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THE IRRIGATION ADVISORY SERVICE: A PROPOSED ORGANIZATION FOR IMPROVING ON-FARM WATER MANAGEMENT IN EGYPT

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Mohamed Sallam, Mohamed Naguib, Abdalla Saber,
Abdel Fattah El-Masry, Ahmed El-Attar, Essam Ezz El-Din
Farouk Abdel Al Omar, Farouk Hassanein, Hoda Hussein Dweeb,
Sohair Kamal Yousef, Yousria Allam

As Compiled By:

James J. Layton

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Colorado State University
Engineering Research Center
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USA

Consortium for International
Development
5151 E. Broadway, Ste., 1500
Tucson, Arizona 85711 USA

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ABSTRACT

In order for an irrigation system to be managed most effectively, all aspects of the system must be taken into consideration. On-farm development is frequently left to the farmers' initiative alone. However, in order for such development to occur in the most effective manner, some technical help is generally needed. The establishment and operation of an on-farm advisory service can provide the mechanism whereby the needed technical help may be diffused to the farmers. The purpose of this paper is to look at two crucial issues involved in establishing such an Irrigation Advisory Service (IAS) in Egypt.

First, there is a discussion on whether or not the circumstances in Egypt will allow for an IAS to be established. Second, there is an examination of the critical parameters of organizational development which need to be addressed when attempting to establish an IAS. The presentation in this report is designed to sensitize the government of Egypt to the issues involved in establishing an Irrigation Advisory Service and provide them with the guidelines which need to be examined in making policy decisions about such an organization.

Arabic Abstract

نبذة

أنه ضروريا أن يؤخذ في الاعتبار كل العوامل التي تؤثر في نظام الري عند تطويره وان هذا الجانب متروك حاليا للفلاح كلية. ولكي يتم التطوير بطريقة فعالة لابد من الاستعانه بالمعاونات الفنية وذلك باستخدام المرشدين الفنيين وذلك لمساعدة الفلاح.

يركز هذا التقرير على عاملين أساسيين في الخدمة الارشادية وهم:

أولا: هل الظروف الحالية يسمح بتطبيق هذا النظام في مصر؟

ثانيا: جس نبض للمسؤلين ومدى تحمسهم لتطبيق نظام الخدمة الارشادية لتطوير نظام الري في مصر.

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A Proposed Irrigation Advisory Service

By:
The Sociology Discipline As Compiled By
James Layton

INTRODUCTION

In order for an irrigation system to be managed most effectively, all aspects of the system must be taken into consideration. One of these aspects involves the management of water at the on-farm level. While the notion of on-farm management has been accepted, the development of efficient irrigation practices at this level has been frequently left to the farmers' initiative alone. If such development is to be made more effective, some technical help is needed and that technical help can be made available through an irrigation advisory service. The purpose of this paper is to look at the critical issues involved in establishing an irrigation advisory service in Egypt.

Given the highly complex nature of establishing an Irrigation Advisory Service (IAS) within an existing governmental bureaucracy, the scope of this report will have to be very limited in order to represent the work of the Egypt Water Use and Management Project (EWUP). What EWUP has done regarding this issue is to demonstrate how an IAS may perform in Egypt and to delineate the critical parameters which need to be taken into consideration if an IAS is to be established within the Ministry of Irrigation.

Essentially, EWUP was looking at how new practices should be introduced to the farmers so that these practices would become part of the farmers' existing irrigation behavior. Two general sets of findings emberged for the work of EWUP. First in examing the general circumstances surrounding the interaction between EWUP and the farmers as an innovation was introduced, EWUP's experience generally supported other major findings in the study of innovation-diffusion. (Havelock, 1973). Next it became apparant that there

needs to be some type of organizational body assigned the responsibility of working with the farmers concerning these innovations if the new ideas are to be introduced in a systematic and effective manner.

This type of organization will be called, for our purposes here, an irrigation advisory service. This report will discuss what should be taken into consideration in order to establish such an advisory service. The discussion will commence with a specification of the circumstances in Egypt surrounding such an issue. These will include how some government officials perceive the knowledge level of farmers regarding irrigation practices and what they see are some possible improvements to the existing situation. Next EWUP's experience in introducing new practices will be delineated in terms of basic innovation-diffusion categories. The second section of this report will look at the organizational parameters which should be included in establishing any IAS. The scope of the report will be limited in that what will be presented is a general outline of the situation in terms of introducing an IAS in the Ministry of Irrigation (MOI). All the ramifications of implementing such an organization in the MOI cannot be presented here and such a detailed discussion will need to be conducted by the appropriate Ministry officials.

THE CIRCUMSTANCES FOR AN ADVISORY SERVICE IN EGYPT

The first question which needs to be asked regarding the establishment of an IAS is whether or not such a service is necessary. To begin with, let us look at what an irrigation advisory service can do for the farmers.

The few countries who have developed particular schemes; Mexico, the United State, France, and Spain; have focused on three major aspects of on-farm irrigation practices for which the organization can be used. (Sargadoy, 1982) The first area of advice pertains to the actual irrigation practices themselves, i.e., applying the correct amount of water at the right time, the management of poor quality of water, proper drainage practices, and so forth. Next, the advisory service provides the farmer with help in terms of proper field preparation and field layout design. Third, an advisory service can work with the farmers in their efforts to organize themselves in cooperative arrangements with regard to various irrigation situations. In short, an irrigation advisory service can serve as a vehicle to provide the farmer the technical expertise needed to effectively improve that farmer's irrigation practices.

The Egypt Water Use and Management Project developed programs to address each of these three aspects of on-farm irrigation practices. This was done based on the perceived need by the government to improve the knowledge level of the farmers regarding specific practices. Figure 1 shows the results of a survey of government officials in both the Ministry of Irrigation and the Ministry of Agriculture concerning the knowledge level of farmers of particular aspects of the irrigation system. The sample for the survey consisted of governorate, district, and local officials in the Kafr El Sheikh and Minya governorates. Results from this survey show that the government officials believe that farmers can improve their knowledge level in many aspects of the irrigation system and thus a situation exists where an IAS may prove to be a valuable source of help.

Given this information, EWUP started to serve as a type of advisory service by introducing new ideas and improving the knowledge level of the farmers in the previously mentioned areas of irrigation management. Generally, the new ideas introduced concerned themselves with the improvement of various field designs, the proper application of water for the crops, the introduction of improved delivery and drainage system techniques, and the use of various agronomic practices in conjunction with proper irrigation methods. (Yousef, 1984). There was also a concerted effort to work with farmers in establishing water users' associations. A detailed description of this effort is presented in another technical report. (Layton, 1984)

In evaluating EWUP's work with the farmers three conditions were examined: (1) whether or not the farmers were willing to adopt new practices, (2) how would the farmers respond to an IAS, and (3) what procedures proved effective in working with the farmers. The findings of this evaluation present a general picture of how the farmers would accept an IAS and what that IAS should look at when working with these farmers.

The results of this work, in terms of farmers involvement, demonstrated that the farmers were willing to learn new techniques if those techniques were feasible. Also, the farmers demonstrated that they were able to make rational decisions in the evaluation of specific practices. The major findings include the following:

The farmers were able to discriminate the various effects of the different items in the total innovation "package" introduced to them, and viewed some of those items more positively than others.

FIGURE 1. Perceived Knowledge Level By Farmers of Specific Irrigation Practices

1. Rather Good to Excellent

   - Tillage and Land Leveling
   - Field Layout and Border Design

2. Rather Good

   - Rotation Schedules Along The System
   - Marwa and Furrow Design
   - Mesqa Maintenance Procedures
   - Soil-Water-Plant Relationships For Crop Production

3. So - So

   - Water Application Scheduling
   - Water Application Per Plant Stage Of Growth
   - Field Water Distribution For Good Infiltration
   - Private Drain Maintenance Procedures
   - Water Allocation Procedures Of The Canal System
   - Soil-Water-Plant Relationship For Soil Quality Maintenance

4. So - So to Rather Poor

   - Public Delivery Channel Maintenance
   - Delivery System Maintenance Procedures
   - Public Drain Maintenance
   - Drainage Practices For Salinity Water Table Control
   - Night Irrigation Water Supply

Techniques which place undue financial burdens on the farmers were rejected. Farmers looked for cost effective solutions to their irrigation problems.

Land leveling was seen by the farmers as extremely beneficial. EWUP however, did much of the leveling work along with the farmers; and the farmers stated that due to the cost and lack of available equipment they probably would not continue the practice.

Items like plastic lining which deteriorated in the field were rejected by the farmers.

Even though the farmers saw positive results from the elimination of field drains, they continued to use them because they felt that other factors in their fields required drains.

The introduction of new agronomic inputs was made more difficult because many of these items could not be procured by the farmer at the cooperative. EWUP helped obtain some items.

The farmers understood the notion of water control and how the various practices introduced to them affected that control.

In terms of the actual introduction of the new techniques by EWUP, it was found that the farmers would indeed respond to an organization, like an advisory service, set up to work with the farmer. The major findings regarding this aspect of the work are as follows:

The farmers were rational decision makers who were knowledgeable about their lands and have reasons for doing what they were doing.

The farmers were willing to change if the new practices and the circumstances surrounding them demonstrated that such a change was appropriate.

The farmers generally were willing to cooperate with EWUP and performed the new practices requested.

The farmers asked for advice to improve their practices. Farmers outside the Project sites inquired of EWUP about working with them.

The farmers sought to understand the new practices introduced.

The farmers were willing to use their own resources, in concert with the assitance provided by EWUP, to make the necessary modifications to improve their situation.

What was also found was that there are proper and improper methods used by EWUP which facilitated the introduction of the new techniques to the farmers, or hindered that process. Following is a list of findings which pertain to this point.

There were effective procedures used to contact farmers and to work with them. These procedures included how to contact the farmers, what to say to them, and how to work with them. Violation of these procedures resulted in many problems.

EWUP had to explain to the farmers the purpose of each practice, how the practices were to be implemented, and the results of those practices.

There was a negotiation process which occurred between EWUP and the farmers in order to effectively introduce a new idea. No practice was introduced unilaterally by EWUP.

The farmers preferred demonstration, but they also valued "expert" opinion in deciding whether or not they would accept a new practice. EWUP persuaded many farmers to try a new idea without those farmers seeing the anticipated results.

The farmers looked at the results of a new practice as it was being demonstrated. This outweighed, in many instances, what EWUP had told them; especially if the results were contrary to the promises given by EWUP.

The need for coordinating EWUP's work with the farmers' practices was crucial in the introduction of any new activity.

The most difficult problems which occurred between EWUP and the farmers were due to circumstances which prohibited EWUP to fulfill its obligations. Basically, the cause of these problems were with the contractors not meeting their schedules and performing unsatisfactory work.

The infrequent use of coercion had a mixed result. In many instances the threat of coercion failed in working with the farmers.

What can be summarized from the findings of EWUP's work with the farmers is that there is indeed a need to help the farmers improve their irrigation management practices. This need is not perceived by the government only but the farmers are also willing to work with the appropriate authorities to change their practices. However, in order for that change to occur, the advisory service needs to understand who they are introducing the change to, how well the new technique will fit into the circumstances of the farmers, and how the introduction should proceed. Again, a detailed discussion of the proper ways of introducing an innovation should be presented, but it is out of the purview of this paper. Havelock (1973) provides a basis for such a discussion.

Given these findings, what needs to be asked next is does the existing organizational arrangements within the Ministries of Irrigation and Agriculture provide the necessary support to help the farmers in the way they should be helped? Officials from the two ministries, as reported in the previously mentioned survey, perceive that some improvements in the government are necessary to provide such support. First, the officials were asked what they perceived were some general approaches needed to be taken to improve irrigated agricultural practices. (Figure 2). The general results show that what the government would like to improve are functions which can be performed by an IAS; i.e., improving communication among government agencies, improving communication between the government and the farmer, improving techniques to introduce changes to the farmers.

In exploring this topic of how the government may be mobilized to improve the farmers' irrigation practices, EWUP examined what the government perceived were possible organizational alternatives to address the problems at hand. From the previously mentioned survey, the government officials were asked three major questions.

FIGURE 2. General Approaches to Improve Irrigated Agricultural Practices

1. First Priority to Extremely Important

   - Establish local governmental demonstration plots.
   - Establish better coordination and communication in planning among the different agencies in the government.

2. Extremely Important

   - Improve the extension skills of the district and local officials.
   - Improve the informal dialogue between the farmers and the officials.
   - Improve the communication of present research to the farmers.
   - Increase professional responsibilities and rewards for good extension work.
   - Develop and make available educational materials and equipment for extension.
   - Use the mass media more.

3. Extremely Important to Rather Important

   - Improve communication of present research results to irrigation and agricultural officials.
   - Improve the relations with the farmers and develop a better understanding of them.
   - Stricter enforcement of present irrigation and agricultural laws and policies.

(1) What are the major constraints to effective extension work?

(2) What can be some modifications of the government's operations in extension?

(3) What can be some alternative organizational actions established to facilitate irrigated agriculture extension improvements?

The term extension is used because an IAS essentially serves as an extension component for the Ministry of Irrigation in introducing new ideas to the farmers. These questions were asked to obtain an understanding of how the Ministries of Irrigation and Agriculture viewed the necessity of changing the existing organizational structure to improve the farmers' irrigation practices. Figures 3, 4 and 5 provide the results of the survey.

Based on this survey, the following major points can be made. The sample of the study views the major constraints to extension in two general categories: (1) the conservative nature of the farmer and (2) the lack of resources available to properly support an extension service. These officials also agree that some modifications in the present system can be made in terms of improved training of personnel, better implementation procedures, and improved information exchange capability. In fact, the sample of officials also showed some interest in changing the existing organizational structure to help improve the farmers irrigation practices.

To conclude this section on the circumstances necessary to support an irrigation advisory service, the essential point to be made is that an IAS can serve as a viable organizational alternative in Egypt to help the farmers improve their irrigation practices. Work by EWUP has demonstrated that the farmers can accept change, despite what the government officials think, and they are willing to work with the government if the relationship between the two parties is appropriate. In looking at the perceptions of the government officials in the Ministries of Irrigation and Agriculture toward this topic, they see that the farmers' circumstances can be improved and they are willing to explore some basic organizational changes to help the farmers improve their irrigation practices. So, the circumstances exist in Egypt to discuss the establishment of an irrigation advisory service. How to specifically establish such a service in Egypt cannot be answered at this point in time because such an issue needs to be debated very carefully within the government. What will be presented though, is a discussion of the general criteria which needs to be examined before such a service can be successfully developed.

FIGURE 3. Constraints to Effective Extension Work

1. Serious Problem

   - Inadequate support resources for extension work.
   - Farmers' indifference to national needs.

2. Serious to Moderate Problem

   - Conservative nature of the farmer.
   - Scarcity of extension aids and materials to be used.
   - Insufficient professional/personal incentives for extension efforts.
   - Insufficient authority/ability to enforce requirements.
   - Farmers' limited knowledge and ability to understand new practices.
   - Too few people assigned to extension duties.

3. Moderate to Slight Problem

   - Farmers not voluntarily accepting the advice of authorities.
   - Inadequate training/experience of those with extension responsibilities.
   - Limited reliable new information to extend.
   - Wrong type of officials given extension duties.
   - Farmers' disinclination to cooperate among themselves.

FIGURE 4. Modification of GOE Operations in Extension

1. Essential to Quite Important

- Establish village irrigation demonstration plots.
- Train officials in extension skills.
- Train officials in irrigated agriculture technical knowledge.
- More and improved applied research for new knowledge to be extended.
- Inspect field conditions for evidence of information needed by farmers.
- Improve the condition for information exchange among the government agencies.

2. Quite Important to Minor Importance

- Ensure stricter enforcement of present irrigation policies and laws.
- Develop new extension materials.
- Call occasional village meetings to discuss irrigated agricultural problems with the farmers.
- More and better research and recommendations to improve government policies to enhance the extension service.
- More information given to the farmers.
- Make knowledgeable officials more available to answer farmers requests.
- Establish regularly scheduled lessons for improving the farmers knowledge of irrigated agriculture.

FIGURE 5. Alternative Organizational Actions to Improve Extension

1. Essential to Quite Important

   - Create a new joint irrigated agriculture extension service for both ministries to replace the present one.
   - Create a new division in the MOI for village level extension.
   - Create a new organizational arrangement of coordinating applied work of the Irrigation and Agriculture Research Centers.

2. Quite Important to Major Importance

   - Create a new joint ministries irrigated agriculture planning and coordinating group at the Ministry level.
   - Add irrigation extension responsibilities to the present village level agricultural extension.
   - Give the district engineer new extension responsibilities in irrigated agriculture.

INSTITUTION BUILDING: ESTABLISHING AN IRRIGATION ADVISORY SERVICE

The establishment of an IAS in the government constitutes a phenomenon known as institution building: the planning, structuring and guidance of new or reconstituted organizations which (1) embody changes in values, functions, physical and/or social technologies; (2) establish, foster and protect new normative relationships and action patterns; and (3) obtain support and complementarity in the environment. (Eaton, 1972: 22) When as IAS is created a number of parameters must be taken into consideration in order to ensure the proper linkage to the necessary aspects of the existing institutions surrounding the IAS. One set of parameters involves the internal make up of the new service and the other set of parameters consist of the external linkages necessary to connect the IAS to other government agencies and to the farmers. The components of an IAS which need to be taken into consideration when establishing such an organization are doctrine, the program, resources, the internal structure, and the external linkages. The discussion about the internal components of the IAS draws heavily from Maunder (1981) and Vlachos (1971).

Doctrine

Before an IAS can be effectively established, the general rationale for having such an organization needs to be clarified. This means that the values, objectives, and operational methods of the organization need to be specified by the government. The Egypt Water Use and Management Project has emphasized two major processes which are seen as necessary guides for the function of any advisory service. The first process is that of an action oriented systematic research procedure which guides the IAS into appropriate work activities. Second, an IAS should be composed of an interdisciplinary team including professionals from at least the following disciplines: agronomy, economics, engineering, and sociology. This will provide the most comprehensive and effective means to solve basic problems at the farm level and thus make the IAS most viable.

Program

A program is defined as those actions which are related to the performance of functions and service constituting the output of the organization. Maunder presents a discussion of how a program for an IAS should be planned.

1. Base program planning upon careful analysis of factual situations. All of the relevant and available facts bearing upon the land, the people, the homes, the customs, the communities, the organizations, the institutions and the agencies operating the area should be taken into consideration. Examine these facts in relation to the objectives of the organization. The results of previous plans should be summarized and appraised. Sources of factual material include research work applicable to the area, and problems under consideration; census reports; reports of planning commissions; surveys and studies of local conditions and the experience of participants in the planning process. Assemble this material by problems or subjects, and in a form facilitating the inclusion of additional information as it becomes available.

2. Select problems for action which concern recognized needs. Not all problems can be attacked at once. It is important that those of most urgent concern and widespread interest be given first consideration. To be effective, extension work must begin with the interests of the rural family and work toward consideraton of the other problems of equal importance which may not be recognized in the beginning. Complete factual information helps determine priority of problems.

3. Keep the program flexible to meet long-term situtaitons, short-term changes and special emergencies. Long-term projects, such as soil conservation and improvement of area wide irrigation systems are essential to rural progress; but these need to be combined with projects meeting more immediate needs of the population or interest will lag. Always make allowance for emergencies such as drought and floods, which require immediate action if suffering is to be minimized. Without flexibility the program may not in fact meet the needs of the people.

4. Make the program educational and direct it toward bringing about improvement in the ability of people to solve their own problems. The program planning process is itself educational. Participation of rural people in gathering and analyzing facts, selecting problems for

attention, assisting in carrying out agreed upon action and in evaluating results, develops their ability to meet new problems as they arise. It puts them in contact with sources of information, and increases their ability to utilize the service of agencies working on their behalf.

5. Use democratic methods in developing an extension program. Arrange for the participation of lay people, the extension staff and others who can contribute. It is the function of the local extension officer to bring to bear on rural problems the best information and judgement available. This will include factual information on local conditions, technical information from research agencies, recommendations of agricultural scientist relative to to specific problems, the guidance of extension supervisors who can bring the experience of other areas, and finally, but most important, the judgment of local people who have knowledge of local customs and needs. It is often said that local people do not recognize many of their basic needs. This may be true but it is then the responsibility of extension workers to carry on an informational program that will acquaint them with the facts of the situation and bring about a realization of the need. Until this is done little can be accomplished toward improvement of the situation.

6. Orient programs to the existing technical, economic and social level of the people of the area. Too often an attempt is made to bring people in a single step from primitive to modern techniques in agriculture, when their education, experience and economic resources will not permit such a rapid change. People are largely a product of their experience and cannot make such abrupt changes. It is therefore important to understand their level of education, their customs, skill and their existing beliefs, as a basis for an extension program. The situation is similar to that in more formal education, where elementary and secondary education are the necessary prerequisites to university training. Even where people are literate and capable of understanding improved agricultural techniques, they may not have the physical or financial resources

necessary for modern agricultural practice. Programs should be planned to utilize only those resources available to the people of the area.

7. Clearly defined objectives at all levels in terms that people will understand. According to Paul Leagans, if there is to be progress and not more evolution in the development of people, the objectives of extension services must be clearly determined and periodically reviewed in light of progress and changed conditions. A good objective in extension is one that will provide possible direction for large numbers of people to move some distance. Extension must help people define the directions in which they want and need to go, then provide assistance to them in traveling in those directions.

8. Extension programs should be carried on by well trained personnel, effectively supervised. There is no substitute for technical training of extension workers. The level of such training should be such that the worker will command the respect of the most advanced farmers, and enable him to deal intelligently with all the ordinary problems which he encounters in the area. However, no one person can be an expert in all technical, economic and social fields. He should therefore have the support and assistance of extension workers with specialized training in various fields. Such specialists can assist in the diagnosis of problems, interpretation and adaptation of research information, development of programs in their specific fields, and in the in-service training of local extension workers.

In order to acquire and maintain the confidence of rural people, the extension worker must also have wide practical skill. As one extension worker in an underdeveloped country has said, he must be able to do the task of an ordinary cultivator and to do them all.

Another type of training which is essential, is training in extension methods. How to organize and conduct meetings and demonstrations effectively; how to prepare educational exhibits; how to speak effectively and gain the interest and cooperation of rural people; efficient management of an extension office, and many other techniques are required.

9. Good program building provides for evaluation of results. Any attempt at evaluation is dependent upon careful definition of objectives. It is therefore important when planning a program, to state objectives clearly and in terms that can be measured or evaluated. Records should be provided which will show achievement in terms of these objectives. Many social objectives of extension work are somewhat intangible but if clearly stated in terms of desired action of people, results can be appraised periodically.

10. Make sure that the program is achievable considering such factors as personnel, finances, time and facilities. A common weakness of extension programs is that they include attempts to solve too many problems at once without making a significant contribution to any of them. Exercise care to select a few important problems for attention in any year, including some which give promise of immediate satisfaction to the people involved. At the same time make a beginning on more basic problems requiring a longer period for completion, but which are also recognized as being important. Such problems must be carefully selected, and those phases attacked in the beginning which will clear the way for greater effort in the future. Goals set for accomplishment in a given period of time should be practical and achievable to avoid discouragement of those who participate in the program.

These points were made for extension programs, but as it was pointed out previously an IAS is essentially a type of extension service. When establishing an IAS it must be remembered that how the program is to be established is a critical factor for which the planning of such an organization needs to understand and be sensitive.

Resources

The resources for an IAS includes the financial, physical, human, technological and informational inputs of the organization. When planning to establish an IAS these inputs obviously needs to be taken into consideration to determine how much support the service needs to meet its goals and how much support it will be able to obtain.

Internal Structure

The development of an IAS must also examine how the structural make-up of this service will be created. The internal structure represents the mechanism by which the program is established and operates. Vlachos (1971) has subdivided this structure into three dimensions: the personnel of an organization, the structure of that organization, and the procedure (process) which the organization follows. Figure 6 shows a further delineation of the three dimensions.

The personnel of an IAS can include, among others, the administrative leaders of the service, the village workers, the subject matter specialists, and so forth. Those individuals planning to establish an IAS will have to determine what type of personnel should staff the organization.

Under the dimension of facilities and infrastructure, three conditions are present: capacity, autonomy and communication. The capacity of the organization includes such items as the complexity of the role-status positions, the size of the organization, and the heterogeneity (degree of specialization) of the system. With regard to the autonomy of an organization, the concern is how open and closed the system is to its environment. The communication network is the criterion for the integration of the specific positions to each other.

The third dimension is called procedures and rules. This dimension describes the process through which an organization functions and behaves and this process evolves from the structural nature of the organization. Within this dimension, two categories can be identified: (1) organizational rationality and (2) technical rationality. (Thompson, 1967) Technical rationality is the core instrumental action which produces the desired output of an organization. Organizational rationality involves acquiring the inputs and dispensing the outputs, both of which are outside the core technology. Whereas, technical rationality is concerned about the actual goal directed functioning of an organization, organizational rationality is concerned about the organization's relations with the environment, i.e., its environmental interchange. Under the technical rationality, two processes occur: centralization - the capacity of one social position to determine actions of other positions; and formalization - the presence of specific rules to govern a given procedure. In establishing an IAS, there needs to be a specification of how that organization is to function. Understanding how the internal strucutre of the organization is to be set up will facilitate the proper development of the advisory service

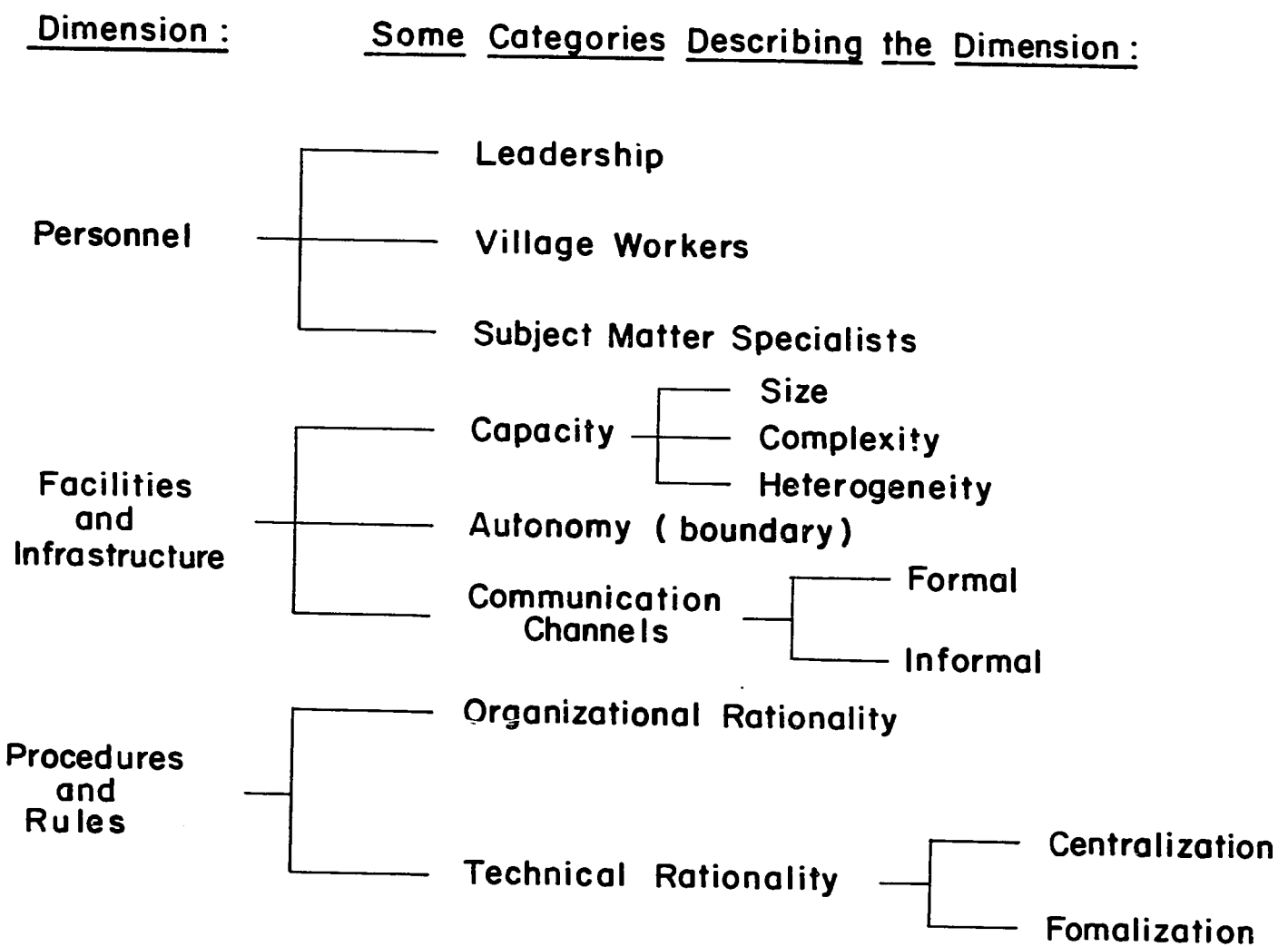

Figure 6: Dimensions of the Internal Structure of an Organization

External Linkages Affecting The IAS

The IAS is not a single organization working in a social vacuum. As previously noted in discussing some of the internal parameters for establishing this service, inputs from the environment and outputs to the environment are key considerations in planning for the development of the organization. Eaton (1972) has identified the external influences of an organization into four categories: enabling linkages, functional linkages, normative linkages, and diffuse linkages.

Organizations and social groups which control the allocation of authority and resources needed by the organization to function are enabling linkages. They provide the group with the authority to operate and the access to essential resources. They also protect the organization from attack. Those organizations performing functions and services which are complementary in a production sense, which supply the inputs and which use the outputs of the organization, are the functional linkages. Normative linkages are organizations which incorporate norms and values (positive and negative) which are relevant to the doctrine and program of the organization. They share overlapping interests in the objectives and methods of the new organization. Finally, diffuse linkages are elements in the society which cannot be clearly identified by membership in formal organizations. They are not aggregated in formal organization but can influence the standing of the organization in its environment, such as the farmers for the IAS.

In conclusion, when the government of Egypt begins to look at the establishment of an irrigation advisory service, a number of parameters must be examined in order to make the service a viable organization. The doctrine of the organization must be established along with what type of program the service will institute. Resources for the maintenance of the organization must be understood as well as how the service will be structured internally. Finally, the external environment must be understood as to how the IAS will be placed in the present network of organizations. Establishing an irrigation advisory service which will become viable is no simple task. The circumstances in Egypt will allow the possibility for such an organization to be developed, but if the institution building part of the establishment of this organization is not satisfactorily accomplished, then the organization will never attain the potential it can to help improve the farmers' irrigation practices. This is the responsibility of the government: to establish a viable advisory service by properly developing the parameters of the organization within the existing

institutional environment. This report provided a set of general guidelines for which the government needs to look at, but the application of those guidelines fall within the authority of the government of Egypt. How the government applies these guidelines will indicate how the government views the creation of an irrigation advisory service.

REFERENCES

Eaton, Joseph W. (Ed.), 1972, Institution Building and Development, Beverly Hills, California: Sage Publications.

Havelock, Ronald G., 1973, Planning for Innovation: Trhough Dissemination and Utilization of Knowledge, Ann Arbor, Michigan: Institute for Social Research.

Layton, James J., et.al., 1984, Experience With Water Users' Associations, Project Technical Report No. 65, Fort Collins, Colorado: Egypt Water Use and Management Project - Colorado State University.

Maunder, Addison, 1972, Agricultural Extension: A Reference Manual, Rome: FAO.

Sargadoy, J. A., 1982, Organization, Operation, Maintenance of Irrigation Schemes, Rome: FAO.

Thompson, James D., 1967, Organization in Action, New York: McGraw Hill.

Vlachos, Evan C., 1971, "Organizational Alternatives In Consolidating Irrigation System," presented at ASCE Irrigation and Drainage Division Specialty Conferences on Optimization of Irrigation and Drainage Systems, Lincoln, Nebraska (Oct. 6-8).

Yousef, Sohair Kamal, et.al., 1984, Sociological Evaluation of the On-Farm Irrigation Practices Introduced in Kafr El-Sheikh, Project Technical Report No. 67, Fort Collins, Colorado: Egypt Water Use and Management Project - Colorado State University.

AMERICAN EQUIVALENTS OF EGYPTIAN ARABIC TERMS AND MEASURES COMMONLY USED IN IRRIGATION WORK

LAND AREA	IN SQ METERS	IN ACRES	IN FEDDANS	IN HECTARES
1 acre	4,046.856	1.000	0.963	0.405
1 feddan	4,200.833	1.038	1.000	0.420
1 hectare (ha)	10,000.000	2.471	2.380	1.000
1 sq. kilometer	100×10^4	247.105	238.048	100.000
1 sq. mile	259×10^6	640.000	616.400	259.000

WATER MEASUREMENTS	FEDDAN-CM	ACRE-FEET	ACRE-INCHES
1 billion m^3	23,809,000.000	810,710.000	
1,000 m^3	23.809	0.811	9.728
1,000 m^3 /Feddan (= 238 mm rainfall)	23.809	0.781	9.372
420 m^3 /Feddan (= 100 mm rainfall)	10.00	0.328	3.936

OTHER CONVERSION		METRIC	U.S.
1 ardab	=	198 liters	5.62 bushels
1 ardab/feddan	=		5.41 bushels/acre
1 kg/feddan	=		2.12 lb/acre
1 donkey load	=	100 kg	
1 camel load	=	250 kg	
1 donkey load of manure	=	0.1 m^3	
1 camel load of manure	=	0.25 m^3	

EGYPTIAN UNITS OF FIELD CROPS

CROP	EG. UNIT	IN KG	IN LBS	IN BUSHELS
Lentils	ardab	160.0	352.42	5.87
Clover	ardab	157.0	345.81	5.76
Broad beans	ardab	155.0	341.41	6.10
Wheat	ardab	150.0	330.40	5.51
Maize, Sorghum	ardab	140.0	308.37	5.51
Barley	ardab	120.0	264.32	5.51
Cottonseed	ardab	120.0	264.32	8.26
Sesame	ardab	120.0	264.32	
Groundnut	ardab	75.0	165.20	7.51
Rice	dariba	945.0	2081.50	46.26
Chick-peas	ardab	150.0	330.40	
Lupine	ardab	150.0	330.40	
Linseed	ardab	122.0	268.72	
Fenugreek	ardab	155.0	341.41	
Cotton (unginned)	metric qintar	157.5	346.92	
Cotton (lint or ginned)	metric qintar	50.0	110.13	

EGYPTIAN FARMING AND IRRIGATION TERMS

fara = branch
marwa = small distributer, irrigation ditch
masraf = field drain
mesqa = small canal feeding from 10 to 40 farms
qirat = cf. English "karat", A land measure of 1/24 feddan, 175.03 m^2
qaria = village
sahm = 1/24th of a qirat, 7.29 m^2
saqia = animal powered water wheel
sarf = drain (vb.), or drainage. See also masraf, (n.)

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