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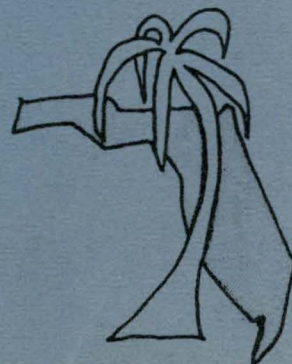
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OUR OBSOLETE DATA SYSTEMS: NEW DIRECTIONS AND OPPORTUNITIES

by

The AAEA Committee on Economic Statistics^{1/}

The American Agricultural Economics Association's Committee on Economic Statistics has been exploring the topic of this session for more than two years. Thus, this paper constitutes a summary view of a major problem we face as professionals, and a progress report to the Association by the Committee.

Growing concern over the inadequacies of our data systems was early expressed in the Executive Committee of the AAEA and in the American Statistical Association-American Agricultural Economics Association Joint Committee on Agricultural Statistics.^{2/} Out of this concern was born the AAEA Committee on Economic Statistics with a charge to explore the problems of our data systems and to recommend appropriate action to the Association.

Our data systems are in deep trouble. Succinctly put that is the conclusion of our deliberations to date. This is ironic since the systems which produce our data have never had more sophisticated statistical capabilities. However, the demands we make on this system are now out-running our meagre investment in its continued development. More importantly, the conceptual foundation of the system is crumbling--and has been for some time.

There is an even greater irony to our present data system difficulties, for if this profession has any single greatest accomplishment, it is the early success in conceptualizing the building data systems for agricultural policy decision making and private industry needs. The old Bureau of

^{1/}The Economic Statistics Committee is composed of James Bonnen (Chairman), James Hildreth, George Judge, George Tolley, and Harry Trelogan.

^{2/}The Joint Committee has three ASA members and three AAEA members. The AAEA members include James Bonnen, Dean McKee, and George Judge. There is, thus, an intentional overlap predicated in part by the initial need to transfer the knowledge gained in the Joint Committee's earlier deliberations to the newer AAEA Economics Statistics Committee which is focused more completely on this topic. The Joint Committee has, as its primary function, an advisory role to the USDA and Census on problems of agricultural statistics.

Agricultural Economics (BAE) was the primary focus of much of this effort. The BAE had responsibility for both statistical services--such as crop and livestock estimates and market news--as well as economic analysis. It was a fountainhead of new ideas involving the practical application of primary data to real problems.

Among names easily remembered for their contributions to the early statistical methods and to agricultural data systems development were Henry Schultz, H. C. Taylor, Henry Wallace, George Warren, John D. Black, Mordecai Ezekiel, Joe Davis, O. C. Stein, Fred Waugh, Charles Sarle, Walter Hendricks, Louis Bean, F. F. Elliott, Meyer Girshick, A. C. Hoffman, Ralph Jennings, Martin Cooper, Herman Southworth, and Karl Fox. There were many others.

On the statistical side, these men introduced or contributed to the development of least squares analysis, simple and multiple correlation, graphic correlation and were particularly successful in the measurement of an adjustment for bias in statistical estimates. On the analytical side, they successfully adapted statistics to production economics.

Out of the investment in conceptualizing and building data systems came a number of statistical series, still familiar to us today, such as crop acreage and production, livestock estimates, prices paid and received by farmers, expenses and returns by types-of-farming areas, realized and net farm income, animal unit feeding rates, and feed and food grain supplies. Econometrics and quantitative methods took root and found early leadership here. The early comparative advantage of agricultural economists among social scientists was in the quantitative and empirical skills that grew out of this experience.

Originally, all of these statistical systems were a well integrated part of the research and public decision process. But with the growth in functions and scale of the Department of Agriculture in the 1930's and 1940's, both professional and organizational specialization set in. This was undoubtedly necessary. But the consequence is that statistics and economic analysis have come to be segregated organizationally and conceptually. Even more important, the profession now perceives them as separate functions. We economists have come to view data and statistical data systems as a responsibility of someone other than agricultural economists. Thus over time the data systems for such things as market news and crop and livestock estimates have become to be thought of as distinctly separate entities from the economic analysis of agriculture. Often the interplay between these activities, even within the USDA, depend upon personal relationships of participants, rather than upon reciprocal organizational responsibilities.

In his presidential address to the American Economic Association in 1970, Professor Wassily Leontief delivered a biting indictment of the economics profession for its failure to develop an adequate empirical foundation for the highly articulated economic analytics and theory of the past 20 years. He

specifically excepted agricultural economists from his indictment.

"An exceptional example of a healthy balance between theoretical and empirical analysis, and of the readiness of professional economists to cooperate with experts in the neighboring disciplines, is offered by agricultural economics as it developed in this country over the last 50 years.... Official agricultural statistics are more complete, reliable and systematic than those pertaining to any other major sector of our economy.... Agricultural economists demonstrated the effectiveness of a systematic combination of theoretical approach with detailed factual analysis. They also were the first among economists to make use of the advanced methods of mathematical statistics. However, in their hands, statistical inference became a complement to, not a substitute for, empirical research." [13]

Professor Leontief does us great honor, but it is an honor which properly belongs to an earlier generation of agricultural economists, for the specialization of the last several decades has brought many of the same ills to agricultural economics. Among them is a growing lack of interest in the data systems that make empirical work possible. Individually there are many distinguished and honorable exceptions, but as a profession we are subject to such judgment.

The problems of formulating the concepts around which data are gathered is perceived today by most economists to be the responsibility of statisticians. However, statisticians are no less specialized than economists and they assert correctly that statisticians are not the best prepared to formulate the economic concepts which economic statistics sets out to measure. They see the problem of "what is to be measured" as something that should best be answered by the people who use the numbers and the discipline whose theoretical concepts are being quantified by the data system. Into the chasm between these two postures we all have fallen. The consequence, in our judgement, is that we have for some time been failing to renew our early investment in the conceptualization of agricultural data systems, and to develop entirely new systems of data needed to contend with the problems of a rapidly changing rural way of life.

It is the conclusion of your Committee on Economic Statistics that we are in the midst of a very fundamental crisis in the data systems upon which we depend in our analysis. With each year that goes by, fundamental structural change transforms agriculture and rural life and the theoretical concepts around which we have constructed our data systems grow progressively more obsolete--so obsolete that no minor tinkering with each census or survey any longer serves to bridge the basic inadequacy of the ideas being quantified.

The concepts no longer have any reality.

Predictive analyses built upon these concepts perform less and less well despite great efforts at statistical manipulation of data, refinement of technique, and elaborate economic modeling. A crude fact stares us in the face. Many of our most basic concepts are now completely obsolete. In addition we have never really faced up to the problem of conceptualizing the theoretical systems that will allow us to understand, measure, and deal effectively with the problems of development, human welfare, and various aspects of the behavior of rural people and their society. It is the belief of this Committee that the profession must begin to devote major resources and some of its best minds to the solution of these problems or see the profession itself decline in intellectual capability and social unity.

We shall try here to outline the problem as we see it. We feel a bit like the proverbial blind men trying to describe a rather large elephant. As the size of the problem has slowly dawned on us, we have begun to realize that it is unlikely that the committee will even be able to define the problem in a truly definitive manner. But we can and must make a start on the process that will do so. For that we need your help. All members of the profession are invited to provide the committee with their own critical perceptions and with an account of their experiences with these problems.

In our deliberations it became clear to us that the problem was divisible into several rather general areas. As a consequence, we recently divided our effort into two initial thrusts by creating a task force on "food and fiber industry statistics" and another on "economic and social statistics for rural society". We have also been impressed by a third set of issues, involving questions of how national data systems and the federal statistical establishment should be organized. Some of these issues are currently in sharp focus as a result of various efforts to reorganize and reform the federal statistical system. Naturally enough, this affects the problems of data systems for agriculture and for rural people.

Food and Fiber Industry Statistics^{3/}

We use the term, food and fiber industry, to avoid any implication that agriculture is composed of farms and farmers only. Indeed, the technological revolution which has made that no longer true in any sense lies at the heart of the difficulties we face. Technological change has led to a major

^{3/}This section has benefited from the use of draft materials prepared for the Committee by Earl E. Houseman, Eldon E. Weeks, Daniel I. Padberg and Louis Upchurch.

reorganization of the production and marketing processes which 50 years ago were found predominately on the farm and lodged in a unit in which the farm and the family were highly integrated, nearly coterminous, units.

Improvements in coverage, precision of measurement, and statistical reliability of the past 30 years are now frequently offset by the fact that the concepts being quantified no longer accurately reflect the reality of the structure and behavior of the industry. Also as a result of this structural transformation there are growing new public and private data needs for decision making, particularly where the locus of decision has shifted to larger industrial aggregates and where the development of imperfect market structures has created a need to substitute both public and private sector planning for the free market mechanism which has been made inefficient or ineffective by commodity programs, regional producer bargaining, concentration and vertical and horizontal integration of food and fiber production.

Food and fiber industry statistics, including income, output, price, labor, and wage data, suffer today from the integration of marketing and farm production operations and also the shift of functions, formerly performed on the farm, to independently operated business firms. Not only have practically all processing and marketing functions formerly done on the farm been spun off, but many previously farm produced inputs such as power, fertilizer and fencing are no longer produced on the farm. Some farm inputs now come in the form of contracted services. In addition, the technological nature of many of the inputs has been greatly changed. This has blurred the boundary and meaning of the farm sector and leaves behind some myths which we continue to honor through statistical use.

J. Edward N. Smith

The farm and the market firm are the basic units of observation from which the food and fiber industrial structure is described statistically under present conceptual arrangements. While farms as physical units continue to exist, the farm has grown to be such a heterogeneous and functionally dissimilar set of activities and processes, as one goes from one part of the farming sector to another, that it is simply impossible any longer to use the farm as the basic unit of observation. The same may be said of the food and fiber market firm. We shall continue to need to construct statistics to say something about physical farms or firms of various sorts, but as the basic unit of observation this idea is conceptually obsolete.

In any data system the basic building block for all other data that the system is capable of producing, is the basic unit of observation. The farm unit has grown so heterogeneous that no longer can groups of farms be compared or aggregated to an industrial level with statistical results that are capable of clear interpretation--i.e., we no longer are sure what such data really mean. This in turn robs the significance from all uses of that data. Under such conditions when we put time and money into modeling and complex analytics, we are wasting our professional resources. Of what value is our professional

effort when the data we use is so flawed, that the end product of the analysis is poor and for that reason never used by decision makers?

What we need then is a basic unit of observation, a primary building block capable of clear definition from which we can construct clearly interpreted firm level as well as industry level statistics. Only when the basic economic structure of the industry can be described accurately by our data system, will it be possible to deal with any analytical accuracy with the performance and behavioral characteristics that are the focus of most economic analysis. An entirely new approach to measurement of industrial performance and behavior must be designed. Here consensus deteriorates rapidly as one considers specific proposals: Some suggest as the basic unit of observation variants of the SIC (Standard Industrial Classification) "establishment" concept. Others would set up a conceptual framework in terms of activities and impute values to each.

The concept developed as the basic unit of observation in the farming sector must be the same as that used for the rest of the food and fiber industrial structure. This makes possible comparability of data and therefore analysis across the entire food and fiber industry which is not now possible. Only if the basic building blocks of both sectors have the same conceptual character can data be generated that is genuinely compatible with analytical frameworks that attempt to span activities in both farm production and marketing sectors. In fact, ideally the basic unit of observation should be compatible across the data systems of the entire United States industrial structure.

When, as is presently the case, the basic unit of observation varies across these data systems and also is conceptually obsolete, the ambiguity over what is being measured leads to a fuzziness in derived measures such as income, output, input and prices. These inadequacies, as well as others, can be seen in present food and fiber statistical series.

In estimating income and output statistics, we have never done a truly adequate job of accounting for assets simply because this is an extremely difficult dimension to measure. The result, however, is that small capital items, some input supplies, and certain stocks of crops and feedstuffs are not entirely netted out of output and income flows. Also a number of personal household items end up in the inventory of farm assets. Eldon Weeks comments that,

"This reflects the dilemma of whether to define a farm as a business or a household. Much precision could be gained by officially adopting one interpretation alone or both separately. There is much to be gained by detailed description of shares in asset ownership, for both observation of capital flows and computation of rates of productivities and returns. This dictates a high degree of conceptual consistency with output and income accounting measures." [20]

Many economists, including Weeks, who is working on an evaluation of our aggregate national agricultural data, have pointed out to the Committee the many limitations and deficiencies of current income and output measures. Many of these problems are simply conceptual failures.

"On current account, there is no widespread official publication of the value of total farm output. Farmers' cash receipts may be only as much as 70 per cent of the total value of farm output. Gradual incorporation of unvalued output into purchased inputs and cash receipts as farm specialization takes place may yield mistaken interpretations of farm sector growth. Otherwise, the flow measures of farm sector size are conceptually unique to agriculture, based on the traditional assumptions of family farm characteristics aggregated to the national level. The Department of Commerce publishes gross farm product and national income originating in agriculture, but its procedures attribute substantial farm output and income to nonfarm sectors." [20]

Thus, an examination of the various Census and USDA measures suggests not only real conceptual difficulties over what is being measured, but grossly incompatible data systems.

Gross farm income gets "spliced" into the national income accounts and is reported in the Survey of Current Business as "income originating in agriculture." The concepts and the data making up "gross farm income" are almost totally incompatible with other components of the national income accounts, even though they are used for this purpose. Moreover, the national income accounts currently provide no convenient barometer of economic performance of the entire food and fiber industry. Such a category in the accounts could be designed, but does not now exist.

The farm gate was once a meaningful base line in measuring farm output, productivity, and prices. It is now pure myth. It now leads to odious distortions in the use of statistics such as the notion that one farm worker feeds so many consumers. Such statements grossly exaggerate farm productivity since much of the implied increase in productivity is, in reality, due to non-farm changes in technology and inputs which are excluded from the computation. Even our conventional labor productivity statistics are open to serious question.

The rapid decline in the use of labor in farming may very well be partially an illusion. Good information is needed on the extent to which farmers are buying labor services, such as dealer application of fertilizer and chemicals. Labor employed by firms in the agricultural services and wholesale and retail trades industries may at least partly offset the apparent decline in labor employed by farmers. If so, measures of agricultural input productivity do not reflect the true use of capital items and labor in the sector. [20]

Our input concepts have never been highly developed and thus in some sense have always been inadequate. But these too have grown conceptually even less adequate over time. Perhaps the greatest difficulty is found in dealing with the categories in which we handle farm labor. These were originally based on straight forward land tenure relationships but labor inputs are now far more specialized and much more complex and heterogeneous. Much labor is contracted, but much of that is not counted as farm labor. For example, is the driver of a lime spreader truck from the local fertilizer dealer who applies lime to farm fields a farm laborer? Is the pilot of a crop dusting plane a farm laborer? Where does the now common labor crew contractor fit? In themselves these seem not too important perhaps, but one could go on and on identifying highly specialized inputs of labor which are individually unimportant but taken together are a very substantial labor input. Other questions that need answering include to what uses are capital input data put, and thus into what categories does capital input need to be factored? Are the present physical and financial categories at all adequate? In land input measurement one is increasingly faced with such things as skip row practices, particularly in cotton. How should land be measured under these conditions: one way for regulatory purposes, another way for statistical?

Farm prices are supposed to represent the value exchanged when ownership is transferred at the farm gate. But the classic question is, what is the farm price of broilers when as a result of integration there is no transaction at the farm gate? Even when there is a transaction the contractual relationship can be quite complicated. The buyer may deduct from this often fictitious value certain charges for services like liming and fertilizing fields, applying insecticides, or providing field crews for harvesting and packing boxes for shipment. In the case of so-called "plant door prices" supposedly going to producers, in addition to the deductions just mentioned, other deductions can be made for delivery to distant plants, grading or sorting services and the like. Even ignoring "contract production", producing and marketing services become intertwined for an increasing number of commodities. The problem of what is being transferred and at what price in a complex series of sequential production processes raises many questions for which our present data systems have no good answer.

Data that describe the agricultural industry come chiefly from the Bureau of Census and from episodic USDA surveys and studies. The Census of Agriculture has, until recently, dealt almost exclusively with farms; in fact, it has been a census of farms and farm people rather than a census of the food and fiber sector. Only in the immediate past farm census has a major experimental effort been made to enumerate the farm service sector of the food and fiber industry.

Although the Census of Agriculture has served many purposes reasonably well for many decades, changes in the organization and structure of the agricultural industry and in the characteristics of farm people cast substantial doubt on its usefulness even as a "census of agriculture", i.e., of the food and fiber industry. The problem here is basically a problem of obsolete concepts that no longer match a greatly transformed industry.

However well the Census of Agriculture may deal with the farming part of the agricultural industry, it has never been adequately coordinated with the Census of Business, Census of Manufactures, and other fields of periodic data. Each data system tends to have its own basic unit of measurement, industry classification system and industry sector definitions. Thus, we do not have a complete and coordinated body of data that permits description or analyses of the food and fiber industry as a whole. No one understands all of this better, or is more concerned, than those responsible for the Census of Agriculture and various USDA data systems [17]. It is time agricultural economists pitched in to help solve this problem.

Since very similar economic forces are operating on farming, on the rest of the food and fiber industry, and on the general United States industrial structure, it is clear that we should start from the same basic conceptual framework in describing and understanding all these industry structures. It is no longer possible to draw a clear conceptual line around farming as an enterprise or a process. One can still clearly define the farming sector for some specific products. But it is nearly impossible in others, and the point for those products in which you can still draw that line today occurs at different levels in the industrial structure. There is every promise that this complexity of structure and interpenetration of process will grow. Therefore, we simply must have a common conceptual base that is not greatly disturbed overtime by this sort of change.

The thing which we have not fully appreciated, even yet as a profession, is the fact that the entire system has grown obsolete in a conceptual sense. This is one of the costs of the great success of the food and fiber industry in increasing its productivity at a rate that has led to massive structural and organizational change.

New Public and Private Data Needs and Issues

In the past few years increasing interest has developed in the subject of economic planning at an industry level. This is reflected in the bargaining movement and in the growing interest in market orders. Industries affected by intense merger activities, such as the Midwestern dairy industry, face the need for facility planning and product flow management on an industry basis. In addition, the process of public appraisal of food and fiber economic activity is increasingly focused at the industry level. The emergence of large economic structures both at processing and distribution market levels raise questions of the public interest. At the same time, the conglomerate structure, increasingly common at all market levels, makes industry appraisal very much more difficult because firm data can no longer be aggregated into industry descriptions. All of these influences lead to a need for a data system which will support private decisions at an industry level and public appraisals of industry behavior and performance.

As you listen to industry people you become quite aware that industry planning is being substituted progressively for small independent firm planning and the semi-automatic functioning of the market. Long before an oligopolistic market structure has evolved there has been a very substantial replacement of the market by conscious industrial planning. The irony in this is that most industry people, while describing this process rather precisely, seem not able to admit, even to themselves, that they are, in this search for market stability, replacing the functions of the market, much as Galbraith has described. [6] This is a function not only of imperfect market structure but of the increasing complexity of modern technologies and the organizations that must manage them.

It is difficult to foresee all of the data needs that eventually will be generated by this sort of change. The place where we must start, however, is where we are obviously inadequate to begin with, i.e., in the availability of stock and flow data on physical commodities aggregated to the appropriate level at which the industry planning function is executed. This must be matched by similar information on the financial transactions. Provision of this sort of data on a comprehensive basis will require far more cooperation of the marketing sectors of the food and fiber industry than has been common in the past. Understandably marketing firms are nervous about exposing to competitors and to public view certain types of firm and industry data. This is simply a problem that must be faced. It is also true that as the need for better and more comprehensive private planning data arises, much of this must be financed by the industry itself. The tradition of almost total government provision of statistics for the farming sector is applicable only where firms and industries are so atomistic that such private investment in statistics cannot be recaptured in the market and thus is not feasible as a private function.

The greatest dissatisfactions expressed by the private sector indicate desires for more data in greater detail, with most emphasis tending to be placed on indications of quality of commodities. That is to say, the demand is for wheat production and stocks classified by variety or some other indication of quality. Livestock data are sought with more detail indicating prospective market dates for animals or animal products. All sectors give lip service to the need for greater accuracy, but every time in the trade-off between accuracy and detail (i.e., more data) the private sector chooses the additional data. Where does the economic analyst stand on this issue?^{4/}

Public data needs and issues are also changing. As food and fiber markets become less atomistic and more imperfect and directed, the problems of public policy with respect to industry take on quite a different cast. As the locus of decision in industry moves to larger aggregates and the industrial structure becomes more imperfect, public policy questions, the kind of public programs implemented and, therefore, information needs, will all change. We have already experienced an increased demand for greater equity in the effects of public programs in the food and fiber sector; this generates a need for new and better data on the distribution of benefits of these programs as well as of costs. Here we have a very inadequate theoretical base, and almost no data or very inadequate ad hoc data. This question is directly related to the larger matter of the management of public programs and the criteria by which they are to be judged, which is also in flux. In any case it is clear that public scrutiny of the food and fiber related industries will continue to increase in frequency and intensity. Data systems to support this process of appraisal of the behavior and performance of these industries should and will be developed. Such data systems will face the same set of structural problems already described above.

What Can Be Done?

The Economic Statistics Committee has only reached the point where it is reasonably sure of the nature of some major parts of this problem. We are not ready to venture very specific answers to the question of what can be done. It is clear that we must start with a conceptualization of the theoretical framework that explains the inter-relationships between the food and fiber sector of the economy and all other sectors. This is necessary, among other reasons, to give the statisticians guidance on what units to count, items to measure, and flows to report--from the standpoint of being useful to the economic analyst as well as to the farmer and market firm decision maker. We must not only redesign our basic unit of observation; we must conceptualize the entire data system to provide for more accurate descriptive and predictive capacity. Unless agricultural economists participate in this conceptualization process, the outcome is not likely to suit the analytical needs of economists concerned with food and fiber industry problems.

^{4/}— An interesting insight into some factual aspects of this are to be seen in [9].

Economic and Social Statistics for Rural Society

The economic development of the United States has transformed rural and urban American in very different ways. The growth of rural society, especially its investment in human capital, has lagged in most rural communities. The exceptions tend to be communities in close proximity to metropolitan areas. In most major dimensions of human welfare, in health, housing, education, etc., rural people appear to be less well served by society, its private institutions, and public programs. On the other hand, most of the highly valued unpolluted air and water, open green spaces, and outdoor recreation is to be found in rural life.

What economic and social data we have on rural people and their society are inadequate and now often obsolete, having been constructed around concepts that no longer match the transformed reality of rural life. Our rural demographic and social data have never been sufficiently comprehensive for adequate public or private planning purposes or social analysis. The same is true also for urban America. With a rising national interest in the development of social indicators and the measurement of the quality of human life and its environment for public policy purposes, rural social scientists must participate effectively in the development of these national data systems or see the more unique needs of rural life again ignored. If national data systems are to realize their capacity for social science analysis of rural problems, rural social scientists must make a substantial contribution to the conceptualization and specification of these data systems.

What we are faced with is not just a demand for social indicators. This happens to be a very visible portion of the increased demand for economic and especially social statistics on American society [7, 12, 14, 15, 18, 21] There is, in fact, a general statistical reform movement now under way made up of many different strands of interest. There is an overlapping group who perceive the need for a social accounting system which would integrate indicators into a social analogue of the national income accounting system. [15, 18] A vocal demand for vastly improved public program evaluation is also a thread that runs through the pressure for statistical reform today. There are also individuals and groups arguing for more articulated micro data. Somewhat related are the economists who argue for the generation of data from large scale social experiments. [11] The idea of integrating federal statistical files into a data bank has also had some currency in recent years. Finally, there is as well the effort of the statistics profession to improve the standards of statistical professionalism in government which contributes a distinct flavor to the current statistical reform movement. [5] This is not a harmonious concert of voices.

In fact, there is a great deal of confusion and conflict over ends, means, priorities and appropriate organizational format. In any case, your committee is now grappling with the arguments of these various groups and working towards

an agenda for the improvement in the economic and social statistics of rural society. We will not try to review these conflicting views but will attempt to outline our own tentative agenda. In the process a number of these conflicts and points of view will be identified. The point is we are not dealing with rural data problems in a vacuum. There are other actors on this scene who will have a great deal more to say about the outcome than will agricultural economics as a profession. Our problem is to understand what is going on in other forums and to contribute constructively to the ongoing debate over what should be done and how.

Agenda and Issues

We are at an early stage in our thinking about the problems of rural economic and social statistics and the best the Economic Statistics Committee can do at this point is to identify a series of issues and areas of need that the profession should address itself to if rural society is to be better served by its data systems. These areas and issues overlap considerably but come down to a general concern for obsolescence in older data systems and the need for new and better data for the assessment of problems, for the public and private planning process, for evaluation purposes and for effective administration.

1. Developing a new theoretical basis for obsolete data systems is an urgent necessity. The conceptual base of much of the data we have has been made obsolete by the changed nature of rural life and its economic and social order. We must reconceptualize that base. The most clearly obsolete set of concepts are our demographic ideas, and the most obsolete of these is "farm population". There was a day when enumerating population on farms and calling it farm population made some sense. But today, besides our difficulty in defining what a farm is, we find that many farmers do not live on their own or other farms; much of agricultural labor also does not live on the farm; and there are many people residing on farms who are not employed in agriculture. The idea of farm population is practically meaningless today.

Even what is meant by rural population is a difficult conceptual problem. Rural, of course, has always been a residual category to whatever was defined as urban. The Census defines urban population to include all of those persons residing in incorporated cities of 2,500 and over. The rural population therefore included those living in open country and in unincorporated villages or incorporated communities of less than 2,500. Increasingly federal statistics are now formulated on a different basis with the primary distinction being between Standard Metropolitan Statistical Area populations (Counties with a city of 50,000 population or over) and non-SMSA populations. The non-SMSA population is now commonly used as an approximation for rural population.^{5/}

^{5/}Hathaway et al conclude that the SMSA concept is superior. [8]

Whether either of these approaches are adequate is a question. The very notion of "rural" needs to be evaluated in terms of social science theory. Perhaps it is something else entirely that we need to be measuring today if, as some social scientists argue, the rural and urban populations now are so much more alike that there is more variation within rural and urban than between. In any case, we need to be clear about what demographic concepts need quantification. The basic difficulty lies in the fact that the term urban has never been adequately conceptualized and thus one must recognize the interdependence between any effort to reconceptualize the notion of what is rural with that of what is urban.

Improved demographic information is needed both for area and community development as well as local problem solving. Better information is needed on such matters as fertility, migration, and occupational, economic, and social mobility--to name only a few categories.

The other general group of concepts that are clearly obsolete is that of rural labor market constructs. They were never well developed concepts and the strong agricultural orientation has, as rural society has grown, left us with inadequate rural labor market data built around quite obsolete concepts.

2. Better measures of social well being are needed whether in health, education, personal safety, housing, income and employment, or leisure and recreation. But you quickly get into very confusing arguments between those who see the need for social indicators as norms versus what appear to be purely descriptive or positive information. Some also seem to see indicators as a technique in evaluating program performance, not just overall societal performance. In any case it is quite clear that social indicators, however formulated, cannot do all of the things that everyone is suggesting they ought to do. Finally there are some who perceive social indicators as simply a first step toward a comprehensive system of social accounting constructed as an analogue to the present system of national income accounting. The conceptual feasibility of this is directly contested by others as a logical impossibility theoretically. [1] In any case there are more than a few difficult logical and practical problems to overcome before social accounting is a reality. Still others seem to suggest (perhaps because social accounting is perceived as an impossibility) that the national income accounting system be modified to take into consideration some of the external social costs and benefits that need to be considered in social decision making. This, of course, correctly views the national income system as a complex accounting structure which provides all sorts of information. One of the more outrageous intellectual vacuities that has been floating around among some social indicator enthusiasts is the notion that the national income accounts system produces only one piece of information annually, GNP--and that this statistic is useless.

There is a great deal of activity now in this area of concern. The National Science Foundation has funded social indicator research and the National Bureau of Economic Research has an ongoing research program of major

importance. The National Academy of Sciences, the Social Science Research Council, Resources for the Future and Brookings are all interested in various aspects of social indicators or social statistics. An extensive literature has begun to develop. Legislation was introduced again this year to create a Council of Social Advisors to the President with the responsibility for developing an annual social report [10]. Under the direction of the Statistical Policy Division (formerly Office of Statistical Standards), the Office of Management and Budget has undertaken to develop from existing data systems a set of social indicators and a publication format for their circulation. [19] A closely related, if not overlapping, concern is program evaluation.

3. Program evaluation is an increasingly strategic need for which our data systems are now poorly prepared to respond. To the traditional program management emphasis on efficiency in the delivery of public and private services has been added a growing concern for the equity and general social performance not only of public programs but of some of our society's private institutions--such as the medical delivery system. Program evaluation focuses on such matters as clear identification of program objectives, identification of who benefits, how costs are distributed and the measurement of trade-offs between alternative means of attaining a given objective. Rural people are increasingly aware of the fact that they have been systematically short changed in the distribution of public program benefits, if one uses equity criteria of rural-urban population distribution. [3] This entire area of concern is of substantial importance to rural development policy. Sensitivity to this issue has for the first time given it some visibility in current presidential primary campaign speeches. Closely related, if not sort of the same concern, is the greater interest in income and asset distribution.

4. The income and asset distributions of rural society need to be explored. The fact that 40% of United States poverty is found in rural areas has lead to an increasing concern with income distribution. Data which gives only frequency distributions of current income do not allow much real understanding of what generates the income distribution. Education, life cycle savings decisions, the distinction between property and non-property income, all of which are related to age, importantly determine income distribution. Temporary fluctuations in income, which have traditionally been greater for farm people than for others, complicate the interpretation of current income data. New data is needed, but also data now collected needs to be tabulated and cross classified in very different ways.

5. The need for improved environmental quality data parallels the need for social indicators, as well as compliments it. Here the need initially is one of accurate description of what is actually happening to the environment in its several dimensions as well as greatly improved knowledge of the interconnections of various technological and biological systems by which such things as agricultural chemicals become pollution problems. Many agricultural economists are already working hard in many states and in the Department of Agriculture on what is clearly a primary professional responsibility.

6. Knowledge of capital investment structures, while it has been improved over the last three decades, still is well short of our needs for understanding the economic behavior of the society. We need better knowledge of the capital investment process particularly with respect to human, but also physical capital formation. This constitutes one of the primary limitations of our present national income accounts and is a strategic dimension to any understanding of the development process. The problem of understanding changes in productivity of people and physical resources they work with is impeded by poor measures of capital formation. Human capital investments via education, medical care, and nutrition have received increased conceptual attention and there is need now to develop information consistent with these concepts.

7. Time as an economic and social variable needs exploration. The amount and use of non-work time is coming to be recognized as of great importance to people's well being, and yet non-work time behavior is completely neglected in usual measures. A most obvious lack, particularly important for rural people, is information on the amount of time worked. Another lack, also important in the case of rural people, pertains to commuting time, which is great and varies substantially among rural people with non-farm jobs. There is the question of availability and use of various forms of leisure. A good deal of thinking has already gone into time budgeting and provides a starting point for us.

8. Regional and local area development data systems should be developed. Research in regional economics has led to the application of input-output and other more recently developed techniques to the understanding of overall growth of rural areas. The Committee on Regional Accounts and other groups as well as individuals have done a good deal of work on the needs for local area data. Some of these needs tie directly to the social indicators problem. [4]

9. We need industrial statistics on non-food and fiber economic activity in rural areas. As a profession we have ignored this entirely too long and if we are to work genuinely on the problems of rural life and on the further development of that life, we must look far more broadly than just the food and fiber section in our concern for the economy. We need to answer the questions of what are the major needs in this area, for we clearly do not know at this point. How adequate are present data systems?

10. Finally, we need to address ourselves in a general way to the question of what are the unique data needs of rural society--what uniquely rural questions need answering--and how are these to be integrated into the various national data systems? This applies both to older data systems which have never adequately recognized non-metropolitan population needs, as well as to the proposed new data systems now being discussed.

This is a very unsatisfactory way to leave this discussion, but we simply have to admit that we are at a very unsatisfactory stage in our knowledge and in our deliberations on what we need to know and for what purpose. Clearly

better data is necessary for the assessment of problems, for planning purposes, for evaluation of performance and for the administration of the public and private organization of rural life.

So far we have only a limited set of general conclusions. It is quite clear that the greatest flaws in our data systems arise out of our failure to conceptualize social problems in as systematic a manner as possible and to match this with an equal concern for the design of the statistical systems which are to measure the social system phenomena. A critical key to accurate data and successful data systems lies in the adequacy of the theoretical base of the ideas being quantified. Attempts to measure any dimension of social welfare that does not have an adequate social theory base capable of explaining the relationship between the various social entities which we are trying to measure is foredoomed to failure. The major reason the national income accounting system has been as successful as it has is simply due to the great theoretical investment that went into the conceptual foundation of that system. Data systems constructed without an adequate conceptual base are simply ad hoc. They may be statistical systems, but they will have limited normative meaning or descriptive power, will be inadequate when put in place, and will decline in adequacy as time goes on.

Agricultural economists have a major intellectual obligation to contribute to the development of an adequate data system for rural societal needs. This is a must if the rural areas of the nation are to become viable communities of reasonable growth and if rural people are to obtain levels of human welfare comparable with the rest of society. The unique characteristics of rural society are not likely to be recognized in the construction of a national system of social and economic statistics, if rural social scientists do not take an early and active role in the intellectual investments leading to the development of those data systems--a process already well underway.

Organization of Federal Statistical Services

As one pursues the design of new data systems and the modification of older systems, one is forced to deal with organizational issues. Many of these are inherent in all organization and are older than the Federal statistical establishment itself. Others are raised by specific proposals, such as the creation of data systems for various social indicators; still others arise out of current government reorganization proposals and various efforts at statistical reform.

One major such notion is the effort to centralize the Federal statistical system, which the present administration is proposing. How far this centralization is ultimately to proceed remains an open and fuzzy question. One of the earlier proposals involved transferring all of SRS and some of ERS

current functions, at least in data collection and processing, out of the Department of Agriculture. This would be a most serious step. It would further isolate analysis from the management of the data systems, which, as we argued in the introduction to this report, is a problem even now. Considering the treatment of SRS in the past several executive budgets, one has cause to wonder also if such a reorganization were not for the ultimate purpose of doing away with many of the present food and fiber data systems, rather than for their improvement. However, one should not just react defensively. We should think about the question of how best these data systems should be organized. Centralization versus decentralization is a battle as old as bureaucracy and good cases can be built for either approach, depending on the specifics of the situation.

Another issue we should be concerned about is the capacity of our data systems to service the locus of use. Many data systems of the Federal statistical establishment are not very responsive to users. Agriculture is relatively unique for its far more intimate and functional interface with users--which accounts for some of the great strength of USDA data systems. Few other data systems are interwoven as deeply and are as intimate a part of an industry's decision processes. Would centralization weaken this responsiveness to user needs? We need to have an answer. Extremely decentralized systems generally exhibit inefficiencies (e.g., duplication and inadequate scale of operation) and lack of compatibility with other systems of data. Even within government statistical usage there are major issues of service to users to be found in the conflict between administrative needs and policy making requirements. This is a serious conflict that is rarely faced in a direct and thoughtful manner.

A third issue is that of the economics of data collection where the computer and electronic data processing have changed the scale of efficient computational operations so greatly that centralized computer utilities are a logical consequence. Whether this means eventually only one computational center for the entire Federal statistical system is debatable however, particularly if values beside efficiency are to be served at all. If one had to wait as long for data output on crop and livestock market statistics as we do now for Census of Agriculture data, then one might as well quit collecting most data. Since Census is a perfectly competent organization with the greatest computer and data processing capacity in government, the problem would appear to be a question of the priorities given to the Census of Agriculture and thus the resources made available. A very high percentage of the value of all data is perishable. If most data is not timely, the taxpayer would be better served by elimination of its collection.

There are substantial differences in the scale economies associated with the different functions of data systems. While processing exhibits substantial scale economies, the efficient scale of organization for data planning (statistical design) and analysis is very much smaller. But the question is how much?

Collection of data and its distribution probably fall in between in their minimum efficient scale of organization. The Office of Management and Budget's proposed reorganization of the Federal Statistical System would separate into two independent organizations the (1) collection and processing, and (2) the planning, analysis, and distribution functions. [16] How adequate is this approach? What does it do to the integrated functioning of the system and to the effective service of the user?

Access to data and effective integration of statistical data systems is another issue of major importance. Presently it is often impossible for one agency of the Federal government to gain access to the data of another agency on a timely and comprehensive basis. This is due to bureaucratic barriers, and is often defended on the basis of real or imagined limitations of confidentiality. It is a general problem which agricultural users are made most conscious of when any effort is made to use Census of Agriculture data in conjunction with other USDA data where matching of the basic populations is necessary. Since the Census of Agriculture is increasing its use of probability sampling and reducing its dependence on complete enumeration, there is even less excuse. In fact, as the data collection process and statistical methods become more alike, the access problem as well as other issues suggest the logic of combining of these data systems. Monopolization of data by individual agencies is a common problem in the Federal Statistical System and is an intolerable waste of public resources. Protection of confidentiality is a serious legal obligation but hardly an adequate explanation for the failure to allow data to be used for legitimate statistical purposes.

Lack of integration of statistical systems is a general problem. The user faces a multiplicity of unintegrated systems. Private data systems are quite diverse. Many separate Federal, state, and local government agencies manage data systems. Almost no matter what the user's needs, he is involved in piecing together noncomparable data from unintegrated data systems. The increasingly complicated and multiple use demands on data require far more concern with this problem. Rural community and area development planning is, to give but one example, continuously and disasterously plagued by this difficulty.

These are major issues. Yet rapid technological and social change creates an even more important issue. Extremely rapid social change creates situations in which data systems are faced with the necessity of frequent redefinition of what is being measured as well as the necessity to adjust statistical measurement procedures to those changes. Have we not perhaps reached the point where the overpowering organizational issue is not any of the above but rather the question of how you design a statistical data system with the capability of continued adjustment to social change. We must have a competent theory of social information processing before this is possible.^{6/}

^{6/}We are indebted to Edgar S. Dunn, Jr. for much of our insight into this matter [2].

Conclusion

We are faced with a more fundamental problem than failures in individual statistical services or even individual data systems. On one hand, it is quite clear that many of the older data systems now rest upon social and economic theory concepts that simply do not match the reality of the world they purport to explain. Until the question of what is to be measured can be answered with some precision, no data system in the world can function properly. We clearly have failed to renew the intellectual capital originally invested in many agriculture data systems. In addition, we are asking questions which present data systems were never designed to answer. The results, naturally are not very satisfactory. We clearly need to create entirely new data systems in many areas of social and economic statistics, not just for the needs of rural society but for the needs of society as a whole.

The basic problem of the farm sector of the food and fiber industry is primarily one of obsolete concepts. There is a substantial element of obsolescence in the concepts around which the industrial statistics for the rest of the food and fiber sector are constructed. However, in this case the statistical base has never been adequate and further data system development is necessary. Economic and social statistics for rural society reflect a totally inadequate investment in conceptual and statistical development. We have a large task ahead of us. In executing that task we must not fall into the trap of simply tinkering with the existing data systems and their institutional framework. We must be able to proceed from a theory of social information processing to the design of a comprehensive fabric of national data systems which have the internal capacity for redesigning themselves to accommodate the continuing social changes of a modern post-industrial society.

In getting our responsibilities in this task underway, the Economic Statistics Committee requests your help. We would appreciate having your critical reactions to the ideas (or omissions) of this paper as well as your own ideas about the nature of the problem. We need suggestions or ideas for reconceptualization of our data systems. Finally, the Committee would like to have a sense of where the profession believes gaps or inadequate data now exist and where the priorities should lie.

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