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INSTITUTIONAL FACTORS AFFECTING THE ADOPTION OF AGRICULTURAL
SECTOR ANALYSIS METHODOLOGY IN LDC'S

H. Klein and T. Roe



Department of Agricultural and Applied Economics

University of Minnesota
Institute of Agriculture, Forestry and Home Economics
St. Paul, Minnesota 55108

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by

H. Klein and T. Roe*

I. INTRODUCTION

Major efforts have been undertaken to both develop and apply large scale agricultural sector analysis models (ASA) in a number of LDC's. Well over a dozen LDC's have ASA models either in advanced or final stages of development including Brazil, Columbia, Egypt, India, Ivory Coast, Korea, Mexico, Nigeria, Pakistan, Thailand and Tunisia to name some of these (13). All of these efforts have been funded for development and directed by foreign donors with heavy participation by FAO and the U.S. Agency for International Development. These ASA models have been developed under a wide variety of circumstances; some have been devised almost wholly by foreign technicians while others have been joint efforts between foreign technical advisers and host country nationals.

Most of the literature in this area has focused on the theoretical and analytical problems that have to be confronted in model development. However, there is very little data concerning the institutionalization of ASA modelling techniques within governmental decision making and planning processes (3, p. 35). What little data there is does not look encouraging. A 1972 USAID study evaluated agricultural sector studies to that date and concluded that the utilization rates of these ASA efforts was quite low and, with few exceptions, the resources expended in these efforts were

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not justified by their usage. Interestingly, the study concluded that there did not appear to be any relationship between the utilization rate and the quality of the ASA effort, (10).

The general purpose of this paper is to consider some issues and constraints relating to the process of using ASA as an operational piece in the on-going policy decision making process of a developing countries host institution. We shall attempt to elaborate from our experience what some of the constraints on the institutionalization of ASA techniques appear to be and to introduce some notions on how ASA efforts might be modified to alleviate or to better deal with these constraints. These issues are considered in light of (a) the generally competing need to maintain a sufficient degree of model or technique isomorphism so as to yield insights into the fundamental directional and magnitudinal impacts of policy instruments on variables (activities) endogenous to the private sector, (b) the data, resource and human capital endowments upon which an ASA effort is based and constrained, and (c) the organizational structure of the institution hosting the effort and/or the institution in which the effort is based. For our purposes here, we accept the premise that sector models comprising at least some comprehensiveness and detail of the agricultural sector are useful policy formulation and evaluation tools, among other uses, and that they offer competitive alternatives to the sole use of other methods in many LDCs.

The plan of the paper is to first briefly, and non analytically, describe the agricultural sector analysis framework developed in Tunisia

and to identify the principle participants involved in its construction. The intent of this section is to provide a glimpse of the product in order to focus the discussion on the constraints and issues considered in its development. Next, a review of the literature is presented for purposes of highlighting the concern others share for actually using these frameworks as a comprehensive policy-decision making tool in LDC's. Then a discussion of the issues and constraints which appear to effect the institutionalization of ASA methods in Tunisia is presented.

II. DESCRIPTION OF THE TUNISIAN ASA MODEL

The sector analysis model was developed in Tunisia. The model is in the tradition of the Mexican ASA model (5) in the sense that a linear programming algorithm is used to solve it and in the sense that the procedures for incorporating nonlinear relationships into a linear programming format (6, 12) are also included. A statement of the initial version of the model appears in (11) and a later version in (4). The present version of the model represents substantial inputs and efforts by FAO and by our Tunisian counterparts who now have full responsibility for and control of the model.

The model is static and small by linear programming standards having about 400 rows and 1800 columns. It is specified so that activities identify four regions of the country, where traditional modern and government farms are identified in each region. Within each region, production activities are specified for the major enterprises of wheat, feed grains, sheep, cattle, irrigated crops produced in and out of season and tree crops.

Resource transfer activities are also specified and include seasonal labor, machinery, credit, fertilizer and forage and for traditional farms, household consumption.

The constraints are specified to capture the regional seasonality of irrigated land, water, labor, and machinery use. Also included are commodity balance equations, and zero balance constraints reflecting livestock feed activities. A set of convexity constraints also appear and correspond to the demand functions for wheat, feed grains, legumes, various irrigated crops, mutton, beef and various fruits. The most recent addition to the model has been the incorporation of Cobb-Douglas production functions for four different varieties of wheat.

Other sectors of the economy are included exogenously in terms of the capital, credit, construction materials and other resources that they have historically supplied to the agricultural sector.

The points of view of others concerning the use of these techniques in a policy-decision making environment are presented below.

III. THE PERSPECTIVE OF OTHERS ON THE ADOPTION OF ASA METHODS

The literature suggests that over the last five years some attention has been given to the problem of using ASA frameworks as an operational tool in the planning process. In an earlier paper by Atkin and Rossmiller (1), they pointed out that sector analysis and system simulation is a "... very useful fool in the decision makers toolbox..." but concluded that it is not a panacea to any of the policy decision makers problem. In his 1974 paper "General Systems Stimulation Models for Sector Analysis", Glenn Johnson (8) reflected his concern for the problem of using analytical

frameworks in the policy-decision making processes when he pointed out the distinction between problem-solving research and disciplinary research. He pointed out that while the former is designed and focused to find solutions to problems faced by real world decision makers it is often a difficult task which does not seem to be well suited to a strict interpretation of the scientific method. Similarly, Thorebecke (13) concluded "... that a large gap exists between what the models can deliver and what the users need and desire for policy formulation purposes." More recently, Bassoco and Norton (2) demonstrated how the results might be formulated from a single sectoral model in a manner and form to shed some light on a rather wide variety of issues of concern to agricultural policy makers. Yet, difficulty exists in assimilating these techniques into an ongoing policy-decision making process.

In our opinion, Kornai (9) very incisively lists nine lessons drawn from his experience in institutionalizing mathematical models developed for planning purposes. While our summation of this article does not do it justice, he essentially emphasizes the need for allocating resources to maintain a continuous dialogue between model builder and planner even at the expense of decreasing the "mathematical completeness" of a model. In a similar vane of thought Sherbini (7) was perhaps on the right track when he suggested that at least part of the problem of institutionalizing sector analysis efforts into the decision making process is related to behavioral organization problems such as motivational, structural and communication constraints. He suggests that using sector analysis to demonstrate how it can be used to improve policy rather than change it tends to engender support on the part of central decision making authorities. He points out

that organizations tend to be compartmentalized and self contained, thereby reducing coordination and that "... feedback communication is invariably weak and provides poor channels for sector analysis."

These views suggest that the resources, structure and behavior of host institution(s) in developing countries play a critical role in the adoption and effective use of ASA methodology. Consequently, the extent to which structural and behavioral factors are considered and incorporated into the design and use of ASA methods, the more effective these methods may become in the policy decision making-implementing process.

IV. EXPERIENCE AND INSIGHTS DRAWN FROM TUNISIAN EFFORTS

The background to our efforts in Tunisia that are important to highlight the issues advance here are: the point in the hierarchical decision making structure in which the ASA was present, the data, human and other resources at the disposal of the ASA effort, the portfolio of activities assigned to the effort and briefly the nature of the planning process.

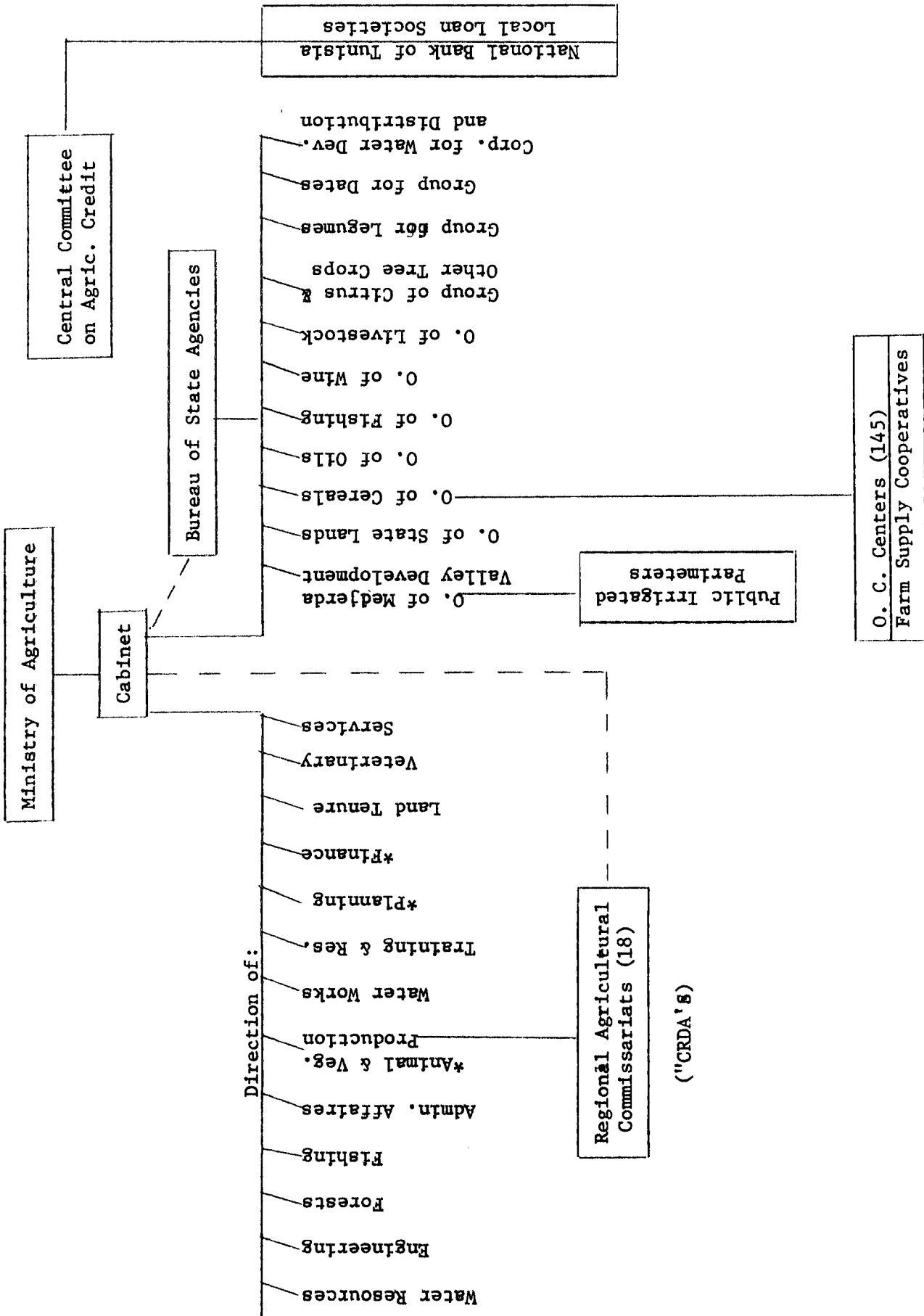
Briefly, taking the above topics in order, Figure 1 approximately depicts the organogram of the ministry of agriculture. The directions appearing on the left perform the functions of information supply and to some extent policy analysis. The offices appearing on the right are program implementing agencies. The division of regional services refers to approximately 12 regional offices located throughout the country in administrative regions referred to as gouvernorats. These regional

offices primarily supply extension services and perform various data collection and monitoring functions.

The ASA efforts were located in the direction of planning, formally referred to as the Direction of the Plan, Economic Analysis and Project Evaluation. The organogram of this bureau appears in Figure 2. This Direction is composed of the four divisions with a total of about 15 people training through USAID funding to the equivalent level of a U.S. Masters of Science in Agricultural Economics plus a cadre of people with various lower levels of college training. The available data base at the initiation of the sector analysis effort was "meager".

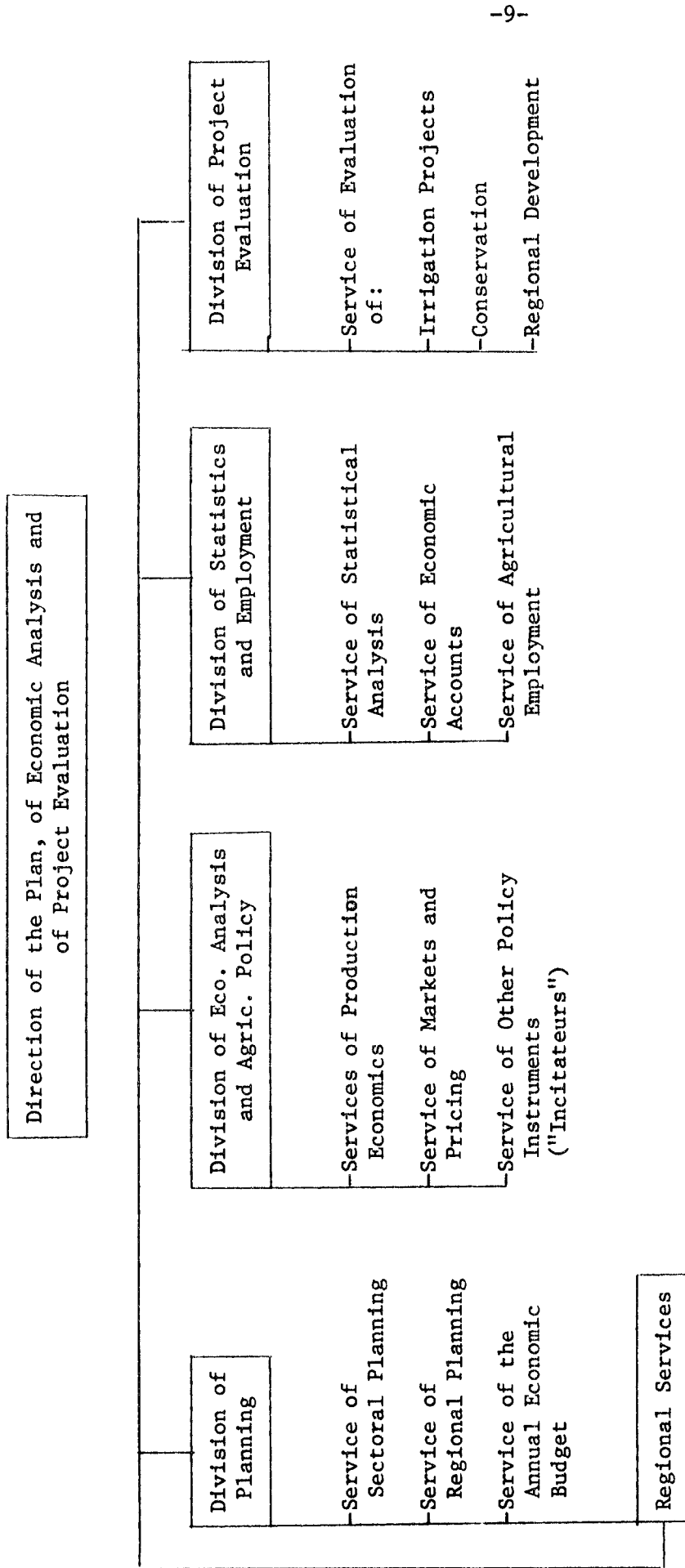
The portfolio of activities ascribed to the ASA effort included the design of an annual planning system and the development of an initial version of an agricultural sector analysis model, both to be located in the Division of Planning (Figure 2). The initial endowment of resources to undertake this activity included two counterpart Tunisians trained to the Masters of Science level in Agricultural Economics, a small cadre of technicians and the right to request data and other special services from the other Divisions in the bureau, in addition to the use of an IBM 360 computer.

While time and space do not allow the opportunity to discuss in depth the nature of the planning process some of its important characteristics can be highlighted. The formal planning process in the Ministry of Agriculture includes the periodic development of a series of documents listing publicly supported projects, data describing the recent history of agricultural production by subsector and its structure, and some subsector



* = Staff planning responsibility
 0 = Office

FIGURE 2



Personnel located at CRDA's

FIGURE 2

input and crop projections over the period of the plan. Committees representing the various Directions and offices appearing in Figure 1 partake in this effort which is organized and directed by the Direction of the Plan (Figure 2).

Now, from this background several constraints to institutionalization of a sector analyses methodology becomes apparent. First, the Direction in which the effort is located is not at a pivotal point in the hierarchical structure so that the composition of the central decision making authority is not obvious. This increases the difficulty of:

- (a) formulating and articulating policy objectives,
- (b) identifying policy constraints and the mechanism that establishes these constraints,
- (c) identifying policy instruments (and their dimensions) over which central authority has discretion and the degree of discretion,
- (d) developing a dialogue necessary for alternative strategy evaluations and eventual strategy selection, and
- (e) considerable effort and time is required to assess the analyses underway in other Directions and evaluate their results and importance relative to the total policy-making effort in general and the sector analysis in particular.

Another set of difficulties attributed to the structure is the need for coordination between the Directions on the one hand and the offices on the other. This implies that a "good" policy strategy derived from an empirical analysis may be very inefficient when

consideration is given to the Offices capacity to implement, monitor and control the program implied by the strategy. Thus, in order to concentrate the analysis on alternative strategies that are feasible in a program implementation sense, a dialogue must be maintained with these offices. Thus, since it is not the discretion of the foreign advisor-technician to modify the organizational structure to better fit his sector analysis efforts, ASA efforts must be modified to fit the structure or at least take into consideration these structural constraints.

With this background the issues considered in developing the sector framework can be presented chronologically. The strategy followed in developing the framework was that the maturation and institutionalization of ASA would be determined by the amount of utility it would provide the Direction (Figure 2), relative to its cost in terms of personnel and other resources consumed in its development.

The issues perceived as important included: (a) the need to rely, as much as possible, on data and sources of data collected and obtained through normal government channels, (b) the construction of an analytical framework in a manner which maintained, in the "eyes" of our counterparts, a progression from field data through manipulative stages and finally, to model coefficients, (c) the specification of a model and selection of a technique whose complexity did not exceed the capabilities of our counterparts, (d) the specification of variables whose resolution, time, space and form (products, inputs) dimensions were as close as possible to the very instruments and variables of importance to decision making by the Direction and the Ministry.

To elucidate the above issues, the need to rely on traditional data sources in addition to the resources required to collect field data was primarily to ensure that once the model was constructed, its need for periodic updating would not be constrained by the need to allocate resources for purposes of obtaining the needed data. However, recent events seem to show that this was not a problem as the data collection capacity and quality have been improved considerably. In the case of (b) above, the progression from field data to model was important as a training device in model construction and it also provided for consistency checks. That is, the raw data were converted into regional budgets. This allowed for consistency checks with other estimates of regional product and input supplies and also helped provide our counterparts with a better initial perspective on the agricultural sector.

The specification of the model to reflect the instruments and constraints which are within the realm of the policy makers authority to manipulate, is, in retrospect, perhaps one of the most important considerations determining the eventual complete institutionalization of the method in the policy-decision making process. It also is perhaps the most difficult. While the Tunisian ASA model is decomposed regionally and subsectorally, further decomposition would yield additional utility to the Direction. This follows because the program implementing functions of several of the offices rely on instruments and resources that are more decomposed than those appearing in the model. Furthermore, some of the variables appearing in the model are not at the discretion of the ministry of agriculture to manipulate. For instance, agricultural product prices

and the prices of imported agricultural inputs are instruments at the discretion of the Ministry of National Economy and the Ministry of Finance. Consequently, policy analysis based on these instruments tended to engender little interest on the part of the Ministry of Agriculture officials. On the other hand, instruments that were later discovered to be at the discretion of the ministry, such as storage and transportation services, do not presently appear in the model. This obviously suggests directions for future modifications of the Tunisian model.

The desirable degree of instrument "resolution" (i.e., the time, place, form) and control, and the "real" objectives are often even difficult for policy-decision making authorities to articulate. To comprehend fully the array of instruments and structural characteristics at the disposal of the policy makers implies a need to understand the policy-making process, the capacity and effectiveness of the policy implementing machinery and to be aware of the human frailties and general behavior of these institutions. We suggest that this is the importance of the dialogue between model builder and planner as discussed by Kornai (9) and the need to consider the institutional constraints as advanced by Sherbini (7).

It also appears to us that plans designed for making ASA techniques an integral part of the policy-decision making and program implementing framework of a ministry delegated with this responsibility, must recognize and take into consideration that traditional channels for information flow between policy-decision making authorities and program implementing agencies have developed over a period of time. Consequently, these

traditional methods and channels have become institutionalized or at least have developed an inertia in terms of the ways to make decisions and take action. The more closely the use of ASA techniques can be made to accommodate and to rely on these traditional structures, the more quickly it is likely to become part of the planning process. If the traditional organizational structure is such that ASA techniques cannot be designed to accommodate and rely on these traditional structures, then it is our notion that they must be associated (in dialogue - and office location) as closely as possible with the decision making authorities themselves.

V. CONCLUSIONS AND IMPLICATIONS FOR FUTURE ASA EFFORTS

This paper focused on factors affecting the institutionalization of agricultural sector analyses (ASA) as a useful policy-decision making tool in developing countries. We suggested that the difficulties faced in institutionalizing sector analysis efforts are probably common to these efforts. These difficulties are associated with the resource, structure, and behavior of the host institution(s) in the developing country which should be taken into consideration by the ASA analysts if these methods are to exert an important influence on the policy decision making process.

We would also like to raise the following question: since sector analysis experts are willing and seem interested in incorporating instruments common to policy-decision making problems in their analysis, are there not perhaps even more important though subtler issues that should be considered in the design and use of ASA frameworks? Should some

consideration be given to formalizing some aspects of the policy formulation implementation, feedback and control process into ASA frameworks? After all, at the farm management level, farm plan formulation and implementation types of issues are commonly considered by agricultural extension economists. For example, we suggest the notion that it may be desirable, in so far as possible, to actually include in a model some of the physical activities of offices or agencies responsible for program implementation. This may provide insights into administrative contradictions and inconsistencies, and in so doing, provide an additional degree of utility to the policy-decision making authority.

There is an additional notion that we would like to suggest. The difficulty of developing an analytical economic model which meets the tests of explaining observed behavior and predicting future values of endogenous variables is a difficult task. If we wish to include in our empirical frameworks the instruments and other variables that are inherent in the existing policy-decision making implementing apparatus (assuming that we can't change it to fit our analytical methods) this is likely to make it yet more difficult to construct models to meet traditionally or classically established explanatory and predictive criteria.

While this criteria is desirable, its application to analytical efforts of this type often results in a decision not to model some phenomenon or to model it in a manner such that the variable it seeks to predict and structure it seeks to capture are at a "resolution" or degree of aggregation that is of little utility to a policy-decision makers. Its of little

utility because they are constrained to a given set of instrument whose dimensions are critical to the implementing agencies of the ministry.

Another validation criterion can be suggested which has more intuitive than analytical appeal. The criterion advanced in (11) is simply the answer to the question, does the analytical tool help make "better" decisions than the previous mix of methods used? "Better" decisions in the sense that because of the use of the tool, the consequences of the policy formulation-implementation activity produces results that are in closer agreement with the targets or objectives for which the policy was designed than would have otherwise been the case.

FOOTNOTES

* H. Klein is an Assistant Professor, School of Management, Temple University, Philadelphia, Pennsylvania and T. Roe is an Associate Professor, Department of Agricultural and Applied Economics, University of Minnesota, St. Paul, Minnesota. Professors Klein and Roe were associated with a USAID-University of Minnesota Project in Tunisia during the period 1972-74 and have maintained consultant contact with the Ministry of Agriculture since 1974.

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