
2.3 / 2.6	2.5 / 2.4	2.3 / 2.4	2.6 / 2.4	2.2 / 2.4	2.1 / 2.5	2.4 / 2.4

potential "usefulness" and "feasibility" score to the 10 agribusiness research areas listed in the schedule. The criteria used in the questionnaire completed by the researchers for rating the research areas according to usefulness and feasibility appear in the first column of Table I. These criteria were selected by the authors to reflect comments received from officials of agribusiness firms, experiment stations, and granting organizations on the determinants of the usefulness and feasibility of research. Respondents were asked to assign numbers ranging from 1 to 5 to the cells in Table I where 1 = strongly agree, 2 = agree, 3 = neither agree nor disagree, 4 = disagree, and 5 = strongly disagree. Thus, if a respondent strongly agreed with the statement that research on "management information systems" provides a potentially useful knowledge base for undergraduate courses offered by his department, then the respondent would place a "1" in the cell appearing in (cell 1,1) of Table I. Each respondent was instructed to rate the potential usefulness and feasibility of research for his department or unit, not for some general group of departments or units.

Areas receiving the strongest average agreement ranking (lowest score) from the researchers would have a claim on a high priority. However, variations in departmental needs and in the feasibility of doing different types of agribusiness research in the departments represented were expected to make a clear consensus for one or a few areas unlikely. In the Department of Agricultural Economics at Purdue University, for example, more research is needed to undergird the executive education programs of the Center for Agricultural Business and the Department's undergraduate teaching program. Also, more applied research in international trade on subjects such as expansion of agricultural exports is needed to complement the trade policy work of the Department's trade researchers. Needs of other departments would likely produce a different set of priorities.

The feasibility of doing research in the different areas also could vary among departments depending upon working relationships between faculty and agricultural businesses that might provide data and funds for the research. Barriers to securing proprietary data from firms are well known. Typically, faculty must earn the trust of businesses and provide other incentives to the firms to secure such research data. Faculty members perceived to be "business bashers" generally will get neither funds nor data from firms.

Certain government grant funds are available to researchers only if businesses commit financial support for the research. For example, an academic researcher seeking National Science Foundation (NSF) support to establish an Industry/University Cooperative Research Center must have the potential to obtain approximately $300,000 per year in industry support to qualify for NSF financial support for the effort.[15] The opportunities to qualify for such support may exist in only a few departments.

Many agricultural experiment station directors exhibit limited fondness for financing firm specific agribusiness research. Some may warm to financing this and other agribusiness research if it has public policy implications. Researchers also might prefer to emphasize agribusiness research which yields public policy implications since, as pointed out by Marion, such research is often more attractive to graduate students and is more acceptable to editors of professional journals.[16]

Many research problems in all areas of science—including those in the sched-

ule—require cross-disciplinary efforts for solution. Important roles exist for business school faculty, general economists, and computer scientists in these agribusiness research areas. How accessible these scientists will be to the agricultural economist planning to do agribusiness research likely will vary from university to university.

RESULTS OF SURVEY

In analyzing the survey data, several questions were of interest. Do agreement scores differ by research area? By research use? By source of support (feasibility)? Are research area/use and research area/feasibility interactions important—i.e., does the relative ranking of the research areas depend on which research use is being considered? While the interest here may not be obvious, this question is important: statistically significant interaction effects imply that it is impossible to consider factors like research area and use individually. Finally, can research areas, uses, and sources of support (feasibility) be prioritized in some meaningful manner? To address these questions, the survey data were analyzed using analysis of variance, Tukey's studentized range test for multiple mean comparisons, and standard *t*-tests for comparing population means.[17] Relevant test statistics are presented in Appendix Tables A.I–A.IV. The responses of the 17 researchers regarding the potential usefulness and feasibility of the different agribusiness research areas showed the tendencies listed below (Table I).

- Strategic management received the strongest average agreement score (2.0) among the 10 research areas. However, there was little difference in the average agreement scores across the 10 areas; the hypothesis of equal means was not rejected at the .05 level (Table I and Table A.I).
- The mean agreement scores exhibit somewhat greater variation across the eight potential uses of the research. The null hypothesis of equal means is rejected at the .05 level. Using Tukey's method to group the eight means, there was no statistical difference in average agreement scores for the management workshop, firm decision making, graduate course, undergraduate course, and extension program uses ("A" group in Table A.III). Likewise, there was no statistical difference in the average agreement score for the public policy and scientific advances categories (the "D" group in Table A.III). This suggests that the 17 researchers perceived agricultural business research to be more useful for educational and firm decision making purposes relative to somewhat broader uses like policy making and basic science.
- The interaction between research areas and potential usefulness is statistically important, as the null hypothesis of no interaction effects is rejected at the .05 level (Table A.I). Hence, researchers' perceptions of usefulness are a function of both the research area under consideration and the use for the research—groupings like the one above for research uses which focus on a single dimension provide helpful information but do not tell the full story.
- Research on the impact of new technologies was regarded as having the largest potential usefulness for creating opportunities for major scientific advances, but was judged less useful for graduate and undergraduate courses and for firm decision making (Table I).
- Research on financial analysis, marketing management, and strategic man-

agement was regarded as being strongly useful for providing a knowledge base for undergraduate courses, graduate courses, management workshops, and extension programs (Table I).

- Business competitiveness research was considered to be potentially useful for generating public policy implications, supporting economic development initiatives of the state, and providing a knowledge base for graduate courses (Table I).
- Trade research was perceived to have limited usefulness for providing information for extension programs while research on managing innovation, change, and risk was judged most useful for firm decision making, and as a foundation for undergraduate and graduate courses (Table I).
- Management information systems received the strongest average agreement score (2.2) for the four items relating to feasibility, although there was no statistical difference in the average scores relating to potential feasibility of the 10 research areas. In addition, the null hypotheses of no differences in the means of the four feasibility agreement scores and of no interaction effects were not rejected at the .05 level (Table I and Table A.II).
- With one exception, respondents gave stronger agreement scores to the potential uses of agribusiness research relative to the respective feasibility of conducting the research. The differences between the mean usefulness score and the mean feasibility score were significant for management information systems, financial analysis, business competitiveness, strategic management, and small business problems (Table A.IV).

While strategic management and marketing management came closest, none of the research areas was regarded as being strongly useful under all eight criteria. The near absence of average agreement scores in the 1.0–2.0 range regarding feasibility suggests that there also was concern among the researchers about the feasibility of doing research in the 10 areas. This pattern of views regarding usefulness and feasibility would explain part of the problem identified by Davan—i.e., the failure of agricultural economists to prioritize research questions.

What then do we make of these findings as they relate to agribusiness research priorities? Mainly, the cross-section of researchers suggest that it will be difficult to establish agribusiness research priorities which narrow the list to one or a few preferred areas. This should not be surprising since the 10 research areas considered represent the distillation of many research areas into a fairly short list. Shrinking the list will be difficult since constituencies exist for research in each area. Note, for example, even "business performance evaluation" which received some of the weaker average scores was regarded as being useful (1.9 score) for providing information for use in management workshops (Table I). Differences of priority also may persist among agricultural economists who believe that agribusiness research should emphasize business management and management science and those who believe that agribusiness research should have a strong public policy focus.

In addition, the consistently higher ranking of research uses relative to feasibility of completion suggests a fundamental inconsistency—researchers feel all areas are relatively important yet the same group perceives that firms, colleagues, and policymakers do not share their exuberance.

When views regarding the usefulness and feasibility of different areas of research are this diverse, the availability of research resources to individual

departments may focus the research. The "Golden Rule" applies. He who has the gold, rules. Who has the "gold" for agribusiness research? As suggested in Table I, the sources of financing for agribusiness research include agribusiness firms, agricultural experiment stations, other government agencies, and foundations. The survey suggests that agribusiness firms are most likely to finance research on management information systems, marketing management, and strategic management. Experiment stations, other government, and foundation support would be more readily available for research on the impact of new technologies and international trade.

In universities, interests of the individual researcher can strongly influence the direction of the research. Sonka,[18] who surveyed most of the same researchers as the authors, found that during the next five years marketing and strategic management would top the list of research areas to be pursued by the respondents. Production and operations management, management information systems and finance ranked next highest as areas to be emphasized by the agribusiness researchers.

The existence of a number of high priority agribusiness research areas poses a problem for agribusiness researchers. If the researchers work on most or all of the areas, they risk not being able to marshall a critical mass of resources for the research. Moreover, in many agricultural economics departments in the US only one or a few faculty members carry out agribusiness research, exacerbating the problem. This situation places a premium on coordination of agribusiness research within and among universities. Coordination can help to eliminate duplication, provide for cross-fertilization of ideas and increase the amount of joint effort. It can be achieved through informal exchanges of information, planning and pooling of resources through regional research committees, use of advisory committees, and other mechanisms.

COORDINATION OF AGRIBUSINESS RESEARCH

In this article, coordination of three areas of research which have attracted widespread attention will be discussed, namely; research on competitiveness, strategic management, and the impact of new agricultural technologies. The discussion focuses on why coordination is needed and how it might be done.

Competitiveness Research

The agribusiness researchers whose views are summarized in Table I plan to form a regional research coordinating committee which would emphasize agribusiness research on competitiveness. The group picked this area because the decline in competitiveness of US industries and products has been a dominating concern of business people and government officials.[19,20] The group also noted that this research would be a unifying theme for the group's effort because it links other important agribusiness research areas, would support economic development initiatives of the states, generate useful public policy implications, and provide a knowledge base for graduate courses (see Table I). It was the promise of such important research contributions that led to the calls for more research on international competitiveness reported by Davan.[4] Related considerations led to formation in 1988 of the North Central Research Committee entitled NC-194 (The

Organization and Performance of World Food Systems: Implications for US Policies) which has attracted participation by about 50 scientists from 20 universities.

Initially, the agribusiness researchers participating in this regional committee will analyze competitiveness using a series of approaches extending from the general to the specific. The most general level of analysis would be the international level, followed by the subsystem level, the industry level, the company level, the product level, and finally the specific, brand level. I/O techniques, strategic management concepts, and several other analytical techniques promise to be useful for carrying out the research. Such an inclusive framework probably is appropriate as a starting point. The challenge will be to narrow the work sufficiently to make it manageable, use to advantage the talents of agribusiness researchers in agricultural economics departments, and not duplicate the work of other committees such as NC-194. Avoiding duplication may be particularly difficult for the research at the international level. As part of its research at the international level, the agribusiness group plans to analyze the impact of variables such as exchange rates, differences in domestic policies, and trade barriers on the competitiveness of agribusiness firms in different nations. Such research is in the domain of many different groups.

Finally, the researchers comprising this group intend to determine what the primary customers—including agribusiness firms and government officials—want from agribusiness competitiveness research. Economists associated with the North Central Regional Committee entitled NCR-140 (Research on Cooperatives) may provide a useful model since the group has done a good job of finding out what the customer desires from the researcher. In the past few years, the NCR-140 Committee has brought in officials from cooperatives for valuable seminars on farm financial stress, the impact of new technologies on cooperatives, and other topics. Aside from obvious benefits, getting such input may be useful for encouraging firms and government officials to buy into the research and ultimately provide financial support for it.

Strategic Management

Interest in strategic management has manifested itself in many publications and as an important thread running through the work of the recently created Northeastern Regional Research project NE-165 (Private Strategies, Public Policies, and Food System Performance).[21] No fewer than 24 of the 40 economists associated with NE-165 listed "Strategic Decision Making" as a main area of research interest.

In broad outline, strategic management ideas are simple and useful. Indeed, strategic management probably is popular among agricultural economists partly because it describes in an organized and intellectually appealing way some work agricultural economists have done for decades. For example, economic outlook programs for farmers have been important extension programs at Purdue University and other midwestern universities since the late 1920s and early 1930s. Such programs can provide excellent information for use by farmers and other agribusinesses in strategic management. Also, some extension farm management work gives farmers information useful for making strategic management decisions. Given suitable twists, I/O information can be used by strategic manage-

ment practitioners to show agribusinesses how to obtain market power. One could go on.

However, Cotterill's comments and advice to agricultural economists regarding strategic management are noteworthy:[22]

> . . . strategic management practitioners have provided us with not one, but a great number of 'how to do it' recipes. They range from simplistic two-variable models, such as the Boston Consulting Group's market share, industry growth matrix, to strategic bibles such as Porter's books. Much of this work is written for the business executive and the management-consulting industry that serves them. Some of it is not worth the paper it is written on. As a result, there is ample opportunity for more rigorous theoretical exposition and empirical research. (p.1064)

The rigorous strategic management research called for by Cotterill may have much to offer. For example, Rogers and Caswell[9] suggest that such strategic management research could help to show how agribusiness firms—particularly the large marketing firms that increasingly dominate the sector—make strategic decisions to enter, expand in, or exit specific market segments. Because of their experience and training, certain I/O researchers probably possess a comparative advantage for such research.

Sonka's survey makes a related point.[18] He found that the agribusiness researchers attending the Las Vegas meeting ranked strategic management second in terms of the seven areas where they would conduct research during the next three to five years. However, these same researchers ranked strategic management fifth among the seven categorics of research as an area where agricultural economists have the most advantage in pursuing agribusiness management research. In addition, the gap between the researchers' perception of usefulness and their perception of feasibility in the survey discussed earlier was greatest for strategic management research.

If one accepts Cotterill's arguments, coordination of strategic management research could have an important quality control function. In addition, this work could help to make the new ideas coming out of strategic management research more accessible to the extension worker and business person.

Analysis of the Impact of New Agricultural Technologies

Many major new biotechnologies and information technologies are being developed in US businesses, foreign businesses, universities, and elsewhere, which will add to the productivity increasing effects of existing mechanical technologies and agricultural chemicals. Much remains unknown about the extent to which the new agricultural technologies will be adopted. Economic incentives and disincentives for use of the technologies, public perceptions regarding the impact of the technologies, legal actions to block or delay experiments involving biotechnologies, government regulatory policies and agricultural policies all will affect the introduction and rate of adoption of these new technologies.

The research of agricultural economists at Cornell University on the impact of bovine and porcine growth hormones, the research of scientists at the University of Minnesota on new crop technologies, and the work of interdisciplinary teams at Purdue University on new technologies illustrate the widespread interest in

adoption rates and research on the economic impact of new agricultural technologies. At Purdue University, where a new Center for Agricultural Policy and Technology Assessment has been established, interdisciplinary teams seek answers to the following questions for each new technology studied:

- How strong are the economic incentives for adoption of the new technology?
- What effect, if any, will agricultural policies and regulations have on the introduction and rate of adoption of the new technology?
- What changes, if any, in agricultural policy legislation are likely to be made necessary by the new technology?
- How will the new technology affect the size and number of farms in the United States?
- How will the technology affect farm families and rural communities?
- How will the new technology affect the competitive position of US farmers, other agricultural businesses, and exporting firms in international markets?

Good answers to these questions would help farm families, agricultural businesses, officials in rural communities, and policy makers to make informed decisions as they adjust to the impacts of the emerging agricultural technologies.

Coordination of research on the impact of new technologies will be necessary to ensure that such research has the needed cross-disciplinary focus. Any comprehensive analysis of the economic impacts of bovine somatotropin, for example, is likely to call for input from agricultural economists, animal scientists, rural sociologists, and officials of firms that plan to market the product. Representatives from the firms will be called upon to provide proprietary or sensitive information. Analysis of the effects of a new technology may be tricky and costly. Kalter and Milligan,[23] for example, point out that the changing feed requirements associated with adoption of porcine somatotropin will cause a web of modifications in key market values—e.g., crop prices and land values. They note that without a general equilibrium model of the agricultural sector, neither their magnitude, or in some cases direction, can be easily forecast. Such models are costly to develop.

In coordinating research on the impact of new agricultural technologies, it will be important to get input from the organizations that would be conducting the research as well as the customers for the product. This consideration was recognized by the Center for Agricultural Policy and Technology Assessment at Purdue University. For each major technology evaluation project undertaken, a User's Advisory Group will be appointed which would consist of representatives from businesses that plan to produce and market the product, research units at other universities or government agencies where the technology is being studied, and farmers who are likely to be early adopters of the technology. Suggestions will be solicited from the User's Advisory Group on design of the research project, refinement of hypotheses, and procedures for disseminating research results. Similar advisory groups may be useful for coordinating other research on new technologies.

TEN COMMANDMENTS REGARDING AGRIBUSINESS RESEARCH

Experiences of successful researchers, admonitions of experiment station directors, and our own experiences as researchers, reviewers of research proposals,

and proposal writers have produced ideas—many of which have been noted earlier—about how to do research involving agribusiness firms. Researchers who plan to work with businesses and obtain funding and data for the research from these businesses may find it useful to keep these commandments in mind:

(1) Find out what the customer wants. Especially in dealings with businesses, you will not be rewarded for doing only what you want to do.
(2) If you expect to receive financial and other support from a business for doing research, be prepared to answer this question effectively: "How will this research add value to the company's products and services?
(3) Avoid becoming an apologist for businesses on public policy issues. However, neither should you alienate businesses unnecessarily. Such people will suffer the fate of the "business bashers" mentioned earlier.
(4) Remember that farmers are important sources of political support for programs of a college of agriculture, possessing influence far in excess of their numbers. Research programs for other agricultural businesses must be designed with this point in mind.
(5) Do not allow a small financial contribution from an agribusiness to dictate the direction of a major publicly-supported research effort.
(6) Use business advisory groups for developing plans for major research efforts. This can provide valuable input on project design as well as help businesses to buy into the effort.
(7) Use extreme care not to divulge proprietary, confidential, or sensitive information obtained from a firm to competing firms. A breach of confidentiality can destroy potential firm cooperation across a broad front.
(8) Remember that few problems can be solved by economists alone. Be prepared to bring scientists from other disciplines into the work.
(9) Deliver the research results on time to cooperating firms.
(10) Use high quality visual aids and executive summaries when presenting research results to agribusinesses. Some of the most competent economic researchers are notoriously sloppy when presenting research findings. One wag suggested that this tendency has the regularity indicated by the following law: "The quality of the visual aids used by an agricultural economist varies inversely with his/her reputation as a researcher".

SUMMARY AND IMPLICATIONS

Agribusiness researchers likely will find it difficult to develop a relatively small number of prioritized research questions. This problem is an outgrowth of the important multiple uses made of such research and by apparent similarities in the feasibility of carrying out agribusiness research in different areas. The survey results suggest that a case could be made for emphasizing any of several areas of agribusiness research, depending upon the needs of different university departments and the resources available for such work. However, coordination of agribusiness research undertaken will be needed to leverage research efforts, use the training and experience of agricultural economists to advantage and limit work in areas where the agricultural economist has little or no advantage. A useful experiment in coordination is being proposed by a western regional coordinating committee that will emphasize agribusiness research relating to competitiveness. This will be an important experiment to follow. Finally, research to be financed by agribusiness firms or which will rely on such firms for data should be designed with the customer's needs in mind. Recognize that your potential agribusiness cooperator also has a number of constituent groups to satisfy: Make

his/her job of justifying to higher management, shareholders, and customers the allocation of resources for agribusiness research by clearly delineating the benefits of your proposed work for the firm.

APPENDIX

Table A.I. Analysis of Variance Results for Agricultural Business Research Area—Usefulness Model.

Source	Degrees of Freedom	Sum of Squares	*F*-Statistic[a]
AREA	9	17.53	1.71*
USE	7	133.99	16.81**
AREA * USE	63	140.72	1.96**
Model	79	292.23	3.25**
Error	1280	1457.41	—
Total	1359	1749.64	—

[a]Single asterisks indicate significance at the .10 level; double asterisks indicate significance at the .05 level.

Table A.II. Analysis of Variance Results for Agricultural Business Research Area—Feasibility Model.

Source	Degrees of Freedom	Sum of Squares	*F*-Statistic[a]
AREA	9	10.25	1.10
FEASIBILITY	3	3.44	1.11
AREA * FEASIBILITY	27	34.25	1.22
Model	39	47.94	1.19
Error	640	662.94	—
Total	679	710.88	—

[a]None of the computed *F*-statistics exceed the associated critical value at the .05 level of significance.

Table A.III. Agricultural Business Research Uses Ranked by Mean Agreement Score and Categorized Using Tukey's Procedure.[a]

Use	Mean Agreement Score	Group[b]			
(3) Management Workshops	1.88	A			
(6) Firm Decision Making	1.93	A			
(2) Graduate Courses	2.01	A			
(1) Undergraduate Courses	2.08	A	B		
(4) Extension Programs	2.16	A	B		
(5) State Economic Development	2.38		B	C	
(7) Public Policy	2.61			C	D
(8) Major Scientific Advances	2.81				D

[a]Multiple mean comparisons made using Tukey's studentized range test at the .05 level of significance.

[b]Letters indicate group members. The mean score for any use labeled "A" is not significantly different in a statistical sense from the other mean scores in the group, likewise for "B", "C", and "D".

Table A.IV. Difference Between Mean Usefulness and Feasibility Agreement Scores and Associated Test of Statistical Significance.

Research Area	Mean Difference[a]	t-statistic[b]
(1) Management Information Systems	0.28	1.74*
(2) Financial Analysis	−0.28	−1.67*
(3) Marketing Management	−0.27	−1.61
(4) Business Performance Analysis	−0.20	−1.29
(5) Business Competitiveness	−0.31	−1.98**
(6) Impact of New Technologies	−0.12	−0.75
(7) Strategic Management	−0.36	−2.69**
(8) International Trade	−0.17	−1.10
(9) Managing Innovation, Change, and Risk	−0.09	−0.63
(10) Problems of Small Businesses	−0.28	−1.66*

[a]Mean Usefulness Score (across 8 categories) − Mean Feasibility Agreement Score (across 4 categories).

[b]Single asterisks indicate significance at the .10 level, double asterisks indicate significance at the .05 level.

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