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AN INFORMATION SYSTEMS ANALYSIS
OF USDA FARM INCOME DATA

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Charles Henry Riemenschneider

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AN INFORMATION SYSTEMS ANALYSIS OF USDA FARM INCOME DATA

By

Charles Henry Riemenschneider

AN ABSTRACT OF A DISSERTATION

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ABSTRACT

AN INFORMATION SYSTEMS ANALYSIS OF USDA
FARM INCOME DATA

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Charles Henry Riemenschneider

Problems relating to the data base in agriculture have been of concern in the agricultural economics profession in recent years. U.S. Department of Agriculture aggregate farm income data have been the subject of a number of studies during this time. The failure of these studies to consider explicitly the ultimate data users as key variables in the analysis of farm income data has often led to an incorrect definition of the nature of data system problems and has made it difficult to establish meaningful priorities among the recommendations of these earlier studies.

This research is based on an information systems paradigm which emphasizes the use of information in decision making. A mail survey and personal interviews with farm income data users were the main research methods used. These yielded results which provided a description of the farm income information system and helped to define the nature of the problems in the system.

The theoretical basis for the research was further expanded by developing the economic implications of the information systems paradigm. Emphasis in the theoretical area was on economic structure and the distributions of information and income in determining the appropriate

government role in supplying information.

The farm income information system was found to have four major components, a primary data subsystem, a formatting and communication subsystem, an analysis subsystem and a decision making subsystem. Public policy uses of the farm income data dominated in the system. Major private sector uses were in the areas of estimating the demand for farm inputs and for credit decisions relating to agriculture. The lack of use by many of those receiving the data or the low weight often attached to the farm income data in policy decisions was also a significant finding.

The descriptive results pinpointed a number of problems in the farm income information system. Two major problem areas were identified by users. First, conceptual obsolescence is a major problem in the system. Through time the issues in agricultural policy have changed but the concepts of farm income have not. The current system fails to provide adequate information on the distribution of farm income, especially by commodity and by legal organization, which are needed to address current policy issues. Conceptual obsolescence of a different type is also apparent because the national family farm data concept currently used is not a true representation of the reality of the farm sector. This latter type of conceptual obsolescence does not appear as serious as the first since aggregate farm income data are used more as social indicators and thus do not require a one to one relationship with reality. Credibility is a second major problem area. Data revisions through time have tended to create a credibility problem for the USDA, especially with regard to analysis of farm income related issues in the policy process.

Other minor issues were also addressed. These included the

integration of USDA farm income data into the national income and product accounts, the usefulness of the information systems paradigm as a research methodology, the political sensitivity of data and the ability to make changes in ongoing public data series.

The major recommendations for improving the farm income information system were to improve data on the distribution of income, to make more use of directly reported data on production expenditures, to give lower priorities to earlier suggestions that farm income data be presented in national income and product accounting formats, and to expand the farm sector performance measures emphasized to improve the credibility of the existing data and analysis done by the USDA.

ACKNOWLEDGMENTS

Needless to say, I have incurred a great many debts during my stay at Michigan State University. Those of a monetary nature were made easier to repay through the financial assistance of the Michigan Agricultural Experiment Station and the Economics, Statistics and Cooperatives Service (ESCS) of the United States Department of Agriculture (USDA). In this regard a few individuals deserve special mention for their roles in supporting this research. I am especially grateful to Dr. Harold M. Riley, Chairman of the Department of Agricultural Economics, Dr. Kenneth R. Farrell, Administrator of ESCS, Dr. John E. Lee, Director of the National Economic Analysis Division of ESCS, and finally, Mr. William E. Kibler, Deputy Administrator for Statistics in ESCS, whose advocacy for research on information systems was instrumental in initiating and continuing the funding for this study. It is my sincere desire that these institutions and individuals realize an adequate return on their investment.

To my parents

Unfortunately, most of the debts which remain are intellectual and are not as easily settled as monetary liabilities. It is never possible to completely repay one's intellectual indebtedness, so I can only hope that a few written words will begin to compensate the many individuals who made my four years of graduate school both rewarding and enjoyable.

To Dr. James T. Bonnen I owe my deepest gratitude. As chairman of my guidance and thesis committee, he influenced all aspects of my graduate work. His contribution toward my development as an economist and as a person deserves far more in thanks than I could possible repay. Much of the credit for the ideas expressed in this dissertation must ultimately go to him. Moreover, on a personal side, his warmth and openness made working with him a true pleasure.

My appreciation also extends to the remaining members of my thesis committee who patiently struggled through a rough first draft of this dissertation. Their comments greatly enhanced the quality of the final product. Dr. Lawrence W. Libby willingly gave his advice in a number of areas, both academic and nonacademic, throughout my graduate career. He was particularly helpful during the final stages of the completion of this research. His observations on the public choice aspects of improvements in information systems further augmented the theoretical arguments in this dissertation. Dr. Lester V. Manderscheid notably provided assistance in matters related to the design of the mail questionnaire and interview schedule along with the subsequent interpretation of the results. His careful attention to details in this area added greatly to the

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usefulness of the empirical findings. Dr. Lindon J. Robison used his understanding of the information systems of the USDA to provide insights during all phases of the development of this research. These insights both strengthened and confirmed the overall results. Dr. Byron W. Brown reviewed and earlier draft from the perspective of a non-agriculturalist. The incorporation of his comments added clarity to the final presentation.

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CHAPTER 1

INTRODUCTION

1.1 PROBLEM DEFINITION

The Economic Statistics Committee of the American Agricultural Economics Association characterized the major problem of the U.S. agricultural data systems as one of conceptual obsolescence. Changes in the economic structure and organization of agriculture and in the important policy questions involving the agricultural sector have not been matched by corresponding changes in the concepts which are expected to capture that reality and which are measured by the agricultural data system. This change in the policy agenda and the resulting conceptual obsolence is particularly disturbing when new problems become all too apparent.

In most instances, governments fail to act before some means is found to measure a problem. The manner in which new problems are identified in a social policy setting often leads to this failure of government action. For the most part, problems are identified through the use of some combination of a specific model of reality and empirical measurements relating to the model (de Neufville, p. 7). Thus, when the existing models or the empirical measurement no longer mesh with reality, it is nearly impossible to identify relevant problems. The lack of awareness of problems arising from conceptual obsolescence can explain the failure of policy makers to act on problems.

These principles might also explain the findings of Judith Innes de Neufville (p. 7) that government policy makers generally concentrate

on problems where progress can be easily measured and demonstrated. It would seem reasonable to assume that the ability to substantiate progress in solving a problem would be related to the ability to identify the problem at the outset.

In some cases, it goes even beyond identifying a problem or demonstrating progress in its solution. Often it appears that government decision makers use methods which allow performance to be measured, i.e., available data may even dictate or suggest the solution to the problem. Inaccurate or obsolete data may lead to a poor solution or to no solution if the problem cannot be clearly defined. Thus, difficulties arising from conceptual obsolescence in the data system can have important ramifications for problem solving decision making.

Conceptual obsolescence does not extend to the entire data system in agriculture nor is it the only type of data problem evident. There are many instances where the accuracy of the data has improved through time, particularly when the concepts are based on biological or physical processes which have changed little, if any, and where measurement, collection and processing techniques have been improved (Bonnen 1975a, p. 754). However, while the conceptual accuracy of some basic economic statistics, such as prices, seems to have remained valid, changes in market structure create problems in operationalizing and measuring some of these concepts and consequently have made these statistics less reliable (Riemenschneider, p. 27-36). Thus the problems of agricultural data systems are not restricted to conceptual difficulties alone.

The farm income data system appears to be a prime candidate for evaluation. In recent years two separate task forces have studied the United States Department of Agriculture (USDA) farm income data and have

pointed out many actual and assumed deficiencies in the system. For example, the current farm income data system often fails to distinguish between some current expenses and capital expenses and nets out many important income flows in the farming sector, which along with other related problems leads to a conceptual labyrinth so complex that one often does not know quite what is being measured (Weeks 1971). In addition, it has been suggested that the farm income data are not always compatible with components of the national income and product accounts (Hildreth, et. al.; Weeks, et. al.). There appears to be ample justification to study the farm income data system simply to learn more about these problems. However these other studies have left other important questions unanswered. These studies assumed a set of uses for the farm income data and based recommendations for improving the data on this assumed set of uses without ever determining if these were the most important uses for current decisions. More explicitly, these reports seemed overly concerned with insuring that the farm income accounts were easily comparable with the national income and product accounts without ever asking the question of whether comparability between these accounts serves a useful function in policy decisions. Hence these earlier studies failed to justify adequately their recommendations and neglected to ascertain the improvements which would be of greatest net value in the most important current uses of the data. Furthermore, consideration was not given in these studies to the question of the acceptability of the implied changes by the relevant data users.

As important, these apparent conflicts and inconsistencies suggest that agricultural policy decision makers may not be receiving adequate or accurate data to use in reaching decisions. As long as farm income data

remain the only integrated measure of changing prices, sales, production, and production costs they will most likely play a role in the decision process and hence efforts must be taken to insure the accuracy in concept, definition, measurement, and use of farm income data.

1.2 HISTORY AND CURRENT SITUATION

The beginnings of the farm income series can be traced to the 1909 Census of Agriculture. The report of the Census was released in 1913 and provided the first estimates of farm income. Over the next decade work continued on estimates of farm income culminating around 1924 when estimates of farm income were started on a calendar year basis along with a series on farm production expenses and national net farm income. It is important to note that the current system used to estimate farm income was developed prior to the time when the national income accounts were established, thus explaining, in part, the differences in format between the farm income accounts and the national income accounts. The farm income series were originally set up to measure the economic welfare of farmers, who at the time of the development of the series made up a significant proportion of the population. This segment of the population was later able to use this measure of welfare to justify price and income supports through Federal legislation in the 1930s.

The relationship between farm income measurement and the agricultural policy of the 1920s through the 1950s is more direct than is apparent on the surface. The pioneering work of the National Bureau of Economic Research (NBER) in the area of national income measurement set the tone for the important agricultural policy debates of this era. The

National Bureau estimated agriculture's share of national income and the purchasing power of farmers relative to the nonfarm population for the period 1909 to 1920. These NBER studies portrayed the national income share and purchasing power of agriculture in a poor light relative to other sectors. John D. Black in 1927 noted that the NBER results were widely circulated and along with other analyses which relied on the NBER findings had an important influence on the farm policy legislation of this period.

Numerous other statements during this period confirm the influence of the NBER results on the government policy toward agriculture. J. I. Falconer, writing during the time of the development of the USDA farm income accounts, pointed out that one of the most important areas of research on farm income was in the area of comparing the purchasing power and well being of farmers with that of the urban population. H. R. Tolley is even more explicit in expressing this relationship between aggregate farm income data and farm policy. In presenting the objectives of agricultural policy, Tolley sets a farm income goal as the highest priority on his list of ten objectives.

> "First, a fair share of the national income for agriculture. Undoubtedly there is disagreement upon its precise measurement. Still, the idea of securing to the average farmer as much purchasing power relative to that of the average nonfarmer as obtained in a more normal period is a definite and tenable objective (Tolley, p. 24).

The notion of income parity developed in response to the perceived plight of farmers relative to non-farmers. Income parity is defined in the farm legislation of the 1930s and 40s in terms of an historical ratio between per capita income of the farm and non-farm population. While the ultimate concern of the farm legislation was with income parity, the

policy to achieve income parity revolved around the use of commodity price supports. Thus, parity prices became the principal data used in implementing farm policy in the 1930s and are used even today in some commodities. Karl T. Wright confirms the important relationship between price and income parity by noting that one of the major assumptions of the 1933 agricultural legislation, which provided the basis for most of the subsequent major farm legislation, was ". . . that price established by the parity formula would provide parity income to farmers." (p. 294).

Farm income measurement seems to have played a significant role in the policy process during the period between 1920 and 1960 because of the importance of the income questions raised in the farm debate. At this time the major equity questions were concerned with comparing the welfare of the farm and non-farm sectors in justifying government action to improve farm welfare. Thus, the public policy users of farm income data prior to the 1960s seem to have been concentrated on this objective.

By 1940 the farm income estimates had reached a stage of development which led to the publishing of the first Farm Income Situation. This report was published regularly until 1975 when its functions were replaced by parts of the Agricultural Outlook publication and the statistical bulletin Farm Income Statistics. In the early 1950s state estimates of gross and net farm income were developed and published. Two significant changes or additions occurred in the early 1960s. At this time one of the first measures of the distribution of farm income was made. The distribution of income and production expenses of farm operators by value of sales class are available starting with 1960. At this same time the calculation of the income of the farm population was changed from a national income basis to a personal income basis which allowed more direct comparisons

between the farm and non-farm populations (Upchurch 1977, P. 325).

Currently there are two major concepts of farm income used by the U.S. Department of Agriculture. The first of these is "income from production." In general this concept is concerned with productive activities of businesses or government. Farmers' net income is the current measure of income from farm production. This concept treats farming as an industry and views farming in the United States as a single national family farm. Gross farm income and farm production expenses are estimated and net farm income is calculated as a residual. Income from production was the primary concern of the earlier studies on farm income and as such will remain the principal focus of this research.

The second major concept used by USDA is the personal income of the farm population. Generally personal and disposable income are used to measure the purchasing power or economic welfare of individuals or families (Hildreth, et. al., p. 3). The USDA concept accounts for income from both farm and non-farm sources. In addition to farm operators this concept includes resident farm workers and other farm residents as well. Conceptually at least, it is a measure of the total income available to operate the farm business and to maintain the standard of living of the farm population (U.S. Department of Agriculture 1969, p. 1).

These two concepts lead to two specific data series: 1) Farmers' Total or Realized Net Income and 2) Personal Income of the Farm Population from All Sources. The former series is on a calendar year basis covering the U.S., each state, and six regions while the latter is also on a calendar year basis but only is available for the United States as a whole.

The total net farm income series has six major components:

1) cash receipts from farm marketings, 2) government payments to farmers, 3) non-money income which includes the imputed value of farm dwellings and farm products consumed directly in farm households, 4) other farm income which is made up of recreational, machine hire and custom work income, 5) farm production expenses, and 6) net change in farm inventories. The inclusion of this last component distinguishes total net income from realized net income. The personal income series measures the sum of all income from farm and non-farm sources received by the farm population, i.e., those actually living on farms.

Except for the government payments these components are not measured directly. Instead, primary data such as prices and quantities are first measured. Then through various aggregations and accounting rules estimates are developed for each of the components and for the residual, farm income. Many sources of primary data are used but the principle suppliers of data are the Statistics branch of the Economics, Statistics, and Cooperatives Service (ESCS) in USDA[1/] and the Bureau of Census. The Farm Income Unit, which is part of the Economics branch of ESCS[2/], then uses this data to construct estimates of the components of farm income.

For any given year, a preliminary and three revised estimates of farm income and each of the major components are made. The preliminary estimate is made in January following the year in question. The second estimate is made six months later in July when more complete data is

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1/ This branch was formerly known as the Statistical Reporting Service, prior to January 1978, and hereafter will be referred to as ESCS: Statistics.

2/ This branch was formerly known as the Economic Research Service, prior to January 1978, and hereafter will be referred to as ESCS: Economics.

available. The third and fourth estimates are made in July of the two following years, incorporating even more complete and revised primary data.

1.3 OBJECTIVES

This research has multiple objectives. An important part or objective of this research will be descriptive. An attempt will be made to outline the relationships among data design, data collection, analysis, interpretation, and decision making for the farm income information system. This descriptive evidence should shed some light on any problems in the system and lead to a better understanding of information system design.

A second concern is to develop further the economic and social theory with regard to information and information systems. Since there has only been a limited amount of theoretical development in this area, a major task will be to provide a more coherent theoretical basis for evaluating the specification and economics of information systems.

The information systems paradigm, which provides the foundation for this research, has not been applied extensively to specific information systems. Thus a third objective will be to test the usefulness of this approach or paradigm as a research methodology. That is, does this paradigm provide a means for identifying researchable areas and for evaluating a specific information system or is it only useful for understanding the more generic system?

A final objective is to suggest changes and improvements in the current farm income information system. This will include the establishment of some priorities among improvements already recommended in the

literature as well as the recommendation of changes based on this research.

1.4 RESEARCH DESIGN

A preliminary examination of the U.S. Department of Agriculture's farm income information system suggests that there are two basic types of evaluative research that might be conducted in the context of this system. First, the operation of the current data system could be analyzed for the purpose of reducing revisions and improving the statistical reliability of the existing accounts. A systematic examination of each account would be in order in this case to reduce the variance between the January and the subsequent July estimates. This type of research would stress the methods and data sources used in the current farm income data system. From a practical standpoint this type of research is probably best done in the USDA by those who have a close working knowledge of the methods and data sources used in estimating the various accounts. Therefore, we will not focus on an effort to refine the current system.

Instead a second type of evaluative research was undertaken. It is more closely akin to what the National Academy of Sciences has called research on "setting statistical priorities." While the Panel on Methodology for Statistical Priorities was concerned with setting priorities among many different data systems their suggestions are equally applicable to establishing priorities within a given data system. Furthermore, they state that setting priorities might even be easier within specific data systems when compared to the difficulties encountered in establishing priorities among very different types of data.

The type of research suggested by the National Academy panel and that done in this study goes beyond what might conventionally be thought

of in setting priorities. More than simply choosing between data sources is involved; this research goes further and attempts to answer some of the important questions concerning the design and redesign of information systems. It is basically an attempt to apply some of the findings of the National Academy panel to farm income data. Their report summarized a methodology in a general way as a set of questions to be asked concerning the use of data. When applied to the farm income information system this methodology can be paraphrased as follows--the relevant question is not simply, who uses farm income statistics, but, instead, a series of questions--what are the important decisions to be made concerning farm income, who makes those decisions, and what are the data needed to make those decisions effectively? (Panel on Methodology for Statistical Priorities, p. 6).

Thomas A. Miller studied methods for valuing information and summarizes the general methodology for this type of research as a "pragmatic user-oriented approach" to valuing information. Thus, the basis for this research seems to be well grounded in the recent literature. This research also builds on earlier studies of farm income data to the extent that these suggested alternative conceptualizations of farm income and recommended changes in the system for which some priorities can be established using the findings of this research.

The research had three steps. The first stage included an examination of the literature, personal interviews with the data producers in USDA, and a mail survey to determine the principal uses and users of the farm income data. The identification of the current uses of the data provided a list of important decision makers in the system. These individuals were then interviewed to ascertain the important issues facing

them with regard to farm income. This second step of personal interviews with decision makers was also used to obtain a more detailed description of the system and to assess the potential for changing the system. The third step was the analysis of the current data system with regard to its ability to meet the needs of decision makers. From this analysis came a better understanding of the operation of the farm income information system which provided a basis for setting priorities and making choices with respect to improvements in the system.

The remainder of this study is divided into five chapters. Chapter 2 develops the conceptual framework. Included are the development of an information systems paradigm and its economic implications which provide the basis for the evaluation of the current farm income data system.

Any changes in an information system normally imply different distributional impacts from the original. The question then becomes how to gauge whether or not the change is "better" since in nearly all cases some individuals benefit and some are disadvantaged by any improvement in the information system. The criteria developed for analyzing and setting priorities among improvements in the existing farm income data are derived from the information systems paradigm and its economic implications. In this sense the research has a normative focus since the results follow from a particular view of the problem. Hence, the criteria used for judging the system are somewhat unique to the approach used in the research and follow from the aims and purposes of this study. However, it must be emphasized that in a different context with dissimilar goals other, perhaps equally justifiable criteria, could exist for evaluating information systems.

Chapter 3 is a summary review of the relevant literature which

concentrates on previous analyses of the USDA farm income data as well as summarizing some of the alternative conceptualizations of farm income suggested in the literature.

Chapter 4 presents the descriptive results of the study, by using the mail survey results and the personal interviews to present a picture of the current farm income information system. The operating system is contrasted with the idealized system developed in chapter 2 to provide a means for classifying the components of the existing system.

Chapter 5 presents the evaluation of the system as it now exists. It is concerned with defining the nature of the problems found in the system and drawing some of the implications from these problems.

Chapter 6 outlines the recommendations for improvements and for setting priorities in the system and reiterates the major conclusions in summary form.

CHAPTER 2

CONCEPTUAL FRAMEWORK: THE THEORY AND ECONOMICS OF INFORMATION SYSTEMS

2.1 INTRODUCTION

There has been only a limited amount of theoretical development in the area of agricultural information systems. Therefore, a principle task of this chapter will be to provide a summary of some of the relevant theory in this area. More importantly, this theory will be extended to provide a more coherent basis for evaluating information systems. Heavy emphasis will be placed in three areas. First, the philosophical basis of an information systems paradigm will be developed. Following this, the paradigm itself, along with some of the difficulties arising in applying it to operating information systems, will be presented. Finally, the economic implications of this paradigm will be laid out. The theoretical aspects in this area will concentrate on the economic characteristics of information, the role of market structure in the supply of and demand for information, and the effects of the distribution of information on the distribution of income.

2.2 INFORMATION AND INQUIRY

In order to assess and evaluate a functioning information system, it is helpful to have a framework within which to make comparisons and to act as a guide in determining the relevant points of concern. Economics has numerous theories which provide a framework to direct researchers to the germane aspects of various economic issues and problems. In this

same vein one would expect that a theory of information would provide useful direction in examining an information system. However, there is no single theory of information. Engineers, computer scientists, business management specialists, and economists, among others, all have their own theories of information which focus on their unique disciplinary concerns. So a principle concern must be with developing a framework for understanding information systems.

Information systems in agriculture are designed to help either public or private decision makers or, in some cases, both, make decisions to solve problems that arise at the farm, farm industry or the national economy level. This would suggest that any theory of information should focus, at least in part, on problem solving. Since problem solving decision making normally requires information from a variety of disciplines, any theory of information must have a multidisciplinary perspective to be useful in understanding information systems. Thus, to assess an operating information system we are not concerned with developing a separate theory of information for any particular discipline but rather with a way to view and understand the process of inquiry and decision making.

To avoid any confusion, the ideas which follow in the next section are best referred to as an information systems paradigm and not a theory of information. Before developing the theoretical aspects further a statement of the philosophical basis of this paradigm will be presented to help clarify the importance of viewing information in a systems context.

In the broadest and most general sense information is the product of some basic process of inquiry. C. West Churchman (1971) emphasizes this point and goes further to add that to a model a problem, (using

model in the generic sense) is to conduct an inquiry about the problem, which is in turn an attempt to produce information on the very nature of the problem. Thus, any knowledge about a specific problem is dependent on the system of inquiry used in obtaining that knowledge. In this sense information must be considered as a function of epistemology (Mitroff and Sagasti, p. 119).

How one models or conceptualizes any information system can be traced back to some philosophically based inquiry system. To attempt to represent reality, as any information system must, while maintaining strict adherence to a narrow philosophical mode of inquiry will limit one's ability to capture reality adequately. The limitations of a single research philosophy are particularly evident when the problems one is attempting to solve are ill-structured, i.e., where the greatest difficulty lies in defining the nature of the problem itself. Well-structured problems, on the other hand, are subject to more precise analytic methods of attack (Mitroff and Sagasti, p. 121).

Some general examples should make this clearer. Well-structured problems in decision theory are of the type where a known deterministic or probabilistic relationship exists between the choice of an act by a decision maker and the occurence of a specific outcome. Further, these acts must in some sense optimize the value to or utility of the decision maker given a known set of states of nature (Mitroff and Sagasti, p. 120-121). Thus, these types of problems are subject to more precise analytical methods of attack in that there are unambiguous rules for deciding on an optimal course of action as well as known relationships between actions and outcomes.

The problem of how much fertilizer to apply to an acre of corn,

given other inputs, is an example of a well-structured problem. In this case, a decision rule of profit maximization is appropriate. Once the physical relationships between fertilizer and corn production are known, along with the values of the inputs and outputs, it is then possible to decide on a level of fertilizer application that is consistent with the decision rule. The mode of inquiry is quite straightforward in this case and the problems of information system design are relatively simple.

Ill-structured problems in decision theory are such that one's knowledge about a given problem is limited by the fact that one or more sets of acts, outcomes, utilities of the decision maker, or states of nature are not known with confidence. With these types of problems decision makers are frequently concerned with the achievement of multiple desired outcomes under the conditions of imperfect knowledge. The uncertainty inherent in ill-structured problems often means that the greatest difficulty in the solution lies in actually defining the problem.

Churchman (1971), Mitroff and others demonstrate this relationship between epistemology and information by pointing out the differences between the pure philosophical systems of inquiry of Leibnitz, Locke, Kant and Hegel. Each of the pure philosophical systems of inquiry is useful in gaining insights into various aspects of problems. However, each has its shortcomings in dealing with the whole of certain types of problems. The solution of ill-structured problems requires a more general philosophical system of inquiry that goes beyond those of Locke, Leibnitz, Kant or Hegel. Singer-Churchman inquiry systems integrate these other inquiry systems into a multidisciplinary approach to problem solving that stresses the interaction between the different modes of inquiry (Mitroff and Pondy, p. 476). This type of inquiry system is similar to what can be thought of

as the systems approach.

It is this systems approach to problem solving that provides the foundation for the information systems paradigm which follows. The concern of information systems and the systems approach in general are with solving practical problems and consequently with the decisions addressed to those problems. Hence an information system is teleological. The goals and values of the decision maker must impact on the design of the information system since these goals and values provide insights into the nature of the problem on which the system focuses. As was noted earlier the nature of the problem dictates the mode of inquiry used in arriving at a solution, so the decision maker must be part of the information system. As long as the values of the decision maker impact on the way in which that same person defines a given problem, then the decision maker must be considered as a part of the information system since the product of the system, i.e., the information, is determined by the mode of inquiry used in defining the nature of the problem. Thus, an information system designed for farm policy decisions by government policy makers would generally be different than an information system for use by a farmer in the day to day operation of a farm business because of the difference in decision makers. An important attribute of the information systems paradigm developed here is its generality. This should permit its use as a guide in assessing the quality of both government agricultural statistical information systems as well as the informal information systems of individual farmers.

A further concern of the systems approach is with workability. The roots of Singer-Churchman Inquiry Systems arise directly out of American pragmatism (Mitroff and Pondy, p. 477), so the implementation phase

of problem solving takes on a greater importance than with many other modes of inquiry. This also follows from the holistic concern of the systems approach which would imply that all important aspects of the problem should be studied including the implementation of possible solutions.

Many persons equate the systems approach with computerized modeling or simulation. This is far from a correct appraisal of either the systems approach or the technique of simulation. Not all systems need to be modeled mathematically in order to assist in solving problems. Often a simple conceptual model of the system which identifies the various components and interrelationships of the system will be all that is necessary or desirable in developing solutions to problems.

2.3 AN INFORMATION SYSTEMS PARADIGM[1/]

Agricultural economists as well as other social scientists often erroneously equate data to information. As Edgar S. Dunn (p. 20) notes, "There is a pervasive tendency to assume that information is an intrinsic property of symbolic data." But he follows this statement with the disclaimer that it is clearly untrue. The following paradigm is an attempt to make clear the difference between data and information and to relate the data collection process to the analytical process or system of inquiry used in solving practical problems.

2.3.1 DATA AND DATA SYSTEMS

A data system is fundamentally an attempt to represent reality empirically. Since reality is infinitely complex and is not readily

1/ Sections 2.3.1 and 2.3.2 are based on Bonnen 1975a.

grasped in total by the human mind, it is necessary to first break down these experiential phenomena into a set of categories or classes that can be counted or measured. This counting or measuring is usually thought of in quantified terms but our arguments apply equally to numerical or non-numerical data. Subjective impressions and simple relative comparisons such as good or bad and high or low can be treated in similar fashion. However, for ease of presentation, the remainder of this section will be discussed in terms of numerical data, remembering that the ideas remain valid for both quantitive and qualitative data.

Data collection is usually thought of in terms of measuring or counting using sampling or complete enumeration of a certain population. But problems of sampling or measurement only arise after the prior question of "what phenomena is to be counted or measured?" is answered. Given the philosophical basis of our approach presented earlier the most reasonable answer to this question is that it depends on the ultimate decisions to be made. To maintain logical coherence and to represent reality adequately these quantified phenomena must be related to each other and to reality in a meaningful manner. Thus, there must be a concept of reality to be measured and to be meaningful this concept must be capable of accurately systematizing and categorizing reality so it can be understood by those using the data. This categorization must also be such that the concepts are relevant to the ultimate decisions. Improvements in sampling procedures or other measurement techniques will be of little value without this solid conceptual base.

While any data collection must be preceded by some conceptualization of reality, a concept is an abstract idea and it is not possible to measure a concept as such. Instead it is necessary to operationalize or

define these concepts so the definitions (categories of empirical variables) are as nearly representative as possible of the chosen concept.

Therefore, data collection is made up of more than the simple step that one might initially perceive, it is really three distinct steps: 1) conceptualization, 2) operationalization of the concept, and 3) measurement. These are the essential components of a data system. With this in mind, statistical reliability takes on three meanings. First, is reliability of concept, i.e., is the concept representative of reality and are the concepts pertinent to the decisions being made. Second, the data accuracy is affected by the reliability in operationalizing or defining the concepts, i.e., the categories of empirical variables should be as highly correlated as possible with the reality of the desired concept. Third, there is measurement reliability which follows from the statisticians' usual definition of the term. 2/

2.3.2. THE NATURE OF INFORMATION

The data system outlined above produces data not information. To become information, data require analysis and interpretation to place it in a decision making context. Raw data or even semiprocessed data are rarely used directly by decision makers. Instead decision makers require analysis to impart meaning to data so they can be used to solve the problems of concern in the decision making process. In this sense an information system is a process which imposes form and gives meaning to data. Economic analysis can be a part of this process but it is not necessarily

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2/ Bonnen attributes this expanded notion of reliability to L. V. Manderscheid.

the only part. Practical problems require knowledge from many disciplines so that the information system must go beyond economic analysis for solutions. Given this understanding of an information system three major components are obvious: 1) a data system, 2) the analytical capability necessary to transform data into information and 3) the decision maker. This is depicted in Figure 2-1.

Among analysts trained in the social sciences there seems to exist a common conceptual basis for analyzing and solving problems. This usually starts with a received body of theoretical concepts which are a perception of reality. Concepts are then defined through some form of model which is subsequently tested against empirical evidence and conclusions are drawn. Hence, data systems must share common ground with epistemological systems of inquiry.

The representation of a data system (left side of Figure 2-1) and an inquiry system (right side of Figure 2-1) points to the necessary overlap between theoretical concepts and the operationalization of these concepts in both data and inquiry systems. Without this common conceptual ground any attempt to use theory and empirical analysis together would be fruitless and the fit between the deductive and inductive processes of inquiry could not exist.

Information systems are teoleological because they are subsystems within social systems which are in turn designed to solve social problems (Bonnen 1976, p. 6). This is an important observation in that if data collection and analysis are purposive in nature, then it is only possible to evaluate information in a social system or decision making context. Thus, the concepts which underlie the data system can only be derived when the context of the decision is known. Furthermore, the system itself

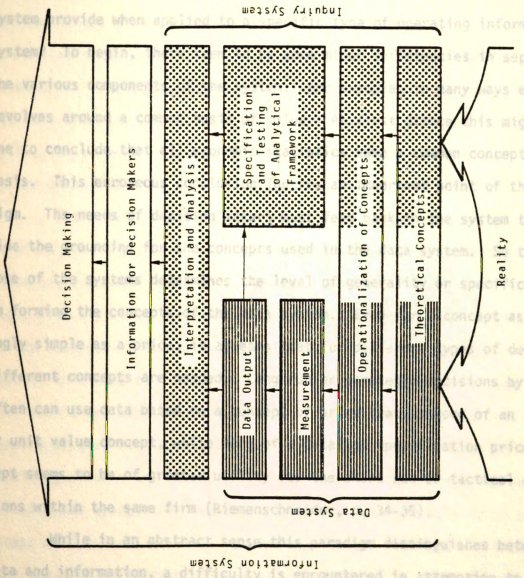

FIGURE 2-1 AN AGRICULTURAL INFORMATION SYSTEM

must adapt as societal goals change while at the same time providing the information that leads to changes in society.

2.3.3 APPLICATION TO OPERATING INFORMATION SYSTEMS

What insights does this abstraction of an idealized information system provide when applied to a specific type of operating information system? To begin, there seem to be some minor deficiencies in separating the various components of the system. For example, in many ways economics revolves around a common basis of value. At first glance this might lead one to conclude that all economic statistics have a common conceptual basis. This erroneous conclusion ignores an important point of the paradigm. The needs of decision makers must feed back in the system to provide the grounding for the concepts used in the data system. So the purpose of the systems determines the level of generality or specificity used in forming the concepts of the data system. Even for a concept as seemingly simple as a price, it appears that for different types of decisions different concepts are needed. Long run or strategic decisions by firms often can use data based on a concept of price that is more of an average or unit value concept, while more of a detailed specification price concept seems to be of greater utility for the short run or tactical decisions within the same firm (Riemenschneider, p. 34-35).

While in an abstract sense this paradigm distinguishes between data and information, a difficulty is encountered in attempting to determine the difference between data and information within the context of a specific information system. Very few decision makers or even analysts can use raw data, so almost all data are presented within a chosen format. The choice of a format implies some level of interpretation of the data.

So formatting clouds the distinction between data and information. More importantly this low level of interpretation or formatting points to the critical nature of the communication function in any operating information system. Except in the very limited cases where a single decision maker undertakes the design and collection of data and their subsequent analysis, the usefulness of data is tied to their interpersonal transmissability. Communication theorists are concerned with the process of encoding messages prior to the transmission of signals in a communication channel. All data undergo initial formatting so that they can be understood by analysts, this formatting seems to be analogous to the encoding of messages before transmission.

The understandability or interpersonal transmissability of data is often directly correlated with the chosen format of the data. For instance, a general politician with only a passing interest in agriculture might find a statistic labelled "hog farrowings" completely useless for a policy decision if he or she does not know the meaning of the word "farrowings." This same politician might be able to perform appropriate analyses and reach a decision concerning an aspect of farm policy relevant to hog farmers if this statistic were called an index of future pork production. Labelling of data is not the only aspect of formatting relevant here. Choosing the appropriate level of aggregation and the ability of users to access data as well as other related aspects are critical. Thus, whenever the data collection process is organizationally separate from the analysis and decision making, this formatting and communication process becomes an integral part of the information system.

Conceptual obsolescence is a problem for most operating information systems and can occur in two ways. First, concepts can become obso-

lete when reality changes in such a manner that the concepts are no longer representative of reality. A second type of conceptual obsolence is often more critical; this occurs when the agenda for decisions changes so the concepts of the data system are no longer pertinent to the decisions that are being made. The American Agricultural Economics Association's Economic Statistics Committee cited conceptual obsolescence as a major source of data problems in agriculture. The majority of agricultural statistics in the United States are collected around a concept of the "family farm" which has not changed in over 50 years.3/ The structure of agriculture has changed greatly during this time but the concept remains the same. Conceptual obsolescence in agricultural statistics has also come about because the policy issues facing agriculture have changed dramatically in recent years. Issues which relate to energy, the environment, consumers, and the world food situation have all had a substantial impact on agriculture yet the data system for the sector is not designed to answer many of the questions which have arisen in response to these issues (Bonnen 1975a).

2.4 ECONOMIC IMPLICATIONS

The major implication of the information systems paradigm presented here is that information only becomes an economically valuable commodity in the context of decision making. For those theoretical economists living in a world of perfect knowledge the disclaimer must be added that information first becomes valuable under conditions of uncertainty. But in most practical applications consideration of uncertainty

3/ While it is true that the concept has not changed, the manner in which this concept has been operationalized has changed periodically.

is a fact of life.

When viewed in an information systems context, information can be treated as a commodity. Kenneth J. Arrow (1962) provides a link between information as a commodity and information systems. His concern was with "inventive activity" which he equates to the production of information. Arrow's notion of inventive activity seems to be analogous to an information system since both processes yield an output of information. In this sense, inventive activity would seem to include data design and collection in addition to the analysis of data to produce information for decision makers.

Since information only acquires value in a decision making framework the value of decisions is a primary determinant of the value of information. Therefore, the value of an information system depends on the types of decisions for which it is used and consequently on those who make the decisions.

Information has many characteristics which provide insights into questions concerning information system design. Once the characteristics of information as a commodity are understood it is possible to look at general used of information to get an indication of the determinants of the supply of and demand for information. While not explicitly providing a measure of the value of information, the determinants of information supply and demand should illuminate some of the difficulties in determining the value of information and the appropriate role of government in the provision of information.

2.4.1 CHARACTERISTICS OF INFORMATION

The characteristics of information as a commodity affect its

allocation in the economy. Information possesses some of the attributes of public goods which lead to allocational inefficiencies when compared to purely private goods in a competitive market. The attributes of uncertainty, indivisibility, and nonappropriability all violate the classical properties of purely private goods. The existence of uncertainty is inherent in our definition of information. Information is also by definition indivisible.

As Kenneth Boulding points out, the absence of any unit of information makes the pricing of information difficult and hence even makes it difficult to think of information as a commodity. The electrical engineers and data processors break information down into "bits" and this concept is basic to their theory of information processing.

> "The bit, however, abstracts completely from the content of either information or knowledge, and while it is enormously useful for telephone engineers, who have no interest in what is being said over their telephones, for the purposes of the social system theorist we need a measure which takes account of significance and which would weight, for instance, the gossip of a teenager rather low and the communication over the hot line between Moscow and Washington rather high." (Boulding, p. 3)

Geoffrey Newman (p. 486) notes two other related problems in defining information in term of bits. First "bits" may vary with the problems of the decision makers, and second even if simple factual propositions could be broken down into bits, how can theories based on deduction be broken down into bits since theories do not necessarily have a basis in fact.

For our purposes the problem of nonappropriability as a property of information is particularly important because of the implications it has for market structure. Producers cannot normally charge for further uses of information once it is disseminated so the returns to the supplier of information are not fully appropriable. As Boulding answers, only

things clearly appropriable can become property and be exchanged; if something cannot be property, it cannot be a commodity. The problems of appropriability of information make it a peculiar kind of property which affect its supply and demand.

The question of appropriability cannot be separated from the issue of property rights for information. Copyright and patent laws make the appropriability of returns to information easier for certain types and certain uses of information but the costs of enforcement make this a reasonable alternative only in selected cases. For instance, if one possesses information about a commodity that is traded in a market, one must trade in the market to get a return on the information. However, by completing a transaction in the market at least the nature of the information that one possesses is released to others in the market. Thus no copyright or patent laws could prevent others from using this information. Many cases still remain, though, where the tradeoff exists between changing the mechanisms for supplying information and changing the property rights to information in order to get a more optimal allocation of resources for the production of information. Changing the supply mechanisms is for the most part easier than changing the property rights and hence our later analysis assumes that the structure of the property rights for information is relatively constant.

The incomplete appropriability of information suggests that in cases where data or information are sold to individuals that it should be presented in a manner that is somewhat ephemeral so that only those who originally pay the information supplier are likely to receive the information. If the information supplier can present it in such a way that the original purchaser of the information does not have a relatively

permanent document containing the information then it is more difficult for the original purchaser to pass the information along to others. For instance, Maynes, et. al., (p. 27) suggest the use of cable television as a means to present consumer price information which would reduce the potential for unauthorized resale of the information. This also suggests that any user fees charged for the information should be low enough so those who buy the information have little incentive to resell it.

Reselling of information is related to the characteristic of increasing net returns in the use of information. This phenomenon stems from the indivisibility of information taken in conjunction with the high fixed costs usually associated with acquiring information relative to the costs of transmitting the same information once it is acquired. The initial purchasers or users of information are able to pass along the information at a cost lower than the original supplier. Increasing returns to the use of information arise as long as the value of the information is relatively constant for each subsequent use. The incomplete appropriability attribute only exacerbates the difficulties brought on by increasing returns in use, since it prevents the original supplier of information from charging for the subsequent uses of the information once it is disseminated. Thus, the high fixed costs of acquisition cannot be spread over all users.

The fact that information only acquires value in a decision making situation gives rise to a fundamental paradox. A decision maker or purchaser of information does not know the exact value of the information until it is acquired and used, but to determine precisely its value prior to buying it the purchaser must in effect obtain the information without cost. The problem caused by this paradox would be alleviated if the

seller retained the property rights to the information, but as was previously mentioned the lack of complete appropriability is a basic characteristic of information. The importance of credibility and reliability of sources of data and information is stressed by this paradox. When the purchaser of the information is forced to estimate its value prior to receipt, the value is often determined from previous experience with the same supplier.

Another common way to judge reliability, especially of statistical data, is through the methodology used in the data collection. This accentuates the critical role of documentation of statistical procedures in operating information systems. When there is no other way to estimate the value of certain kinds of data except through an assessment of the data gathering procedures, this documentation of the procedures is important. In cases where new suppliers or new users of the data arise documentation is even more essential since prior experience cannot be used to place a value on the data. Given the three types of statistical reliability implied by the information systems paradigm, this documentation should include a statement of the concepts underlying the data, how these concepts are operationalized, as well as some notion of the statistical sampling methods used.

There are further characteristics which affect both the supply and demand for information as a commodity. The production of information is a risky process. The output of the production process, i.e., the information, cannot be predicted perfectly from the inputs so the process has uncertainty associated with it (Arrow 1962, p. 616). For an information system this problem arises because of the nature of the decisions for which the information is to be used. The same data can be analyzed

to produce information that is different depending on the problematic situation.

The characteristics outlined above, i.e., the riskiness of information production, the indivisibility of information, its nonappropriability, increasing returns in use, all cause the competitive model to lead to a sub-optimal allocation of resources from society's point of view for the production of information. Arrow (1962) shows that these attributes cause an underinvestment in and an underutilization of information in the free enterprise economy. The same conclusion is reached if one considers that information has many of the attributes of public goods and thus will be underproduced relative to a purely private good in a competitive system.

2.4.2 SUPPLYING INFORMATION FOR PRIVATE USE

The characteristics of information outlined above create some difficulties in determining a suitable means of organization for the provision of agricultural information for private sector decision making. There seem to be three basic organizational arrangements for supplying information on a given industry. Each firm could purchase information from a specialist firm, all firms could work together in data gathering, using an industry or trade association to provide the information, finally governments could gather and provide information to all of the firms.

The social returns to information are not estimated in most instances, perhaps, because of the inherent difficulties in valuing information. However it does seem clear that the social returns to information often exceed the sum of individuals' private returns, particularly in a decentralized economic system where information is needed to coordinate economic activity among firms. Without information the prospects of

realizing the full potential for increases in productivity from technical change in a sector would be greatly diminished. The initial work in this area by Yujiro Hayami and Wilis Peterson tends to confirm these hypotheses. Their results show that, at least at the margin, improvements in the measurement accuracy of data can cause increases in social welfare in a market situation, as measured by losses of consumer surplus, beyond the benefits estimated by merely summing the individual private benefits.

While in an aggregate sense data improvements might be in the overall interest of society, it is clear that any improvements in an information system generally benefit some groups more than others or benefit certain groups at the expense of others. Thus, it is likely that improvements or changes in data design will be non-Pareto better. This stresses the normative tone associated with any decisions in this area. As in most public choice situations tradeoffs between different groups must be weighed to determine the sagacity of any improvements in a public information system.

It should also be noted that arguments presented in this section begin with the implicit assumption that social benefits to information do exceed private benefits, i.e., positive externalities exist. From this starting point it is then easier to discuss economic considerations in evaluating different information systems. While related to questions concerning the economics of information, the following discussion is perhaps best described as dealing with the economics of information systems. This subtle distinction is necessary to maintain the generality of the results and to avoid the overwhelming difficulties associated with determining the social value of information for each existing or proposed information system.

Of particular interest is the effect of an industry's market structure on organization to supply information. Since there are generally high fixed costs in information production relative to the variable dissemination costs, one might expect a firm to exploit these decreasing average costs by monopolizing the collection and dissemination of information for an industry. The incomplete appropriability of the returns to information production is one factor which decreases the likelihood of the development of information specialist firms. Also, as Oliver Williamson notes, the opportunistic behavior of firms reduces the probability of existence of these information provision specialists. There is a risk that any firm specializing in information provision will selectively distort the information it sells. Since the information is not easily verified, usually only by collecting original data again, exchange between firms in an industry and the specialist firm will fail. Thus, the importance of credibility, pointed to by the fundamental paradox of information, suggests that as long as firms are opportunistic in their bahavior, it is unlikely that firms will purchase information from a profit seeking firm specializing in information.

Recent hearings by the United States House of Representatives Small Business Committee concerning the manipulation of meat prices by the National Provisioner Daily Market Service, a private meat price data collection firm, suggest that very little incentive is needed by specialist firms to distort the information it provides. Testimony by the committee staff investigator stated that the National Provisioner Daily Market Service reported prices where only a limited number of trades or no trades at all took place. The implied incentive in this case was to maintain sales of data to the specialist firm's customers.

As the number of transactions in the meat industry declined it became more difficult to report prices for all types, weights, and grades of meat. Instead of admitting this, the National Provisioner appears to have continued reporting prices based on a small number of transactions simply to give the appearance that it was doing its job. These actions appear to have been undertaken to maintain customers. While these allegations have not been proven it is suggestive of problems arising from the reliance on specialist firms for information (United States House of Representatives, pp. 245-292).

The argument against specialist firms hinges on the notion that these firms will be opportunistic in their behavior, which Williamson defines as seeking self-interest with guile. If opportunistic behavior is not assumed, then the risk of strategic misrepresentation disappears and specialization in the production of information is possible. This stresses both the need for an unbiased, nonopportunistic firm or organization to collect market information as well as the importance of reliability and accuracy in data collection.

The lack of appropriability of returns to and indivisivility of information production also makes the possibility for individual firm production of market information less likely, except in the case of monopoly. Since there is only one firm in the industry in a monopoly situation, the benefits of any investment in market information for that industry accrue directly to the monopolist. Hence, it can justify its expense and can expect to reap the benefits of any investment in information to manage the industry.

Advertising by farm input firms is another example of some of the problems of information specialization. The advertising function is

usually a case of specialization of information provision within part of a larger firm. Here the obvious incentive is for the advertising branch strategically to misrepresent or distort the information it provides to farmers in order to increase the profits of the firm. Thus, the information provided by advertising is of limited use to the farmer. For the most part, the useful portion of the information is only that which can be easily verified such as price, product availability, and those quality characteristics identifiable by inspection. While truth in advertising laws can be used to alleviate problems of gross misrepresentation by opportunistic firms it is unlikely that these will eliminate all biases. When the advertising concerns product characteristics that can only be determined through experience, such as the durability of a piece of farm machinery, rather than by simple inspection, the opportunities for misrepresentation multiply.

The public good attributes of information suggest that some form of collective action in information production should lead to an increase in social welfare. However, no indication is given from the characteristics of information, per se, as to whether a voluntarily organized private effort is possible rather than government intervention. In making this choice the theory of groups can provide some insights.

If industry is viewed as a group of firms and information as a public good, then Mancur Olson's theory of groups can be used to show the effect of economic structure on information supply. Olson shows that the ability to organize a group depends on whether the individual member is able to obtain benefits in excess of costs. Olson has shown that some small groups can organize to provide a public good without any benefits other than those provided by the good itself. In cases where groups are

very small, i.e., where each member gets a major proportion of the total benefits of the public good simply because the members of the group are few in number, this public good can often be provided by the voluntary action of the individuals in the group purely on the basis of the self-interest of the group members. This suggests that as industry structure moves toward oligopoly that market information is more likely to be provided by an industry association and that government collection of data for private use in the industry is probably not necessary.

As groups get larger some other incentive such as government subsidy or selective benefits in the form of private goods might be necessary to organize a group to provide public goods. Since a public good is such that use by one individual does not preclude the consumption by another individual, even small groups will fail to provide an amount of public good near the amount provided in the case where information possessed the characteristics of a purely private good. The divergence between these two amounts increases as group size increases (Olson). The conclusion can be drawn from this that government intervention might be appropriate to achieve a desired level of information production as an industry becomes more atomistic. This would also force some of the "free riders" in an industry, who would use information provided by a trade association but would not support the group financially, to pay for the use of the information through taxes. It must also be kept in mind that government information provision subsidized by tax revenues would force some taxpayers who do not benefit from the information to pay for it anyway.

To summarize the arguments about the relationship of economic structure to the supply of information for private use: First the problems of indivisibility and nonappropriability make private data collection and

analysis unlikely under the conditions of a competitive market structure. As an industry becomes more and more concentrated, it will be increasingly in the self-interest of the firms in the industry to supply information for their own use and hence government provision of information for private use is less and less necessary. However, as the industry structure moves toward more atomistic competition, then the argument for government provision of data collection and analysis can be made on the grounds of improved efficiency in the allocation of resources because the industry is not likely to provide an amount any where near optimum, assuming that there are net social returns to the information in addition to the sum of the private returns.

2.4.3. INFORMATION FOR PUBLIC USE

The previous discussion centered on providing data and information for private sector decision making. For public sector decision making, data collection and analysis is by definition a government activity. Government information provision is usually relied on to assure accurate and credible information for public policy decisions and to avoid the strategic misrepresentation of information supplied by the private sector for public decisions. This is not to say that government data and information is always beyond reproach. When data are used as performance measures for public policies it is easy for the data to become politicized and lose credibility. Even the private use of data can cause it to be politicized. Private sector lobbies have politicized some public data used in critical private sector decisions, e.g. the use of the Consumer Price Index in collective bargaining has tended to enhance the political pressure on this data preventing timely modifications to maintain or

improve the reliability of the Consumer Price Index. Somewhat similar private sector pressures have developed around the USDA measure of aggregate farm income.

Politicizing data rarely involves changing the numbers, per se. Usually more subtle methods are found such as speeding up publication of favorable data or delaying unfavorable data to mesh more closely with policy proposals, controlling the format of the data to insure that technical interpretations fit with policy pronouncements or the failure to make changes in existing data concepts or definitions to fit reality since these changes might make a situation look better or worse and thus make the current government look bad.

Comments on personnel and other changes in the Federal Statistical System of the United States in the early 1970s by Philip M. Hauser show that the integrity and credibility of data can be affected without actually changing numbers. Some of these events, such as appointing political cronies to head statistical agencies and the cancellation of regular surveys, while yielding no evidence of direct political manipulation of data, at least suggested possible impropriety and thus reduced the credibility of the data. In agriculture the political difficulties encountered in changing the definition of a farm gives an indication of why it is often politically difficult to make improvements in data once they have become firmly institutionalized (Hildreth and Worden).

One should not paint too bleak a picture for government provided data for public decisions since the alternative is often much worse. Many other types of difficulties are encountered when the government relies on private sector information to make policy decisions. The current debate in the United States over the level of natural gas reserves points to the

problems of strategic misrepresentation of data supplied by private firms for public use (James N. Miller). Therefore, in designing a government information system various efforts to guard against politicization of data should be considered. Some of the important means of avoiding politicization of data include the complete documentation of methodologies used in obtaining data, the encouragement of ties between government statisticians, economists, and other analysts and academic and other nongovernment professionals in these fields, the selection of leaders of statistical agencies on merit not political acceptability, and an attempt to maintain appropriate distance between policy formulation and evaluation and the collection of statistics. In this last case we are not necessarily arguing for a separate statistical agency, only that the functions of data collection and policy formulation be quite distinct within an agency to avoid even the appearance of impropriety.

2.4.4. THE DEMAND FOR INFORMATION

The value of information is discovered only in a decision making context, so the demand for information is determined by its value in the decision process of firms or government. The value of information, then, is not known with certainty until it is obtained and used, so problems arise in estimating the demand for information. Firms that are risk adverse will tend to demand less information because of the uncertainty of their returns, a priori, to investments in information.

As industrialization occurs in a country, production processes become specialized so more information is required for firm and market coordination. Thus, for the same investment in market information, returns to the firm should increase as an industry becomes more specialized. As

industry structure becomes concentrated, the returns to information investment for private use can be captured by the small number of firms in the industry. This ability to capture returns to information investment also affect the demand for information by an individual firm. At the other end of the industrial structure spectrum where there are many independent firms, as in agriculture, the amount of private sector investment in producing information will probably approach zero since only a small portion of the returns can be captured by any one firm. In this case the public returns to information in the form of better coordination would probably exceed the private returns. On this same continuum, the public use demand for information will decline as one moves away from atomistic markets then increase as information to monitor and regulate monopolistic industries is necessary. This is expecially true where regulation on monopolies through antitrust laws is viewed as a socially desirable goal.

The need for data on monopolistic industries raises the additional question of public access to data collected by highly concentrated industries and monopolies. There is a public interest in this type of information which should temper any discussion of confidentiality and disclosure. Data on these types of firms are often sensitive because of the concentrated nature of the industry and the immediate effects of any firm's actions on the market. However, this makes this same data extremely critical for public decisions. Thus the benefits to society of the preservation of privacy, particularly among corporations, must be weighed against the information needs of public policy decision makers (Bonnen 1975b, pp. 101-102).

The ability to capture returns is related to the ability to use information. A farmer who has sold all of the farm's grain for a year

will find further information on grain prices of little immediate value, indeed, it has been known to lead to high blood pressure and other aggravations. The ability to use market information is also related to the accessability of sellers to different buyers of the commodity. Therefore, the market area covered (in terms of number of buyers) by an information system should be related to the demand for the market information. A farmer in California is not likely to be as concerned with spot market prices in New York as those prices in California. This question of accessability to markets must be answered to define the area of coverage for certain kinds of market statistics. It should not be implied from this that markets are not related or prices from other areas cannot enter into the decisions of farmers in a given area. However it seems reasonable to assume that sellers would be most interested in the prices from the specific markets where their sales occur.

Up to this point we have dealt in terms of the effect of industrial structure on information in a reasonably obvious fashion. There is a more subtle effect which runs in the opposite direction, i.e., the effect of information on industrial structure. Earlier some of the economic characteristics of information were mentioned. These can affect firm size and industrial structure. The riskiness of information production is often such that outside insurance cannot be purchased to offset that risk. Self-insurance in the form of diversification is often used to deal with such risk. This suggests that in order for a firm to be able to produce information through data collection and analysis, it must be large enough to internalize the risk of losses in information gathering. Thus, information production is usually done by large firms and large firm size is generally related to industrial concentration.

The indivisibility of information also can affect industrial concentration, in that it leads to increasing returns in the use of information. Roy Radner notes that "the acquisition of information often involves a 'set-up cost'; i.e., the resources needed to obtain the information may be independent of the scale of the production process in which the information is used" (p. 457). Robert Wilson calls this "informational economies of scale," and notes that this phenomenon is self-reinforcing in that a higher scale of operation justifies better information acquisition and increased information acquisition will justify a higher scale of operation. Hence, economies in the acquisition of information can increase firm size to the point of monopoly. Theoretically this will occur as long as information is acquired in an optimal fashion. While Radner and Wilson seem to have horizontal firm structure in mind, as Williamson (p. 86) notes, the same argument can be made for vertical integration in many cases. Thus, indivisibilities in information and the resulting increasing returns in use of information can also affect the vertical structure of a sector by providing an incentive for vertical integration solely to reduce uncertainty.

The arguments presented in this section demonstrate that it is not a political or bureaucratic accident that government collects more detailed statistics and does more analysis for private use on highly competitive, atomistic industries, such as agriculture, than it does in more concentrated industries such as steel or autos. Publicly collected data for private management decision making have played a substantial role in the great increases in agricultural productivity in the United States over the past century. Society has captured the returns to improved resource use in agriculture through lower food costs and the availability

of much of the former farm labor force for nonagricultural production. The greater returns to society through improvement in resource allocation from better public information on competitive industries when compared to concentrated industries provide the primary basis for allocating public monies for statistical systems to support private decisions. Hence, the logical allocation of public resources not just for public decision needs but for private uses follows from the nature of the industrial structure itself (Bonnen 1976, pp. 14-15).

2.4.5. INCOME DISTRIBUTION AND THE DISTRIBUTION OF INFORMATION

Modern economic theory also has been particularly deficient in dealing with distributional issues while concentrating on problems of allocative efficiency. Just as uncertainty is usually assumed away in models of resource allocation, the distribution of income is often assumed to be optimal to begin with and hence is not treated. The connection between the distribution of information and the distribution of income seems to be a key but often overlooked notion.

As Lester C. Thurow argues,

> "The factors that cause changes in the distribution of income are themselves distributions. The distribution of education and training affects the distribution of income. Thus, to adequately study the American distribution of income, it is necessary to develop methods of explaining the distribution of income in terms of the distribution of causal factors which influence it." (p. 261)

Information is clearly one of those causal factors to which Thurow refers and thus the study of income distribution requires an understanding of the distribution of information.

The distribution of income can be discussed at two different levels and the types and impacts of information will differ at each of these

levels. First, one can consider the overall or size distribution of income in the entire society. Secondly, there is the question of income distribution among given individuals or groups of individuals within society. This distinction may be viewed as a macro-micro delineation of the problem.

Keeping in mind that we are considering information in a systems context, the distinction between data and information has important implications for income distribution. Data require analysis and interpretation in the context of a specific decision to become information (Bonnen 1975a, p. 758). In general, a more equal distribution of data among members of society is likely to have quite different effects on income than an equal distribution of information because of the disparity in analytical capabilities of those receiving the data. It is this analytical capability that Thurow and others seem to have in mind when discussing the relationship between the distribution of education and training and the distribution of income. Insofar as education provides superior data interpretation capability among members of society, one would expect that the distribution of education and hence information would in turn be related to the distribution of income. This expectation is supported by the literature (Thurow).

This relationship between education and income has been directed primarily at the most general level, i.e., its effect on the size distribution of income in society. As Donald M. Lamberton (p. 462) notes, the general expectation of improved information is to reduce inequality in power, wealth, and income. However, it is at this most general societal level that improved information is often least likely to cause the desired reduction of inequality because of the different capacities of firms and

individuals to use or act on the information that they receive, even given the same capability to analyze and interpret data. When new information becomes available to both concentrated buyers and dispersed sellers, the buyers are at a great advantage. Not only do the buyers have greater analytical capabilities and capacity to use information but they also have a greater capacity to take counteraction. For example, published prices can also make price fixing agreements between buyers easier to maintain. While there is no evidence of this actually happening, it is conceivable that an agricultural information system could encourage price fixing among oligopsonistic buyers of agricultural commodities. Furthermore, in a recent unpublished survey of nonrespondents to U.S. Department of Agriculture surveys, the two comments most frequently given by farmers for their refusal to respond were that 1) the surveys benefit others more than farmers and 2) the surveys hurt farmers. Whether or not these statements are completely true is debatable but at least it suggests the possibility of data being used against the more dispersed traders in a market.

These insights have important implications concerning the relationship of information to income distribution. First, since the value of information arises only in its use, the capacity to use or act on information will have a significant effect on income distribution. Second, economic structure again influences the distributional consequences of information. Insofar as the size of firms are related to market structure, e.g., firms in oligopolistic industries are assumed large enough so their decisions will influence the market, large firms probably have both superior analytic capability and a greater capacity to use or act on information than do small firms. These larger firms can be expected to use their superior information to influence in its favor transactions with smaller

less informed firms, so the subsequent income distribution will favor larger more concentrated firms. The distribution of income is primarily determined by the outcome of the market in the private sector (Weisbrod, p. 178). So as information affects market structure and behavior, it also affects income distribution.

This reliance on market transactions to determine income distribution highlights the importance of the distribution of information between individuals in an exchange situation. The problems here are at a more micro-level than those discussed earlier and the effects of the distribution of information are on the distribution of income between the individuals involved. This is similar to the market failure brought on by what is called information impactedness by Williamson. He argues that this phenomenon,

> ". . . is attributable to the pairing of uncertainty with opportunism. It (information impactedness) exists in circumstances in which one of the parties to an exchange is much better informed than is the other regarding the underlying conditions germane to the trade, and the second party cannot achieve parity except at great cost--because he cannot rely on the first party to disclose the information in a fully candid manner." (p. 14)

When trading occurs under the circumstances of asymmetrical information, one can only expect a redistribution of income in favor of those who possess the supperior information when compared to the case when information impactedness does not exist.

In the previous section, it was argued that the governmental collection of data and its production of information for agriculture could be justified in terms of improved resource allocation. Burton Weisbrod (p. 179) makes the point that income redistribution can be undertaken in a number of ways including the use of redistributional "side effects" of policies that are usually considered to have efficient resource allocation

as their goal and not income redistribution. To the extent that government wishes to redistribute income in favor of agriculture, one can argue that many of the programs to improve the information system for agriculture are achieving this objective, even though many of the programs are aimed at the resource allocation problems caused by uncertainty. However, even those programs which tend to equalize the access of information in trades, such as price and production estimates, might not have desirable income distribution effects because of the market structure in agriculture. The predominance of atomistic producers and concentrated buyers in this sector may prevent any major redistributions of income between buyers and sellers because of the superior analytical capability and ability to use government produced information possessed by the larger firms in the agricultural sector. However, to the extent that government research and data collection tend to equalize the information of individuals involved in exchanges of agricultural commodities, there will be a change in the distribution of income toward greater equality. Many programs have tended to achieve this desired income distributional change. For example, the land grant college system and extension education programs probably have increased the analytical capability of farmers relative to those with which they deal, and the establishment and regulation of futures markets give farmers a greater capacity to use or act on information that did not previously exist for farmers.

The major arguments of this chapter suggest that there exists a chronic or absolute underinvestment in information production because of the economic characteristics of information. Perhaps of greater importance are the implications of these theoretical findings for the relative distribution of investments in data collection and analysis. In those

cases where changes in the information system benefit some groups more than others or at the expense of different groups, a basis is required for determining which changes represent the best use of government resources.

The criteria for making improved government investments in data collection and analysis follow from the market structure of the industry which benefits from the information and from the effects of the information on income distribution. Using these criteria it is possible to establish relative priorities for public investment in information. Wise public investment in data collection and analysis should help to equalize the information of individuals involved in transactions and thus will lead to greater equity in the income distribution.

2.5 SUMMARY

In order to evaluate an operating information system it is particularly useful to have a framework to serve as a guide in structuring the evaluation. For the purposes of this study an information systems paradigm provides the framework for the subsequent analysis. The main focus of this paradigm is with problem solving and to the extent that problem solving decision making requires information from a variety of disciplines this framework is multidisciplinary.

An information system as presented here has three major parts: 1) a data system which includes data concepts, the operationalization or definition of these concepts and the measurement of these defined concepts to produce data; 2) an analysis or interpretation step to transform data into information for decisions; and 3) the decision maker. When applied to operating information systems this paradigm has some minor deficiencies

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with respect to the formatting and communication of data and information. Problems of conceptual obsolescence become apparent in operating data systems when the concepts used in the data system are no longer representative of reality or when the agenda for decisions changes so the concepts are not pertinent for the types of decisions that must be made using the data.

The primary economic implication of this paradigm is that information only becomes valuable in the context of decision making. The public good characteristics of information coupled with the implied condition that information can be treated as a commodity within a decision making framework has major consequences for understanding the role of government in producing information.

With these characteristics and conditions in mind, two variables or relationships become critical in the design or redesign of an information system. The first of these is the configuration of the relevant economic sectors. Economic structure affects the supply and demand for information in both the public and private sectors, has consequences on the distribution of information and is critical in understanding the appropriate role of government in providing information.

The second key theoretical relationship considered was that between the distribution of information and income distribution. Economics often neglects the effects of the distribution of information on the distribution of income but, in many instances, equity concerns lie behind the reason for allocating public funds for data collection and analysis.

CHAPTER 3

REVIEW OF LITERATURE ON AGGREGATE FARM INCOME DATA

3.1 INTRODUCTION

A review of the relevant literature for this study is in order. A comprehensive treatment of the literature on the economics of information or information systems in general is not intended. These were covered in part in the development of the conceptual framework in the preceding chapter. Instead, this literature review will focus on some of the recent literature on aggregate farm income accounting. The intention is to concentrate on the important works related to this study and to point out the relevant aspects of these for this analysis. These earlier studies provide a set of recommendations for farm income data improvements but their approach and intent often differ from the type of analysis undertaken in this study. After examining the USDA farm income data in an information systems context, it should be possible to set priorities among the improvements recommended in the earlier studies.

Within the area of aggregate farm income accounting two aspects will be emphasized. First, some of the recent reports and evaluations of USDA farm income data will be summarized. Second, some alternative conceptualizations of farm income or economic well being of farmers will be examined.

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3.2 ANALYSES OF FARM INCOME DATA

3.2.1. GROVE

Ernest W. Grove was one of the first agricultural economists to question the relevance of a concept of farm income to the current needs of data users. Grove's focus was rather narrow and concerned the appropriateness of the realized net farm income concept as opposed to the total net farm income concept. Data on both are estimated by the U.S. Department of Agriculture.

The concept of realized farm income does not consider increases or decreases in farm output inventories as part of income, while the total farm income concept does account for the value of crop and livestock inventory change. Grove argues that there are six major deficiencies in the realized farm income concept that make it less desirable than the total farm income concept. First, since total farm income is needed for the Department of Commerce's estimates of farm product, the publication of both realized and total farm income can cause confusion among unsophisticated users of the data. This dilemma suggests that understandability of data is an important consideration in data system design.

Second, he argues that the realized farm income concept is contrary to generally accepted practice and the theory of income measurement. This stems from the usual notion in economics that increases in inventories are actually a form of savings from current income and real income can only arise out of current production. In part the distinction between realized and total farm income is somewhat analogous to accounting on a cash or accrual basis. However, the analogy is not exact since producer owned purchased input inventories are not included in total net farm income. So at least by analogy it seems that Grove is arguing that the accepted theory

and practice in income measurement is to account for income on more of an accrual basis. While accrual accounting dominates other sectors of the economy because of Ferderal income tax rules, it is clear that cash accounting is much more prevalent in agriculture. Harrison notes that 98% of all 1969 farm tax returns used cash accounting methods. But Grove is correct in saying, in effect, that the accrual method is the most accepted method in the sense that the National Income Accounts of the Department of Commerce are on an accrual basis. Grove seems to imply this when he traces the development of the total net income series. This series arose out of a need by the Commerce Department to have a measure of farm income more closely in line with its accounts.

The third objection that Grove has to realized farm income is that it provides an undesirable choice of statistics even among sophisticated users. Grove observed that the realized income figures were used by decision makers in USDA except in those cases where the total income data better proved the point that these decision makers were trying to make; so that having a choice of two series might tend to confuse some issues. This argument is certainly not unique to farm income data and applies to almost any data sets which measure similar phenomena. So the usefulness of this argument alone is somewhat suspect.

The fourth objection arises indirectly from measurement difficulties in estimating the value of inventory change. Grove claims that since physical inventories are the residual of production less marketings and that production is measured with more relative accuracy than marketings, then total income is more accurate than realized income. In the case of total income, any errors in estimating marketings are offset by

changes in inventories since inventories must equal production plus beginning inventories less marketings and home consumption. C. Kyle Randall, in his comment on Grove's article, points out that it is not always as easy to measure total income since production is not measured for meat animals. So inventories here tend to be more difficult to estimate. Related to this, and shown in Breimyer's comment to the Grove paper, is the difficulty in valuing inventories. The inelasticity of demand for agricultural products means that using average yearly prices to value inventories tends to overvalue large year end inventories and undervalue small inventories.

These phenomena also, as Harold F. Breimyer suggests, tend to exaggerate year to year swings in the income actually received by farmers when compared to total net farm income published by USDA. This tends to refute another of Grove's objections to the realized income concept, that being that it has resulted in an unrealistic smoothing out of farm income estimates by eliminating increases and decreases in output that are added to or taken from inventory. The smoothing occurs because inventory change is not considered in the realized farm income concept, hence this form of forced saving from current production is not counted. Breimyer's point that large inventories are overvalued using the current methods also reduces the significance of Grove's other objection, that over decades when aggregate inventories are increasing an omission of income occurs by using the realized farm income concept.

For the purposes of this study the measurement problems associated with realized farm income are not as critical as those involved in the first three of Grove's objections which suggest that there might be difficulties with the concept used by USDA in making policy decisions. While

his case is far from convincing, Grove at least raises the question of conceptual relevance which is a first step in understanding the problems that should be considered in any proposed redesigning of the farm income information system.

3.2.2 TASK FORCE ON FARM INCOME AND CAPITAL ACCOUNTING 1972

In 1972 a Task Force of U.S. Department of Agriculture economists and statisticians headed by Eldon Weeks completed the first comprehensive evaluation of the department's farm income and capital accounting data. In addition to the final Task Force Report (Weeks, et. al., 1972), numerous other publications resulted from this study, e.g. Weeks 1971, Weeks 1972, Carlin and Handy, Carlin and Smith. These will all be considered as a single development in this literature review, except for those which summarize the Task Force's recommended alternative accounting system which will be dealt with in the following section on alternative conceptualizations. Unless otherwise noted the following discussion of this development will be based on the Final Task Force Report (Weeks, et. al., 1972).

The Task Force report covered the basic accounting for aggregate farm inputs, outputs, capital, farm operator inputs and to a more limited extent the distribution of these aggregates by farm size, type and location. For the purposes of this study the capital accounting aspects will not be considered except as these relate to farm income. More important are the areas not covered by the Task Force. Given the information system paradigm that provides the conceptual framework for this study, a serious shortcoming of the 1972 Task Force was their explicit failure to consider farm income accounting designed specifically to aid decision

making.

> "Finally, possibilities of accounting for institutional mechanisms designed to facilitate or exercise decision making and control were considered out of scope for the purposes of this Task Force." (Weeks, et. al., 1972, p. 3)

While it may be true that the 1972 Task Force was directed to stop its analysis at the data output stage of the information system, it does not relieve them of the necessity to consider how the data are ultimately used in order to make appropriate recommendations concerning the concepts to be used in redesigning the data system.

The first step in understanding the 1972 Task Force report is to look at some of their assumptions used in evaluating the current accounting system. This is also significant since much of the analysis in the later chapters of this study will at least implicitly test the validity of some of these assumptions.

The Task Force assumes three major purposes for an aggregate farm sector accounting system (Weeks, et. al., 1972, p. 5). First, the system should describe the major economic features of the farming sector when presented in aggregate terms. Implied in this is that the concepts of data system should bear a close correspondence to the reality of the farming sector in order to be useful. The second assumption is that the system should yield aggregate and individual series which are measures of performance for the farm sector for both public and private uses. The final general assumption is that the system should provide data which is easily compared with other sectors of the economy. This would seem to imply that these types of comparisons are useful in public and private decisions.

From these three general assumptions six more specific assumptions

were made concerning improvements in the current farm income and capital accounting system. First, the current system should not be abandoned, i.e., any recommended system should not be substituted for the current series. This at least implicitly assumes an almost unlimited budget for farm income data provision in the short run. Second, any recommended system should be readily reconcilable with the Department of Commerce's National Income and Product Accounts. Third, the system should be formatted in such a manner that the data can be used in national input output models. Fourth, the basic farm income and capital accounts should provide the basis for describing the performance of the farm sector through time. Fifth, the data system should have a conceptual basis that allows for easy cross sector and within sector comparisons. Sixth, the system should distinguish between farm businesses and farm households and between the long and short run while reflecting the unique characteristics of the farming sector.

The major difficulty for the purposes of this study with the assumptions outlined in the Task Force Report is that it is never stated why these specific assumptions are made or on what ground the assumptions are based. So before one can establish priorities for improving the current farm income data system using the Task Force recommendations, it is necessary to assess the relevance of these assumptions in an information systems context. This topic will be addressed later.

After presenting a recommended accounting framework, the Task Force appraised the existing USDA accounting formats for farm income, using the recommended framework as a norm. The farm income data series were evaluated along three separate lines: 1) overall format, 2) the conceptual basis of the most important series and 3) the linkages between

series. In their appraisal of the overall format, the Task Force concluded that the farm income accounting format does not resemble the formats used in other sectors or countries and does not yield measures of performance similar to those found in other sectors. This arises in part because much of the capital formation in agriculture takes place on the farm with the expenses being measured as current production expenses. Thus, the input and output sides of the current accounts are inconsistent and the distinction between the production and capital accounts are unclear.

Certain conceptual problems arise within specific components of the farm income data that cause difficulties in using the farm income series. The 1972 Task Force cited five of these problem components that relate to farm income. Government payments can be treated in two basic ways in the accounting system. Direct government payments can be thought of as compensation to farm businesses for the production of public goods or as income transfers to farm families. Since the costs of compliance to the programs are currently considered as production expenses, an inconsistency arises when government payments are treated as income transfers. So depending on the concept of production expenses used, the treatment of government payments might be different.

Farm housing is another component which causes some conceptual difficulties. The maintenance and operation costs of farm housing are treated as production expenses, so it is necessary to consider the gross rental value of farm housing as farm output in order to be consistent. Under alternative accounting systems this treatment of farm housing might be different depending on whether one includes housing as part of the output of the farm sector. For instance, under the national income and

and product accounting formats, one might wish to consider farm housing as part of the real estate sector. If this were implemented, then it would be necessary to change the maintenance and operation costs of farm housing to the real estate sector rather than the farm sector.

Depreciation was the third problem identified by the Task Force. In addition to the problems associated with using book value or replacement value in measuring capital consumption a further difficulty arises because of the own account capital formation on farms. As noted earlier, own account capital formation in the farming sector is generally not accounted for in the current data system. So depreciation using either book value or replacement value is understated in the existing series.

The conceptual basis of the inventory measurement in farm income also poses a dilemma when the current system is considered. Questions arise because of the content of some of the inventories. For example, beef breeding herds, dairy herds and laying flocks are all considered as part of the current livestock inventories when these are actually capital items in most uses. So the current accounts might reflect changes in capital items when inventory change is measured. Under alternative conceptualizations one might also want inventories of work-in-progress in addition to finished goods, both of which are reported for other sectors. The Task Force recommended that work-in-progress, such as cattle on feed and crops in pre-harvest stages of development, should be included in the inventory change measured for the farm income accounts.

A final quandary pointed out by the Task Force was in the area of measuring unsold output. The current farm income accounts do not provide a measure of total output of the farm sector. Without a measure of this, increases in cash receipts or purchased inputs could be interpreted as

changes in industry size and/or structure. But in reality, these might only reflect an increase in specialization. For instance, feed grain farmers raise fewer livestock and sell the grain they had previously fed to livestock. Output in this case is sold and shows up in the accounts as cash receipts for the feed grain farmer and a production expense for the livestock feeder but the total production of feed grains did not increase. Thus the conclusion that a better accounting of intermediate products is necessary for measuring aspects such as the productivity and size of the farming sector.

Definitional and conceptual difficulties arise when the relationships between the various components and series of the farm income data system are examined. The linkage between returns to resources in farming, as measured by realized gross and net farm income, total net farm income, and personal income of the farm population highlights one of the major problems in the current system. In tying these series together it is assumed that for every farm there is only one farm operator. This seems to be a rather tenuous assumption and makes it quite difficult to assess the impact of the changing tenure structure in agriculture.

In the formal accounting sense there are very few linkages between the current accounts in the farm income series and the capital accounts in the balance sheet series. The problems associated with inventory and depreciation concepts and definition weaken the linkages between current and capital accounts.

Gross farm income is derived mainly from ESCS estimates of sales of commodities, government payments, and imputed nonmoney income, while production expenses are estimated on a national basis primarily from census benchmarks, ESCS prices paid, and industry data. Thus, the

empirical linkages between these two aspects are also tenuous. The fact that some production expenses for one type of farmer can be cash receipts for another only complicates these linkages. So this system of independent estimation of income and expenses may cause the linkages between the series to be less direct.

In considering the various disaggregations and distributions of farm income the linkages in the system vary from quite direct to nonexistent. The disaggregation of cash receipts by state is very direct since prices and sales are estimated at the state level. However, on the expense side disaggregations are based on much more limited data, since expenses are first estimated at the national level. The distribution of income and expenses by sale class is based on Census of Agriculture benchmarks, hence this series has a number of consequent measurement problems in intercensal years. However, this series for the most part provides useful information as judged by the Task Force. The disaggregation of these sales class distributions by state or region is not even attempted by USDA, suggesting rather weak linkages between these aspects.

The Task Force also notes that no attempt is made on a regular basis to distribute farm income and expenses by type of farm. A lack of appropriate data is blamed but they do not conjecture why these data do not exist. Perhaps the conceptual problems associated with determining preciselv what constitutes a certain type of farm leads to this data gap. Given the probelms USDA encountered in redefining a "farm" (Hildreth and Worden), one would expect similar problems in defining a "cash-grain farm" or most other types of farms.

All in all the 1972 Task Force made a significant contribution in suggesting improvements in the USDA farm income extimates. However,

various reorganizations within ESCS: Economics and revisions of the current farm income data series has precluded the implementation of very many of the Task Force recommendations (Guebert).

For the purposes of this study, two major criticisms of the 1972 Task Force Report are apparent. First, in making recommendations for improvements, no basis was provided for establishing priorities within their suggested accounting framework to guide those who would wish to implement these recommendations in an incremental fashion rather than as a whole package. While the task force did recommend that as much as possible be done in implementing the alternative accounting system over a two year period and that any residual work be prioritized at the end of two years, a means for setting priorities was not presented. Second, and even more significant, was the fact that the Task Force assumed certain purposes for a farm income accounting system without determining if these purposes suited the users of the data.

3.2.3 TASK FORCE ON FARM INCOME ESTIMATES 1975

In 1975 a second Task Force comprised primarily of non-U.S. Department of Agriculture employees was established to evaluate the Farm Income estimates. It did not examine the overall income and capital accounts, as did the earlier Task Force. The "Report of Task Force on Farm Income Estimates" (Hildreth, et. al.) will be summarized in the following paragraphs. The exceptions to this will be some of the recommendations of the Task Force which refer to alternative conceptualizations of farm income which will be summarized in the next section.

The 1975 Task Force was primarily interested in reviewing the methods and techniques for estimating farm income. Hence most of their

recommendations centered around these type of improvements. The formation of this Task Force was prompted by the large revisions required between the January and July, 1974 estimates of 1973 farm income, which helps to explain their focus on measurement problems. During the period 1960-1971 the changes in farm income were gradual and the revisions of the data published by USDA were relatively small. From 1972 to 1973 farm income increased nearly 78% and the subsequent July 1974 revisions of total net farm income and realized net farm income showed increases of 35% and 23% respectively. The revisions focused attention on the procedures used to estimate farm income. Many of the problems on which the Task Force focused were caused by USDA's reliance on historical marketing patterns to allocate crop and livestock sales during the year.

One of the principal areas addressed by the 1975 Task Force was the integration of farm income data with the national income and product accounts. GNP and other summary measures provided by the national income and product accounts force a certain consistency in accounting among sectors and make farm income accounting potentially more difficult than would be the case if only agricultural sector uses were considered. The Task Force Report cites a U.S. Department of Commerce, Bureau of Economic Analysis study which showed that the quarterly estimates of farm income had the largest revisions of any income type in the national income and product accounts over the prior ten year period. The Task Force suggests that this may occur because unrealistic measures are used. An additional explanation not considered by the Task Force is that, since more data are available for the agricultural sector relative to other sectors, farm income might be subject to greater revisions than income in other sectors. Further, the greater inherent variability in farm income relative to other

sectors would lead to greater expected revisions for the farm sector even if the measurement procedures were comparable among sectors.

Farm inventory estimates also caused a problem with revisions even during the 1960s. The importance of inventory estimates is magnified somewhat since the USDA estimate of net change in farm inventories enters into the change in business inventories component of GNP in the national income and product accounts on a quarterly basis. In order to be consistent with other sectors the farm sector also needs to account for inventories of purchased inputs and "work-in-progress." The Task Force then suggests that this latter component is probably not feasible to measure at this time, since weather and other factors can significantly affect growing crops. Thus, treating growing crops as work-in-progress may cause some difficulties.

The separation of corporate income of farms is also difficult under the current system but is required in order to arrive at an accurate measure of national income. The income of farm establishments owned by corporations in non-farm industries can be double counted in the current national income and product accounts. This also raises a question of the need for disaggregated or distributional information on the claimants to income in the farm sector. Increases in corporate ownership are not well documented nor are other organizational or ownership pattern changes in the farm sector. Thus, little data exists on the distribution of income by the legal organization of farms. While suggesting that the proposed Census classification of primary, part-time and business associated farms would improve the data on farm income by giving estimates by organizational form, the Task Force avoids many of the distributional questions by arguing that these are not in the scope of their study.

The recommendations of the 1975 Task Force were in four broad areas: accounting rules and definitions, basic data, timing and revisions, and improved techniques for data use. Under accounting rules they suggest that the farm should be treated as a business establishment rather than a family or household and thus the term "net income of farms" should be substituted for "net income of farm operators." In addition to this they recommend that economic activity in the farm sector be measured and emphasized primarily as gross value added[1/] rather than net income of farms. This former concept is a more comprehensive one and includes the latter as a principal component and can be reasonably estimated with existing data. They also recommended that farm income be measured on an establishment basis in preference to a product basis,[2/] but at the same time recognized the difficulty in developing a precise definition of an establishment consistent with other sectors. A further examination of the establishment concepts used in other sectors shows that these concepts are quite varied and even incompatible in aggregation. The differences arise primarily in the operationalization of the establishment concept, however, the vehicles used for data collection in other sectors also tend to aggravate these differences. Thus, the difficulty in precisely defining an establishment concept, noted by the Task Force, might have been due to the existing inconsistencies in the operationalized concepts used in other sectors.

The Task Force also perceived a need for better data on industry

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1/ See next section of this chapter for a definition of this concept.

2/ Ibid.

size and specialization and hence argued for better measures of interfarm transactions with offsetting entries in cash receipts and production expenses to assure accurate net income estimates. Appropriate changes to separate capital formation on farms, paricularly own account capital formation, from current production were recommended. Specifically, removal of increases in beef breeding and dairy herds and laying flocks from inventory change was recommended along with the inclusion of depreciation on own account capital in the production expenses. The Task Force also recommended that the treatment of CCC loans be changed to include crops under loan as farmer owned inventories rather than sales unless the farmer forfeits the collateral for the CCC loan. The current practice treats CCC loans as sales at the time the loan is made and appropriate adjustments are made when CCC loans are redeemed. The current practice was probably more appropriate during the period of the 1930s through the 1960s when chronic surpluses dominated in the farm sector. The establishment of farmer held grain reserves under the Food and Agriculture Act of 1977 also gives added significance to the Task Force recommendation.

Consistent with the stated earlier recommendations of this Task Force, they also recommend that inventories of purchased inputs be measured so that current and suggested income measures more accurately reflect income from current production. They further suggest that the gross rental value of farm dwellings and associated production expenses be included in the real estate industry rather than farming industry. The net rental income of nonoperator landlords is excluded from farm income but to be consistent with the gross value added on farms concepts, this should be included along with appropriate depreciation, indirect taxes and interest payments of nonoperater landlords. The final

recommendation concerning accounting rules and definitions follows Grove's recommendation that "realized net farm income" be dropped as a separate series.

In the area of basic data the Task Force recommended that better quarterly data be collected on: 1) crop movements, 2) expenditures for feed and livestock, 3) inventories of cattle and calves, and 4) inventories of purchased inputs. The probability surveys of grain buyers now used by ESCS: Statistics is a response to this first request since it now provides data on the movements of major grains within a month after the sales. At the time of the 1975 Task Force Report, data on crop movements often was not available until 18 months after the end of the calendar year. However, this does not help to measure interfarm sales nor does the probability survey cover all crops, so the basic data in the area of crop movements still does not meet all of the recommendations. On the livestock side the Task Force noted the inadequacy of data on interstate movement of feeder and stocker cattle for which better data is needed for accurate farm income estimates. In line with their earlier recommendations on interfarm transactions, the Task Force recommended that investigations be made as to the feasibility of collecting such data for livestock.

In the area of production expenses the recommendations centered around making better use of and increasing the sample size of the ESCS: Statistics Farm Production Expenditure Survey to obtain expense data by region and size and type of farm. Among particular expense items the need for quarterly data on feed, livestock and fertilizer was deemed most critical because of the inherent variability in the purchases of these items by farmers during the course of a year.

Since changes in inventories displayed the most need for revisions

in the past, this area was also cited as needing more and better primary data. Cattle and calf inventories, especially cause difficulties because of the failure to separate livestock on feed, which are really work-in-progress, and beef breeding and dairy herds which are actually capital items. Thus improved data of sufficient detail to separate out these aspects are needed. The absence of data on purchased inputs also prevents accurate income estimation on an accrual basis and this type of data is necessary to have accounts consistent with the national income and product accounts.

The price data used in estimating farm income was judged adequate for the most part by the Task Force. Problems do occur when only season average prices are available for certain crops, especially when prices and sales are changing during the year. Contract prices where the terms of trade are unknown also cause some problems when these prices are used in estimating income. For income estimation the Task Force was particularly concerned with matching prices with quantities sold rather than the conceptual problems in discovering prices. This is in keeping with overall concern of the Task Force with the estimation accuracy of revisions of the farm income data.

The final two areas of recommendations concern the relationship of farm income work within the U.S. Department of Agriculture and between USDA and the Bureau of Economic Analysis (BEA) in the Department of Commerce. The constraints placed on USDA by BEA can lead to problems in the timing of revisions. For the purposes of this study the recommendation for a higher priority for farm income work within the USDA particularly within ESCS: Economics is important. The implementation of many of the recommendations of the Task Force is impossible without increased

staff and budget resources. As in the earlier Task Force study the question of priorities among the recommendations is not well developed so that it is difficult to make improvements within an incremental budget process. Thus a study of the uses and users of the data seems necessary to a better understanding of the benefits of various improvements, so that some priorities can be set on implementation of the suggested changes.

A point raised by Emanuel Melichar, concerning the recommendations of the Task Force to separate out the inventory change of beef breeding and dairy herds from inventories of current production, suggests that the overall impact of these data improvements might not be very significant in terms of the effect on total farm income. However he is quick to add that such an action is conceptually sound. This does suggest that in determining priorities among different types of changes in estimating procedures or accounting rules, those which have the greatest effect on the aggregate income figures might be given priority. However one must also give consideration to the importance of individual components of the aggregate which often have separate uses. In the case of farm inventories it might be very important to have measures which are conceptually sound since these data also affect business inventories in the National Income and Product Accounts which have uses distinct from the aggregate farm income data.

In general the motivation and recommendations of the 1975 Task Force on Farm Income are quite different from the 1972 Task Force. The more recent group was concerned with improving the preliminary farm income estimates each January and with the current quarterly farm income estimates. So in general the recommendations were not centered on conceptual issues but rather on the provision of key bits of data on a more timely basis in

order to improve accuracy and reduce revisions.

3.2.4. GROSS NATIONAL PRODUCT DATA IMPROVEMENT PROJECT

The Gross National Product Data Improvement Project was undertaken in 1973 by the Statistical Policy Division of the Office of Management and Budget (now the Office of Federal Statistical Policy and Standards in the U.S. Department of Commerce) to examine the accuracy and timeliness of the underlying data base of the National Accounts. This project ended in 1976 with their report following later. Chapter six of their final report is entitled "Improving Non-Benchmark Estimates: Farm Sector." They justified this separate study on farming sector income even though gross farm product has traditionally been only about 4% of GNP. They cited four reasons for examing farm income data. First the volatility of farm output in the short run can greatly affect quarterly changes in overall national output. Second, farming still is a major industry in the economy. Third, the importance of U.S. Farming in the world food economy has increased in recent years. Fourth, the current agricultural statistics show more clearly than other sector statistics the problems of obsolescence in the Federal statistical system arising from structural changes in an industry.

The concern of the GNP Data Improvement Project was almost exclusively on the current quarterly estimates of national income. In the farm sector accounts this concern was manifested by examining the data base for the current quarterly estimates of income originating in the farm sector and to a slightly lesser extent the January estimates of farm income. The quarterly farm inventory change data also received heavy emphasis. Given that the current methods used by USDA in estimating quarterly farm income

rely heavily on extrapolations of annual data and other historically based procedures, the GNP Data Improvement Project concentrated their recommendations on a shift away from the indirect data sources presently used to more directly reported figures. For the most part these recommendations paralleled those of the 1975 Task Force (this latter group in their report noted that their ideas were supplemented greatly through the help of the GNP Data Improvement Project). The 1975 Task Force placed a higher emphasis on the data problems associated with the January preliminary farm income estimates as well as the subsequent July revisions but their recommendations were still reasonably congruent with the GNP project. The GNP project's recommendations also focused somewhat more on the Bureau of Economic Analysis data on gross farm product and income originating in farming than on the USDA's farm income estimates. This is not as serious a difference as it appears, since most of their recommendations also influence USDA in that USDA is the main data provider for BEA regarding quarterly farm income.

One of the spinoff benefits of the GNP project's work is that they documented the procedures currently used by USDA in making the quarterly estimates of farm income. Most of the methodology that USDA uses in estimating farm income is only published for the annual July estimates with little information on how quarterly or preliminary estimates are made. Hence this study of the GNP Data Improvement Project is an important contribution in this area.

3.2.5. GUEBERT

In a paper presented at the Workshop on Farm Sector Financial Accounts in April 1977, Steven Guebert reviewed some of the data and

concepts used in the farm income accounts as well as identifying some of the major users and uses of the farm income data. Guebert notes that the farm income data enter into the deliberations on national level farm policy and he considers this one of the major uses of the data. There is also a program implementation use for the data in that the state estimates of farm income enter into the revenue sharing allocation mechanisms. At the state level he suggests that government budget planning is an important use. Guebert also noted that private sector uses of the aggregate farm income data lie in three major areas. First, U.S. farm income data are used in advertising and investment decisions in what can be called the farm input sector, e.g., machinery manufacturers, fertilizer supplying firms as well as those firms which supply inputs to these firms. Second, the local and national political interest groups concerned with agriculture use the data. Third, the banking and financing industry is a user of farm income data. Guebert then makes the statement that the primary interest of the private sector appears to be more with the overall economic activity or total dollar turnover for specific commodities or expense area rather than net income per se. For the most part the perceptions of the author were not substantiated by any study of users and uses.

In evaluating the data base used in estimating farm income, Guebert considers the measurement of quantities of inputs as the major data constraint to better farm income estimates. The second data base problem is in the area of timeliness of the marketing data for cash receipts estimates. A third area of difficulty is in the determination of farmer owned inventories and inventory change. In this case the problem centers on substituting the value of the change in on-farm stocks for the value of the change in farmer owned stocks. The former neglects farmer

owned inventories held in elevators or other facilities off the farm. In addition to the conceptual problem concerning the inclusion of breeding livestock as part of current inventory Guebert notes that a further data problem arises from measuring inventory change as the value of the change in the number of head of livestock. For current production this method neglects the change in weight of the national livestock herd. Guebert appears to overstate his case in this area since it is the value of the inventory change that is used in the national accounts not the physical change. So as long as the weight of the animals is discounted in the pricing system, measuring value on a per head basis would not seem to be a significant problem. Also as long as beef breeding and dairy livestock are included in the inventory account, valuing inventory change on a per head basis is probably not that serious a problem.

Guebert also raises some questions as to the apparent difficulty of reconciling the USDA farm income accounts to national income and product accounts of the Department of Commerce. This was a major concern of the two Task Forces on farm income and the GNP Data Improvement Project. Guebert argues that the problem is not one of estimation but that differences only arise in the manner of presentation. He goes further to state that the concepts used by USDA in the farm income accounts fits more closely the data needs of the Department of Commerce than the data from any other sector.

Guebert's analysis while not as detailed as some of the earlier projects and Task Force reports raises a number of important issues. By identifying user and uses the seeds are sown for a better understanding of the needs and design of the system. Given the nature of his study, Guebert cannot really be blamed for not making the explicit connection

between uses and redesign of farm income data system. His approach at least reflects a concern for these issues. Guebert's findings also raise a question as to the significance of the alleged problems associated with bringing the farm income accounts more in line with the national income and product accounts. If the USDA data fit the needs of the Department of Commerce as well as any other sector then improving the data for the national income and product accounts should probably be given a lower priority than was suggested in some of the earlier studies.

3.2.6 AGRICULTURAL AND RURAL DATA WORKSHOP

Lee Bawden, et. al., presented a paper at the AAEA-USDA Agricultural and Rural Data Workshop which analyzed the USDA farm income data from a slightly different perspective than some of the earlier studies. Their main concern was with measuring the well being of farm operator families so they concentrated on the areas of personal income and wealth of farm people. Their findings were that the existing farm income and wealth data were inadequate to measure the well being of farm people. The differences here come about primarily because of problems in defining the farm population and in the treatment of capital gains. The concern of Bawden, et. al., with farm families as opposed to farm businesses is somewhat different than the studies summarized earlier. They state that the agricultural community seems to prefer a farm operator family concept as the appropriate unit of observation but it is unclear on what grounds this statement is based.

One aspect that they point out but do not develop to any extent is the need for distributional data on farm income and wealth in order to understand the well being of farmers and to measure the impact of

government policy. Some types of distributions suggested include those by size and type of farm, time spent farming, tenure, age, net income, education and geographic region. They note that the current series on the personal income of the farm population does not allow one to evaluate the impact of government farm policies because the "farm population" includes farm residents whose only ties to the sector are as a place to live and excludes farm operators who happen to live off the farm. Bawden, et. al., suggest that distributional data which allow one to examine the impact of policies are needed to understand how the change in income brought on by policy changes affects agriculture.

As with the earlier studies, this group seems implicitly to assume an unlimited budget in that they accept the recommendations of the earlier Task Forces and recommend that their findings be implemented in addition to the earlier recommendations. They fail to identify the users and uses of this data so that some notion of the priorities for these improvements can be established nor do they give any other criteria for determing the importance of their suggested changes.

3.3 ALTERNATIVE CONCEPTUALIZATIONS

Many of the studies summarized in the previous section suggested alternative accounting systems for farm income. This section will present the concepts of the farming sector currently used by USDA and some alternative conceptualizations of income and economic well being put forth in the literature. These alternative conceptualizations provide the basis for some of the recommendations of the final chapter of this study in that the results help to establish priorities in choosing between these concepts.

3.3.1 NATIONAL FAMILY FARM CONCEPT

The current farm sector accounting system used by the U.S. Department of Agriculture treats the sector as if it were a single national family farm. Thus, the measure of income derived using this concept includes the value of farm products consumed in farm households, government payments or transfers to farmers, and the imputed value of farm dwellings in addition to the cash receipts from the sales of farm products. This concept also implies that net returns to nonoperator landlords be excluded from farm income so this is included on the production expense side. The other expenses include depreciation, taxes, and interest on farm mortgages in addition to the current operating expenses. So in effect, this concept of the farming sector produces an accounting system similar to that used by a typical farm operator for Federal income tax purposes (Carlin and Smith, p. 2).

This tax accounting analogy can be carried somewhat further in that the farm income accounts under this concept are on a cash accounting basis as are most individual farm tax returns rather than an accrual basis. The inclusion of inventory change in the total net farm income series is a departure from this cash accounting basis, but even this departure is not complete since inventories of purchased inputs are not deducted from the measured operating expenses.

In estimating income using this national family farm concept, as with any concept of the sector, it is critical that the production expenses and income sides be comparable. Expenses must only be associated with the income generating activities included on the gross income side, e.g., if government payments to farmers are included on the income side then costs to farmers associated with program compliance should be

included on the expense side or if own account production of capital items is excluded from the income side then the associated production expenses should be excluded (Weeks, 1972).

3.2.2 ESTABLISHMENT CONCEPT

This characterization of the farm sector views it as one made up of farm establishments. An industry, such as farming, is made up of those establishments for which more than half of their production is of the commodities characteristic to the industry. Establishments for which the production of agricultural commodities is their major activity would be considered farm establishments.

Thomas Carlin and Allen Smith provide a more general definition of an establishment as it is used in the national accounts and other Federal statistics.

> "An establishment is defined as an economic unit, generally at a single physical location, where business is conducted or where services or industrial operations are performed. Where distinct and separate economic activities are performed at a single physical location, each activity should be treated as a separate establishment wherever: 1) no one industry description in the classification includes such combined activities, 2) the employment in each such economic activity is significant, and 3) reports can be prepared on the number of employees, their wages and salaries, sales or receipts, and other establishment type data. Establishments are the basic unit of account. Firms would be composed of one or more establishments." (p. 4)

In many ways this establishment view of the farm sector is similar to the national family farm concept, since most family farms are probably each a separate establishment. However, this specific definition of an establishment does not coincide on a one to one basis with the definitions used in arriving at the existing farm income accounts. The establishment view of the farm sector makes it clear that a farm

can use its resources to produce both characteristic farm products, (e.g., cattle, corn) and ancillary products which are nonagricultural (e.g., trucking). Thus, in measuring income using this concept one would wish to determine all outputs of farms including those minor outputs not normally considered as farm output in addition to the associated production expenses for both the agricultural and nonagricultural products. This view of the farming sector would be more useful in answering questions of decision makers concerning the performance and economic behavior of farms, farm business-household relationships, the structure and control of the industry, and would make comparisons with other industries easier because data for these are also estimated on an establishment basis (Weeks, et. al., 1972). As was noted earlier these comparisons may be difficult because of the heterogeneity in the operationalization of the establishment concept in other industries.

3.2.3 PRODUCT CONCEPT

Another characterization of the farm sector suggested by the 1972 Farm Income and Capital Accounting Task Force is a product concept. This concept implicitly recognizes that agricultural commodities are in some cases produced by establishments which do not produce characteristic farm products as a major activity. Thus, if one is interested in the output of all agricultural commodities then a product concept is needed to insure the consideration of farm products produced by both farm and nonfarm establishments.

On the output side of the production account only the output of characteristic agricultural products would be measured. But at the same time only those inputs associated with the production of these

characteristic products would be deducted in arriving at a net income estimate. This concept then would be particularly useful in assessing the relationships between the total output of food and fiber commodities with the inputs used to produce them. Information concerning the productivity of the sector can also be derived more readily from data based on a product concept when compared to data with alternative conceptualizations. Other questions relating to aggregate supply of farm products are in most instances better approached with data organized on a product basis than on an establishment basis.

The existing farm income accounts rely quite heavily on data which are closely related to this product concept, especially on the output side. Cash receipts for farm marketings are for all farm products and do not exclude production from non-farm establishments. However, on the input side the existing methodology uses data more closely akin to data collected on an establishment basis since it is impossible to separate out those production expenses used in the production of ancillary products on farms. Thus, the empirical problem associated with using these alternative conceptualizations would be difficult to overcome unless the existing data base were greatly modified.

3.3.4 VALUE ADDED CONCEPTS

The production or value added approach to measuring income and product by industry is perhaps the most basic approach to national accounting in that it considers aggregate production as the sum of the production statements of the producing units in the economy (Kendrick, p. 39). Conceptually, value added can be estimated in two ways for a particular sector. Using what is called a production approach, value added

for a sector is determined by taking the value of total production in the sector and deducting from this the cost of the intermediate products used in the production of the sector's current output. The second approach is called the income approach. Value added for a sector, using the income approach, is estimated by summing the factor and nonfactor costs used in production. Factor costs include such items as labor compensation, net interest, and corporate profits while nonfactor charges might include depreciation and indirect business taxes.

Value added for a sector should be identical no matter which approach is used. The production approach is preferred when one wishes to deflate industry output to obtain a measure of real output. This approach also provides a beginning point for the development of the input-output matrix for the economy. The income approach provides a statistical check and allows for the analysis of factor shares by industry in addition to making it possible to deflate to obtain real factor cost (Kendrick, p. 40).

For agriculture the value added concept is the desired concept of the Department of Commerce which they use in their estimates of farm output, gross product, and income published in the Survey of Current Business. However, in practice the value added concepts are modified somewhat by the Commerce Department in estimating the farm income and product accounts.

Theoretically, at least, one should begin estimating the value added in farming using the production approach by estimating the value of production. Assuming that all production is sold, the value of production would equal the value of sales plus inventory change. But in agriculture many farm products are not sold, instead these are used as intermediate products on the same farm where produced. For example, feed grains are often fed to cattle on the same farm where produced. The

estimation of value of production as the value of sales plus inventory change is the basis for the existing U.S. Department of Commerce estimates of farm product. This underestimates the value of production by the amount of unsold or own account production in the sector. Simunek notes that the value of sales is appropriate for cash income analysis, but also points out that a measure of value of production which includes own account production is necessary to avoid distortions in productivity analysis, input-output studies, size and type of farm classifications, and estimates of total capital formation. Thus, it appears Simunek is arguing that while the value added concept might be appropriate for certain uses, the current definition of farm output is an inadequate operationalization of this concept because it neglects own account uses.

Gross farm product is used by the Bureau of Economic Analysis (BEA) in the U.S. Department of Commerce as the estimate of value added in farming. The current measure using the production approach starts with farm output. As noted above, farm output is not really the total value of production in farming; rather it is the sum of cash receipts from farm marketings and CCC loans, other farm income, farm products consumed on farms, change in farm inventories, and gross rental value of farm dwellings. From farm output the value of intermediate goods and services consumed is deducted. This latter item includes net rent paid to nonoperator landlords as part of the intermediate goods and service. Gross farm product is the measure of value added in farming since in theory at least it is an attempt to measure total value of production less intermediate purchases. It should be noted that BEA also adjusts the gross farm product figure by adding adjustments for such items as wage supplements, social security contributions from wages and salaries, interest received and Federal fines.

Using the income approach, gross farm product is the sum of the factor and nonfactor costs, i.e., net interest, corporate profits, proprietor's income, employee compensation, indirect business taxes, capital consumption less direct government subsidies to operator landlords. This differs from the USDA definition of net farm income which includes proprietor's net income, corporate profits and direct government subsidies (GNP Data Improvement Project).

National income originating in farming is also derived in the BEA estimates. For the economy as a whole, national income is derived in theory by subtracting depreciation and indirect business taxes from gross national product (Schultze, p. 45). National income originating in farming is derived in a similar manner. Gross farm product less capital consumption allowances and indirect business taxes plus subsidies to operator landlords equals national income originating in farming using the existing BEA accounts. National income originating in farming can also be estimated by summing net interest, corporate profits, proprietors' income and employee compensation.

The 1975 Task Force on Farm Income recommended that USDA use the value added approach in estimating and presenting data on farm income. They noted that the gross farm product and income originating in farming could be approximated by merely changing the accounting rules now used in estimating farm income so that a change in the accounting system is not necessary. Since they also recommend an accounting for all output, their recommendations would require collecting new data on own account uses of production and on some interfarm sales which are now excluded. Therefore, changing the accounting rules would in effect require more primary data than is now available.

3.3.5 TAXFILERS INCOME CONCEPT

Periodically the Internal Revenue Service (IRS) publishes data on income obtained from samples of individual and business income tax returns. The concept of income used by IRS is sufficiently different from the USDA income concept so that the two concepts are not readily comparable.

Edward Reinsel has noted several differences between the farm income concept of IRS and USDA. On the gross receipts side he found that the IRS and USDA estimates were reconciled fairly easily. The IRS figures include intrastate livestock sales to other farmers which are netted out of the USDA estimates. The IRS estimates exclude some sales of breeding livestock which are treated as capital assets, however USDA includes these as receipts for livestock. In the IRS data a significant amount of farm income is not measured because crop share tenants report only their own share of the farm receipts while the landlord might report income from the farm operation as rent rather than farm receipts. Since the prices used to estimate farm income by USDA include normal marketing charges, the gross receipts data of USDA would then be higher than the IRS estimates of gross receipts, ceteris paribus, in that receipts are reported to IRS without these marketing charges. Since the USDA subtracts out these charges on the production expense side, the net income estimates should not differ dramatically because of this. IRS data also exclude some receipts from corporations that are primarily non-farm businesses. However, IRS data also include some corporate receipts from foreign countries. The sum total of these conceptual and definitional differences on the gross receipts side appear offsetting since gross receipts on tax returns and from USDA estimates were about the same in 1962 as noted by Reinsel. Data for 1974 suggests that this same relationship holds.

When comparing USDA net farm income with IRS net farm profits there are large differences in the reported data. Since the gross income estimates are basically the same, this suggests that the major conceptual differences exist in expense accounting between the two data suppliers. For instance, depreciation in the USDA accounts is estimated at replacement cost while IRS data can be based on the book value of the assets and IRS considers gross rent as an expense while USDA only uses net rent to nonoperator landlords as an expense because of USDA's desire to measure income based on a national family farm concept.

3.3.6 COMBINING INCOME AND WEALTH

Income is often used by economists and public decision makers as a proxy measure of well being in society. Burton Weisbrod and Lee Hansen have developed an approach that, while not a perfect measure of current welfare, attempts to go beyond traditional income measures as indicators of well being. Their suggested measure is a combination of current income plus current net worth. Net worth is converted to an annuity to overcome the difficulties of combining a stock concept like net worth with a flow concept such as income. By adding the annual lifetime annuity value of current net worth to current income Weisbrod and Hansen develop a measure of welfare that can be used to assess the economic position of various sectors of society.

Thomas Carlin and Edward Reinsel used the methodology developed by Weisbrod and Hansen to compare the economic position of farmers with other sectors and the economic well being among different units within the farm sector. Their results show that when wealth is added to income, the distribution of well being in the farm sector became more equal than

when income alone was considered. Weisbrod and Hansen's findings for the entire U.S. economy showed well being to be more unequally distributed when wealth is added. So the apparent disparity in welfare between the farm and non-farm sectors when income alone is considered is less pronounced when wealth is also considered.

This points out some of the difficulties in using farm income as a measure of well being for the farming sector. Not only does it neglect the distribution of income within the sector but important wealth effects fail to receive proper attention.

3.3.7 PARITY RETURNS CONCEPT

The concept of parity returns was first put forth in a 1967 USDA report to the U.S. Congress concerning parity income, in response to a mandate for this type of study set out in the Food and Agriculture Act of 1965. The concept of parity returns was used in place of the parity income concept laid out in legislation in the 1930s and 40s. Parity income is defined in the 1936 and 1938 agriculture legislation and is in terms of the historical ratio, using a 1910-1914 base, between per capita income of the farm and non-farm population. The 1948 definition of parity income eliminates the fixed base period and attempts to establish an equivalent standard of living between the farm and non-farm sectors using a moving average of the 10 preceding years. These parity income concepts have some obvious limitations such as reliance on a fixed base, the exclusion of off farm income of farm operators, and the reliance on averages of all farmers which neglects important distributional effects by size and type of farm.

To overcome some of the disadvantages of the parity income

concept the USDA report developed an income concept called parity returns. Parity returns are defined as "income required to make the current rate of return to the labor, capital and management employed in farm production equal to the current rate of return to comparable resources employed in other sectors of the economy." (USDA, 1967, p. 9) In operationalizing this concept both the income and changes in net worth of farmers are compared to the opportunity cost in nonagriculture uses of the resources currently used by farmers. The approach also took into account distributional differences by size and type of farm and did not rely solely on averages as did earlier parity income measures.

Parity returns standards were developed for capital and labor in farming which in theory reflects the returns to farm capital and labor in comparable nonagricultural uses. So in effect these returns exclude off farm income of farmers. Another limitation of the concept is that the inclusion of capital gains might not be appropriate for short run comparisons when farm capital would tend to be illiquid and thus spending from net worth to increase well being might not be an available option.

Two aspects of the parity returns study are important in the context of this analysis. First, the idea of separating out returns to various resources used in farming provides useful information for agricultural policy decisions, e.g., in choosing between programs for improving agricultural credit and programs aimed at giving tax relief to farmers. Secondly, this study showed the importance of considering the income and returns position of farmers by size and type of farm. The finding of the USDA on parity returns showed that farmers with gross sales over $20,000 were earning parity returns or more in 1966 under each alternative method of calculation used while farmers under $20,000 gross sales earned less

than parity returns under all methods. The smallest farmers (under $5,000 gross sales) earned only one third to two fifths of parity returns in 1966 (USDA 1976, p. IV). So the average income figures even for a relatively good year like 1966 fail to show the important differences in income within the sector.

3.4 SUMMARY

Six specific analyses of farm income data were summarized in the first major section of this chapter. Each of these point out some of the important shortcomings of the existing farm income data system but all differ in approach from this study. These earlier evaluations often begin to question the conceptual relevance of the USDA farm income data and all make recommendations for improvements in the data. However in all but one case they fail to identify the users and uses of the farm income data. For the most part assumptions are implicitly or explicitly made about the uses of the data without any attempt to substantiate the congruence of these assumptions with reality. This failure to consider the uses of the data in decision making makes it difficult to place any weights on their recommendations or to establish priorities for improvements. The consideration of users and uses is not the only means of setting priorities but the literature summarized provided few other criteria for determining the significance of the recommended improvements.

These studies of farm income as well as other research provide a set of alternative conceptualizations of farm income or well being which are also summarized in this chapter. These include: 1) the national family farm concept, 2) an establishment concept of the farming sector, 3) a product concept of farming, 4) value added concepts of sector income,

5) taxfilers income, 6) a concept combining income and wealth, 7) a concept of parity returns. The results presented in later chapters will be used to show the strengths and weaknesses of these alternative concepts as bases for the information to be used in decision making concerning farm income.

CHAPTER 4

DESCRIPTIVE RESULTS: THE FARM INCOME INFORMATION SYSTEM

4.1 INTRODUCTION

This chapter presents a description of the existing farm income information system. A complete description of this information system does not now exist anywhere in the literature. The information systems paradigm developed in Chapter 2 provides a convenient framework for understanding and analyzing the farm income information system and as such will be the basis for organizing the overview and summary presentations in this chapter. A descriptive examination of the users and uses of the USDA will also be presented. This latter section is based on the results of a mail questionnaire sent to a random sample drawn from the mailing list of the USDA statistical bulletin Farm Income Statistics with foreign addresses and libraries eliminated. In addition some of the more detailed observations with regard to data uses by some public and private users are developed from personal interviews. Thirty-five of these interviews were with people in different roles in all the organizations that normally participate in public policy decisions for agriculture. Ten others were follow up interviews with individuals on the Farm Income Statistics mailing list. Finally the relevant parts of the primary data used in the USDA farm income estimates will also be described based on written documentation and personal interviews with the providers of the data.

4.2 OVERVIEW

It is difficult to separate a discussion of the uses of farm income data from a description of the farm income information system. In describing the components of the system it is necessary to start by considering the ultimate decisions that must be made and work back to the data sources used to estimate farm income. The farm income information system as perceived in this research has four basic components: a primary data subsystem, a formatting and communication subsystem, an analysis subsystem and finally a decision making subsystem. Figure 4-1 schematically outlines these components. The distinctions between these parts are not as clear as the titles would imply but this categorization does allow one to focus on the most important interralationships in the system.

When comparing the existing farm income information system with the idealized system outlined in Chapter 2, one finds many similarities. This paradigm pinpoints five basic steps or actions that make up an information system, beginning with theoretical concepts and ending in decision making. The farm income information system begins with a theoretical concept of farm income. The basis of this concept is developed in section 3.3.1 and revolves around what is called the national family farm concept. The operationalization of this concept of farm income involves defining a set of accounting rules or relationships which relate various price and quantity data, yielding farm income as a residual. Thus, the operationalization phase actually involves the conceptualization, operationalization and measurement of the different sets of primary data needed. The primary data underlying the farm income series are provided by a number of government and private sources, such as the Statistics Branch of the Economics, Statistics, and Cooperatives Service (ESCS) in USDA, the

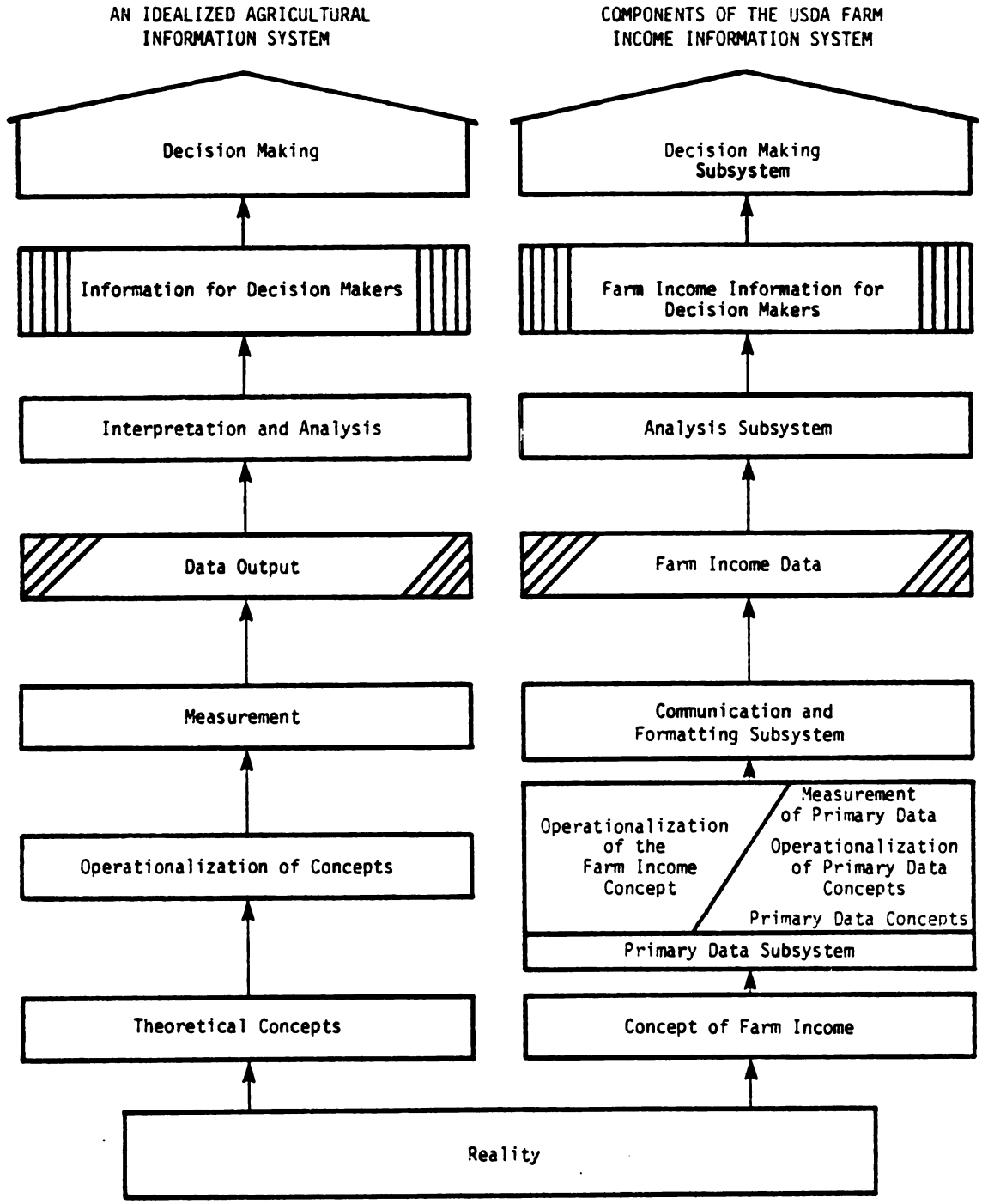

FIGURE 4-1 COMPARISON OF AN IDEALIZED AND OPERATING INFORMATION SYSTEM

Bureau of Census in the U.S. Department of Commerce, the Farm Equipment Institute, and the Market News Branch of the Agricultural Marketing Service in USDA. These, among other, government and private data sources make up what can be called the primary data subsystem.

Since farm income is calculated as a residual, the measurement phase of the idealized information system becomes more of a formatting process when applied to the farm income data system. In cases where decision making is not tied organizationally to the data system the communication between those who produce the data and the ultimate decision makers is important. With respect to the farm income information system these formatting and communication functions are performed primarily by the Farm Income Unit in ESCS and to a lesser extent by the Bureau of Economic Analysis (BEA) in the U.S. Department of Commerce. In addition to these government agencies, a communication function is also performed by educational institutions, private publishers of agricultural and trade magazines and other government agencies. These organizations constitute what can be called the formatting and communication subsystem of the farm income information system.

The analysis and decision making phases of the farm income information system are at least conceptually the same as in the idealized system. However, the diverse nature and number of decision makers and analysts dictates that these phases be viewed as subsystems rather than merely steps in a process. The analysts include government agencies, private consultants, educational institutions and the staffs of the primary decision makers interested in farm income. Decision makers are in both the public and private sectors and make decisions with regard to public policy, demand estimation, credit needs and other areas.

4.3 USERS AND USES

Government data and information systems often begin with one type of ultimate use or decision as a primary focus. However, even in those cases where data are collected strictly for administrative purposes, multiple uses for government provided data usually develop despite the original intent and design of the data. Farm income data are no exception to this. Through time a number of different uses of this data have developed both in the public and private sectors. This section will attempt to identify the various user groups associated with the farm income data and to categorize the various uses of the data.

4.3.1 LIMITATIONS OF MAIL SURVEY POPULATION

Before proceeding into a discussion of the results of the questionnaire a few statements on the survey design would seem appropriate. This should reveal some of the limitations of the results with regard to identification of the relevant population.

Farm income information like other types of information possesses attributes of high fixed costs of collection relative to the costs of transmission of the data to additional users. Therefore, one would expect many individuals to obtain the farm income data from sources other than the original supplier, in this case from sources other than the bulletin Farm Income Statistics each year from the U.S. Department of Agriculture. Thus the population by definition excludes those users of USDA farm income data who receive it from other sources. Even within the Department of Agriculture these data are supplied to other individuals through the Agricultural Outlook publication, various press releases, and other sources such as the annual volume, Agricultural Statistics, and

extension service reports. In the private sector sources such as magazines, newspapers, trade publications, radio, television, libraries, and private consultants report USDA farm income statistics.

The existence of multiple sources of USDA farm income data creates some difficulties in using the results of a sample drawn from the mailing list provided by USDA. Very little can be said about the overall magnitude of the use of farm income based on this survey since many users are probably excluded from the population. However, as long as those who are on the mailing list are fairly representative of the entire population of users, one can use the survey to gain an understanding of the various types of users and uses of the farm income data. If the assumption is made that the total number of different types of users is directly proportional to the number of the types of users found on the mailing list then one can begin to obtain an indication of the relative importance between different users and uses when measured in terms of absolute frequency of use.

A comparison of numbers of users and uses based on the mail sample does not take into account the importance in terms of value or social welfare, etc., of any one type of use but instead treats all users and/or uses as of the same importance. This is an inherent difficulty in using random sampling; one must assume that those who are not selected are of equal importance to those selected in some respects.

The relationship among economic structure, income distribution and the supply and demand for information developed in the conceptual framework for this study suggests that in some cases different types of users and uses should receive higher priority than others in the design of a government information system. Others can undoubtably develop

different criteria for determining the importance of various users and uses. Implied by this is that frequency of use is not necessarily a good proxy for the importance of a given use. So a mail survey also has some shortcomings in this respect.

These problems in defining the population and in sampling begin to point out some of the limitations of this methodology for evaluating the farm income information system. However, it is not unreasonable to assume that those individuals who are the principal users of farm income data are likely to be on the mailing list, especially those users outside of the Federal government, since the most detailed data on farm income are not readily available from the other sources. This assumption would not appear to hold in all cases within the Federal government where internal lines of communication would probably transmit much of this information and direct distribution rather than mailing is more likely. Furthermore, users of detailed data are more likely to understand the concepts and definitions and to be able to respond intelligently to alternatives. Casual users tend not to know the limits of the data.

4.3.2 SELECTION OF SAMPLE

The total mailing list contained 4224 names and addresses, of these 268 were foreign addresses, and 290 were libraries or duplicates leaving a population of 3666 to be sampled. Libraries were removed from the population because the ultimate concern of this study was to obtain information about the use of the data in decision making. It was felt that libraries were not ultimate users of the data and therefore could be left out of the survey. Foreign organizations or individuals were also excluded since it was felt that input from these users was not relevant

for questions concerning the appropriate design of a United States farm income information system funded at least, in part through U.S. tax dollars.

In selecting the appropriate sample size for the mail survey no clear cut method could be used without making some assumptions because of the multi-purpose nature of the questionnaire. As Moser and Kalton (p. 149) note there is "no perfect solution" to this difficulty. Thus, for this study it was assumed that the determination of the users and uses of the farm income data was the most important objective of the survey. From this an arbitrary decision concerning significant users and/or levels of use was made so a sample size could be ascertained. A priori, fourteen different user groups were tentatively identified. If all groups were equally represented in the population then 1/14 of the population would be in each group. This arbitrary proportion of 1/14 or .07 was used to provide a basis for selecting the sample size. A 1 to 2 percent error in this was deemed acceptable. Using standard methods[1/] this decision then led to a selection of a sample size of 268. A 50 percent response rate was also assumed so the actual sample size was doubled and then rounded up to 545. These 545 names and addresses were selected at random from the USDA mailing list.

1/ Where n is sample size, p is proportion of population in a user group and S.E. is the standard error, then without the finite population correction,

$$n = \frac{p(1-p)}{S.E.^2}$$

For this study p=.07 and S.E.=.015, so n=290. Using the finite population correction of $n' = \frac{n}{1+\frac{n}{N}}$ where N is the population size, 3666, n' is 268.

4.3.3 MAIL SURVEY RESULTS

Of the 545 samples, some form of response was obtained from 307 individuals. These responses are characterized in part in Table 4-1. A total of 270 questionnaires had responses to the questions concerning the use of farm income data. These provide the primary basis for the descriptive results which follow.

TABLE 4-1 MAIL SURVEY CHARACTERISTICS

Total USDA Mailing List		4224
Foreign Addresses	268	
Libraries and Duplicates	290	
Population for Survey		3666
Sample Size		545
Total Responses		308
Problem Responses:		
Bad Address	22	
Library	3	
Foreign Institution	3	
Refused to Answer	9	
Usable Responses		270
Usable Sample*		517
Response Rate	52.22%	

*Sample size less bad addresses, libraries, and foreign institutions.

The information systems paradigm used in this research provides a a guide for analyzing the farm income information system. The importance of decision making in this paradigm stresses the need to identify users and uses of information in order to evaluate the system.

Table 4-2 presents data on the frequencies of different types of users obtained from the mail survey. The fourteen different user groups

identified prior to sampling seemed to be an adequate categorization of the users since less than 2 percent of the respondents and users were placed in the miscellaneous category. Perhaps the most significant fact to be gleaned from Table 4-2 is the comparison of respondents to users. While there were 270 usable responses to the mail survey, only 205 of these respondents actually made use of the farm income data provided by USDA. In three categories the rate of nonuse of the respondents seems worth noting. Only 53 percent of the farmers or ranchers who responded to the survey actually used the data. For commodity trading firms and farm product processing firms the rates of use among respondents were 50 and 43 percent, respectively. On the other side of the coin, all 23 farm input supply firms reported using the data. The rate of data use of respondents from most other major user catergories varied between 70 and 90 percent.

In terms of the number of individuals in a user group, four major users of USDA farm income data are apparent. In order of number of users reported from the sample, educational institutions, the Federal government, farm input supplying firms, and banking and financing firms are the most prevalent users, each with greater than 10 percent of the sample. Educational institutions made up 26.3 percent of the reported users of the farm income data. The relative importance of educational institutions as users is somewhat surprising but included in this total are state and county extension service personnel which accounted for 35 percent of the users within the educational institution category. If these extension service personnel were included as part of state and local government then this category would contain over 15 percent of the users. However, it was felt that the extension personnel, especially those at the state

TABLE 4-2 RESPONDENTS AND USERS BY USER CATEGORY

User Category	Respondents		Users		Nonusers	
	Absolute Frequency	Relative Frequency (percent)	Absolute Frequency	Relative Frequency (percent)	Absolute Frequency	As a Percent of Respondents
Farm or ranch operator	17	6.3	9	4.4	8	47.1
Manufacturing/supplying farm inputs	23	8.5	23	11.2	0	0
Farm product processing and/or selling	7	2.6	3	1.5	4	57.1
Banking or financing	25	9.3	22	10.7	3	12.0
Federal government	38	14.1	30	14.6	8	21.1
State or local government	17	6.3	12	5.9	5	29.4
Agricultural cooperative	4	1.5	4	2.0	0	0
Agricultural interest group	9	3.3	8	3.9	1	11.1
Private consulting firm	19	7.0	14	6.8	5	26.3
News medium or other publication	14	5.2	12	5.9	2	14.3
Educational institution	65	24.1	54	26.3	11	16.9
Utility company	3	1.1	2	1.0	1	33.3
Commodity trading or brokerage firm	18	6.7	9	4.4	9	50.0
Miscellaneous	5	1.9	3	1.5	2	40.0
No user group reported	6	2.2	0	0	6	100.0
TOTAL	270	100.0	205	100.0	65	24.1

level, were really part of the educational system rather than the state government policy making process. It should also be noted that the percentage of users to respondents in these four categories was higher than the average for all categories which should also give some indication of the usefulness of the farm income data to these types of users.

The information systems paradigm that undergirds this research stresses the importance of the use of data and information in the design of an information system. Thus, while information on the users of farm income data is important for improving these data, an understanding of the uses of these data is of equal or even greater importance.

Table 4-3 summarizes the response to the question, "What is your primary use of USDA farm income data?" This was the first question on the questionnaire.[2/] A priori, all of the uses of the data were not known so it was felt that an open ended question would best identify the uses of the data. An additional question was asked about the types of decisions on which farm income data have the most impact in order to clarify the answers to the questions concerning the use of the data. From these answers a list of uses was developed and the responses were categorized accordingly.

Seven major categories of uses of the data were determined from the mail survey. Within four of these major use categories, subclasses of uses were disaggregated where appropriate. The first major category was that of general information or no specific use. In this case the respondent could not identify any specific types of decisions that the

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2/ See Appendix A for a copy of the questionnaire.

TABLE 4-3 PRIMARY USE BY CATEGORY

Use Category	Respondents		
	Absolute Frequency	Relative Frequency (Percent)	Adjusted Relative Frequency (Percent)
General Information--			
No specific use	41	15.2	20.0
Pass On to Others	40	14.8	19.5
Public Policy Uses			
General policy uses	30	11.1	14.6
Program evaluation	10	3.7	4.9
Tax-revenue planning	3	1.1	1.5
Allocation of reasearch funds	7	2.6	3.4
Demand Estimation Uses			
Production planning	6	2.2	2.9
Marketing-advertising	26	9.6	12.7
Within firm investments	3	1.1	1.5
Credit and Financing Uses			
Future loan volume	6	2.2	2.9
Repayment ability	4	1.5	2.0
Investment in agricultural firms	3	1.1	1.5
Land Valuation	10	3.7	4.9
Miscellaneous Uses			
Futures market trading	9	3.3	4.4
Other	7	2.6	3.4
Total Users	205	75.9	100.0
Do Not Use	65	24.1	
Total Respondents	270	100.0	100.0

farm income affected but the data were used by the receiver for maintaining a general knowledge of the sector. Thus, the data in this case are not likely to be used directly in specific decisions but instead to provide background information for any number of decisions. This category contained 20 percent of the users of the data and 15.2 percent of the respondents. As was noted earlier, 24.1 percent of the respondents did not use the USDA farm income data so for each category of use the percentage of respondents will be less than the percentage of users.

The second type of use is one of passing the data along to others. This is not really a use of the data in the sense that it impacts on the decisions of those who initially receive the data. However, it is important to understand the communication function of the system. This category contains 19.5 percent of the users who responded to the survey, again stressing one of the limitations of this methodology in identifying all of the ultimate decisions based on farm income information.

One would expect that an important use of aggregate farm income data would be in public policy decision making; in the sample population this seems to hold with 24.4 percent of the primary uses falling into the area of public policy decisions. Within this category most respondents identified only general policy uses, such as in policy research, but some expressed uses of a more specific nature. Almost 5 percent of the total uses were in the area of program evaluation; examples of these were projecting the farm income effects of various pesticide regulations and water development projects. Among state government users who responded, 25 percent reported the utilization of farm income data in estimating taxes and revenues within the state. Only 1.5 percent of the total uses reported were in this group but it appears to be important since one would expect

that the total population of users of this type to be at most 50. A final specific policy use of the farm income data was as a guide in allocating research funds. This seems to indicate that a goal of agricultural research is to enhance farmer income. Government and university research administrators were those most likely to use the data in this way but in total only 3.4 percent of the primary uses of the farm income data fell into this category.

Prior to the survey, use of the data by farm input supplying firms was thought to be a major use. An implication of this is that farm income is an important variable in estimating the demand for inputs and other goods purchased by farmers. Three different types of decisions appear to be dominant within the category of demand estimation. Farm income data are important in marketing and advertising decisions of firms. For instance one pesticide manufacturer used data on crop receipts by state to decide if enough of the crop is grown in a state to justify expenditures to register the pesticide in a state. A farm equipment manufacturer used state cash receipt data and annual net income figures to allocate marketing resources between regions. Other firms use similar data in the deployment of sales staff between regions. One firm in a reasonably oligopolistic industry even mentioned that it used farm income data in deciding on the price of the farm inputs that it sold. These marketing and advertising type decisions comprise almost 13 percent of the total uses reported.

A second type of demand estimation use is in production planning; this made up about 3 percent of the reported uses. These uses are of course closely related to the marketing uses but some respondents specifically mentioned such uses as production scheduling, new product

development, or inventory management. A final use related to these is in the long run planning of firms supplying the farm sector. Capital expenditures within the firm and long range planning were cited as decisions for which the data were used. Thus, it would look as if for a small number of reported uses, about 1.5 percent, farm income data have an impact on estimates of the long run demand for farm inputs. However, the economic impact of this use would tend to be understated by considering only the frequency of the use. The value of the information might be much higher because the decision involves relatively significant expenditures.

Credit and financing uses were a fifth major category of use of farm income data. Within this category the data were used in estimating future loan volume, in determining the repayment ability of farmers on loans or inputs sold on credit, and as a guide in evaluating the future profitability of investments in agriculturally-related firms. In total these credit and financing uses accounted for 6.4 percent of the total primary use of those sampled. Again the disclaimer must be added that the frequency of use is not a good proxy for the economic impact of the decision and hence, the value of the information.

Almost 5 percent of the primary uses of this data was in valuing farm land. One firm used the data to compare farm incomes in various parts of the U.S. to farm land costs in order to ascertain where the best agricultural investment values are located. Another was attempting to use the data in an econometric model to forecast farm land values. In government, a senior appraiser for the Army Corps of Engineers noted that the farm income data were used as check data to compare with locally collected data on income used in determining land values.

The final major category of use was a miscellaneous category.

Within this class the most readily identifiable subgroup was the use of farm income data in commodity futures trading. In this case it seems that income and receipts data are used to get an indication of planting intentions for certain crops which in turn cause fluctuations in the price of futures contracts. Over half of the miscellaneous uses reported were in the area of commodity trading while the remaining miscellaneous uses were in such areas as bargaining in cooperative contract negotiations, location of commodity processing plants, and in making wage adjustments for farm employees.

When the term multiple use data is mentioned it is usually thought of in terms of multiple users of the data. However, there are also multiple uses by the same user. Nearly one third of the users of farm income data in the mail survey reported a secondary use of the data in addition to a primary use. Furthermore, almost 5 percent of the total users reported a third use of the data as well. Table 4-4 summarizes these secondary and tertiary uses of farm income data by the same categories developed for primary uses. The most important of the major secondary and tertiary uses was in passing the farm income data on to others, again this only points out the problems in defining the population of users. Over 31 percent of the users (64 out of 205) perform a communication function in the system as either a primary, secondary or tertiary use of the farm income data. The decentralized social and economic organization in agriculture would lead to the expectation that a high proportion of users would pass the data on to others. The results tend to confirm this hypothesis. The value of information in coordinating and managing the farming sector is also stressed by the fact that the data are shared with others by many of those who receive them.

TABLE 4-4 SECONDARY AND TERTIARY USES BY CATEGORY

Use Category	Uses	
	Absolute Frequency	Relative Frequency (Percent)
General Information	11	14.3
Pass On to Others	24	31.2
Public Policy Uses		
General policy uses	5	6.5
Program evaluation	0	0
Tax-revenue planning	0	0
Allocation of research funds	1	1.3
Demand Estimation Uses		
Production planning	9	11.7
Marketing-advertising	10	13.0
Within firm investments	0	0
Credit and Financing Uses		
Future loan volume	5	6.5
Repayment ability	6	7.8
Investments in agricultural firms	0	0
Land Valuation	5	6.5
Miscellaneous		
Futures market trading	1	1.3
Other	0	0
Total Secondary and Tertiary Uses	77	100.0

Public policy and miscellaneous uses make up a much lower percentage of the secondary and tertiary uses than of the total primary uses, while relatively more respondents make additional uses of the data in credit and financing, demand estimation, and land valuation uses as compared to primary uses. The relative importance of these latter three categories in secondary and tertiary uses suggests that the overall importance of these three categories might be higher than the results comparing the primary uses alone indicates. Table 4-5 adds together both the primary, secondary and tertiary uses to paint a slightly different picture of the uses of the data.

An important consideration is the relationship among different users and uses of the data. Target groups of users can be identified and recommendations made to improve the data to meet the needs of these groups. Given the importance of group interests in the political decision process and the need for government funds to make improvements in data, it is often crucial to develop support from interested data users in order to obtain the budgetary support needed for improvements. The ability to translate user support into political support and consequently budget support is a strength of the decentralized Federal statistical system in the U.S. Without this ability to foster user political support, improvements in government provided data might be even more difficult. Thus, if improvements in farm income data can be offered which respond to the uses of the data, then identifying the relevant user groups associated with these uses is an important step toward realizing action on the recommended improvements.

The results of a cross tabulation of major users and primary data use for farm income is presented in Table 4-6. For clarity, only the

TABLE 4-5. ALL USES BY CATEGORY

Use Category	Uses	
	Absolute Frequency	Relative Frequency (percent)
General Information	52	18.4
Pass On to Others	64	22.7
Public Policy Uses		
General policy uses	35	12.4
Program evaluation	10	3.5
Tax-revenue planning	3	1.1
Allocation of research funds	8	2.8
Demand Estimation Uses		
Production planning	15	5.3
Marketing-advertising	36	12.8
Within firm investments	3	1.1
Credit and Financing Uses		
Future loan volume	11	3.9
Repayment ability	10	3.5
Investments in agricultural firms	3	1.1
Land Valuation	15	5.3
Miscellaneous Uses		
Futures market trading	10	3.5
Other	7	2.5
Total Uses	282	100.0

TABLE 4-6. CROSSTABULATION OF USERS BY PRIMARY USE

Primary Use / User Category	General Information	Pass On To Others	Public Policy	Demand Estimation	Credit and Financing	Land Valuation	Miscellaneous Uses	Row Total
Educational Institution	11 5.4%	25 12.2%	16 7.8%	0 0	0 0	0 0	2 1.0%	54 26.3%
Federal Government	5 2.4%	5 2.4%	18 8.8%	0 0	1 0.5%	1 0.5%	0 0	30 14.6%
Farm Input Supply	4 2.0%	0 0	0 0	19 9.3%	0 0	0 0	0 0	23 11.2%
Banking Financing	8 3.9%	0 0	0 0	1 0.5%	10 4.9%	3 1.5%	0 0	22 10.7%
Private Consultants	3 1.5%	0 0	1 0.5%	4 2.0%	1 0.5%	2 1.0%	3 1.5%	14 6.8%
News Media	0 0	4 2.0%	0 0	8 3.9%	0 0	0 0	0 0	12 5.9%
State or Local Government	0 0	4 2.0%	8 3.9%	0 0	0 0	0 0	0 0	12 5.9%
Miscellaneous	10 4.9%	2 1.0%	7 3.4%	3 1.5%	1 0.5%	4 2.0%	11 5.4%	38 18.6%
Column Total	41 20.0%	40 19.5%	50 24.4%	35 17.1%	13 6.3%	10 4.9%	16 7.8%	205 100.0%

major use categories and major users (those with more than 5 percent of the total users) are shown.

For almost all categories of users there appears to be one or occasionally two dominant uses. Perhaps the two most surprising findings shown by the crosstabulation are in the user categories of educational institutions and the news media. The domimant use by educational institutions is in passing the data on to others, accounting for 46 percent of the primary uses in this category. This communication function appears to be performed primarily through extension and classroom teaching programs. It should also be noted that public policy uses, usually in the area of policy research, make up nearly 30 percent of the primary uses reported by educational institutions.

The dominant primary use of farm income data among news media users is also somewhat surprising. Two-thirds of the media users reported that their primary uses were in the area of demand estimation. A priori, one might have expected the news media, for the most part, to provide a communication role in the farm income information system by simply reprinting the USDA data. However, it appears that many publications, especially those aimed at a specific group of farmers, use the data to determine which groups their publications should cater to in terms of advertising and editorial content. For example, one publisher for a group of regional farm magazines reported that they use the data in presentations to advertisers defining the size, scope and character of their market. Another noted that media buyers refer to farm income data for advertising decisions. The USDA data tends to have special value in these uses because it is provided by an objective third party. It should be noted that half of those in the news media who reported that advertising decisions were a

primary use, also reported that a secondary use was in passing the data on to readers in various magazine and newspaper articles. Thus, when all media uses of the data are considered, the same number of uses were reported for demand estimation and for passing the data on to others. Table 4-7 shows this relationship as well as the distribution of total uses among users.

Within the Federal government and state and local governments the primary use of the data appears to be in public policy uses, as one might expect. In each of these cases a secondary and somewhat less significant use in terms of number of uses reported is in transmitting the data to others, again not an unexpected use in these categories.

Among farm input suppliers, the clearly dominant and anticipated use was reported in the area of estimating demand. Over 80 percent of these firms reported this as a primary use. Almost 50 percent of the banking and financing firms cited the various credit uses as a primary use. The other major use within this banking and financing category was for general information. However, given the types of decisions typically made by these firms one would presuppose that the farm income uses in this case would be similar to those users within this same category who cited credit and financing uses as a primary use.

Private consultants showed no dominant primary use of the data. Since these firms typically perform analysis of the data for other firms one would expect that the primary uses of the data would cover a wide range, depending on the needs of the clients of these consultants. The miscellaneous users also reported uses in all of the primary use categories. The fact that over one quarter of these miscellaneous users reported that their primary use was for general information or no specific use gives

TABLE 4-7. CROSSTABULATION OF USERS BY ALL USES

User Category \ Use	General Information	Pass On To Others	Public Policy	Demand Estimation	Credit Financing	Land Valuation	Miscellaneous Uses	Row Total
Educational Institution	18 6.4%	35 12.4%	18 6.4%	4 1.4%	2 0.7%	2 0.7%	3 1.1%	82 29.1%
Federal Government	5 1.8%	8 2.8%	21 7.4%	3 1.1%	2 0.7%	1 0.4%	0 0	40 14.2%
Farm Input Supply	4 1.4%	0 0	0 0	29 10.3%	2 0.7%	0 0	0 0	35 12.4%
Banking Financing	8 2.8%	2 0.7%	0 0	2 0.7%	15 5.3%	5 1.8%	0 0	32 11.3%
Private Consultants	5 1.8%	0 0	1 0.4%	5 1.8%	2 0.7%	2 0.7%	3 1.1%	18 6.4%
News Media	0 0	8 2.8%	0 0	8 2.8%	0 0	0 0	0 0	16 5.7%
State or Local Government	0 0	4 1.4%	9 3.2%	0 0	0 0	0 0	0 0	13 4.6%
Miscellaneous	12 4.3%	7 2.5%	7 2.5%	3 1.1%	1 0.4%	5 1.8%	11 3.9%	45 16.0%
Column Total	52 18.4%	64 22.7%	56 19.9%	54 19.1%	24 8.5%	15 5.3%	17 6.0%	282 100.0%

support to the miscellaneous character of the uses among this category.

When the crosstabulation of users by all uses (Table 4-7) is examined the dominant uses do not change and in fact even become more dominant in some cases. The exception to this, noted earlier, was the news media uses.

Question 5 on the mail survey identified 24 different components of the USDA farm income data or formats in which these data are presented. Users were asked to indicate the usefulness of these components or formats by checking whether these were very useful, moderately useful, rarely useful or not used. Table 4-8 presents the frequency distributions of the responses from this question.

For the purposes of priority setting it would seem relevant to identify those components which are most useful so one might insure that maintaining the accuracy of these series takes precedence over other series. For different formats of the data this information on usefulness gives an indication of how the data are used since each different format implies a certain level of analysis of the data.

The frequency distributions in Table 4-8 shows the greatest variability among formats and components in the "very useful" category, with only 3.7 percent of the respondents finding the series on value of home consumption very useful while 37.8 percent found the data series on farm production expenses very useful. It is interesting to note that those series found very useful by more than 30 percent of the respondents were divided equally among the summary income measures, distributional data by commodity and state, and the production expense data. The fact that data on production expenses are found very useful by nearly 40 percent of the respondents is somewhat surprising since

TABLE 4-8 RELATIVE USEFULNESS OF SELECTED FORMATS AND COMPONENTS OF USDA FARM INCOME DATA

Component or Format	Very Useful (Percent)	Moderately Useful (Percent)	Rarely Useful (Percent)	Do Not Use (Percent)	No Answer (Percent)	No Answer Do Not Use Farm Income Data* (Percent)
Gross and net farm income by quarters	14.1	23.0	17.8	17.8	4.4	23.0
Annual realized gross and net farm income	35.6	22.6	7.0	8.5	3.3	23.0
Annual total net farm income	31.5	21.1	9.3	8.5	3.7	23.0
Farm income by state	31.9	21.1	10.7	8.9	4.4	23.0
Cash receipts by state	25.6	21.1	13.3	13.0	4.0	23.0
Cash receipts by commodity	33.0	23.7	6.7	9.6	4.0	23.0
Cash receipts by month	9.3	12.2	24.8	27.0	3.7	23.0
Value of home consumption	3.7	15.6	24.4	29.3	4.0	23.0
Number of farms and average income per farm	27.8	27.0	9.6	8.1	4.4	23.0
Personal income and disposable personal income of farm population	17.8	24.8	18.5	11.5	4.4	23.0
Per capita income of farm population	16.3	25.2	17.8	13.7	4.0	23.0
Non-money and other farm income	6.3	21.5	18.5	25.9	4.8	23.0
Farm production expenses	37.8	24.4	4.8	6.3	3.7	23.0
Current farm operating expenses	31.1	24.8	8.9	7.8	4.4	23.0
Expenses for hired farm labor	14.4	23.7	18.5	16.3	4.0	23.0
Repairs and operation of farm capital items	13.3	23.3	18.5	17.8	4.0	23.0
Farm gross capital expenditures and net investment	17.0	28.1	14.1	13.3	4.4	23.0
Farm depreciation and other capital consumption	11.5	23.0	21.1	17.0	4.4	23.0
Net cash income of farm operators from farming	24.8	24.8	12.6	10.0	4.8	23.0
Number of farms by value of sales class	20.0	23.0	17.0	13.0	4.0	23.0
Farm production expenses by state	21.9	21.9	14.4	14.4	4.4	23.0
Government payments	18.1	23.7	17.4	13.7	4.0	23.0
Income per farm operator family by major source and by value of sales class	14.1	23.3	19.6	15.9	4.0	23.0
Farm income and production expenses of farm operators by value of sales class	17.0	23.7	18.5	13.3	4.4	23.0
Average Percentage	20.6	22.9	15.2	14.2	4.2	23.0

*This category is for those respondents who stated that they did not use farm income data and only completed Section II of the questionnaire.

those who produce the data suggest that in terms of accuracy the production expense data are one of the weaker component series.

The usefulness of different types of distributional data is also suggested by these results. The current users of the farm income data would seem to find income data distributed by commodity to be slightly more useful than income data by state and each of these somewhat more useful than income distributed by size of farm as measured by value of sales class. This would tend to imply that some measure of net returns by commodity or type of farm might be a useful addition to the current series since the only data of this type currently available is gross cash receipts distributed by commodity.

While it might be expected that the two summary formats for presenting the USDA data, i.e., realized and total income, would be more useful than some of the component series to those who responded, it is interesting to note that the realized series was found to be slightly more useful than the total net income series. In the face of the criticisms of the realized income format in the literature, this finding is somewhat surprising. One possible explanation for this might be that the realized net income series has been emphasized by the USDA in the past and there is a carryover effect that causes some users to place more emphasis on the realized income statistics.

The two least used series or components of the farm income data are the value of home consumption and nonmoney and other farm income. This latter category actually includes the former along with gross rental value of farm dwellings and income from custom work, machine hire and recreation on farms. These first two components are based on imputed values estimated by USDA rather than collected data and as such

might explain some of the lack of use. Furthermore, this suggests more of a concern for data on farm business rather than farm families.

A priori, it was conjectured that because of the list of detailed components presented in this question that it would be useful for respondents to refer to the USDA statistical bulletin Farm Income Statistics in answering the questionnaire. In the cover letter sent with each questionnaire, it was recommended that users refer to the bulletin in answering the questions. So an additional question was asked to determine whether individual respondents referred to this bulletin in answering the questionnaire. It was also felt that the question on the usefulness of components and formats would be the one most likely affected by whether or not respondents consulted this bulletin. So a crosstabulation of answers for each component or format was made with the answer to the question on the use of the Farm Income Statistics bulletin. A chi square test was used to determine if there were differences in the usefulness of the component series or formats depending on whether or not this bulletin was used. Differences which were significant at the 10 percent level were found for only 4 of the 24 components: value of home consumption, number of farms and average income per farm, farm production expenses, and repairs and operation of farm capital items. In general, though, this would seem to suggest that those who referred to the bulletin in answering the questionnaire did not answer this question in a manner significantly different from those who did not consult this publication. For 24 questions taken at random one would expect 2 or 3 to appear significant at the 10 percent level.

TABLE 4-9. PERCENT OF RESPONDENTS USING FORECASTS OF FARM INCOME BY SOURCE

	Absolute Frequency	Percent of Total Respondents	Percent of Those Using Forecasts	Percent of Total Sources
Total Respondents	199	100.0	100.0	
Do Not Use Forecasts	24	12.1		
Use Forecasts	175	87.9	100.0	
Source of Forecasts				
U.S. Department of Agriculture	151	75.9	86.3	53.5
In-house or internal estimates	42	21.1	24.0	14.9
Radio, TV, Newspaper	23	11.6	13.1	8.2
Trade Publications	26	13.1	14.9	9.2
Private Consultants	22	11.1	12.6	7.8
Other	18	9.0	10.3	6.4
Total Sources of Forecasts	282			100.0

As a proxy for identifying major sources of outside analysis of the farm income data, a question was included on the mail questionnaire to ascertain the major sources of forecasts of farm income used by the respondents. Simple forecasting of future farm income was thought to be one of the most basic forms of analysis of the historical data. Of the 199 users of the farm income data who responded to this question, 88 percent reported using forecasts of farm income from at least one source while 12 percent did not use forecasts. Table 4-9 shows the sources of farm income forecasts as a percentage of the 282 responses, as a percent of those who use forecasts and as a percent of total respondents. Since it was possible for an individual to give more than one source of farm income forecasts these latter two percentages sum to

a total of more than 100 percent. For example, 86.3 percent of those using forecasts reported receiving them from the USDA, while 24 percent reported making their own forecasts. Thus some individuals must have used USDA forecasts in addition to their own. From this table it is clear that the U.S. Department of Agriculture is a dominant analyst in the system when one considers forecasting of farm income. Not only do 86.3 percent of those who use forecasts report that they use USDA forecasts but also 13.1 percent report using forecasts obtained from radio, television or newspapers and 14.6 report receiving forecasts from trade publications. Table 4-11 shows that 100 percent of the news media respondents used USDA forecasts of farm income so it is likely that those individuals who reported using radio, television, newspapers or trade publications also received USDA forecasts. Of the 13 percent who reported using private consultants many named one of the econometric modelling companies which have agricultural sector models such as Data Resources Inc. or Chase Econometric Associates. In the category of other sources of forecasts state universities were mentioned by many as a provider of farm income forecasts.

Perhaps of more interest are the results presented in Tables 4-10 and 4-11 which show the sources of farm income forecasts by use and user categories respectively. These show a relationship among users and the source of forecasts used in private sector decision making. Those who use the data for demand estimation and credit or financing decisions seem to rely on their own or private consultant forecasts to a much larger extent than those who make other uses of the data. Also, those who use the farm income data only for general information tend to use USDA forecasts much less frequently relative to other use

TABLE 4-10. SOURCE OF FORECASTS BY PRIMARY USE

Source of Forecast / Primary Use	1 U. S. Dept. of Agriculture	2 In-House or Internal	3 Radio, TV Newspaper	4 Trade Publications	5 Private Consultants	6 Other	7 Do Not Use Forecasts	8 Number of Respondents	
General Information	22	7	4	7	2	5	9	39	Absolute Frequency
	56.4	17.9	10.3	17.9	5.1	12.8	23.1		Percent*
Pass on to Others	31	4	5	1	1	5	4	36	Absolute Frequency
	86.1	11.1	13.9	2.7	2.7	13.9	11.1		Percent*
Public Policy Uses	41	8	3	5	4	3	3	49	Absolute Frequency
	83.7	16.3	6.1	10.2	8.2	6.1	6.1		Percent*
Demand Estimation	23	15	4	5	9	3	3	34	Absolute Frequency
	73.5	44.1	11.8	14.7	26.5	8.8	8.8		Percent*
Credit and Financing	12	4	2	1	4	2	1	13	Absolute Frequency
	92.3	30.8	15.4	7.7	30.8	15.4	7.7		Percent*
Land Valuation	7	2	3	4	2	0	1	10	Absolute Frequency
	70.0	20.0	30.0	40.0	20.0	0	10.0		Percent*
Miscellaneous	13	2	1	2	0	0	1	15	Absolute Frequency
	86.6	13.3	6.7	13.3	0	0	6.7		Percent*
Column Total	151	42	22	25	22	18	23	196	Absolute Frequency
	78.4	21.4	11.2	12.8	11.2	9.2	11.7		Percent*

*Percent of respondents by use category using a particular source, i.e., Frequency Column 1 ÷ Column 8, Column 2 ÷ Column 8, etc.

TABLE 4-11. SOURCE OF FORECASTS BY USER CATEGORY

Source of Forecast / Primary Use	1 U. S. Dept. of Agriculture	2 In-House or Internal	3 Radio, TV, Newspaper	4 Trade Publications	5 Private Consultants	6 Other	7 Do Not Use Forecasts	8 Number of Respondents	
Educational Institution	40	9	9	5	2	6	8	53	Absolute Frequency
	75.5	17.0	17.0	9.4	3.8	11.3	15.1		Percent*
Federal Government	25	3	0	1	0	0	2	28	Absolute Frequency
	89.3	10.7	0	3.6	0	0	7.1		Percent*
Farm Input Supply	15	8	2	4	8	1	4	23	Absolute Frequency
	65.2	34.8	8.7	17.4	34.8	4.3	17.4		Percent*
Banking Financing	15	8	5	7	4	4	2	22	Absolute Frequency
	68.2	36.4	22.7	31.8	18.2	18.2	9.1		Percent*
Private Consultants	10	2	0	3	0	1	2	14	Absolute Frequency
	71.4	14.3	0	21.4	0	7.1	14.3		Percent*
News Media	10	4	2	1	1	2	0	10	Absolute Frequency
	100.0	40.0	20.0	10.0	10.0	20.0	0		Percent*
State or Local Government	9	3	1	0	1	3	0	11	Absolute Frequency
	81.8	27.3	9.1	0	9.1	27.3	0		Percent*
Miscellaneous	27	5	4	5	6	1	6	38	Absolute Frequency
	71.1	13.2	10.5	13.2	15.8	2.6	15.8		Percent*
Column Total	151	42	23	26	22	18	24	199	Absolute Frequency
	75.9	21.1	11.6	13.1	11.1	9.0	11.6		Percent*

*Percent of respondents by user category using a particular source, i.e., Frequency Column 1 ÷ Column 8, Column 2 ÷ Column 8, etc.

categories. The low relative level of use of USDA forecasts found in this category seems to be attributable to the low level of use of forecasts in general by this group since they have over twice the percentage of nonusers of forecasts compared to the other groups.

When analyzing user categories and sources of forecasts the results tend to confirm the findings mentioned previously. In this case, the two major private sector farm income data users, farm input suppliers and banking and financing institutions, show the lowest level of direct use of USDA forecasts and among the highest levels of use of both internal and private consultant forecasts. Two possible explanations for these phenomena are apparent. First, the importance of the decisions in these firms require multiple sources for validation and the reduction of uncertainty. Second, the ability of these firms to capture the returns to improved information causes these firms to be willing to make expenditures for more information.

4.3.4 NONRESPONDENTS

In part, the applicability of the mail survey results to the entire population of farm income data users, or that part of the population on the USDA mailing list, depends upon whether and how the nonrespondents to the survey differ from the respondents. Given the level of nonuse of the farm income data found among those who responded to the questionnaire, one reasonable hypothesis would be that those who did not respond to the questionnaire, for the most part, did not use the USDA farm income data. A counter hypothesis is that those who responded made up an inordinately large portion of the nonusers of the farm income data. This might be expected since it was more difficult to explain how

the data was used than to simply write that the data was not used.

The responses to a telephone survey of the nonrespondents presented in Table 4-12 seem to refute this latter hypothesis and support the hypothesis that those who did not respond also did not use the data. Of the nonrespondents to the mail survey who were contacted, 56.7 percent said outright that they did not use the data while in another 13.3 percent of the cases, the individual to whom the mail survey was originally sent was no longer with the firm or agency and the person contacted on the telephone could not refer the call to anyone who used the data. So almost 70 percent of those contacted did not use the data. This proportion is significantly different at the .01 level from the proportion of nonuse found among the respondents. Even the 56.7 percent level of nonuse is significantly different at the .01 level when compared to the 24.1 percent of nonuse found among the respondents.[2/] Thus, if this percentage of nonuse is applied to 46.85 percent of the sample that did not respond and added to the 24.1 percent of the respondents who did not use the data then over 45 percent of the sample did not use the USDA farm income data. The fact that nearly half of those surveyed do not use the data is even more significant when one considers that the sample was drawn from a population that receive the data on a regular basis.

Table 4-13 summarizes the breakdown of the nonrespondents by user category. While the sample size is relatively small, the nonrespondents identified seem to be represented in about the same

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2/ The procedure for testing the difference between sample proportions is presented in Freund, p. 285-287.

TABLE 4-12 NONRESPONDENT SURVEY RESULTS

	Absolute Frequency	Relative Frequency (Percent)	Adjusted Relative Frequency (Percent)
Contacted	30	83.3	100.0
Use for general information	5	13.8	16.7
Use specifically	4	11.1	13.3
Do not use	17	47.2	56.7
No longer with firm or agency and could not refer to a user	4	11.1	13.3
Not Contacted	6	16.7	
No telephone listing	4	11.1	
Unpublished telephone	1	2.7	
Unable to contact	1	2.7	
Total Sample	36	100.0	
Total Nonrespondents	237		

TABLE 4-13 NONRESPONDENTS BY USER CATEGORY

User Category	Absolute Frequency	Relative Frequency (Percent)
Educational Institution	4	13.3
Federal Government	6	20.0
Farm Input Supply	2	6.7
Banking or Financing	3	10.0
Private Consultants	2	6.7
News Media	1	3.3
State or Local Government	1	3.3
Miscellaneous	6	20.0
No User Group Given	5	16.7
Total Contacted	30	100.0
Unable to Contact	6	

proportions as the respondents. Using a z test to test the differences between proportions and the null hypothesis that the proportions of the contacted nonrespondents in each category are equal to the proportion of respondents in each category, at the 10 percent level the null hypothesis cannot be rejected for any category of user.[3/] Thus, the nonrespondents seem to be similar to the respondents in most ways except that the nonrespondents have a much lower level of use of the data than do the respondents.

4.3.5 IDENTIFICATION OF DECISION MAKERS TO BE INTERVIEWED

The main thrust of the personal interview portion of the research was aimed at the public policy uses of farm income data. A somewhat more limited number of interviews with private sector data users were made to gain a better understanding of the uses of the farm income data in the farm input industry and the banking and financing industry. However the majority of those interviewed were in the agricultural policy decision process at the national level.

As was stated earlier, the value of information stems from the value of the decisions in which the information is used. Accepting the fact that some decisions are more significant than others forces one to have misgivings about relying on a random sample of users to set priorities on the redesign of a data system. The use of publically collected farm income data in public policy decisions was felt to be a major use, the importance and details of which would not be brought out in a

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3/ Ibid.

strictly random sample of users.

Given the population chosen for the mail survey, i.e., subscribers on a USDA mailing list, it appeared that public policy users might be underrepresented since more direct channels for supplying this information exist for public policy decision makers when compared to the use of a mailed printed bulletin. Thus, the population was expanded to include more of these users. In a sense the total population of farm income data users was stratified with the major public policy decision makers being sampled at nearly a 100 percent rate while other users were sampled at a lower rate. The basis for selecting the public policy users is outlined below.

Through time the decision process in agricultural policy has expanded to include more actors than the traditional "Farm Bloc" of the 1920s. The increased specialization of production in farming has increased the fragmentation in the policy decision process (Bonnen 1977). Hence the number of important actors who use farm income data in policy making has also increased since the time the data system was first designed.

Within the Federal government there are two main branches which are concerned with policies affecting farm income. The executive branch has remained a principal locus of decision making in agricultural policy. However, through time the primary nodes of decision activity have moved to higher levels in the executive branch hierarchy when compared to the 1920-1940 period when a high proportion of the decision making in the executive branch was focused at the bureau chief level. Decision making at this earlier time was characterized by what Randall Ripley and Grace Franklin call the "subgovernment phenomena" where interest

groups, Congressional committees and agency head or bureau chief level members of the exesutive branch dominate the decision process. When subgovernments are strong there is generally good agreement as to the appropriate direction of policy in a given area. In agriculture the fragmentation of interests brought on by increased specialization has led to greater conflict in agricultural policy and thus has moved the decision making up to higher levels in the process. This has weakened the subgovernment in agriculture so that important decisions on agricultural policy in the executive branch are now being made at the Assistant Secretary and Secretary level in USDA, in the Executive Office of the President particularly at the Office of Management and Budget and the Council of Economic Advisors, and even in the White House itself (Bonnen 1977; Cochrane and Ryan; Stucker, Penn and Knutson). In recent years, many other actors in the executive branch, such as the Secretaries of State, Commerce, and Treasury, the Special Trade Representative, the Special Assistant for National Security, etc., have also played an important part in the policy process (Bonnen 1977; Stucker, Penn, and Knutson). A priori, it was felt that these other executive branch actors would be less concerned with farm income and more concerned with issues of direct interest to their specific positions than the actors mentioned earlier. The interviews with individuals in these traditionally nonagricultural agencies and others seemed to confirm this hypothesis. Farm income was not as crucial to the types of decisions with which these individuals normally dealt.

In the legislative branch the important actors concerned with farm income fall into three basic areas: the Senators, Congressmen and their staffs on 1) the agricultural committees, 2) the House and Senate

Budget Committees, and 3) two of the research arms of Congress, the Congressional Research Service in the Library of Congress and the Congressional Budget Office. The appropriations subcommittees concerned with agriculture in both the House and Senate were at first thought to have a major interest in farm income data. However, since most of their appropriations work concerns the operating budget of the U.S. Department of Agriculture and only indirectly the income support programs, the interviews revealed these subcommittees to be less concerned with farm income data relative to these other Congressional users. Again there are other committees such as the Interior Committees which affect various aspects of food and fiber policy but their concern with farm income issues are not as critical as the groups mentioned earlier.

Various private interest groups are also influential in the agricultural policy process. Thus, interviews with the general farm organizations such as the National Farmers Union, the American Farm Bureau Federation, the National Farmers Organization and the National Grange or commodity groups like the Milk Industries Foundation might also give insights into the private use of government data in public decision making. Also some other interest groups representing consumers and other interests were chosen for interviews to see how some of these groups outside of the "agricultural establishment" might use the farm income data.

Thus, 35 interviews with the various actors in the public decision process in agriculture were undertaken to obtain a more in-depth understanding of the use of farm income data in the process. Those interviewed were selected to represent a crossection of the roles and organizations that currently participate directly in public policy

decisions for agriculture. Those selected for interviews included present and former members of the Department of Agriculture such as the Assistant Secretary responsible for commodity programs, the Director of Agricultural Economics, and various USDA staff and advisors dealing with price and income policy; agricultural policy experts in the Office of Management and Budget, on the staff of the Council of Economic Advisors, and on the White House staff; the relevant staff people of the Congressional committees and their research organizations; and the lobbyists and economists of many pertinent interest groups. Interviews with 35 of these individuals were conducted during the fall of 1977 to determine the uses and needs of these policy makers with regard to farm income. All interviews were made under conditions of confidentiality of individual respondent indentity.

4.3.6 RELEVENT INTERVIEW RESULTS

The common expectation concerning the use of data in policy decision making would seem to indicate that data are important in the formulation of policy. Data should provide a source that along with analysis can produce information about problems that require government action. Insofar as farm income is a measure of the combined effects of changes in prices, sales, production and costs it should be a useful guide in policy formulation. Thus, farm income data might be used to monitor developments in the farm sector and to provide an impetus for policy action.

However, none of the policy makers interviewed could cite any instances where the data on farm income alone led directly to any specific policy action. Aggregate farm income data are used in the policy

process primarily to support positions taken by decision makers after these stands are taken. As one Congressional staff person put it, "knowledge fortifies bias." Most uses of aggregate farm income data seem to be in justifying positions that were already held and not in initial policy formulation, per se. Farm income data do not seem useful in placing issues on the policy agenda, rather, in most cases, the data are used merely as a tool in the debate.

The nature of the political process itself may force farm income to a lesser role in policy formulation. Farm income tends to be used in reinforcing policy positions rather than in forming policy prescriptions because most policy formulation arises from constituent pressure or pressure from other decision makers in the process which occur before the income data are available to reflect the source of the pressure. One former Executive Branch decision maker noted that the timeliness of the farm income data, since they are for the most part, published on a yearly basis, causes many of the uses of these data to be ex poste, that is the data are used to justify positions rather than formulate policies. Another Congressional staff person felt that many politicians like to use the aggregate farm income figures because changes in the aggregate are much more dramatic in their impact. Since the main uses are primarily in speechmaking and the ex poste justification of policy proposals, the dramatic nature of changes in farm income are much easier to show when dealing with aggregate figures rather than averages.

Another reason that farm income data are not used in the policy formulation stages of decision making on agricultural policy is due to the way the legislation is generally written. Agricultural policy has

tended to be commodity specific, aggregate farm income data are not, so in most cases farm income data must be used in conjunction with price data or cash receipts data by commodity to influence commodity policy decisions.

If farm income data are not used to a great extent in the formulation of alternative policies the next logical place to examine their usefulness is in evaluating alternative policies after these are formulated. Farm income data do seem to have some influence in the decision process with regard to certain issues. In terms of Congressional decision making a few interviewees felt that USDA farm income data are more likely to influence those Congressmen and women on the fringe of agricultural issues, i.e., those with nonagricultural constituencies or who are undecided on a particular issue. The major agricultural leaders in Congress tend to have their own informal information sources and thus rely less on published sources of data on farm income. This use by nonagriculturalists stresses the importance of understandability as an attribute of data on agriculture. It is doubtful whether any person unfamiliar with agricultural data would be able to make the distinction between realized net farm income and total net farm income, so some confusion might arise because of this. The recent turnover in members of Congress and their staffs only exacerbates this problem. The apparent preference of Congress to use the notion of "cost of production" as a basis for setting target prices as opposed to "parity" seems to be a reflection of the understandability of the data. Most urban members of Congress at least implicitly feel that they know the meaning of costs of production but for the concept of parity this understanding is not as prevalent, even though both of these in a sense are variations

of the same general concept.

While no one suggested that farm income data were disregarded in decisions concerning various policy alternatives, many suggested that aggregate farm income as a statistic was given a rather low weight in the process. The analysis concerning the 1978 set-aside program for wheat provides an example. The Agricultural Stabilization and Conservation Service of USDA did a study that showed lower aggregate farm income under the various proposed set-aside programs. One high level Executive Branch decision maker stated that this aspect of the analysis was given a very low weight in the process because a large error in the farm income data was assumed which would most likely overshadow the effects of the set-aside on farm income, Second, the more important question of whose income is reduced was not answered, so the distributional aspects of the effect of the set-aside might offset the aggregate effects. Another decision maker noted that aggregate farm income data were not very useful in evaluating different program alternatives, because the data are not sensitive to changes among policy alternatives. He felt that this arose primarily because of the way the data were calculated. The reliance on trends around census benchmarks and historical patterns in estimating the data tends to smooth out the income estimates and thus reduces the sensitivity of the data to specific dimensions of proposed policy changes. Other policy makers suggested that cash receipts data are often more useful for comparing policy alternatives because these tend to be more sensitive to the policy options.

These problems in using farm income data in program evaluation seem to have reduced the effectiveness of farm income data as a prime mover in decisions on agricultural policy. Most of the uses of the

data in policy were indirect or ad hoc, so other variables were often more important in the decisions. Variables such as budget costs and consumer prices and, in 1977, cost of production often become dominant in the policy deliberations. Another reason that farm income data have not been as critical as other types of data in agricultural policy decisions is the failure to debate the question of the need for government intervention in agriculture. Aggregate farm income is the primary sector performance measure available for farming. Without serious questioning of the need for special treatment for the farming sector, aggregate sector performance data which can be used to compare agriculture with other sectors are not as critical. Instead, the farm policy debates center on the distribution of the benefits and costs of the programs. This creates quite different data needs which will be discussed in the next chapter. The principal focus of the debate on farm policy also effects the type of analysis needed. For instance, input-output models might be useful in program evaluation but as long as the farm policy debate does not explicitly consider the impact of farming on other sectors then the importance of this type of analysis is reduced. However, an observation is in order. A case can be made that an important consideration for agricultural policy is the increasing impact on agriculture of changes in other sectors. An obvious example in recent years was the concern among policy makers over the impact of changes in the energy sector or in environmental policy on farming. Thus, input-output studies and similar types of analyses might provide needed information for decisions in agricultural policy in some cases. Conversely, the greatly increased importance of agricultural exports in the balance of payments and the potential impact of farm policy changes and farm

sector performance on inflation reputedly now cause concerns among U.S. policy makers outside agriculture because of the farm sector's impact on various aspects of the U.S. economy. Nevertheless, no evidence of any of these policy concerns showed up in the interviews with policy makers primarily concerned with agricultural policy decisions.

Prior to studying the system, a further policy use of farm income data that was considered was in program implementation. For example, many government programs or grants are made available to certain localities based on measured levels of unemployment as published by the Bureau of Labor Statistics. There seem to be no specific examples of program benefits or other aspects of programs tied directly to USDA farm income data. Guebert noted that farm income data enter into the revenue sharing mechanism but this use is only indirect in that the farm income data enter into the overall income measures of a geographic area computed by the U.S. Department of Commerce. These are then used to allocate the revenue sharing dollars. This lack of uses in implementation might also explain the seemingly low level of direct use of this farm income data in the policy process. It also suggests that changing the concept or definition of farm income might run into less political roadblocks, since few program benefits are directly affected by changing the concept or definition. However, the implicit ties of farm income to price parity might create difficulties since parity prices are presently still used in implementing a few government programs.

The sources and types of analysis found in the public decision process are also important in understanding the operation of the farm income information system. Until recently the primary government analysts for public policy decisions in agriculture were in the U.S.

Department of Agriculture. The subgovernment phenomena and its dominance in earlier years of the decision process gave analysts at the lower levels of USDA influence in the process. However, the lack of conflict in the process also tended to reduce the need for analysis of alternatives. Recent changes, particularly in Congress, have shifted the relative importance of different analysts. Congress has increased its ability to do analysis in the agricultural policy area. The budget process in Congress has increased the demand for both analysis and more detailed data in Congressional decision making. The conflict between the Executive Branch and Congress that dominated the later Nixon Administration years has also had a carryover effect which has caused Congress to rely less on USDA analysis of farm policy issues. Increased staff on Congressional committees, increased reliance on the major research arms of Congress, i.e., the Congressional Research Service of the Library of Congress, the Congressional Budget Office, and the General Accounting Office, and the increased use of paid private consultants have all reduced the relative importance of USDA analysis in farm policy decisions. Analysis is also provided by the various interest groups in the agricultural policy process. While recognizing some of the problems mentioned in Chapter 2 concerning the use of privately supplied information in public decision making, the continuity of the decision process through time reduces the incentive of private interest groups to distort selectively the information that they provide. The use of private interest group analysis seems to be most important in Congressional decision making and among those decision makers in the Executive Office of the President. Private interest groups are also more likely to be used for analysis on commodity specific issues since many of these groups

have a commodity focus and considerable access to information on their subsector of agriculture.

Private consultants, especially those offering large econometric simulation models of the agricultural sector such as Data Resources Inc. and Chase Econometric Associates Inc. have become more important in decisions on agricultural policy. The Congressional Budget Committees and the agricultural committees all subscribe to and use these services as do most of the Executive Branch decision makers outside of USDA. One reason given for the rise of these private analysts relative to USDA analysts are that the private consultants are willing to take more risks and project farm income estimates much further into the future than USDA. When dealing with a four- or five-year farm bill this can be significant, although it must be added that the USDA does produce unofficial forecasts for these types of uses. This willingness to take additional risks is perhaps more important among the private sector users of forecasts where USDA forecasts of sufficient length into the future might not be available.

University researchers also provide a source of policy analysis in the public decision process. The type of analysis provided by these researchers is usually more of a long run, in-depth nature rather than evaluations of selected policy alternatives under deliberation at a given time in the decision process. As one staff person noted, it is difficult to get university researchers to respond fast enough to be of use in the policy process. It is apparent that timeliness in analysis is often as important as timeliness in the provision of the data. Lags in either of these steps hinders the use of information in the decision process. University researchers also influence government analysis

through professional ties with government analysts. Nearly all of the government decision makers reported using, to some extent, university sponsored research but the usefulness of it varied depending on the types of decisions to be made. The remarks of a Congressional staff person as to the relationship between research and policy making are somewhat enlightening in this regard. It seems that researchers tend to have quite different aims than policy makers. For the most part researchers want a product that is entirely defensible in the sense that it is comprehensive and correct, while policy makers must define a product that will be acceptable to their constituents. The policy maker does not necessarily care if he or she is right for the right reasons, so a policy prescription does not have to be entirely defensible. Thus, the data requirements for research and policy making are somewhat different. When a researcher encounters insufficient data on a given aspect of a problem, he or she is able to shift the focus of the research and thus can shift the risk to others by not dealing with this aspect of the problem. A policy decision maker is not often able to shift the risks brought on by insufficient data and must deal with the issue at hand with or without the relevant data. So insufficient data or gaps in the data on a given issue create problems which are often more critical to the decision maker than the researcher.

The use of various components and formats of farm income data seem to be somewhat different among those interviewed and the mail questionnaire respondents. The data on farm income and number of farms by value of sales class seemed to be much more important than suggested by the mail survey. A reason for this, which was cited by many of those interviewed, was that for most of the decisions relating to income

distribution this was the only data available, so it received a significant amount of use. Comparisons of cash receipts data among various crops and between crops and livestock also appears to be very important, this finding concurs with the mail survey. It was also suggested that cash receipts were used primarily because net income data by commodity are not available. Most policy makers recognized the problems associated with the data on average income per farm and hence these were not used often in the decision process.

Decision makers in agricultural policy at the national level also seem to indicate a much lower use of the production expense data than those who responded to the mail survey. Some interviewees suggested that the data was too crude for any major types of analysis. This coupled with the relative insensitivity of these data to changes in the short run also reduced its usefulness. A further consideration of the mail survey results would tend to confirm this. Only 18.9 percent of the Federal government respondents to the mail questionnaire found production expense data very useful while 40.8 percent of the remaining respondents found production expense data very useful. While it is not statistically correct to compare these proportions taken from an ordinal scale ranking, these mail survey results at least suggest an explanation for the interview findings.

Another and much more limited set of interviews were used to develop information on the use of farm income data among two of the major user categories in the private sector. Six personal and telephone interviews with representatives of farm input manufacturing and banking firms were used to gather more in-depth information on their uses of farm income data. Individuals were selected from the Farm Income

Statistics mailing lists and an attempt was made to choose firms representative of these two user categories in the judgment of the researcher. All individuals were assured confidentiality in responding to the questions. The schedule of questions was similar to that used for the public policy user interviews but concentrated primarily on how data and analysis was used and on deficiencies in the existing data.

In the farm input supply industry, farm income data are used to gain an understanding of changing economic conditions in agriculture which then can be related to the demand for farm inputs. Cash receipts also tend to be more important relative to other farm income data in any econometric analyses of demand done by these firms. In part this is because of the way farm income data are estimated. Cash receipts elements seem to induce most of the year to year changes in farm income. These changes are what effect the forecasts and demand estimates of these firms, so cash receipts become key data.

As agriculture has become more specialized, inputs have become more commodity specific. The fact that cash receipts data are available by commodity increases its usefulness for input suppliers. Even in the case of a general input such as a tractor, commodity specific data are important. In general, the size of tractors used on various types of farms is different. For instance, knowing that dairy farms and tobacco farms use more small tractors makes cash receipts data for these commodities more useful in estimating demand for these types of equipment. Since data on income and number of farms by value of sales class can be used as a proxy for income distributed by farm size, this type of data is useful in estimating demand for inputs which are used on different sized farms. The experience of a farm equipment

manufacturer also explains the relative importance of cash receipts as compared to realized or total net farm income in estimating demand for farm equipment. This firm found that most farmers pay for purchases of farm equipment out of the gross farm receipts and in reality the farmer does not generally distinguish between current and capital expenses. A further finding by the firm was that farm operators tend not to pay for farm inputs with off-farm income. So data on off-farm income are not as important in estimating demand.

Three main types of farm input firm decisions are affected by farm income estimates: 1) production scheduling and inventory management, 2) marketing, advertising and sales strategies, and 3) financial planning for the firm. Production scheduling is often influenced the most by changes in estimated demand brought on income changes. If the firm already has an idea of its actual market share and desired market share and its actual and desired inventory levels, in the short run, most changes in demand will first affect production scheduling. Over a slightly longer period, changes in income may lead to changes in marketing strategies which can be planned to account for these income induced changes in demand. Finally and to a much smaller extent, farm income data might influence investment decisions with regard to expansion of plant and equipment for manufacturing farm inputs.

In the banking industry the uses of farm income are at the same time both more and less direct than in the farm input supply industry. Indirectly these data are used as an indicator of the economic health of the farm sector and as such are useful in decisions regarding the allocation of funds of the bank between agridultural and other types of loans. In this same manner the ability of farmers to repay outstanding

loans plus some notion of the future credit needs of farmers can be anticipated by monitoring farm income estimates. However, since most banks do not have truly national markets, aggregate farm income data are only useful in giving general indications. At the national level institutions interested in farm credit policy, such as the Federal Reserve Board and the Farm Credit Administration, make similar uses of the data. The aggregate national level data are also more important for these agencies than any specific bank for obvious reasons. Thus, for estimating the debt financing capabilities of the agricultural sector or future loan volumes, aggregate farm income data have more of a direct use for these national level users.

Larger banks or the "money center" banks often make a more direct use of the farm income data. The contribution of farm income to total gross national product and farm inventories to business inventories are of concern to these banks. This arises because of the need to anticipate reactions in bond markets. The bond markets respond very directly to changes in key economic indicators. Movements in personal income tend to be one of the critical variables and farm income is a major component of the personal income data series. Using monthly cash receipts estimates, a projection of the contribution of farm income to the monthly personal income estimates of the U.S. Department of Commerce can be made. Using these along with other data, an estimate of personal income can be made which allows the bank to anticipate the reactions of other banks in the bond market and thus make better decisions about the purchase and sale of bonds. It is also interesting to note that very little difficulty is encountered in integrating the farm income data into the national income accounting format used in the personal income

accounts. Uses similar to those described in estimating the contribution of farm income to personal income arise because changes in farm income and farm inventories can often mask changes in the non-farm component of GNP and in business inventories. These latter two data series are important indicators in analyzing the business cycle which consequently impact on many economic decisions.

4.4 THE FARM INCOME INFORMATION SYSTEM

Figure 4-2 is a schematic representation of the major components of the aggregate farm income information system. The following sections will describe each of the subsystems which make up the overall system. While these will describe the important individuals and organizations involved in the system, it must be kept in mind that the importance of farm income data in decisions varies to a large extent. The high level of nonuse of the data among those receiving the data through the mail from USDA coupled with the low weight often applied to these data in public policy decisions should be considered in evaluating this system.

4.4.1 THE PRIMARY DATA SUBSYSTEM

The primary data subsystem of the farm income information arises because estimates of farm income, per se, are not obtained by sampling. Instead these estimates of aggregate farm income are built up from primary data consisting, for the most part, of price and quantity data for farm inputs and outputs.

The Statistics Branch of the Economics, Statistics, and Cooperatives Service (ESCS) in USDA is the principal source of primary data for estimating farm income. For estimating livestock receipts the

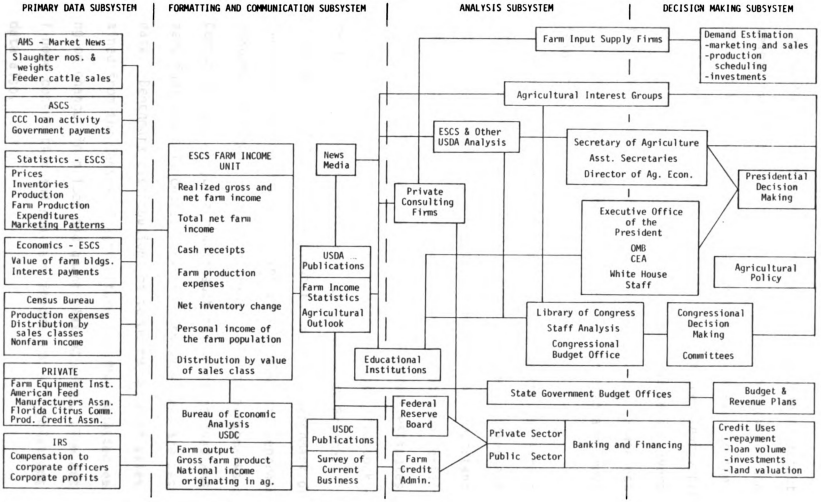

FIGURE 4-2 THE FARM INCOME INFORMATION SYSTEM

Statistics Branch provides production, disposition, and income reports as well as monthly marketing percentages to be used in distributing cash receipts over the year. The Statistics Branch provides somewhat more limited data on slaughter and feeder cattle sales. In the area of crop receipts the data from the Statistics Branch are clearly preeminent. Monthly prices for major crops by states and season average prices for minor crops and minor states are provided. State estimates of monthly marketing percentages and quantity marketed are provided for major field crops.

On the expense side, data are provided by the Statistics Branch on monthly prices paid for production items, interest, taxes and wages. The annual Farm Production Expenditure Survey data are important, particularly for minor items in the expense accounts. Data on fertilizer consumption and purchases of livestock from inshipment estimates are also provided. Inventory quantity estimates for both livestock and crops are also obtained primarily from the Statistics Branch.

The Census of Agriculture provides important benchmark data for estimating production expenses. Of the approximately 50 separate expense accounts estimated, most are extrapolations of benchmarks provided by the Census Bureau. Major accounts such as purchased feed and seed, fertilizer, fuel and oil, custom work and cash wages all are based on Census data. Benchmark distributions of farms by value of sales class are obtained from the Census of Agriculture and then adjusted each year depending on changes in prices and quantities of sales. The data on value of home consumption and non-farm income are extrapolations from Census data also.

The Agricultural Stabilization and Conservation Service (ASCS)

provides monthly data on direct government payments which enter, without major changes, into the published government payment series. Commodity Credit Corporation (CCC) loans and redemptions are also reported by ASCS and these are added in or deducted from the cash receipts estimates for those crops with CCC loan programs.

The Economics Branch of ESCS also provides some data on the rental value of farm dwellings and the value of farm buildings. This latter item is important for adjusting estimates of depreciation and repairs of capital items. On the expense side the Economics Branch also provides estimates of taxes and interest.

The Market News Branch of the Agricultural Marketing Service (AMS) in USDA provides data that are used primarily in estimating livestock cash receipts. Data on slaughter numbers, the number of head shipped to public stockyards, placement numbers and weights from seven major feeder states are developed from AMS data.

Private trade associations such as the Farm Implement Equipment Institute, the Limestone Institute and the American Feed Manufacturers Association are sources of data on capital expenditures on farm machinery, limestone expenses, and feed purchased, among other items. Private data also provide check data for the estimates developed in the ESCS Farm Income Unit.

The Internal Revenue Service (IRS) produces data on compensation to corporate officers and corporate profits which are used by the Bureau of Economic Analysis (BEA). This agency uses the IRS data to adjust USDA farm income estimates to get farm proprietors' income.

Much of the data collected in the primary data subsystem are not designed explicitly or solely for the income estimates. Thus, the

concepts used in the design of these data can cause problems which reverberate through the system. One of the less apparent reasons that cash receipts data are used more often than many other components might be that the price concept used to estimate the cash receipts is explicitly designed to yield aggregate income estimates. The concept used in ESCS: Statistics estimates of prices received by farmers is "That of a price which, if multiplied by the total quantity of the commodity sold, would give the total amount received by all farmers for that commodity" (USDA 1975).

Many of the difficulties in the timing of the release of primary data used in farm income estimates alluded to in earlier studies (Hildreth, et. al., Weeks, et. al.) can be viewed as measurement problems in the primary data subsystem. Since estimates of farm income are built up from primary data on prices and quantities rather than direct measurement of income, difficulties in measuring the primary data cause problems in the current system analogous to those which would arise in attempting to operationalize a concept of farm income under a system where income is measured directly. Thus, problems associated with the concepts, operationalization of concepts and the measurement of primary data then will tend to reduce the accuracy of the farm income data in the same manner as problems in the operationalization of a concept of farm income that is measured more directly.

4.4.2 THE FORMATTING AND COMMUNICATIONS SUBSYSTEM

The formatting of this primary data into a form that has meaning and can be used as an input into the analysis subsystem is done primarily through the Farm Income Unit in ESCS. The various accounting rules

and relationships among the primary data are somewhat analogous to statistical sampling procedures in other data systems. In this latter case statistical procedures provide rules for gathering individual cases into a single summary statistic. Accounting rules and relationships also provide a way for summarizing the primary data into a single or limited number of income measures.

The Bureau of Economic Analysis uses the farm income data supplied by USDA but has a slightly different set of accounting rules and uses some additional primary data to arrive at a slightly different measure of farm income. Even though the underlying concepts of farm income used by USDA and BEA are different, the resulting income estimates are not essentially different. The reason for the similarity in measures arises in the operationalization of these different income concepts. Since both agencies basically rely on the same primary data, differences in concepts cannot be easily operationalized. For instance, BEA attempts to measure a value added concept. Under this concept data are needed on total value of production to get farm output. Since these data do not exist the value of sales or receipts is substituted for value of production. This in turn forces the measurement of income or actually the formatting to be similar for the different concepts of farm income.

Through government publications, particularly in the USDA's Farm Income Statistics and Agricultural Outlook, the data on farm income are then transmitted to analysts or directly to decision makers who can use the data. Some nongovernment groups also provide a communication role in the system. The news media, primarily newspapers and trade publications receive the data and pass them along to other potential users.

Educational institutions also have a communication function. Teaching and extension education programs often are used to pass the data along to others as well as to provide some additional analysis on the farm income data.

The BEA publication Survey of Current Business presents their estimates of farm output and gross farm product. However these data are not used to any great extent by agriculturally oriented decision makers. Most of these individuals seem to rely on USDA data.

4.4.3 THE ANALYSIS SUBSYSTEM

The analysis function in the farm income information system is performed by many different firms and organizations. The Economics Branch of ESCS remains a major analyst of data on farm income which are used primarily in the public policy process. Indications are that the USDA analysis with regard to farm income for policy decisions is not as prominent as it might have been earlier. The increased ability of Congress to do policy analysis has perhaps reduced the role of USDA analysis somewhat. Professionalization and increases in the size of Congressional staffs have led to a greater capacity within Congress to do analysis on farm income issues. The Congressional budget process has also put new demands on data and the addition of the Congressional Budget Office has provided another source of analysis.

Private consultants and interest group analysts also provide important sources of data interpretation concerning farm income. While the provision of information has traditionally been a function of interest group lobbyists in the decision process, the use of private consultants seems to be a more recent phenomena. Firms with econometric and

simulation models of the agricultural sector and the entire economy seem to be able to provide information on farm income that is both timely and pertinent to agricultural policy decisions. In the policy process these consulting firms as well as the interest group analyses are used the most in Congressional decision making and by those in the Executive Office of the President as opposed to USDA.

Educational institutions also provide analysis that is used in the public decision process but their analysis is in some ways different from other analysts. Academic research often suffers from a timeliness problem. It is difficult to use university analysis to a great extent in actual policy deliberations because policy makers are not often aware of ongoing research or when they are aware of this it is difficult to get a rapid response which is often critical. On line computer records of research currently underway in land grant universities as provided by the Current Research Information System (CRIS) might possibly help cope with this problem. University research is perhaps most useful in suggesting broader alternatives or on more longer run analysis of future problems and programs or in analyzing the impacts of existing programs. The maintenance of professional ties among government and academic analysts is critical in the communication of the results of analysis and helps to foster the use of academic research in policy decisions.

In private sector decisions, analysis by private consultants and more internal or in-house analyses are prevalent, although most firms seem to rely in part on USDA analysis. Banking firms might rely on some aggregate analysis done by the Federal Reserve Board or Farm Credit Administration but insofar as certain kinds of information have returns to uses that are almost fully appropriable by the firm, these firms are

willing to do their own analysis in these areas. In most of the private sector uses of data it is more difficult to separate the analysis and decision making functions because they are both undertaken within the firm. Thus, separate organizations do not exist for identification.

The goals of firms in the private sector tend to be more easily identified than goals in many public policy areas so the analytical methods for dealing with farm income issues are probably more precise in private uses than in public uses of farm income data. For example, the uses of cash receipts or income data in econometric modeling seemed to be much more prevalent in those firms estimating the demand for a product than in the public policy uses of the data. Thus, the types of analysis would appear to be more easily identified in the private sector.

4.4.4 THE DECISION MAKING SUBSYSTEM

The types of decisions on which farm income data impact can be classified into a rather small number of categories. Farm income data impact on public policy in agriculture but these are rarely key or critical data because of the way policy is formulated. As long as the critical questions in agricultural policy do not center on the desirability of government intervention in agriculture then the crucial income data needs will be for more disaggregated measures, particularly distributional data, rather than for aggregate measures.

The central actors in the public policy decision process in agriculture are in three main areas. First, in the Executive Branch, the Secretary of Agriculture and others in the Department are major actors and users of farm income data in this process. The important

economic advisors in the Executive Office of the President also have input into Presidential decision making. Agricultural economists in the Office of Management and Budget, on the staff of the Council of Economic Advisors, and on the White House staff itself are the most important farm income data users and policy decision makers in this part of the system.

The second area of users and decision makers in the agricultural policy process are in Congress. In terms of their use of farm income data, four committees are most important. The agricultural committees in the House and Senate are users of the farm income data but more in the justification of given policy alternatives rather than as indicators for anticipating problems and formulating policies. The budget committees in both houses of Congress are also important and their uses are somewhat similar to the agricultural committees. The appropriations subcommittees for agriculture do not appear to be major farm income data users. This arises because these committees only appropriate funds for the commodity price and income policies of the Commodity Credit Corporation two years after the losses occur. These committees have no alternatives in their ex poste decisions, thus their influence over current farm legislation is not as important as some other committees.

Agricultural and other interest groups also influence farm policy. The uses of farm income data by these groups varies somewhat, with the traditional agricultural interests concerned for the most part with commodity specific data. The way in which agricultural legislation is written leads to the concern for commodity oriented data. Even those interest groups outside of the traditional agricultural establishment are concerned more with the distribution of farm income and program

benefits than aggregate income. One might have thought that these groups would be questioning the appropriateness of government intervention in agriculture rather than expressing concern over which farmers benefit from the farm programs. Their attitudes might be explained by the nature of the public decision process, i.e., decisions tend to be incremental except in times of major crisis.

At the state level the public policy uses were not as easily identified. Many of those receiving data merely act as a data source for others. However, one significant use of the data appears to be in estimating tax receipts for the state income and sales taxes. Some states also use econometric models in their forecasting of general tax fund receipts.

Two major private sector end uses of the data were found. First, many farm input supply firms use cash receipts and farm income data to estimate the demand for farm inputs. In the short run these demand estimates affect production scheduling within the firm and then such areas as marketing and advertising strategies. To a lesser extent decisions on plant expansion or other investment within the firm might be influenced by farm income.

Among banking and financing firms, farm income data in a more general way affect the firms' estimates of the repayment ability of farmers and thus affect decisions on the allocation of funds between agricultural loans and other loans. Banks with a high percentage of farm loans might also use the data to obtain an indication of future loan volume. Trends in farm income also seem to be correlated to some extent with farm land values which also enter into financing decisions on farm mortgages. Investments by banks are also affected by farm income data.

First, the farm income projections give some idea as to the profitability of investments in farm input firms. Second, the effects of aggregate economic statistics on bond markets makes farm income data important in that these are a component of these other aggregates.

4.5 SUMMARY

The farm income information system has four major components. First, the primary data subsystem is composed of those public and private data gathering activities which provide the price and quantity data used to estimate the various farm income data series. Second, the formatting and communication subsystem uses a set of accounting rules and economic relationships to create income statistics from the primary data which then can be passed on to analysts and decision makers. Third, the analysis subsystem is comprised of the public and private organizations and firms which transform the farm income data into information for the ultimate users. Finally, the decision making subsystem includes the decision makers and decisions that rely on farm income information. Public policy uses dominate in this subsystem but significant private decisions on the demand for farm inputs and the credit needs of farmers also are apparent. However, any discussion of the importance or value of farm income information should be tempered by the survey findings which indicate a high level of nonuse of the existing data by those who receive it. Possible explanations for this nonuse and its implications will be the subject of a major portion of the subsequent chapters.

CHAPTER 5

EVALUATION OF THE SYSTEM AND IMPLICATIONS

5.1 INTRODUCTION

Information systems, as part of social systems, tend to be characterized by problems which are ill-structured. The farm income information system is not an exception. A basic dilemma in dealing with any ill-structured problem is the imperfect knowledge which characterizes the problem itself. So solving the problems of the system are precluded by the absence of knowledge about the exact nature of the problems. Out of necessity, a major portion of the time and effort in evaluating the farm income data system will be spent in trying to define the nature of problems in the system.

In this way, the subject of this research differs from earlier studies in that by examining the nature of problems, rather than assuming a set of problems or purposes, it is possible to establish priorities for data improvements to meet the needs of decision makers. This chapter will concentrate on defining the nature of the problems in the farm income information system in order to obtain insights into the appropriate redesign of the system and will be divided into seven sections. First, the question of priorities among users is addressed. This is followed by sections on the problems associated with conceptual obsolescence, credibility, national income accounting, and the feasibility of changing the system. Finally, an assessment of the usefulness

of the methodology used in evaluating this system is presented.

5.2 DESIGN FOR WHOM

The importance of farm income data in public policy uses as noted by the number of those surveyed who cited this as a primary use points to the role of government in supplying data on farm income. As was noted earlier, data collection and analysis for public policy uses is by definition an appropriate government activity. Since there are also some private sector uses of the farm income data, questions arise concerning the tradeoffs between designing the system to meet public versus private sector needs.

In atomistic markets the social returns to improved data for private use often appear to justify assigning a high priority to private sector needs in designing an information system. Much of the production data and some of the price data supplied by USDA seem to have taken into account the private sector needs in designing these data systems. The fact that farmers are perceived to be the main beneficiaries and users of these data would also attest to the appropriateness of designing production and price data for private users since the market structure in agriculture would probably prevent farmers from organizing to supply the data themselves.

For farm income data, the survey results seem to pinpoint a different set of private sector users distinct from actual farmers or ranchers. Farm input suppliers are a principal private sector user of farm income data rather than the farmers themselves. This has important implications for the design of a farm income data system. The market structure among the major farm input supply industries is quite

different from the market structure of farming itself.

Of the 23 firms that were identified by the mail survey as farm input suppliers, almost 57 percent were manufacturers or suppliers of farm machinery and equipment. In a USDA report on the structure of the farm input industries, Strickler noted that seven firms were responsible for almost two-thirds of all sales of farm machinery. The fertilizer and pesticide industries accounted for about 30 percent of the respondents. These industries seem to be best considered together since the majority of the farm input firms reporting use of farm income data in the pesticide industry were also in the fertilizer manufacturing industry. This finding is consistent with the findings of Duane A. Paul, et. al. (p. 13), who reported that 76 percent of the anhydrous ammonia producers or their parent firms produce chemicals and allied products in addition to fertilizer. The diversity in the fertilizer industry prevents one from estimating exact levels of concentration in this industry. However, Paul, et. al., did summarize their findings by suggesting that the fertilizer industry is relatively concentrated and this concentration is increasing due to horizontal and vertical integration and certain barriers to entry. Both of the cited studies taken together would seem to indicate that overall, the farm input manufacturing industries which use farm income data are relatively concentrated.

Given the theoretical relationships between market structure and government provision of information developed in Chapter 2, the appropriate recommendation concerning the design of a farm income system would be to emphasize the needs of public policy decision makers relative to those private sector decision makers in the farm input

industries. Excluding the communication function performed by educational institutions, their main use of farm income data was also in the area of public policy research. Thus, the needs of academic users of farm income data would seem to coincide generally with government and other public policy users.

The other major private sector users of the farm income data were in the banking and financing industry. Of the 22 firms or organizations in this industry which reported using farm income data, 41 percent were institutions under the direction of the Farm Credit Administration. Thus, insofar as government credit policies toward agriculture are carried out through this agency the usefulness of the data in banking and financing industries is related to the usability of the data in public policy making in general. Based on the mail survey, local banks make up less than 30 percent of the users of farm income data in this industry, while large money center banks and investment firms account for nearly 25 percent of this category.

All in all it would seem that the highest priority for the redesign of the farm income information system should be given to meeting the needs of public policy users of this data with private sector users receiving somewhat lower priority. This is not as important a distinction as it appears since many of the data needs of public policy makers were echoed by the private sector users of the data. These areas of overlap will be brought out, where appropriate in the following sections of this chapter.

In order to approximate an intensity of use of farm income data, a question was asked on the mail questionnaire to assess the re-

spondent's willingness to pay for USDA provided farm income data.[1/] The results from this question can only be used to make comparisons between the private sector users of the data since a substantial portion of the government users were unable to place a value on the farm income data or felt that because of their association with the government that it was inappropriate for them to pay for the data. Table 5-1 summarizes the results of this question categorized by user group.

Based on willingness to pay for farm income data, the farm input supply users seem to be more intense users of the data than the banking and financing users. The proportion of banking and financing users that are willing to pay nothing for the data is significantly greater at the 10 percent level than the proportion of farm input suppliers who would pay nothing. At the same time the proportion of the farm input suppliers willing to pay more than $75 per year for the data was significantly greater at the 5 percent level than that proportion willing to pay the same in the banking and financing user group. A possible conclusion from this is that among private sector users farm input suppliers should be given a higher priority since their demand for the data as measured by willingness to pay might be greater.

These results do not hold when a comparison of the primary uses of data are made with the willingness of the user to pay for the data. Table 5-2 shows these results of this crosstabulation. The same limitations mentioned earlier also hold in this case. However, when comparing the willingness to pay between those who use the data to estimate

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1/ See Question 3 Appendix A.

TABLE 5-1 WILLINGNESS TO PAY FOR FARM INCOME DATA BY USER

Willingness to Pay \ User	Educational Institution	Federal Government	Farm Input Supply	Banking Financing	Private Consultant	News Media	State or Local Government	Miscel-laneous	Row Total	
Zero	19	5	3	7	6	3	0	15	58	Absolute Frequency
	32.7	8.6	5.2	12.1	10.3	5.6	0	25.9	100.0	Row Percent
	45.2	20.0	14.3	33.3	40.0	27.3	0	41.7	32.4	Column Percent
Less Than $75	18	4	7	8	5	3	2	12	59	Absolute Frequency
	30.5	6.8	11.9	13.6	8.5	5.1	3.4	20.3	100.0	Row Percent
	42.9	16.0	33.3	38.1	33.3	27.3	25.0	33.3	33.3	Column Percent
Greater Than $75	1	1	7	2	0	1	2	3	17	Absolute Frequency
	5.9	5.9	41.2	11.8	0	5.9	11.8	17.6	100.0	Row Percent
	2.4	4.0	33.3	9.5	0	9.1	25.0	8.3	9.5	Column Percent
Unable to Place a Value on Data	4	15	4	4	4	4	4	6	45	Absolute Frequency
	8.9	33.3	8.9	8.9	8.9	8.9	8.9	13.3	100.0	Row Percent
	9.5	60.0	19.0	19.0	26.7	36.4	50.0	16.7	25.1	Column Percent
Column Total	42	25	21	21	15	11	8	36	179	Absolute Frequency
	23.5	14.0	11.7	11.7	8.4	6.1	4.5	20.1	100.0	Row Percent
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	Column Percent
Do Not Use Farm Income Data	11	8	0	3	5	2	5	31	65	
No Answer	12	5	2	1	0	1	4	1	26	

TABLE 5-2 WILLINGNESS TO PAY FOR FARM INCOME DATA BY PRIMARY USE

Willingness to Pay \ Primary Use	General Information	Pass on to Others	Public Policy	Demand Estimation	Financing and Credit	Land Valuation	Miscel-laneous	Row Total	
Zero	17	10	10	6	2	4	5	54	Absolute Frequency
	31.4	18.5	18.5	11.1	3.7	7.4	9.3	100.0	Row Percent
	50.0	33.3	24.4	18.2	18.2	40.0	35.7	30.9	Column Percent
Less than $75	8	15	11	8	6	5	6	59	Absolute Frequency
	13.6	25.4	18.6	13.6	10.2	8.5	10.2	100.0	Row Percent
	23.5	50.0	26.8	24.2	54.5	50.0	42.9	33.7	Column Percent
Greater than $75	2	0	5	8	2	0	0	17	Absolute Frequency
	11.8	0	29.4	47.1	11.8	0	0	100.0	Row Percent
	5.9	0	12.2	24.2	18.2	0	0	9.7	Column Percent
Unable to Place a Value on Data	7	5	15	11	3	1	3	45	Absolute Frequency
	15.6	11.1	33.3	24.4	6.7	2.2	6.7	100.0	Row Percent
	20.6	16.7	36.6	33.3	27.3	10.0	21.4	25.7	Column Percent
Column Total	34	30	41	33	13	10	14	175	Absolute Frequency
	19.4	17.1	23.4	18.9	7.4	5.7	8.0	100.0	Row Percent
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	Column Percent
No Answer	7	10	9	2	0	0	2	30	

demand and those who use it in making credit decisions these uses do not seem to be significantly different. As one might expect, the demand for the data between those that use the data for general information or pass it on to others seems to be less than those who use it for demand estimation or credit decisions; comparing both the proportions of those willing to pay zero and those willing to pay more than $75 between these two groups shows the above relationship to be significant at the 1 percent level.

Even with the apparent difficulty that public policy users had in placing a value on government provided data, a comparison of those who use data for general information or pass it on to others with the public policy users suggests that these latter users have a somewhat higher demand for the data. Comparing the combined proportion of those in the general information category and those who provide a communication function with the proportion of public policy users the former group has a significantly greater proportion at the 5 percent level who are willing to pay zero for the data and the latter group has a significantly greater proportion at the 5 percent level willing to pay more than $75 per year for the data. As expected, at least when comparing the major uses of the data in terms of number of users, those who use the data in specific types of decisions seem to have a higher demand for the data when measured by willingness to pay than those who use it for general information or pass it along to others. Thus, if the demand for data by specific users can be utilized to establish priorities in information system design, then those who make a specific use of the data should presumably be given a higher priority than the more general or nonspecific users of the data.

Among public policy uses this willingness to pay criteria for determining the level of demand for data offers an interesting relationship among state government users. Of the three users in this category reporting a use of farm income data in tax and revenue planning, two were willing to pay over $500 per year for the data and one did not answer the question. While this is a relatively small sample it does appear suggestive of the importance of this use relative to some others in the system.

5.3 CONCEPTUAL OBSOLESCENCE

Conceptual obsolescence is a problem with many operating information systems, the farm income information system is not an exception. Understanding the nature of this problem of conceptual obsolescence is critical for making improvements in the farm income information system. Conceptual obsolescence can be of two types. First, a data concept is obsolete when it fails to represent adequately the reality of the situation for which it is designed. A data concept is also obsolete when it fails to meet the needs of decision makers as the issues facing the decision makers change. Hence, data concepts can become obsolete when either reality changes (actually our perceptions of reality) or when the agenda facing decision makers changes.

These two types of conceptual obsolescence are both evident in the farm income information system. This section will identify the root causes of this problem and will also attempt to assess the severity of this difficulty as it relates to the functioning of the information system.

5.3.1 POLICY AGENDA CHANGES

Many of the agricultural policy decision makers interviewed stated that aggregate farm income was "meaningless." However, in most of these cases, it appeared that "meaningless" was more of a code word for "not usable in the type of decisions that I make." This arises for a number of reasons, predominant among these is the fact that most of the decisions which concern policy makers are in reality equity issues. Aggregate farm income data are not very useful in addressing distributional issues. As one Congressional aide argued, aggregate data are not that useful because it is difficult to tell which farmers you are discussing and hence the use of aggregate data could tend to distort the policy. For instance, it might be true that farm income is adequate for cotton producers but not for corn producers. The amount of consensus on this issue was almost unanimous. Given the more parochial views often found in Congress, one might expect a certain desire by them for data that provide clear ties to an identifiable group of farmers. However, this concern for better distributional data was expressed with nearly the same force by decision makers in the Executive Branch and among the leaders of various interest groups. Even the limited number of private decision makers interviewed listed better distributional data as an important data need. For instance, banking firms found commodity oriented data very critical since this tended to give the best indication of the repayment ability of certain types of farmers. Input suppliers noted the importance of distributions of income or receipts by size of farm and commodity.

Perhaps the most important reason for the need for better distributional and disaggregated data occurs because of the types of

questions raised in agricultural policy. The interview process suggested that there exists an overriding ethic of farm politics, that being the responsibility of the U.S. government to maintain farm income. As was mentioned earlier, when the aggregate farm income accounting system was originally designed in the 1920s, the data were used to point out the need for and to support the role of government intervention in agriculture because of the plight of farmers relative to other sectors. Rarely is the question posed at the present time as to why government should maintain farm income. Only the question of how is raised. Thus, the need for aggregate sector level performance measures, like farm income, are not needed to justify farm programs.

The fact that the data is not used to justify farm programs has important implications concerning the recommendations of the earlier task forces on farm income. These earlier studies stressed the need for comparability among different sectors of the economy. The 1972 Task Force even listed comparability across sectors as one of the principal purposes of a farm income accounting system. According to decision makers interviewed, comparability between sectors is not as important a consideration as comparability between groups within the farm sector. Since there is very little debate on the justification of farm programs in general, only the costs of programs receive serious debate, comparisons between the farming and other sectors are not as important to current decision makers. Instead the distribution of costs and benefits within the sector become the important decision criteria. This gives rise to an inordinate amount of interest for data by size and type of farm. Since the agricultural legislation is written on a commodity by commodity basis, commodity specific data such as

relative profitability or returns to resources by commodity were often suggested as gaps in the current data.

Comparability between sectors is one of the principal arguments in favor of national income accounting formats, however, the ability to make comparisons among sectors is not limited to the case where the national income accounts data format exists. For most types of analysis the need to have a greater ability to combine microdata files from different sectors is more critical. For instance, the importance of the inflation issue in economic policy implies that price data from different sectors need to be comparable in order to obtain information on aggregate inflation and determine the impact of price increases in one sector on the remainder of the economy. The growing internal interdependence of economic sectors of the U.S. economy, indeed of the world economy, generates greater need for intersectoral comparability of data.

A more serious problem suggested by this type of conceptual obsolescence has been pointed out in the interview process. The current farm income data are really misleading in that they do not account for many distributional aspects of the situation. Since the farm income data do not take into account these distributional issues, many problems brought on by skewed income distribution, such as concentration of land ownership, are not identified and dealt with in the farm legislation. The picture of the agricultural sector held by most non-agriculturists active in the decision process is shaped by how the statistical system is set up. Since the distribution aspects are neglected in the farm income data system, many data users do not obtain the true picture of the sector and hence important policy areas are overlooked.

Even those distributional aspects currently reported by USDA, i.e., distribution by value of sales class, are relegated to the back pages of the annual summary.

The statistics themselves may also lead to a policy which implicitly assumes away distributional issues. A few decision makers suggested that the reliance on aggregate data may lead to a policy which assumes homogeneity between different farms. One noted that it is rare that the difference between the livestock and crop subsectors are dealt with in current policies. For instance, the loan rate for corn might not be considered in conjunction with its effects on livestock production and the income of livestock producers. Another decision maker in the executive branch argued that the effects of homogeneous data and a policy which assumes homogeneous farms are most likely reinforcing. So changes in the data will most likely be met by changes in policy and vice versa.

When the early farm income data system was designed in the mid 1920s there was little call for distributional data. The farming sector was relatively homogeneous and the major farm programs similar to current programs were not implemented until the 1930s. Perhaps the nature of those who designed the original system might explain some of the difficulties now encountered. The farm income information system was designed by economists and agricultural economists who by virtue of their training tend to deal with questions of efficiency. So the system appears to have been designed more readily to answer efficiency questions. Whether this was an explicit consideration is unknown, but treating the U.S. farming sector as if it were a single national family farm would certainly seem to make more traditional types of microeconomic

analysis easier to perform on the aggregate level. The conceptual obsolescence problem emerges because of the nature of the political decision process. If one accepts that the value of information is discovered only in a decision making context and that farm income information should be used in public policy decision making, then data on the distribution of income are essential because the policy questions which face public decision makers today revolve around equity issues. Thus, while economists are often trained to deal primarily with issues of allocative efficiency, many political issues involve equity considerations. Problem solving decision making in this area requires information on both equity and efficiency, to concentrate information production in only one of these area will yield inadequate solutions to policy problems.

After recognizing the need for better distributional data on farm income, consideration must be given to what types of distributions are most useful. From the interviews it became apparent that data distributed by commodities or type of farm were important because of the nature of agricultural legislation, which supports income through price programs for specific commodities. The responses to the mail questionnaire seem to bear this out also.

Table 5-3 presents the results to a question in the mail survey which attempted to assess the priorities among different criteria for designing a farm income information system. While the technique used in asking this question produces an ordinal scale variable, mean scores are calculated to provide a summary measure for each design question. The calculation of means is not a statistically correct procedure for ordinal variables, but is used for more conciseness in the presentation

of the results. Some comparisons between the means are made and the nonparametric Mann-Whitney U test (Clark and Schkade, p. 390) is used to estimate the statistical significance of these differences. However, this makes the implicit assumption that these scales are the same for all questions for each respondent. Consequently, these comparisons must not be considered as analytically precise but rather as a general indication of the results.

In comparing the mean scores of different criterion concerning distributional data it is apparent that income distributed by commodity is given a higher priority than income distributed by state or region. Using the Mann-Whitney U test to compare these mean scores, commodity or type of farm income data was given a significantly higher priority by respondents at the 5 percent level. Furthermore, each of these types of distributional data was accorded a significantly higher priority by respondents at the 1 percent level when compared to data on the distribution of income among individuals in the farming sector.

Congressional policy makers' interview responses perhaps gave one reason for the lower priority given to data on the distribution of income among individuals. The role of group interests in the American political process is well documented. Congress tends to respond to readily identifiable groups, among those suggested were by commodity, by geographical region, or by size of farm. It is not surprising that the distribution of income among individuals received less enthusiastic support, since members of income groups are not usually a politically distinct group. Also, the movement of farmers among income groups is much more likely than movement of farmers from one geographical region to another or among different types of farms. Hence, these latter two

groups are more easily identified as a political group.

In summary, the policy agenda in agriculture has shifted to include many equity issues which are not easily addressed with current data. This implies that the current data concepts are inadequate or obsolete. Among the types of distributional data that currently appear most important are the income differences among commodities or enterprises and disaggregations by states and regions and by size of farm.

5.3.2. CHANGES IN REALITY

Most decision makers also admitted that the aggregate farm income concept was not an adequate representation of reality because it implicitly assumes a homogeneous single national farm, i.e., current farm income accounting does not paint a true picture of agriculture. Thus, the type of conceptual obsolescence brought on by changes in reality is also evident in the system. The two earlier Task Force Reports stressed this type of conceptual obsolescence when discussing problems in the existing system. However, the examination of how farm income data are used suggests that this type of conceptual obsolescence may not be as critical a problem when compared with the type alluded to in the previous section. The way the data are used, in an ex poste justification of policies or in speechmaking, connotes a use of aggregate farm income as more of an economic or social indicator rather than as an explicit representation of the reality of the sector. There seems to be a distinction between an economic or social indicator and a more microeconomic statistic, such as a price, that is designed to represent reality. While an indicator does have to be tied in general to reality, ostensibly a more important consideration would be whether or not it

gave good indications of changes in the performance of the sector rather than measure the state of the sector at any one point in time. In practical application this would imply that an indicator should measure more closely changes in a variable from one period to the next instead of the absolute level of that variable. The sensitivity of the measure to changes in the sector or to policies which affect the sector would also seem to be an important aspect for designing an indicator.

Almost without fail those who were interviewed stated that the change in aggregate farm income from one period to the next is more important than the absolute level of farm income at any point in time. Those who were concerned about the level of farm income tended to express this concern in reference to some historical level. Analysis of the mail survey results on the appropriate criteria for designing an aggregate farm income accounting system yields findings which support this concern for changes in income over the level of income. Questions 12 and 13 in Table 5-3 were included to test the hypothesis that the measurement of changes in aggregate farm income should be given higher priority over the measurement of absolute levels of income. A comparison of the mean scores of these design criteria using a Mann-Whitney U test found that respondents placed a significantly higher priority at the 10 percent level on designing the system to estimate changes in farm income rather than the absolute level.

The importance of sensitivity in an indicator is also suggested by the interview findings. Many noted that aggregate net farm income was not sensitive to changes in policy variables affecting the sector. However, many individuals further stated that cash receipts data often provided a reasonable but not totally acceptable substitute when data

TABLE 5-3 MEAN PRIORITIES ASSIGNED TO DESIGN CRITERIA

Actual Question:*

A national aggregate farm income accounting system can be designed to answer many different types of questions. However, resource constraints require that some priority be given to certain questions over others. Rate the importance of the questions listed below on a scale of 1 to 5 (where 1 is highest priority and 5 is lowest).

	Questions To Be Addressed By System	Mean Score
1.	How do the returns in agriculture compare with other industries?	2.546
2.	What is the income of farm businesses?	2.333
3.	What is the income of farm families?	2.578
4.	What is the size of the farming sector in monetary terms?	2.639
5.	What is the economic well being of farm families?	2.602
6.	What is the distribution of income among individuals within the farming sector?	2.989
7.	What is the productivity of the farming sector?	2.208
8.	What are the returns to the resources committed to agriculture?	2.231
9.	What are the income differences by type of farm or commodity?	2.279
10.	What are the farm income differences between regions and/or states?	2.543
11.	What are the major economic features of the farming sector?	2.694
12.	How much has the level of farm income changed from previous time periods?	2.380
13.	What is the level of aggregate farm income?	3.260
14.	How is the farm business related to the farm family?	3.260
15.	How are income and assets related in the farming sector?	2.648
16.	What is the aggregate income of farms accounted for on an accrual basis?	3.214
17.	What is the aggregate income of farms accounted for on a cash basis?	3.005
18.	What is the nonfarm or off-farm income of farm families?	2.962

*See Appendix A for actual mail questionnaire

sensitive to changes in the sector were needed. Many individuals attributed the lack of sensitivity of the net farm income figures to the way the data are estimated, especially production expenses. The reliance on census benchmarks make this portion of the data less sensitive to quarterly and yearly changes in variables affecting the sector. Cash receipts data, on the other hand, are relatively responsive to changes within sector and often these changes can be detected monthly. Thus, while the sensitivity of the net income data may not be as high as desired, the availability of data in the form of cash receipts that are responsive tends to alleviate some of the difficulty. However, a possible implication of this is that the data on production expenses need to be more responsive to short run changes in the sector. So production expense data collected at more frequent intervals, perhaps with less detail, might provide improvements in the sensitivity of the net farm income to intrasectorial changes.

The use of aggregate farm income data as more of an economic indicator is also borne out by the way decision makers appear to form norms with regard to aggregate farm income. Most seem to develop a notion of the economic health of the sector on the basis of information from constituents or others concerned with agriculture. After obtaining a subjective impression of well being, they turn to the measure of aggregate farm income to get a quantified indication of sector welfare that can be easily used in speechmaking or to give a quantified justification for a particular policy alternative.

A quite different method can also be hypothesized for formulating norms about farm income. In this case a person would simply quantify an adequate level of farm income for an individual farm and then

aggregate it up to a national level to get a standard measure of income adequacy for the welfare of the sector. In this example it would seem more useful to have a measure of farm income that is more clearly related to reality. This latter type of norm does not seem to exist to any great extent for farm income. The relatively low mean score in Table 5-3 for the design question, "What are the major economic features of the farming sector?" would also seem to suggest that concern for data which showed a one to one relationship with reality might not be as important as some other concerns.

One area where the current data may be inadequate even as indicator is in the area of productivity measurement. The mean score for the design criterion concerning productivity measurement showed this receiving the highest priority among all others. The current data system often does not provide data which are relevant to productivity measurement because of the focus of the current system on cash receipts rather than value of production in measuring gross income. The large number of intermediate products produced on the same farm where used causes most of the discrepancy between gross receipts and value of production. To avoid counting increases in marketings as increases in production, a measure of value of production might be needed. The high priority accorded this area from the mail questionnaire is somewhat surprising since this concern over productivity measurement was not expressed to any great extent in the personal interviews.

When asked whether the farm income accounting system should be concerned with measuring the income of farm families or the income of farm businesses, the respondents to the mail questionnaire seem to be more concerned with the income of farm businesses. A comparison of

mean scores between criterion 2 and 3 in Table 5-3 shows that the individuals surveyed tend to give a higher priority to the income of farm businesses. This difference is significant at the 5 percent level. The fact that the measurement of nonfarm income of farm families was assigned a relatively low priority by most respondents would also seem to confirm this interest in farm businesses. Those interviewed expressed similar concerns. It also suggests that the concept of a national family farm might not be an adequate measure of reality and hence a problem of conceptual obsolescence could exist. But insofar as the current concept mixes both concepts of the farm business and family at least some information about farm businesses can be ascertained. A further implication concerns the appropriate level of detail in the current system, it might be important to insure that these farm business and family aspects can be separated out. For instance, it might be useful to provide estimates of net nonmoney income of farm operators rather than gross nonmoney income as is now presented.

All in all it appears that the type of conceptual obsolescence brought on by changes in the reality of the food and fiber industry as compared to changes in the policy agenda might not be as serious in the case of farm income because of the predominant use of farm income data as an indicator. The obvious implication is that those aspects of changing reality which affect the data's usefulness as an indicator should be given a higher priority in making improvements in the system. In many ways it is not possible to completely separate these two types of conceptual obsolescence. Changes in the structure of agriculture toward increased specialization and heterogeneity of farms has made the question of equity within agriculture more of an issue. Hence, the

policy agenda has changed because the reality of the sector has changed.

5.4 CREDIBILITY

A second area of problems in the current farm income information system concerns the issue of credibility of the U.S. Department of Agriculture. A decision maker cannot know the exact value of any information until it is received and used. So the principal way to judge the value of information, before receiving it, is by the previous reliability of the data source. One important means of assessing data accuracy or reliability is by evaluating the methodology used in collecting the data. Statistical sampling theory can be used to assess the accuracy of certain types of data. However, in cases where there is little documentation or understanding of data estimation procedures to which the producing agency is committed then the reliability of the source remains a critical variable in predicting the value of the data.

5.4.1 RELIABILITY OF USDA DATA

There seems to be a basic credibility problem in the farm income information system. The methodology used to estimate the data on farm income is very complex and not particularly well documented or publicized. Even when the methodology is modified, very little notice is given to the users of the data. This does little to foster the credibility of the data. Of the 203 individuals who responded to the mail questionnaire only 19 percent were familiar enough with the methodology used to estimate farm income to cite some of the basic procedures used in making the estimates. Thus, the main option left for an individual is to estimate the reliability of the data by considering the previous

accuracy of USDA farm income estimates.

Normally, one would estimate the reliability of data after it is received by collecting new data and comparing this sample to the original data. For aggregate farm income data this is not an economically feasible alternative. So a principal way in which the reliability of USDA farm income data is determined by a user is through examining the number and size of revisions the data undergo after the first estimates are published. In the early 1970s the number and size of the revisions of the farm income estimates increased (Hildreth, et. al.). This appears to have undermined the credibility of these data. The emphasis which the USDA has historically placed on aggregate farm income as the primary indicator of well being for the farm sector has made the credibility problem even worse. With this in mind it is interesting to conjecture as to what course agricultural policy would have taken in recent years had the U.S. Department of Agriculture chosen in the past to place a much greater emphasis on data regarding the increase in the value of assets in agriculture as taken from the Balance Sheet of Agriculture rather than farm income.

Strangely enough, this credibility problem does not seem to have been manifested by a lack of use of historical data, although this might be a partial explanation for the apparent lack of use of the farm income data among those receiving it in the statistical bulletin, Farm Income Statistics. Most individuals interviewed noted that they still relied on USDA historical estimates of farm income, though some suggested that their uses were much less critical than earlier and that the frequency of revisions caused the data to be disregarded as a key input in econometric models. But for the most part USDA historical

estimates of farm income are not seriously affected by this credibility problem because no other historical estimates of aggregate farm income exists. So users consider these to be the best estimates available, since the accuracy of the data cannot be tested without incurring the cost of collecting the data again. A second reason that the use of historical data is not affected by revisions is that timeliness is a key variable in the decision process. Most historical data arrives too late to have any impact in and of itself on decisions about future courses of action. So even historical data with very few revisions are not used extensively in decision making.

The revisions of farm income data seem to influence the credibility of the Department of Agriculture's analysis rather than data collection. While there is only one source of historical data on farm income there are numerous sources of forecasts in the private sector. Congressional decision makers cited this lack of trust in USDA forecasts as a major reason for the choice by the Congressional Agricultural and Budget Committees to subscribe to the agricultural models of Data Resources Inc. and Chase Econometric Associates. Another Congressional staffer noted that around Capitol Hill the USDA is believed to have the facts, i.e., their historical published data is accepted as fact. But he then went on to add that this is not so with their analysis and other information. When the USDA might have a stake in defeating a bill their analysis is much more suspect, so Congress relies on its own or private analysis. One area cited was in the forecasts of farm income. USDA normally makes and publishes forecasts for aggregate farm income for only a few quarters in advance. Forecasts which are not widely published by USDA are generally viewed with more

suspicion by the users in Congress. In analyzing a farm bill which is designed to operate for four or five years, the forecasts done by USDA beyond one year in advance are not likely to be given as much credence since these forecasts are not widely published, instead private sources seem to be relied on heavily.

It is also interesting to note that the private consultants do not stop using the historical estimates of farm income because of the frequent revisions. These historical data must be regarded as fact because without them the private consultants would have no benchmark from which to make forecasts. Without some standard of truth there is no way to judge the accuracy of the forecasts. In the case of aggregate farm income the USDA historical estimates are accepted as this standard of truth.

The apparent finding that this credibility problem affects the forecasts and outlook work of USDA but not the historical estimates is something of an anomaly since good historical data are usually necessary to make forecasts. Insofar as revisions in historical data affect forecasts of farm income, revisions do affect future policy. The repeated revisions of the estimates also raise doubts as to the reliability of the USDA farm income forecasts, so these forecasts are more heavily discounted in making decisions. This credibility problem extends beyond the Congress. Members of the Executive Branch outside of USDA expressed similar concerns as did some private data users.

5.4.2. ACCURACY

The mail survey attempted to obtain some estimates of the data users' perceptions of the accuracy of the farm income data. Beforehand

it was hypothesized that the data users might attribute more accuracy to the data than was possible to obtain, given the current methods of estimation. The current methods calculate net farm income as a residual. This method of operationalizing the concept of farm income creates difficulties in making accurate estimates of net farm income. A simplified example perhaps will best illustrate this problem. Assume that net income is only the difference between cash receipts and production expenses. Between 1973 and 1976 cash receipts averaged about 90 billion dollars, while production expenses averaged about 75 billion, so net farm income in this simple case would be about 15 billion. An optimistic but not unreasonable assumption might be that cash receipts and production expenses could be estimated to within 3 percent of the true value. Assuming the estimates above are the "true" figures, cash receipts could be estimated to be 92.7 billion and production expenses as 72.75 billion and still be within 3 percent of the true figures. But in this case net farm income would be almost 20 billion dollars. So while maintaining a 3 percent level of accuracy in cash receipts and production expenses, the accuracy of net income is only within 33 percent, assuming that the errors in estimating the two components are independent. Even assuming a one percent error in the components could lead to an 11 percent error in the estimate of net income in the above example. Thus, it would not seem at all unjustified to conjecture that the USDA net farm income estimates are within 20-30 percent of the "true" figure for net farm income.

The results in Table 5-4 show the mail survey respondents' perceptions of the accuracy of the annual realized net farm income estimates published by USDA. Of those who were able to assess a level

of accuracy over 75 percent felt that the data was almost always within 0 to 10 percent of the true value. The type of use or user did not seem to affect these perceptions of accuracy. Perhaps those who use the data have a somewhat unreasonable expectation with regard to the accuracy of the farm income data. This might also explain the apparent negative reactions to large revisions in the data, in that the magnitude of the revision might cause the estimate of farm income to be outside the limits of error that the users typically incorporate into their plans.

TABLE 5-4 USER PERCEPTIONS OF ACCURACY OF ANNUAL REALIZED NET FARM INCOME

Users Perceived Level of Accuracy	Absolute Frequency	Relative Frequency (Percent)	Adjusted Relative Frequency (Percent)
0-5 Percent	27	10.0	21.6
6-10 Percent	69	25.6	55.2
11-20 Percent	23	8.5	18.4
21-30 Percent	3	1.1	2.4
Greater than 30 Percent	3	1.1	2.4
Subtotal	125	46.3	100.0
Don't know	55	20.4	
No Answer	25	9.3	
Do Not Use--No Answer	65	24.1	
Total	270	100.0	

It does appear that the perceptions of accuracy are based at least in part on the magnitude of past revisions in the farm income data. This was frequently cited as the basis for making a judgement on accuracy, although most individuals did not give a reason for their estimate of inaccuracy. The perceptions of accuracy do seem to be in line with revisions of the data in the recent past. Table 5-5 shows the absolute and relative magnitudes of recent revisions in the farm income data. It shows that the average revisions of the annual realized net farm income data average about 9 percent. This seems to be quite close to the average perception of the accuracy noted in the mail survey.

5.4.3 OTHER ASPECTS OF CREDIBILITY

While not a major factor in the apparent credibility problem of USDA, the fact that multiple sources of data are published by USDA for measuring similar phenomena adds to this problem. Most often noted in the interviews were the two sources of data for production expenses in farming. Farm production expenditures are produced by the Statistics Branch of ESCS and are based on a survey of farmers. These data are indirectly used as a source of the expense accounts but are not perfect substitutes. A few public decision makers noted that the presence of multiple data sources from the same department tended to confuse some issues and further reduced the credibility of USDA in doing analysis.

The fact that the Department of Commerce also publishes farm income estimates does not seem to pose any major difficulties. Most agricultural decision makers rely on the USDA estimates and do not use those published by the Bureau of Economic Analysis. Also, most users

TABLE 5-5 REVISIONS AND ACCURACY OF RECENT USDA FARM INCOME ESTIMATES

Year and Component	Preliminary Estimate* (Billion $1)	Most Recent Estimate** (Billion $1)	Absolute Difference	Absolute Percentage Difference
1973				
Cash Receipts from Farming	83.4	87.1	3.7	4.4
Production Expenses	64.4	65.6	1.2	1.9
Farmers' Realized Net Income	26.1	29.9	3.8	14.6
Value of Inventory Change	0.8	3.4	2.6	325.0
Farmers' Total Net Income	26.9	33.3	6.4	23.8
1974				
Cash Receipts from Farming	95.0	92.4	2.6	2.8
Production Expenses	74.8	72.2	2.6	3.6
Farmers' Realized Net Income	27.2	27.7	0.5	1.8
Value of Inventory Change	2.4	-1.6	4.0	166.7
Farmers' Total Net Income	29.6	26.1	3.5	13.4
1975				
Cash Receipts from Farming	90.6	88.1	2.5	2.8
Production Expenses	75.5	75.9	0.4	0.5
Farmers' Realized Net Income	23.7	20.8	2.9	13.9
Value of Inventory Change	2.3	3.5	1.2	52.1
Farmers' Total Net Income	26.0	24.3	1.7	7.0
1976				
Cash Receipts from Farming	94.8	94.3	0.5	0.5
Production Expenses	80.9	81.7	0.8	1.0
Farmers' Realized Net Income	23.3	21.9	1.4	6.4
Value of Inventory Change	-1.3	-1.9	0.6	46.0
Farmers' Total Net Income	22.0	20.0	2.0	10.0

* Source: Farm Income Situation, USDA-ERS, FIS-223, February 1974, FIS-225, February 1975: Agricultural Outlook, USDA, April 1976, March 1977.

** Source: Farm Income Statistics, USDA Statistical Bulletin No. 547, July 1977.

are aware that the BEA estimates of farm income are basically the same as the USDA estimates from which they are derived.

Farm income data tend to be politically sensitive in that it is somewhat institutionalized in the policy making process. Since these data are often used by politicians to justify a certain policy stance and because they are the main measure of sector wide performance emphasized by USDA, farm income data maintain a certain amount of political sensitivity. This sensitivity will probably remain as long as farm policy and the farm population are politically important. Thus, farm income data are politically sensitive because they give an appearance of objectivity to this political concern for the well being of farmers and the data are accepted as a valid measure by those in the system.

Revisions in the data are politically sensitive also. These revisions can embarass a politician, who may have used the data to justify a position, by causing a certain policy position to appear wrong simply because revisions caused the data no longer to support that position. The types of positions taken using farm income usually make downward revisions in the data more politically sensitive than revisions which increase aggregate farm income. If farm income data are used to justify a particular level of price supports for farmers and then revisions show income actually to be lower, then farm constituents are likely to be clamoring for more assistance. Revisions in the opposite direction tend not to have similar effects because strong anti-farm groups do not seem to exist.

However, the way farm legislation is written also makes farm income data less politically sensitive than it might be otherwise. Commodity prices tend to be more politically sensitive than farm

income. This point was made by most of those interviewed and arises because most current farm program benefits are tied to farm prices. The hypothesis that data are the most politically sensitive when tied directly to program benefits is reinforced by this phenomenon.

One final note before leaving the area of credibility. The credibility problems of USDA seem to be lessening somewhat at this time. The credibility of USDA, especially with Congress, was weakened in the past when many members of the Democratic controlled Congress used the data and analysis problems of the USDA to attack the Nixon and Ford administration. This is not as important in the Carter administration, but it does appear that a carryover effect of this lack of credibility still remains and is likely to affect the USDA for some time to come.

5.5 NATIONAL INCOME ACCOUNTING AND FARM INCOME

Many of the earlier studies of USDA farm income data stressed the importance of these data in the national income accounts. Arguments were made in the earlier Task Force Reports as to the need for farm income data that could be easily integrated into the National Income and Product Accounts. Consequently these reports stressed the need for data which were comparable between sectors and for data which closely met the needs of the Department of Commerce.

As was pointed out earlier, this need for data which are comparable among sectors does not appear to be that crucial to users, particularly in government. Guebert's analysis, cited in Chapter 3, begins to put to rest the questions concerning the reconciliation of USDA accounts with the BEA accounts on national income. Interviews

with individuals in the Department of Commerce suggest that the problems of reconciling the USDA data with the BEA concepts are blown out of proportion by some of the earlier studies. Conversations with those responsible for reconciling these accounts pointed out that the problems were more in measurement than in concept. Most of the adjustments made to the USDA data to get these to fit the BEA concept are relatively minor considering the overall magnitude of farm income. For example, they rearrange sales in some commodities because of the way USDA treats Commodity Credit Corporation loans. Another important difference is that BEA separates farm income into corporate and noncorporate shares and takes out corporate officers' salaries, this has only been about $500 million in recent years. Other minor adjustments were pointed out by Guebert. But for the most, these adjustments are no worse than the problems encountered in reconciling data from other sectors.

The measurement problem arises because of the need for quarterly data for the GNP accounts. USDA seems to consider yearly estimates as most important and hence the farm income unit in USDA has tended to concentrate on making certain that the quarterly levels of farm income come out to an accurate yearly total. BEA would prefer an accurate accounting for the quarterly change in farm income. However, it was also mentioned that no other sectors have particularly good quarterly data. The yearly data supplied by USDA was said to be of sufficient accuracy in concept and measurement for most Department of Commerce needs for nonquarterly data.

The seasonality of and time required in the production of agricultural commodities along with the uncertainty of the level of output

arising from a set of inputs makes accurate quarterly income estimates in agriculture more difficult and less meaningful than for some other sectors. Such aspects as measuring growing crops as work-in-progress are probably not feasible given the uniqueness of agriculture. Recent improvements in primary data collection especially in measuring total cash receipts for grains within a month after the sales should serve to improve the quarterly income estimates. So given the adequacy of quarterly agricultural data relative to other sectors, major improvements in the farm sector data on a quarterly basis may not justify the recommended high priority which was given these improvements by some earlier studies. Other farm income data needs for agricultural policy making seem to deserve equal or higher priority.

One of the main differences between the current farm income accounts and the national income accounts is that the latter are basically on an accrual basis and the former on a cash accounting basis. The farm income accounts do attempt to measure inventories of outputs so that the data are at least partially on an accrual basis.

The mail survey was used to assess the importance of these different accounting methods for aggregate farm income data. This should also give an indication of the usefulness to farm income users of data presented in the national income and product accounting formats. When all users were considered, it is apparent that a higher priority is given to cash accounting, as shown in Table 5-6. When the major categories of end uses are considered, a slightly different picture emerges. While those who use the data in public policy and demand estimation seem to place a higher priority on cash accounting principles in designing a farm income accounting system, the credit and financing

users seem to place a higher priority on accrual accounting. Thus, it would seem that the largest users of that data might prefer data presented in the current format over the national income and product account format, with the possible exception of banking and financing firms. This might also explain why many users of the data seem to find the realized net income data as useful or more useful than the total net income data currently published by USDA.

TABLE 5-6 PRIORITIES BETWEEN CASH AND ACCRUAL ACCOUNTING BY USES

Design Criteria	Mean Scores			
	All Users*	Public Policy Users**	Demand Estimation Users***	Credit and Financing Users***
Cash Accounting	3.005	3.116	3.000	3.333
Accrual Accounting	3.214	3.419	3.548	2.833

Scale: 1 is highest priority and 5 is lowest.

*Mean scores significantly different at 7 percent level
**Mean scores significantly different at 12 percent level
***Mean scores significantly different at 5 percent level

5.6 FARM INCOME STATISTICS IN A DEVELOPMENTAL MODE

Edgar Dunn discusses the importance of having an information system that is in a learning or developmental mode. By this is meant that the system must be capable of supplying information on changes within the areas addressed by the information system as well as adapting itself to these changes. Thus, the ability to make changes in a

data system is critical for it to remain in a developmental mode.

This raises two questions of importance for this research. First, how difficult is it to make changes in the current data system given its apparent political sensitivity? Second, what issues or changes in the sector which affect the farm income information system will become important in the future? Given the policy focus of the current farm income information system this latter question concerns the important future issues in agricultural policy.

5.6.1 POLITICAL SENSITIVITY

The political sensitivity of farm income data will make changing the data system somewhat sifficult, especially if these changes affect the definition and level of farm income. Hildreth and Worden cited many of the difficulties encountered in trying to change the definition of a farm. Some of these types of political roadblocks are bound to appear if major changes in the farm income data system are attempted. The timing of changes seems to be critical. When net farm income is at a relatively low level, as it is at the present time, any changes in the estimates of farm income are bound to be interpreted, by some, as politically motivated. If new procedures are used which raise the aggregate figure, those in favor of increased support for farmers are likely to claim that the data were changed to make farmers appear better off than their true situation. If changes reduced the level of farm income, opponents of farm programs are likely to argue that the data were changed to gain more support for farm programs. Those interviewed tended to confirm the hypothesis that changing the concepts or definitions used in the farm income data system would be

more difficult when the level of farm income was at an historically low level.

Farm income data are also a measure of performance for the current Administration's farm policy. Thus, changes in the data system are more likely to be acceptable early in the tenure of a given administration, since they are not as likely to have developed a vested interest in the data. While most of those who were asked about this consideration agreed in principle, most felt that the timing of changes with respect to the level of aggregate farm income was most important.

The fact that farm income data are not tied directly to the benefits of specific programs should make changes in the data system easier than some other types of data. This should prevent groups which are organized directly around program benefits from becoming active opponents to any suggested changes.

While some of those interviewed were somewhat pessimistic about the possibilities for making changes in the existing data system, these individuals were not necessarily in the majority. Most suggested that changes in the current system could be made if presented well and backed up with appropriate research. Some individuals suggested that the problems encountered in the attempted change of the definition of a farm were not envisioned beforehand so the appropriate analytical support was not available. Hence, the implication that changes could have been made if the analytical support were available.

5.6.2 FUTURE POLICY ISSUES

The interviews with public policy decision makers suggest that three major types of issues will be important in the future for

agricultural policy. This classification of issues will be made according to how these issues are related to farm income data needs.

First, many felt that the current farm program issues would remain important. Thus, the data needs pointed out in the previous analysis in this chapter should remain in the foreseeable future. The second area of future concern can be called structural issues in farming. These primarily deal with the areas of legal organization and control of agriculture. Included in this are problems associated with the ownership of agricultural land, vertical integration, and part-time versus commercial farming. The third set of issues might be characterized as productivity issues. Many individuals argued that world food problems and the role of the United States in producing this food would be important. A set of issues concerning energy, the environment, and land use are also really productivity issues in that these all have a primary effect on the productivity of farming.

The importance of structural issues again stresses the need for data on the distributional aspects of farm income. One of the principal concerns in this area is the relative importance of large corporations and part-time farms in agriculture. One possible way to distribute income data to help in answering these questions is suggested in the chapter on "Agricultural Statistics" in the U.S. Department of Commerce's "Framework for Planning U.S. Federal Statistics 1978-1989." This report recommends an allocation of total farm income between nonoperator landlords, production contractors, business associated farms and to primary and part-time farms. How often this type of data needs to be collected is also an issue. Structural change is not likely to occur at as rapid a rate as prices or income so Census

benchmark data might be all that is necessary for collecting appropriate data for these categories.

For the productivity issues it seems that data on total value of production might be appropriate. Currently data of crop value of production are provided by the Statistics Branch of ESCS, but data on livestock value of production is lacking in some cases. Even where there are data on value of production it rarely receives much emphasis from USDA, so the potential users of the data may not be aware of its existence. It should also be noted that in terms of accuracy, the measurement of value of production, especially for crops, is probably one of the most accurately measured of any aggregate income related figures because of the relative accuracy in measuring crop production as opposed to sales. The multiple frame surveys used in estimating crop production appear to yield more accurate estimates of production than sales because of problems in defining a transaction and in determining own account uses of crops.

5.7 ANALYSIS OF METHODOLOGY

Perhaps the greatest deficiency in using the information systems paradigm as a guide for research arises in defining the population of users and uses. In the previous chapter some of the problems encountered in defining a population of farm income data users were identified. The problem arises because of the general characteristic of information that the fixed costs of gathering the information are much higher than the costs of transmitting the information to additional users. So the identification of the population of users most likely will be a problem in the design of any study using this information system paradigm.

A priori, it was hypothesized that a further deficiency of this approach would be caused by the fundamental paradox of information. Since decision makers cannot necessarily place a value on data until they are used it was thought that these decision makers would have difficulties in deciding on their potential data needs. This proved to be false; most decision makers were able to identify gaps in the existing data and could point out the types of data that they needed but did not have available. Thus, this information system paradigm is much more effective as a guide in doing research since it is possible to specify problems and data gaps in the system by examining the users and uses of the information.

There remain a series of difficulties in placing a value on different uses of data and information particularly nonmarket uses which are likely to hinder the utilization of this framework in deciding on specific improvements to suit one user over another. At this point it may be easier to rank the importance of different users within the same information system by using some criteria such as those developed in Chapter 2. However, until a common unit of measurement exists for information, it seems unlikely that meaningful comparisons and rankings between different information systems will be possible, except at the most general level.

5.8 SUMMARY

Given the users identified in the previous chapter and the market structure of some of the private sector users of the aggregate farm income data, it is apparent that any redesign or improvements in the system should probably be made to increase the utility of the data in

public policy decisons. Among private sector uses a willingness to pay criteria was suggested and applied as a measure of the demand for farm income data. Those who make specific uses of the data in such areas as demand estimation and credit financing decision showed the greatest demand for the data.

Two major problem areas were identified by the users of the data. These can be characterized as conceptual obsolescence and credibility. Conceptual obsolescence is of two types in the system. First, and most important, is the conceptual obsolescence brought on by changes in the policy agenda in agriculture. The current system fails to provide adequate distributional data on farm income, especially by commodity group, which appears necessary in answering questions which arise in the agricultural policy process. The second type of conceptual obsolescence arises because the current concept of farm income centers on a national family farm concept which does not seem to be a true representation of the reality of the farming sector. Ostensibly, this second type of conceptual obsolescence is not as serious as the first because of the way in which farm income data are used in policy decisions. Since aggregate farm income data are used more as social indicators, the need for data which bear a one to one relationship with reality is not as critical.

Revisions in the data through time have tended to create a credibility problem for USDA, especially with regard to the analysis performed by the department for others in the policy process. The change of administrations after the last election seems to have lessened, but not eliminated, this credibility problem.

The importance of better integration of the USDA farm income

accounts into the national income and product accounts does not appear to be as serious a problem as the earlier Task Forces have suggested. Data on farm income, while showing some problems for quarterly data, are not much worse, if at all, when compared to data on other sectors. Except for the credit and financing users of USDA farm income data, most users tend to prefer the cash accounting methods used by USDA in reporting farm income rather than the accrual methods which undergird the national income and product accounts.

Because of the political secsitivity of the data, the ease in making changes in the concepts, definitions, or format of farm income data depends primarily on the level of farm income at the time changes are proposed. The fact that farm income data are not tied directly to program bevefits is likely to make it easier to redesign the data system. Future policy issues, in addition to the current issues, which the information system will apparently have to address primarily revolve around structural and productivity questions. This points out the need for better distributional data on legal organization and control in farming and for better data on the value of production.

In analyzing the methodology used, the major problems in using the information systems paradigm as a guide in research is in defining the population of users. The problems in defining a unit of measurement of information make it difficult to place a value on information and hence the usefulness of this paradigm in setting priorities among different types of data is more suspect. However, this paradigm is helpful in setting priorities for improvements within the same data and information system in that it provides a framework for defining problems in the system.

CHAPTER 6

CONCLUSIONS AND RECOMMENDATIONS

6.1 GENERAL CONCLUSIONS

The specialization of functions and activities that has occurred in agriculture over the half century since the farm income accounts were designed has caused serious problems with regard to the usefulness of aggregate farm income data. The aggregate data, based on the concept of a single national family farm, are not utilized to any great extent in public decision making except as general indicators of the economic health of the sector. Aggregate sector performance measures, such as farm income, are not as useful in policy decisions as in the past because the specialization of agricultural production has forced policy to focus on issues which are commodity specific or specific to other groups within the farming sector. This shift in policy has made the current concept of farm income obsolete, because the data concept has not changed in response to the changes in the policy agenda. The low level of use found among those receiving the data directly from USDA also tends to confirm the significance of this type of conceptual obsolescence. Most seemed to imply that their lack of use of the existing farm income data arose because it was not of value in the types of decisions which they normally made. It would seem, beforehand, that most persons who requested the bulletin Farm Income Statistics would have expected to find farm income data of some use. The fact that many did not use the data after receiving it would tend to imply that the

current data are not useful in their decisions.

The increasing heterogeneity among farms in the sector has made the national family farm concept used in the farm income data system obsolete in the sense that it does not represent reality. However, users of the data seem to have already incorporated this fact into their use of the data. Most do not appear to expect the data to bear a one to one relationship to reality, instead these data are relied upon for a measure of the changes in income from one time period to the next. So as long as the current concept is adequate for measuring change in income this type of conceptual obsolescence is not as critical as that arising from the changed policy agenda. However, the further task remains of assessing the ability of the existing data to measure year to year changes.

Major changes in the farm income data system toward national income and product accounting formats, as recommended by earlier studies of the farm income data system, will have little impact on the conceptual obsolescence caused by changes in the focus of agricultural policy. Unless explicit consideration is given to various disaggregations in the income data, changes in the farm income accounting system to make it compatible with the national income accounts will not produce data which can begin to answer the important questions in agricultural policy.

The results of this study also suggest that problems of conceptual obsolescence may be more critical for some types of statistics than others. In designing social or economic indicators the need for concepts which represent reality exactly is not necessary or perhaps not even desirable. There might be tradeoffs in measuring the level

of detail for income and expense accounts against measuring those accounts which cause the greatest change from one period to the next. Some social or economic indicators can be operationalized in such a way to have no meaning in and of themselves. For instance, to know that the Consumers Price Index is 150 means very little unless the level of the index is known for other time periods. Aggregate farm income is similar in the sense that knowledge of any individual estimate does not mean much unless there are estimates for other periods which can be compared with the current estimate. For example when farming in the United States was reasonably homogeneous, it was possible to use aggregate estimates of farm income and the number of farms to obtain an average income per farm that was useful alone since it was easily comparable with a person's experience. The lack of homogeneity among farms has raised doubts as to whether any measure of average income per farm could be useful even if the problems with defining a farm were solved. With adequate data on the distribution of income among farms the problems in defining a farm disappear, since any reasonable definition can be operationalized by combining the distributional data.

Decision makers in the public policy process outside the USDA also raise some questions about the credibility of USDA and their ability to do unbiased analysis and forecasting with regard to farm income. Revisions in the historical data on farm income seem to be a major cause of this lack of credibility since the size of the revisions are often outside the range of accuracy expected by the users, i.e., most users expected the farm income data to be within 10 percent of the "true" value yet revisions of greater than 10 percent are not uncommon.

The emphasis placed on farm income data by USDA as the measure of sector performance only serves to intensify the credibility problem by making the revisions more visible. It is also rare that the reasons for the revisions are presented when these are made, so even the more sophisticated users of the data begin to doubt its reliability, when actually the revisions are supposed to enhance the accuracy of the data.

Earlier studies have stressed the need for better integration of the farm income accounts into the national income and product accounts but this does not appear to be an immediate necessity. The questions raised in agricultural policy tend to center on who benefits from and who pays for the farm programs rather than whether it is appropriate to have a national agricultural policy. So data which allow for comparisons between the agricultural sector and other sectors is not as necessary for this purpose, hence the importance of having farm income data in a national income accounting format is diminished.

The apparent ease with which the current farm income data are used by the Bureau of Economic Analysis also belies the importance of having data in a national income and products accounts framework. As long as the farm income data are no worse than the data BEA uses for other major sectors, it would seem that the integration of these two accounts would be less critical than other problems in the system.

Comparisons between agriculture and other sectors do not seem to be as important a use of the data at the present time relative to the need for comparisons between groups within the sector. In the long run, however, it seems more likely that farming will become similar to other business sectors. In all probability this will lead to questions

concerning the appropriate role of government intervention in agriculture vis-a-vis other sectors. However, very few of the policy decision makers interviewed foresaw this within the next decade. Thus, while gradual changes in the farm income data toward the national income and product framework would be appropriate, the urgency of these changes is not evident. More gradual change is also less likely to cause political objections to be raised concerning changes in the data, or to raise questions about changes being motivated by political purposes.

Comparability between sectors is one of the principal benefits of national income accounting formats. However, the ability to make meaningful comparisons among sectors is not limited to the case where the national income accounts formats are used. In most instances the need to have comparability among more basic microdata files is even more critical since these types of data are fundamental for understanding the behavior and policy interactions among sectors.

In the future the need for better distributional data will also remain important. In particular, the disaggregation of the income data according to legal organization or other structural aspects of the sector will be of increasing importance. At the same time, the current farm policy issues are likely to maintain their significance so data distributed by commodity, states or regions, and by value of sales or any other size class will remain useful.

The methodology used to evaluate the system seems to have been an appropriate choice at this time. The information systems paradigm provided a guide that was useful in understanding and categorizing the problems in the system. The ill defined nature of problems usually associated with information processing makes this type of framework or

paradigm very useful in that it is possible to gain an understanding of the relationships between problems in the system. In a sense it provides a means to judge the system by providing an ideal against which the operating system can be compared and pinpoints areas where potential problems exist in an operating information system. The major difficulty faced in using this methodology is brought on by the increasing returns in use characteristic of information. This makes it difficult to identify the population of data users and the nonusers who might be potential users. Since a principal focus of the paradigm is on the use of information in decision making, the inability to determine the users of data and information of a given type will reduce the utility of the paradigm in doing research in this area. However, this does not appear to be a serious deficiency as long as the users identified are relatively similar to those users not identified. Furthermore, this would also seem to imply that this type of research might be more appropriate for setting priorities among users within a specific system rather than between different systems.

6.2 RECOMMENDATIONS

6.2.1 DISTRIBUTIONAL DATA

The need for more data on the distribution of income was one of the most obvious findings of this research. Solutions to the problem of conceptual obsolescence associated with this seem to deserve a high priority in the redesign of the farm income data system.

Of the many types of disaggregated data which were cited as deficient or nonexistent, two types are most significant. First, data on net returns by commodity or income by type of farm would appear

deficient. The existence of cash receipts data by commodity reduces the urgency of this problem but does not eliminate it.

As a first step toward obtaining better net income or returns data by commodity it would seem useful to have the data disaggregated into two different categories, net returns from livestock and livestock products and net returns from crops. In this latter case some potential for integrating the data from the cost of production studies with the current cash receipts data might provide a means to estimate net returns for a major proportion of the crops. One relatively easy way to make these estimates would be to take the difference between average monthly price and cost of production and multiply this by the amount of monthly marketings. This type of data would be more of an indicator or index of profitability for the subsectors within the farming sector.

The second type of distributional data which seems critical given the nature of future issues in agricultural policy is data which deal with the ownership and control of productive resources in the farming sector. As the questions raised in agricultural policy begin to focus on areas such as the role of large corporations in agriculture or on foreign investors in U.S. agricultural land, data on legal organization and other aspects of resource control will become important. Data distributed by legal organization or other claimants on income seem to be even more critical than that concerning the lack of data on income distributed by commodities. In the case of commodity specific data at least some proxy variables in the form of cash receipts by commodity exist. There seems to be very little time series data on some of the major structural issues facing agriculture. To achieve this goal of improved data on structural issues in farming, it is

recommended that a high priority be given to the disaggregation of total farm income and its allocation to nonoperating landlords, production contractors, businesses with only a minority interest in farming, and self-employed farmers. This latter category should be further disaggregated into part-time and primary farms. Primary farms are those where the majority of the self-employed operator's time is spent in farming. This recommendation is essentially the same as one of the recommendations made by the Office of Federal Statistical Policy and Standards in the Department of Commerce in their framework for planning agricultural statistics (p. 34). It is important to reiterate this recommendation since it should be given a high priority in making improvements in the system.

The same U.S. Department of Commerce report notes that USDA and the Census Bureau are currently using the operationalized concepts of "business associated", "primary" and "part-time" farms in some of their data collection activities. Their beginning efforts should be applauded but better data on nonoperator landlords and production contractors may be necessary. An important question that has not been answered adequately is how fast changes are taking place in the structure of agriculture. If these occur at a relatively slow rate then it might only be necessary to collect data on the number and size of farms in each of these structure categories during each Census of Agriculture. These Census benchmarks could then be used to allocate income among the categories during intercensal years using techniques similar to those currently used in allocating income by value of sales class in the existing series. It would appear that a pilot study of some type might be in order to determine if these structural changes are occuring

at a rapid enough rate to warrant collection of the data more frequently than every five years.

The farm income data are currently disaggregated by state and by value of sales class. Both of these types of distributional data should be maintained. However, some minor improvements seem in order. With regard to the state data, the insensitivity of the net income data to year to year changes is somewhat of a problem. This arises mainly because of the way production expense data are calculated for each state, i.e., data are estimated at the national level and then allocated to the states based, for the most part, on cash receipts estimates. Therefore, many users rely more heavily on cash receipts by states rather than net income that would normally be of concern to them. Recommended improvements in measuring farm production expenditures, outlined in the next section, should alleviate some of these difficulties.

Inflation has tended to make data on the distribution of income by value of sales class less useful in answering questions concerning changes in farm size. Since the economic classes of farms are delineated according to fixed dollar amounts, where lower classes are associated with higher sales, inflation can cause some farms to shift to lower classes without any increase in physical farm size or productivity. Thus, the current data would not be adequate for use in decisions concerning such areas as economic concentration in the farm sector. Two approachs can be used to ameliorate some of the difficulties brought on by inflation. First, measuring the sales classes and value of sales in real dollars might be used. This would involve using a price index, such as the index of prices received by farmers to deflate the value of sales reported and then maintaining the same endpoints in dollar terms

for the sales classes. A second way would be to estimate the number of farms or income in each percentile of value of sales. Thus as the number of farms in a certain percentile of value of sales increases it is more likely to be caused by changes in the structure of farming rather than merely by inflation.

6.2.2 FARM PRODUCTION EXPENSES

Since farm income data are used primarily as an indicator of the economic health of the sector, it would be helpful to have a measure of net income that is sensitive to yearly and quarterly changes within the farm sector. Given the methods currently used, the production expense data are relatively insensitive to short run changes in expenses since extrapolations from Census benchmarks are the principle means of determining these estimates. Thus, as the patterns of resources and inputs used in producing farm commodities change, it is less likely that these changes will be noted in the expense estimates.

The Farm Production Expenditure (FPE) component of the Annual Economic Survey of Agriculture appears to be a ready vehicle for gaining more sensitivity in the estimates of production expenses. The results of the FPE survey could be used directly in estimating the production expense component of the farm income accounts, but now these are used only indirectly, if at all, in making expense estimates. The fact that the current Census of Agriculture is no more than a list frame survey of farmers raises questions as to whether the Census data are any more statistically accurate than the Annual Economic Survey of Agriculture data which are collected using a multiple frame survey. Thus, it is difficult to make the argument that the Census farm

expense data are "better" than the data collected by ESCS. In order to obtain data which are more sensitive to changes in expenses on a yearly basis it is recommended that the results of the FPE survey be used directly as the estimate of production expenses in the farm income accounts. This will require some minor modifications of the current survey and the existing methods for estimating two of the expense accounts must be maintained.

The current FPE survey (as was done in 1975 and 1976) will need to be modified to obtain data on intrastate sales of livestock and feed. However, reasonable approximations should be obtained by asking those surveyed the percentage of feeder and stocker livestock and feed purchased from out-of-state firms. Data on intrastate sales are needed in making state farm income estimates. The sample size for this survey should also be increased to secure better estimates of state level expenses. Currently a sample of about 5000 has been used, sources in the Statistics Branch of ESCS suggest that a multiple frame sample of between 15,000 and 20,000 would be necessary to obtain reliable state level expense data.

One expense account currently estimated by the Farm Income Unit that probably could not be estimated from a survey would be depreciation or capital consumption based on replacement costs. Estimates of this account should therefore remain a function of the Farm Income Unit. The current FPE survey obtains data on some capital expenditures such as machinery purchases and land and building improvements. While there is no harm in asking these questions, in fact they are useful in estimating depreciation in the future, it does create some confusion when the total farm expenditures estimated by the Statistics Branch of ESCS

are compared with the Farm Income Unit's estimates of production expenses. Using the FPE survey data directly would not cause a large change in the expense estimates from the current methods. When the capital expenditure items in the FPE survey are removed and replaced by the Farm Income Unit's estimates of depreciation and other capital consumption and the FPE rent estimates are replaced by the Farm Income Unit's estimates of net rent paid to nonoperator landlords, the FPE estimates of production expenses are within 2.2 and 3.6 percent of the Farm Income Unit's estimates of production expenses published for 1975 and 1976 respectively.

Many of the other reports on farm income have also suggested that the production expense data are probably the weakest component of the data system. So this recommendation for increased use of more directly obtained expense data follows closely and is supportive of this aspect of the other studies.

A principal concern of the Bureau of Economic Analysis is in measuring quarterly change in GNP. Thus, the sensitivity of the farm income data to quarterly change is a significant consideration for their uses. Again the lack of sensitivity of the current farm production expenses make these data less useful for users of BEA data. To secure better estimates of quarterly change in expenses three major components need to be measured: 1) feeder cattle, 2) feed and 3) fertilizer. These three expenses make up nearly 50 percent of the current operating expenses and are the inputs most likely to show the greatest variability between quarters, so data on these inputs should be collected on a quarterly basis at the national level.

6.2.3 NATIONAL INCOME ACCOUNTING

The concern for commodity specific data and the desire to measure productivity in the sector as expressed by the mail survey and interview results has important implications for changing the farm income accounts to be more in line with the national income and product accounts. Given the current uses of farm income data, the recommendations of the 1972 and 1975 Task Forces that farm income be measured as value added and the farm income accounts be put in national income accounting formats, do not seem to warrant a very high priority over the next five to ten years. However, as agriculture becomes more industrialized and specialized, it will be more useful to have farm income accounts in the same format as some of the other sectors. A gradual move toward these formats can be achieved by placing a greater emphasis on the farm business aspects rather than farm families and by obtaining some of the key primary data needed to build up to these national income and product type accounts.

The concern of the data users for better information on the productivity of agriculture suggests an essential first step in getting the type of data to make the change to national income type accounts. Value of production is the starting point for the value added concepts of income. In agriculture, estimates of the value of production are made for most crops and some livestock products but these tend to be hidden in obscure publications and a measure of aggregate value of production is not presented. One way to begin making this transition to a value added concept of farm income would be to publish data on value of production in aggregate and for some of the major crops and livestock products in the same publications as the current farm income

data.

Since for most crops value of production data are not available until after the marketing year is over, the preliminary estimates will need to be made before prices are available for the entire marketing year. This problem cannot be overcome unless the marketing year for crops coincides with the calendar year. The unique nature of agricultural production insures that this difficulty will not be overcome in the near future. Forecasts of prices and marketings consequently must play an important role in the January estimates of value of production but the problems would not seem any worse than the current difficulties which arise in making the preliminary farm income estimates.

The concern expressed for data on farm businesses as opposed to farm families pimpoints another area where gradual changes toward a more farm business oriented national income accounting framework can be made. At the present time a major link between farm businesses and farm families in the income from farm production accounts is the area of nonmoney income, particularly the imputed rental value of farm dwellings. Nonmoney income is presented as a gross income figure and the associated expenses are included along with the remainder of the production expenses for the sector. For those users who wish to exclude these components to more closely approximate their desired farm business concept, it is not now possible to remove both the income and expenses associated with these components. Also, if it is deemed that the rental value of farm dwellings is more appropriately included in the real estate sector of the national income accounts then it will be necessary to separate the expenses associated with farm dwellings from the remainder of the expenses.

Some of the improvements in the primary expense data suggested earlier should also provide some of the data on the intermediate products consumed, which are necessary to estimate the value added by farming. This should also make the transition somewhat easier.

The lack of concern for farm income data accounted for on an accrual basis, relative to a cash basis, would seem to imply that data on inventory change do not merit a high priority in improving the data system. However, the spinoff effects of improvements in such expense items as quarterly fertilizer expenses should make the estimation of input inventories easier. In terms of output inventories the Task Forces both cited the example of the inclusion of beef breeding herds, dairy herds, and poultry laying flocks as part of current inventories as a major problem with the existing accounts. Melichar's (p. 83-84) counterarguments that the magnitude of the errors brought on by this are not great imply that these types of improvements might rate a lower priority. The findings which suggest that farmers in general make many capital purchases from current receipts also would seem to infer that the concept of inventories which includes both current production and short term capital items could quite appropriately be utilized in understanding some aspects of farm operator's behavior.

The earlier Task Forces also noted two different views of the farming sector which could be used in designing farm income accounts as part of the national income and product accounts. The 1975 Task Force recommended that an establishment concept be used in forming the farm income accounts because this fits more closely with the traditional notion of a farm as a "place." When considering the apparent demand for farm income data that are commodity specific and the concern

for measuring productivity in the sector, it seems that the product concept deserves equal attention relative to the establishment concept in the development of the farm income accounts. However, it should be remembered that the concept of an establishment is more compatible with the idea of a "family farm" which remains central to much of the agricultural policy debate. The establishment concept is also more easily reconciled with disaggregations of income by legal organization and other structural aspects.

The importance of family farms was a key part of the debate on the "Food and Agriculture Act of 1977." Section 102 of Public Law 95-113, the Food and Agriculture Act of 1977, is entitled "Family Farms" and reaffirms Congressional support for the maintenance of family farms. More importantly for the purposes of this study, the law directs the Secretary of Agriculture to provide written information to Congress every year on the current status of family farms in the United States. If this request by Congress is backed up with sufficient appropriations, then this might provide the support for better data collection on farm income, especially on some of the structural issues mentioned earlier. This may also tip the scales in favor of an establishment concept as the basis for a future accounting system. But the issues mentioned above also show the importance of a product concept.

6.2.4 IMPROVED CREDIBILITY

The absence of knowledge by those using the data about even the rudiments of the methodology used in estimating farm income statistics suggests that if the users were more aware of the methodology that it might be easier for them to assess the reliability of the data. Given

the current estimating techniques, some revisions are inevitable, however, this point is rarely made to the users. So revisions tend to reduce the reliability of the data in the eyes of the users when just the opposite should be true. Since the reasons for revisions are not often published along with the data, the users cannot determine why the revisions are made. So they must assume that the data are of poor quality. Also, the methodology is not well understood by the users so the inevitability of revisions is not understood.

To improve the credibility of the USDA as a data supplier, a statement concerning the methodology used in making the farm income estimates which stresses the need for revisions should be included in each Farm Income Statistics bulletin. This statement could be similar in style and length to the statement on concepts now published in this bulletin. It will also make it easier to present a statement as to why revisions in the data have been made, so that users can be made aware of the improvements in the data.

Some might argue that this merely attacks the symptoms of the problem rather than the problem itself, in this case the problem being that of revisions. Of course, by eliminating revisions in the data the credibility would most likely be improved, however, the timing of the release of the estimates almost insures some revisions. Recent improvements in the availability of primary data should help to reduce revisions. For instance, estimates of monthly marketings of major grains are now made within a month for the preceding month, while in the past this data was not available until the end of the crop year. The suggested improvements in the expense data should reduce the number of revisions of this component, especially those occurring after the

first July estimate, since this estimate will be based on more directly reported data.

The fact that USDA emphasizes farm income as the singular measure of sector performance only intensifies the credibility problem, since these data become more politically sensitive. Earlier recommendations should also alleviate some of the credibility problems. Changing the name of the bulletin Farm Income Statistics to Farm Sector Performance Measures and including in it other recommended series such as value of production and indices of profitability for various commodities should also serve to reduce the political sensitivity arising from an exclusive focus on farm income.

The Department of Agriculture still has a great deal of influence on what becomes an issue in agricultural policy. The political sensitivity of farm income data is in part a carryover from times when this data received more emphasis than they do even today. This has caused farm income data to become institutionalized to a certain extent in the policy decision process. Thus changing the farm income data will be more difficult as long as the focus of many decision makers remains so exclusively on farm income. USDA can choose to emphasize different performance measures and these will become the universe of data which have the potential for being politically sensitive. Hence, by emphasizing a larger set of performance indicators rather than farm income alone, making changes in the design of farm income data might become easier.

One other approach to reducing the revisions of farm income data and thus enhancing the credibility of USDA is to reduce the number of estimates of farm income made before the last primary data become

available. The 1975 Task Force was particularly concerned with revisions between the January preliminary estimate and the first revised estimate in the following July. One way to avoid this would be to eliminate the January preliminary estimate and replace it with a forecast made in December. Users are more likely to expect a forecast to be different than the actual estimate, so revisions will tend to be less sensitive. Given the current estimation procedures, the January estimate is not much more than a forecast anyway since many of the key pieces of primary data are not available in their entirety. But calling this January figure a preliminary estimate seems to set higher expectations about accuracy. A December forecast could then be used in the same fashion as the January estimate, except that the changes made in July would be treated and perceived as inaccuracies in the forecast rather than as revisions in an estimate. Inaccuracies in a forecast should not be as politically sensitive as revisions in estimates.

The premise that data users view inaccuracies in forecasts differently and more favorably than revisions in data estimates is an untested hypothesis. However, in Canada no estimates of farm income are made until July and the December Canadian forecast seems to be used in the same manner as the January preliminary estimate in the United States without apparent problems.

6.2.5 GOVERNMENT DATA PROVISION: RATIONALE AND PRIORITIES

The question has been raised as to whether government should provide data that are used in market transactions. Arguments against government data collection tend to center on the inequitable consequences which can occur in many situations where government data is

provided. The conditions for this have been described in Chapter 2. Many individuals feel that the rich get richer and the poor poorer when the government supplies data because of the great disparities in analytical capabilities between large and small firms. Farmers often insist that they are hurt by USDA data because the firms buying agricultural commodities or selling farm inputs use the resulting information to the detriment of farmers who must transact business with these firms. The implication is that these firms are often able to perform more sophisticated analyses on the USDA data than are farmers. An initial reaction to this difficulty, and a solution advocated by some individuals, is to stop all public provision of market data.

This Luddite view of the problem and its solution is likely to widen only further the income inequities between large and small firms. If the government does not provide the data, the largest firms will most likely produce proprietary data to meet their needs. Hence, termination of government data collection will only serve to broaden the disparity in income among the largest and smallest trading partners.

Despite the availability of government data many of the largest firms produce their own data on market conditions and thus only use government data as a source of validation. For instance, Continental Grain Company maintains observers in most of the major grain producing areas of the world to monitor production. The USDA used agricultural attaches for similar purposes and publishes information on production in foreign countries based on these observations. The grain company would clearly be in a more advantageous position relative to the farmer if the USDA stopped publishing data on foreign grain production since the grain company would be the only party with data in

addition to their inherent advantage in analytical capability. The degree of industrial concentration and the income distribution that would follow would be even more extreme than now prevails.

The more reasonable conclusion to be drawn after examining the problems of unequal information in trades is that the government should do a more thoughtful job in managing its investments in data collection and analysis. The criteria developed in Chapter 2 relating to market structure and income distribution provide some means for establishing relative priorities for public investment in data and analysis. Accounting for income distributional consequences and the effects of market structure on data design could help insure that new data investments would tend to ameliorate the inequities among large and small firms in trades. However, the government must make this a conscious goal in order to have an impact.

Currently some data series serve the interests of large units. For example, the agricultural census includes detailed questions about machinery on farms. Some of the data arising from this are of public value but the principal benefits go to the oligopolistic farm machinery industry. The same could be said of data collection on other oligopolistic industry sectors. Given the appropriate role of government in data collection this part of the census seems to be a candidate for rethinking the use of government funds for data collection.

Another way to counteract the inherent analytical bias in favor of large firms would be for the government to undertake more analysis of data. Implicit in this recommendation is the need for the government to communicate this analysis to the small units that can use the information. The timing of the release of data and analysis can also

reduce the bias in favor of large firms. If the data and analysis are released simultaneously then large firms will lose one of their advantages in doing analysis, that being, the ability to analyze data more rapidly than small units. Thus, the argument that the government should not produce new data because this only serves to skew the income distribution further is perhaps the least attractive of the alternatives for dealing with the bias that follows from greater analytical capabilities of large firms.

6.3 ADDITIONAL REMARKS

The ability to generate political support for data improvements is an important consideration for implementing many of the recommendations suggested in the previous section. Improvements in primary data are often costly and thus political support is necessary in the budget and appropriations processes to fund these improvements. Data gathering is not often a glamorous activity for an agency that also has other functions such as research and policy analysis. So political support muct go beyond that for allocating funds to an agency. It is also necessary to insure that support exists for allocating agency funds to these activities. The 1975 Task Force recommended that farm income related work be given a higher priority within the Economic Research Service of USDA. It does not appear that this recommendation was implemented, if anything recent budget reductions have probably hit the farm income area harder than others.

The lack of use of the farm income data in the private sector is not encouraging in terms of the ability to generate political support for data improvements. The problems of conceptual obsolescence

and credibility have also reduced the demand for the existing data in the public decision process. Improvements in these areas should increase the demand for the data and hence lead to more political and budget support for these activities. However, potential users of the improved data are unsure of their demand for new data until these are available, so it is difficult to generate the support necessary to make the improvements. This is a corollary of the fundamental paradox of information. An obvious implication of this corollary is that any failure to improve data, simply because there is no immediate payoff to the agency for achieving these advancements, might be a very myopic choice by a data producing organization.

Given the current level of staffing and funding of farm income work in USDA, it is not likely that improvements can be made without additional support. To obtain this support, agency officials and others associated with budget allocation must be made aware that the payoffs for improved data are often of a longer run nature when compared to other activities such as direct assistance to farmers which tend to generate more political support for the department. Improved public data and information in a decentralized sector are likely to result in better private decisions for the coordination of the sector. The tremendous increases in productivity in agriculture over the last half century, the benefits of which accrued to all of society, can be attributed, at least in part, to the existence of government supplied data. Unfortunately, the benefits of improved data are not always obvious before they are collected since the value of the data arises in its use and all potential uses might not be predicted beforehand. Thus, criteria for budget allocation in government agencies for data

collection must go beyond the shorter run interests of political expediency and instead recognize that the benefits of better information often are spread over a longer time frame than other activities and serve other users besides government decision makers.

The benefits of public data collection for private uses often transcend the normal gains arising from uses by individuals in market decisions. In a democratic social order an informed electorate are better participants in the policy process. Hence, private sector users of data also provide the basis in part for collecting data for public uses. Unfortunately, the private use of government data in both private and public decisions are easily overlooked in establishing budget priorities for data gathering by an agency yet without private support the possibility for data improvements are greatly diminished.

6.4 FURTHER RESEARCH

As was noted in the introduction, one potential type of further research would be in the area of making improvements in the statistical measurement accuracy of specific accounts within the farm income data system. This type of research is probably best done within USDA as quality and accuracy of data should be an ongoing concern of any statistical agency.

The research presented here is far from a complete statement on farm income data and analysis. Unanswered questions arise concerning the tradeoffs between improved concepts and improved accuracy in measuring existing concepts or improvements in analyzing existing measures. Further work on the inherent differences in data design between social indicators and more micro-level statistics is suggested by the manner

in which farm income data is used in decision making. Of a more specific nature is the need for research which gives a better understanding of the relationship among specific types of similar data, such as cost of production and farm production expenses. It would seem that these concepts should be related and the potential for collecting primary data which can be used to operationalize either concept needs to be explored.

Many conceptual and theoretical aspects also need further work. Questions concerning the value of information are often asked but currently the conceptual basis for guiding one in this area is weak. As zero based budgeting comes into vogue in government, estimating the value of government information production will be critical. However, the lack of a solid conceptual and theoretical basis for estimating the value of information will raise doubts as to the validity of any results in this area. There seems to be a general conclusion that increases in information are always welcome. However, problems of information overload can obsfucate issues and make decisions more difficult to reach. The economics of obsfucation or whether more information is always better is an area that deserves further study.

This research was primarily a case study which addressed some aspects relevant to valuing information systems. Case studies of other information systems also seem justified in order to arrive at a set of principles or guidelines which can be used in a general way to place a value on information systems. From this could come methods for establishing priorities among different information systems in addition to setting priorities within systems. Until a more universally acceptable method for valuing information is found, much more research in this

area is necessary. The difficulties in determining a suitable unit of measurement for information is a hindrance in measuring the value of information which also tends to make the case study method currently more appropriate and likely to yield more results of long term value.

APPENDIX

QUESTIONNAIRE DIRECTED TO USERS OF USDA FARM INCOME DATA

INSTRUCTIONS: If you do not use the U.S. Department of Agriculture farm income data please refer this questionnaire to a person in your organization that uses it. If the data is no longer used by anyone in your organization please answer all of the questions in section II of this questionnaire and return. Please read each question carefully before answering. Complete sentences are not necessary -- use phrases or whatever structuring suits your purpose in answering the questions. All information will be considered confidential. No identities of individuals, firms or organizations will be revealed in the report derived from this survey. The form does carry a control number so that we can send reminders to those who do not respond.

I. USES AND PRIORITIES

1. a) What is your primary use of USDA farm income data?

b) List any other of your uses of USDA farm income data.

2. On what types of decisions do the farm income data that you use have the most impact?

3. Hypothetically, if you could not obtain data on aggregate farm income from any other source, how much would you be willing to pay on an annual basis to receive the data on farm income as it is now published by the U.S. Department of Agriculture?

4. a) Are you familiar with the general methods used in making the annual USDA farm income estimates?

___ yes ___ no

b) If yes, describe these methods briefly.

5. Farm income data are made up of many different components and are presented in different formats. Indicate the usefulness for your purposes of these various components and formats by checking the most appropriate response given in front of each.

VU = Very Useful MU = Moderately Useful RU = Rarely Useful DU = Do Not Use

VU	MU	RU	DU	
__	__	__	__	a) Gross and net farm income by quarters
__	__	__	__	b) Annual realized gross and net farm income
__	__	__	__	c) Annual total net farm income
__	__	__	__	d) Gross and net farm income by state
__	__	__	__	e) Cash receipts by state
__	__	__	__	f) Cash receipts by commodity
__	__	__	__	g) Cash receipts by month
__	__	__	__	h) Value of home consumption
__	__	__	__	i) Number of farms and average income per farm
__	__	__	__	j) Personal income and disposable personal income of the farm population
__	__	__	__	k) Per capita income of the farm population
__	__	__	__	l) Nonmoney and other farm income furnished by farms
__	__	__	__	m) Farm production expenses
__	__	__	__	n) Current farm operating expenses
__	__	__	__	o) Expenses for hired farm labor
__	__	__	__	p) Repairs and operation of farm capital items
__	__	__	__	q) Farm gross capital expenditures and net investment
__	__	__	__	r) Farm depreciation and other capital consumption
__	__	__	__	s) Net cash income of farm operators from farming
__	__	__	__	t) Number of farms by value of sales class
__	__	__	__	u) Farm production expenses by state
__	__	__	__	v) Government payments
__	__	__	__	w) Income per farm operator family by major source and by value of sales class
__	__	__	__	x) Farm income and production expenses of farm operators by value of sales class

List any other components or formats of farm income that you find particularly useful:

_____

_____

6. On whom do you usually rely for forecasts of aggregate farm income for future time periods?

___ U.S. Department of Agriculture

___ In-house or other internal estimates

___ Radio, TV or newspapers

___ Trade publications - specify: _____

___ Private consultant - specify: _____

___ Other - specify: _____

___ Do not use forecasts of farm income

7. What types of economic indicators or statistics do you feel would best suit your needs for monitoring the performance of the farming sector?

_____

_____

_____

8. A national aggregate farm income accounting system can be designed to answer many different types of questions. However, resource constraints require that some priority be given to certain questions over others. Rate the importance of the questions listed below on a scale of 1 to 5 (where 1 is highest priority and 5 is lowest) by circling the appropriate number based on your own farm income data needs.

   1 2 3 4 5 a) How do the returns in agriculture compare with other industries?
   1 2 3 4 5 b) What is the income of farm businesses?
   1 2 3 4 5 c) What is the income of farm families?
   1 2 3 4 5 d) What is the size of the farming sector in monetary terms?
   1 2 3 4 5 e) What is the economic well being of farm families?
   1 2 3 4 5 f) What is the distribution of income among individuals within the farming sector?
   1 2 3 4 5 g) What is the productivity of the farming sector?
   1 2 3 4 5 h) What are the returns to the resources committed to agriculture?
   1 2 3 4 5 i) What are the income differences by type of farm or commodity?
   1 2 3 4 5 j) What are the farm income differences between regions and/or states?
   1 2 3 4 5 k) What are the major economic features of the farming sector?
   1 2 3 4 5 l) How much has the level of farm income changed from previous time periods?
   1 2 3 4 5 m) What is the level of aggregate farm income?
   1 2 3 4 5 n) How is the farm business related to the farm family?
   1 2 3 4 5 o) How are income and assets related in the farming sector?
   1 2 3 4 5 p) What is the aggregate income of farms accounted for on an accrual basis?
   1 2 3 4 5 q) What is the aggregate income of farms accounted for on a cash basis?
   1 2 3 4 5 r) What is the nonfarm or off-farm income of farm families?

   List any other questions that you feel should be given high priority in designing a national aggregate farm income accounting system.

   _____

   _____

9. a) How accurate is the aggregate realized net farm income data published by the U.S. Department of Agriculture? Almost always within:

   ___ ± 0-5% ___ ± 6-10% ___ ± 11-20% ___ ± 21-30% ___ Greater than ± 30% of the true value.

   b) On what do you base your perceptions of the accuracy of the farm income data?

   _____

   _____

   c) Have your perceptions of the accuracy changed through time?

   ___ yes ___ no ___ inadequate information to make a judgment

   If yes, in what direction and why?

   _____

   _____

   _____

10. What changes or improvements in the current USDA farm income data would be most useful for your purposes? Why?

    _____

    _____

    _____

    _____

11. What other U.S. Department of Agriculture data, in addition to that in the USDA Statistical Bulletin Farm Income Statistics, do you use?

_____

_____

If you use other USDA data, how does the overall usefulness of this data compare to the USDA farm income data? (For example, I find that USDA data on production of commodities is more useful in general than USDA farm income data)

_____

_____

_____

II. RESPONDENT DATA

1. For statistical purposes only, please identify your principal business or professional affiliation.

___ 1) Farm or ranch operator
___ 2) Manufacturing/supplying farm inputs
___ 3) Farm product processing and/or selling
___ 4) Banking or financing
___ 5) Federal government
___ 6) State or local government
___ 7) Agricultural cooperative
___ 8) Agricultural interest group
___ 9) Private consulting firm
___10) News medium or other publication
___11) Educational institution
___12) Utility company
___13) Commodity trading or brokerage firm
___14) Foreign government or institution
___15) Other - specify: _____

2. Please state your personal job title and description.

_____

_____

_____

3. Do you wish to continue receiving the U.S. Department of Agriculture Statistical Bulletin Farm Income Statistics?

___ yes ___ no

4. Did you refer to the USDA Statistical Bulletin Farm Income Statistics while completing this questionnaire?

___ yes ___ no

5. To be completed by those respondents who do not currently use USDA farm income data.
Why do you receive the USDA Statistical Bulletin Farm Income Statistics?

_____

_____

_____

_____

Please complete and return to: Mr. Charles H. Riemenschneider
Department of Agricultural Economics
Michigan State University
East Lansing, Michigan 48824

THANK YOU FOR YOUR HELP

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BIBLIOGRAPHY

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