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ABSTRACT

ORGANIZATION AND ENVIRONMENT: A CASE STUDY OF A BRAZILIAN INSTITUTE OF TECHNOLOGICAL RESEARCH

By

Luiz Fernando Terra Tallarico

The study focused on organization theory, more specifically on the contingency theory of organizations. The differences in conceptual structures among theories led the author to choose one specific approach as a basis for the design of the study.

J. D. Thompson was the contingency theoretician selected because of the detailed treatment given by him to the interaction between organization and environment in his book, Organizations in Action. Environmental politics viewed through a nonzero-sum power concept seemed to constitute a relevant area of study, particularly in terms of institutional development.

Eighteen propositions were selected from Thompson's theory which were related to the concepts of power, dependence, task environment, domain, goals and organizational assessment. These were judged as composing a coherent whole upon which to base the design of the study. From the propositions, a normative model was derived and a

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case study was developed in order to verify whether the focal organization operated according to Thompson's prescriptions and to account for any possible discrepancies. The study was not designed primarily to test Thompson's theory or solely to assess the organization; it attempted to speculate about both.

In order to operationalize Thompson's concepts, two interview guides were developed, one for the top management of the focal organization and the other for the members of the organization's task environment. Documentary evidence and the author's personal observations supplemented these data.

A public research institute operating in the area of food science and located in Brazil was the focal organization chosen for study. Six of its top executives and nine executives belonging to task environment (external) organizations were interviewed.

The final results were that 13 of the 18 propositions selected were supported by the data collected. For the remaining five there was a complete lack of evidence.

Finally, after emphasizing the difficulties of operationalizing Thompson's theory, it was suggested that the theory may be most useful as a guide for analyzing organizations.

ORGANIZATION AND ENVIRONMENT: A CASE STUDY OF A BRAZILIAN INSTITUTE OF TECHNOLOGICAL RESEARCH

By

Luiz Fernando Terra Tallarico

A DISSERTATION

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

Department of Management

1976

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This dissertation is the combined result of the efforts of many persons. It is difficult to name all those who aided and to state each individual contribution precisely.

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Getúlio Vargas, Brazil, my thanks for his continuous support and help.

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Without the many years of support and assistance of my parents, Carlos and Zaira Tallarico, it is unlikely that this work would even have been attempted. Their contributions are lovingly appreciated.

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CHAPTER I

INTRODUCTION

Foreword

Recent literature in organization theory has emphasized the existence of a continuous and dynamic interaction between organizational units and forces which operate in their specific external environments.

Research studies by William Dill, Joan Woodward, Tom Burns and G. M. Stalker, and P. R. Lawrence and J. W. Lorsch,[1] to name a few, have particularly raised the question of environmental impact on organizational structure and functioning.

Taken as a whole, the theorists who have advocated what has been called the "contingency theory of organizations" make use of identical expository structures for theory building:[2] the approach of studying organizations by means of an open-system strategy. In this strategy, the complex organization is viewed as a set of interdependent parts which together make up a whole, each part contributing something and receiving something from the whole, which in turn is interdependent with some larger environment.[3]

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Although their expository structure can be said to be the same, this does not hold for their conceptual framework.[4] Each author defines his personal preferences in what he selects to emphasize, which is ultimately translated into the variables and relationships to be studied. Considered in the light of theory building, this fact points out the existence of some lack of homogeneity of concept and method. Therefore, it seems that, for theoretical purposes, numerous empirical studies are necessary so that conceptual differences may be ironed out and strong evidence can be accumulated in support of the contingency theory of organizations.

Aside from the need for additional testing of the theory which deals with the interaction of organization and environment, there is also a growing recognition of the importance of assessing its validity in developing countries.

A. R. Negandhi and B. C. Reimann have already tested the contingency theory in a context of economic development.[5] They concluded that "a slightly modified version of this theory still appeared to hold in a cultural setting very different indeed from industrially advanced nations like the United Kingdom and the United States."

For the above reasons this study uses one specific theory, that of J. D. Thompson's, as a basis for its

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design. Also, it focuses on the assessment of this theory in one organization operating in a developing country.

Importance of the Topic

The impact of environmental variables upon internal organizational variables is in itself an important topic. When one adds to this the need to understand the behavior of the variables in a developing context, the topic acquires new dimensions of significance.

Economic development has been defined as the rate of increase in productivity and,[6] in some cases, as the rate of increase in production of goods and services designed to satisfy the basic needs of the population of a nation. Hence, economic development must be concerned with the process of invention and availability of relevant industrial and agricultural techniques, with their rate of adoption and implementation, and with their efficient management and utilization for the benefit of society. Implicit in the above statement is the assumption that the process of economic development requires the building of institutions and organizations to achieve the production and productivity goals of the country in question. Basically, it is a process of establishing new organizations and adjusting the old ones to a new system of interactions in view of the required change. Therefore, it would seem to be reasonable to infer that the organizations involved in the basic economic sectors where

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development plans exist are organizations operating by definition, in a dynamic environment in which change is the overall goal. Ideally, all organizations in a developing country should be deemed to operate in an environment with such dynamic characteristics.

Organizations operating in critical sectors of the economy of developing countries may not reflect the characteristic response envisaged by the planning objectives set up at the national level. If this is the case, the task of planning becomes one of controlling environmental stimuli so that critical organizational sectors may respond and act toward the goals of economic development.

Studies based on the contingency theory of organizations can be of crucial importance for developing nations if they enable one to derive normative statements for policy determination. The knowledge of the operation of environmental and organizational variables can ultimately suggest actions which are effective in achieving development goals.

Purpose of the Study

This study focuses on the analysis of the relationships between an organization's internal variables and its specific external environment, using the approach that has been called the contingency theory of organizations. The investigation took place in a developing country, Brazil.

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As already pointed out, the differences in conceptual frameworks among authors in this area of study present an almost insurmountable problem. Thus, a choice had to be made as to which specific approach to use in order to establish a basis for the design of this study.

J. D. Thompson was the contingency theoretician selected.[7] He deals in reasonable detail with those specific interactions between the organization and the environment which seemed to be of relevance for the situation of economic development.

Starting with a basic framework of concepts, Thompson develops a large array of propositions throughout his book. The purpose of this study, then, is to investigate the validity of some of his propositions for organizations in a developing economy, concentrating on the concepts of domain, task environments, power, and dependence. These concepts provided a basis for the empirical study developed here. They were selected because they comprised a coherent whole, separable from the rest of the theory. In addition, these concepts are crucial if one's intention is to investigate the institutional level of organizations.

The general objective of this study can be stated as an attempt to use Thompson's propositions related to domain, task environments, and interdependence to constitute a normative model for organizations in developing countries and to collect data about one specific

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organization in order to determine whether or not, and to what extent, the selected organization appears to be operating according to Thompson's prescriptions. Where discrepancies exist, further speculation should be made on their causes.

Methodology

The research method selected is the case[8] or field study[9] approach. This method implies taking one set of measurements on one unit. Examples of its use in the literature about organizations can be found in the work of Alvin Gouldner, Herbert Kaufman, Philip Selznick, and Alfred Stanton and Morris Schwartz.[10]

This approach is well adapted for providing an overall picture of the organization and information about the interdependence of its constituent parts. It is particularly well suited to the combined use of a variety of data gathering methods, including direct observation, interviewing, and the analysis of documents and records. This advantage is crucial, for it means that the investigator can select from the research repertoire those methods that are the most appropriate for the study of a given problem. A variety of approaches allows one to examine subtle differences which otherwise would escape attention. Moreover, its focus on social relations among individuals and groups in natural settings provides data

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of great importance for the study of organizations, data of a type not obtained by any other design.[11]

To develop this study, one organization was selected, and the necessary time was spent within it to conduct the investigation on the variables and relationships related to domain, task environment, power, and dependence. Interview guides were developed and used to investigate the internal and environmental dimensions of existing relationships. (See Appendices A and B.)

Type of Organization Selected

The organization selected for this case study was a Brazilian public research institute in the area of food technology. It was chosen for two reasons: (1) the public sector is large and relevant in Brazil; and (2) a research institute is supposed to be an important organization in a developing nation, since it produces basic inputs for industrial and agricultural growth.

Selection of Subjects to be Interviewed

Selection of the executives to be interviewed involved a two-step procedure. First, six top executives of the public research institute were interviewed. The purpose of the study and the kinds of questions to be asked were explained to them. Their assessment of areas of crucial environmental interaction provided nine additional names of persons to be interviewed outside the

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focal organization. When contacted, all agreed to a personal interview.

The interviewees at the public research institute were (1) the director of the research department, (2) the director of the processing department, (3) the director of the engineering and planning department, (4) the director of the administration and maintenance department, (5) the head of the planning staff, and (6) the executive director.

The nine interviewees outside the organization were: (1) the head of the office of Coordination of Agricultural Research of the state government, (2) two technicians from the State Council of Technology, (3) the head of the Science and Technology Project, a state government project, (4) a representative of EMBRAPA (Brazilian Agricultural Research Corporation), a federal government organization, (5) a representative of the Food and Agriculture Organization of the United Nations, and (6) three representatives of the Brazilian food industry.

The Interview

Despite the length of the interviews (each took from 4 to 8 hours), the subjects were cooperative. Once the purpose of the study was understood, all seemed very interested in the topics discussed and gave them great attention. The interviews worked well. (Appendix C presents a complete report about how one interview was

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The Interview Guide

Two interview guides, one for each group of interviewees, were used. There were five major sets of questions which were designed to elicit the information needed to explore the Thompsonian propositions. (A copy of the interview guide is presented in the Appendix.)

The guide was pretested in two interviews to determine whether the wording was clearly understood and to determine the approximate length of time needed for a complete interview. (The data obtained in the pretest are not included in the study findings.)

How Interview Results Were Analyzed

The subjects' answers to and comments on the questions were content analyzed. Whenever pertinent, documents and printed materials were collected and used when portions of them referred specifically to the purpose of the study. An attempt was made to summarize interviewees' viewpoints, detect trends, and integrate these with documentary evidence. Wherever relevant, interviewees' comments are reproduced to illustrate their perceptions.

The findings were compared to Thompson's conceptual framework and propositions and, according to the

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insight gained, Thompson's concepts either were maintained, restated, or rejected.

Limitations of the Study

Because this is a study that uses Thompson's framework of concepts and propositions, it has an inherent limitation. It does not throw light on the entire contingency theory of organizations, nor does it attempt to resolve conflicts in the literature. But this is not the purpose. The study's focus and contribution are limited to the Thompsonian framework.

Limitations Regarding the Sample

In order to develop a more significant assessment of Thompson's propositions, it would be reasonable to use a sample of many organizations in one or many areas of activity. However, this study was developed in one single organization. The choice of the organization served automatically to define those who would be interviewed within the organization, and these subjects indicated which other people should be interviewed. The latter were persons with whom they had developed some sort of interaction.

The sampling and research procedure reduces the possibility of generalizing conclusions. The study findings are valid within the context of the specific organization selected, only for the fifteen persons

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interviewed, and only within the Brazilian context. The results can evaluate and challenge Thompson's propositions in a particular organization, but they cannot establish the validity of these propositions for other organizations.

The intrinsic limitations of such a small sample for a study which tries to draw conclusions about perceptions must be recognized. However, the cooperative attitude of the interviewees and the interest with which they answered the questions provided valuable insights for the exploration of the propositions.

Limitations of the Interview Guide

The interview guide was satisfactory, but it was hardly perfect. First, some basic concepts orienting the study had to be stated as introductory explanations of the questions. This may have hampered understanding, but observation indicates that the subjects did comprehend both the concepts and the questions, although this may have required some effort.

Second, the interview guide was too long. The length of the guide, coupled with the fact that most interviewees took a long time answering, made the interviews so lengthy that in-depth exploration of all questions was precluded.

Third, it was impossible to record all comments in view of a general refusal to allow the interview to be recorded. Comments were written down by the interviewer,

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Format

An historical analysis of the development and evolution of the literature is presented in Chapter II. It summarizes some of the main contributions in the area as viewed by this writer.

In Chapter III the conceptual framework used by Thompson is presented, along with the propositions used in this study.

The perceptions, observations, and materials collected are presented in Chapter IV. A descriptive method was used to characterize the organization, and the format used in the interview guides was maintained in order to facilitate the ordering of the case study report.

Chapter V presents the conclusions of the study.

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CHAPTER I--FOOTNOTES

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[2]Sherman Krupp, Patterns in Organizational Analysis: A Critical Examination (New York: Holt, Rinehart and Winston, 1961).

[3]J. D. Thompson, Organizations in Action (New York: McGraw-Hill, 1967).

[4]The concept is here used according to Krupp, Patterns in Organizational Analysis.

[5]A. R. Negandhi and B. C. Reimann, "A Contingency Theory of Organization Re-Examined in the Context of a Developing Economy," Academy of Management Journal 15 (June 1972):137-46.

[6]The concept used here is based on one developed by Robert A. Solo, Economic Organizations and Social Systems (Indianapolis: Bobbs Merril, 1967).

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[11]Scott and Blau, Formal Organizations.

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CHAPTER II

ORGANIZATION AND ENVIRONMENT: HISTORICAL DEVELOPMENT OF THE THEORY AND REVIEW OF THE LITERATURE

Introduction

This chapter presents an historical perspective of the development of the area of organization theory, which studies the interaction between the organization and environmental variables. A review of the literature indicates the relevant theoretical contributions in the area.

A literature review presents peculiar problems. In the field of organization theory, many new contributions appear each year, adding to the large amount of existing publications. Although this situation is not peculiar to organizational theory, it is necessary to recognize that an exhaustive survey is unfeasible. A set of basic criteria therefore was adopted to reduce the difficulty to manageable proportions.

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First, the objective of the review would be to expose the reader to major developments and familiarize him with the present state of the art.

Second, specific selections would be chosen for the following reasons: (1) Authors who use an open-system approach to the study of organizations would be examined, since that approach is the basic expository structure which makes possible the study of environmental variables;[1] (2) contributions not using such an approach would be deliberately excluded; and (3) adopting Krupp's orientation,[2] design theories, which are normative, would be omitted.

In reviewing the materials selected, the intent is to stress the treatment given environmental variables and their interaction with internal organizational characteristics. Furthermore, some contributions are described in greater detail than others, either because they are considered more relevant, or because they are deemed more deserving of extensive treatment for a proper understanding of the major variables they examine.

The Environmental Impact on Organizations: Earlier Contributors

Chester I. Barnard

Barnard's work is a landmark in the history of organization theory,[3] primarily because of his pioneering use of an expository structure,[4] based on what is now

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called the systems approach. His theory departs from classical theory, in the sense that the anatomy of formal organization,[5] so much in vogue at that time, does not receive great emphasis. He deals with the variable structure but presents it in a broader system of social exchange.

For Barnard, a formal organization is a system of consciously coordinated activities or forces of two or more persons (a cooperative system). An organization comes into being when (1) there are persons able to communicate with each other (2) who are willing to contribute action (3) to accomplish a common purpose.

Organization survival depends upon the maintenance of an equilibrium of the system. This equilibrium is primarily internal, a matter of proportions between the elements, but is ultimately and basically an equilibrium between the system and the total situation external to it.

An organization is effective, in Barnard's terms, when its purpose is relevant to the environmental situation and, consequently, it can attain its objectives.[6] An organization is efficient when individual motives are satisfied in the interchange between the organization and the individual. Therefore, organizational survival depends on the two interrelated and interdependent processes of attaining (1) effectiveness and (2) efficiency. On one hand, the environment exerts pressures and requires a matching of organizational purposes and environmental

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factors. On the other, individuals must be satisfied in their interaction with the organization and, therefore, willing to cooperate in the achievement of organizational purposes.

Willingness to cooperate, except as a vague feeling or desire for association, cannot develop without an objective of cooperation. Unless there is such an objective, it cannot be known or anticipated what specific efforts will be required of individuals nor, in many cases, what satisfactions they might obtain.

Barnard distinguishes between organization purpose and individual motives. He says that it is frequently assumed that common purpose and individual motive are or should be identical, but under modern conditions this rarely appears to be the case. Individual motives are necessarily internal, personal, and subjective; common purpose is necessarily external, impersonal, and objective, even though its interpretation is subjective. The one exception occurs when the accomplishment of an organizational purpose becomes itself a source of personal satisfaction and a motive for many individuals in many organizations. Only in connection with family, patriotic, and religious organizations, and under special conditions, may organization purpose become the only or even the major individual motive.

Barnard maintains that the possibility of accomplishing a common purpose and the existence of persons

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whose desires might constitute motives for contributing to it are the opposite poles of the system of cooperative effort. The process by which these potentialities become dynamic is that of communication. A common purpose must be known, and to be known it must be communicated in some way. Inducements to persons depend upon communications to them. Informal organizations become necessary to the operation of formal organization precisely because they provide the means for communication, cohesion, and protection of the integrity of the individuals. In a sense, informal organizations link the purposes stated by the formal organization (cooperative purposes) to individual desires. The functions of the executive also appear to be devoted to that linkage: (1) maintenance of a system of communications, (2) securing essential services from individuals, and (3) formulating and defining purposes and objectives.

The efficiency of a cooperative (organizational) system, in Barnard's terms, is therefore a result of the interaction among individual desires, common purpose, and the system of communication. If the individual finds his motives being satisfied by what he does, he continues his cooperative effort, he is willing to cooperate; otherwise, he is not. If he does not cooperate, this subtraction from the cooperative system may be fatal to it. Therefore, efficiency from the productive viewpoint depends not only upon what or how much is produced, but also upon what or

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how many returns accrue for each individual contribution. The cooperative system must create a surplus of satisfaction to be efficient. Thus, the process of cooperation also includes that of satisfactory exchange. Efficiency in the offering of noneconomic inducement may be, in these terms, as vital as productive efficiency.

Given this general framework, Barnard analyzes in detail the unit organization, the economy of incentives, the process of specialization, and the theory of acceptance of authority.

These details of his theory may be disregarded here, for purpose of this work. Our main emphasis is upon Barnard's general theory of cooperation, primarily on its linkage with environmental variables. This aspect characterizes his theory's departure from a closed-system type of approach. (See Figure 2.1).

March and Simon

For James G. March and Herbert Simon, the postulates of traditional theory make rather severe assumptions about the environment of an individual in an organization, the impact of that environment on him, and his response to it.[7] The environment is viewed by classical theory as a well-defined stimulus or system of stimuli. Each stimulus evokes in the individual to whom it is directed a well-defined and predictable psychological set. This set

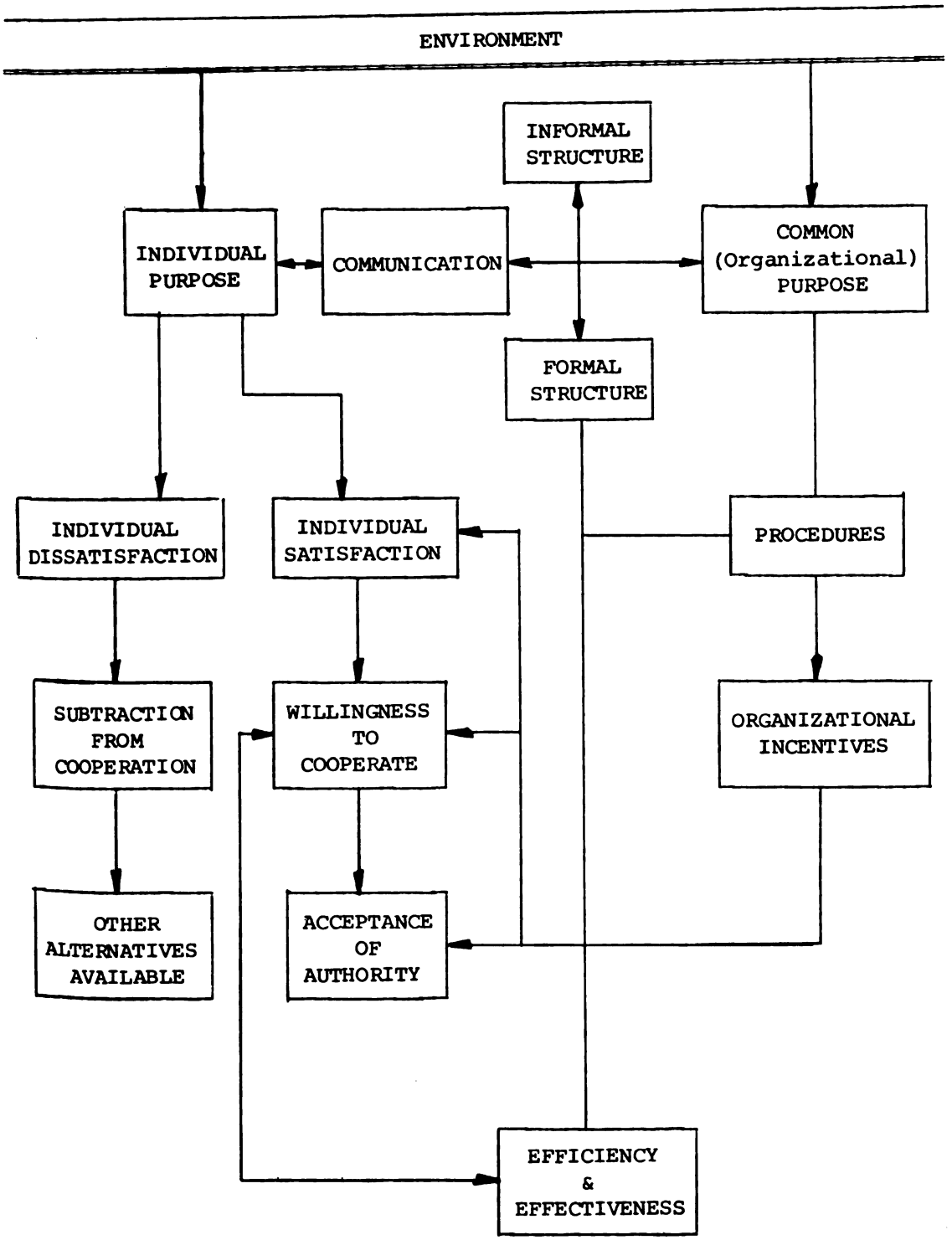

Figure 2.1.--The Theory of Chester I. Barnard.

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includes a program for generating a specific behavioral response, the response that is "appropriate" to the stimulus in question.

March and Simon view an organization as a system of interrelated social behaviors of a number of participants. Behavior results from a stimulus (see Figure 2.2). Stimuli are perceived by individuals, they act upon memory, and memory is composed of values, perceptions, beliefs, experiences, programs, alternatives, and other knowledge stored in the psychological bank of the individual. Perceiving an external change in the environment, the individual evokes or calls for certain of these stored values or perceptions which he believes particularly pertinent to the situation. This evoked set contains some behavior program which the individual will enact. The evoked set is that part of the memory which influences the behavior of the individual. Memory content may move from an unevoked state.

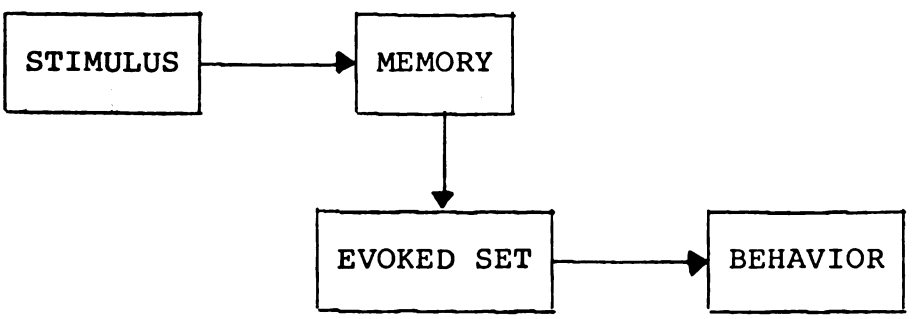

Figure 2.2. March and Simon Influence Model.

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Behavior can be changed in at least two ways: (1) by learning, or by changing the memory set of the individual; and (2) by changing the stimuli. Different stimuli may evoke different sets, which include different behavior programs, resulting in different behaviors. Stimuli may act upon the memory and obtain the desired behavior, or they may be misunderstood by the individual and evoke a different set than originally intended (unintended responses).

March and Simon propose that the individual in an organization is essentially faced with two different decisions. The first is whether or not to participate, and the second is whether or not to produce. These reflect different considerations. The decision to participate is based on the concept of organization equilibrium, which refers to the balance of payments to members for their continued participation and contribution to the organization. (See Figure 2.3.) The motivation to produce is a function of the character and perceived consequences of the evoked set of alternatives. These are weighted against the individual's goals and values. The evoked set of alternatives evolves from the cues the individual perceives within the environment, both internal and external to the organization. (See Figure 2.4.)

March and Simon also treat the variables of group conflict in their theory. They say that conflict among organizational units arises from the following factors:

Figure 2.3.

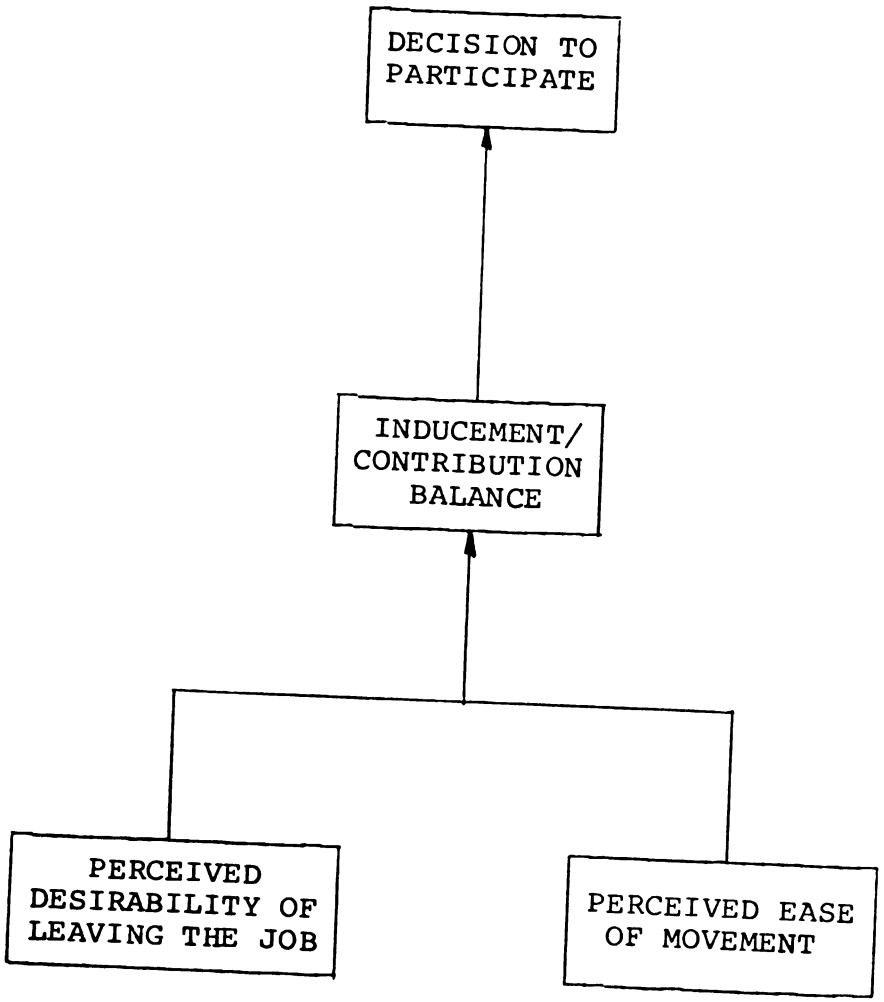

Figure 2.3.--The Decision to Participate (Rough Representation).

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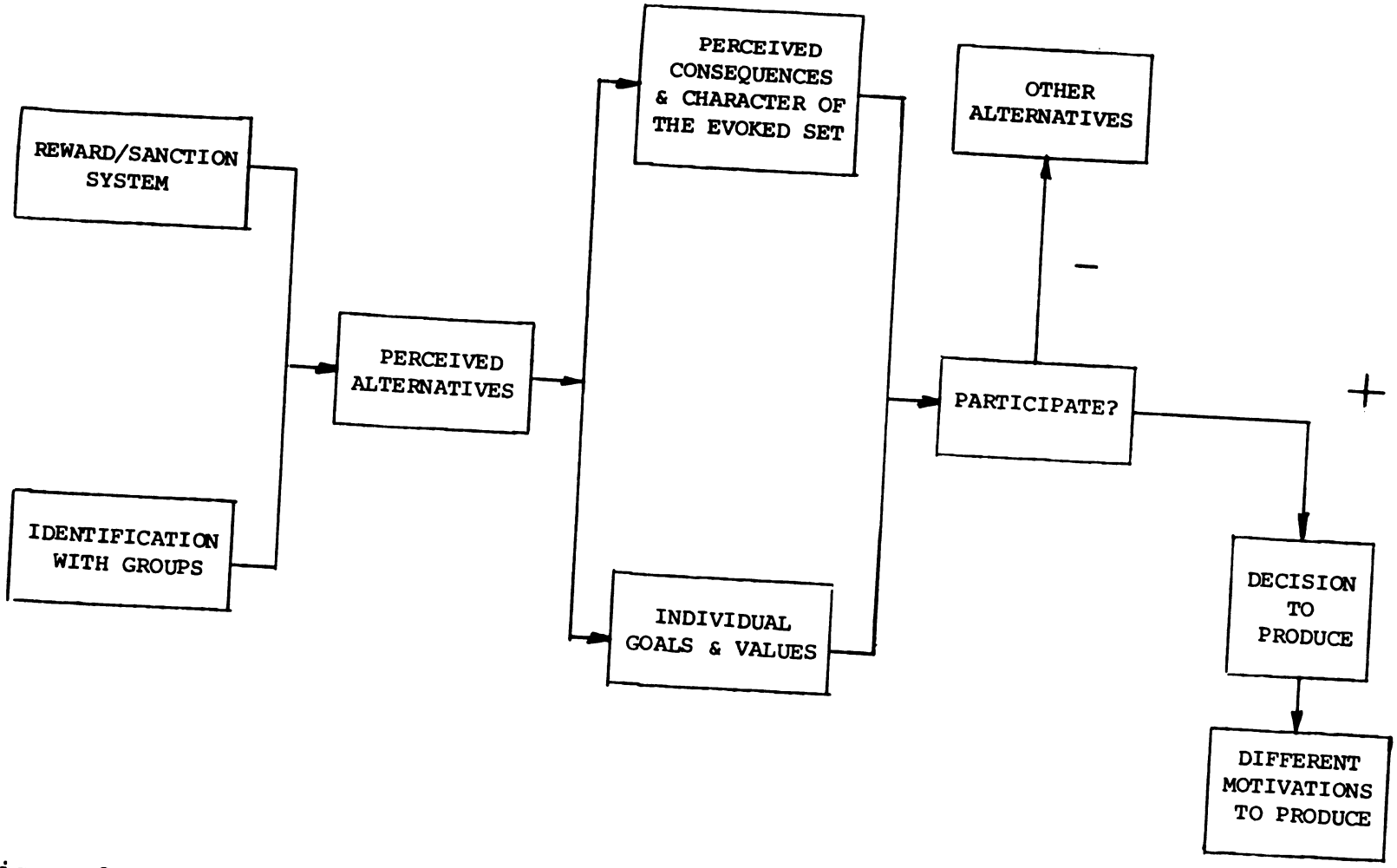

Figure 2.4.--The Decision to Produce (Rough Representation).

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(1) the existence of a felt need for joint decision making, (2) differences in goals, and (3) differences in perception of reality. They further say that decision making can only be rational within certain limits. The known alternatives represent boundaries, or parameters, of decision rationality. Rather than "optimize" as an organizational decision making methodology, decision makers "satisfice." An alternative is considered satisfactory if (1) a set of criteria exists that describes minimally satisfactory alternatives and (2) the alternative in question meets or exceeds all these criteria. Most human decision making, whether individual or organizational, is concerned with the discovery and selection of satisfactory alternatives. Only in exceptional cases is it concerned with the discovery and selection of optimal alternatives.

March and Simon state that decision making may be of many types, ranging from a case in which an individual might seek out and search for various alternative behaviors to one in which an environmental stimulus evokes a highly complex and organized set of responses. These highly complex sets are called "programs."

The organization structure may be viewed as a function of the problem-solving process. The existence of structure, or programs, provides boundaries or parameters of rationalities for the decision-making process. Programs provide some degree of stability and permanence to

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behavior within an organization, which is a necessary characteristic of organization behavior.

Rational behavior rests upon the concept of "goal." The individual defines his behavior in terms of goal attainment, and the goals of the individual condition whether his behavior is "rational" or "irrational."

March and Simon deal, finally, with the concept of innovation. They say that changing old programs, or devising new ones, requires a process of innovation and initiation. New program possibilities must be generated and their consequences examined. Sensitivity to innovations is a function of the relevance of the innovation to the needs of the specific unit involved.

This is a very rough condensation of the March and Simon theory. The similarity of their work to Barnard's formulations lies in their emphasis on the individual in an organization, as distinct from the classicists' view. Both Barnard and March and Simon use the same model of organizational equilibrium. However, the latter specify some of the sources of environmental effects upon the organization: (1) the stimuli, in their influence model; (3) the evoked set, whereby past environmental stimuli have already influenced the formation of programmed responses; and (3) the individual goals and values which enter into consideration in the motivation to produce. Hence, the open-system strategy is also advocated by March and Simon, although the basic emphasis still remains on

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considering the individual within the organization, allowing the specific variables of the environment to remain without elaborate formulation.

Victor Thompson

Victor Thompson's theory could be said to be built upon a framework which expresses his personal reaction toward one specific environmental variable, technology, and its pace of change through time.[8] The theory has its merits for expressing one particular outlook toward the traditional model of bureaucracy.

For Thompson, the traditional bureaucratic structure is not compatible with rapidly developing technology. Therefore, conflict emerges between those charged with the responsibility for performance and those charged with the capacity to make decisions. The authority of superiors is decreasing in legitimacy, while that of the specialist is increasing. Thompson states that authority in the hierarchy revolves around the question of rights and prerogatives of office, and it is basic to his approach that bureaucratic authority be considered as a right of office.

He argues that to use presumed technical competence as a basis to allocate authority is inappropriate. The rapidity of technological development has caused decisions to shift from the manager to the specialist, yet the former is still responsible. Such rigidity in

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organization structure precludes adaptation to that change, and since the structure is unlikely to be altered, the ever growing gap between the right to decide and the ability to decide inevitably results in conflict. Yet, in order to maintain the appearance of legitimate authority, defense mechanisms are used both by subordinates and superiors. These defense mechanisms involve resorting to ideology, dramaturgy, and bureaupathology.

Thompson further says that intraorganizational conflict and structural adjustment will be more critical to effectiveness in cases where technology changes rapidly. This implies a need for readiness for adaptation and change in both the technical and social system within the organization.

Although Thompson's theory is a legitimate attempt to explain the impact of an environmental variable (technology) upon the internal conditions of the organization, it does not describe alternative forms of organization nor the mechanisms for adaptation to change. This task is left to other authors.

E. L. Trist and A. K. Rice

Some of the most vigorous proponents of the systems approach to organizational phenomena are found among the group of social scientists associated with the Tavistock Institute in London, E. L. Trist and A. K. Rice

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being two of the more prominent.[9] From their studies of changing technology in the coal mining industry and the redesign of work in Indian textile mills, they developed, first, the important concept of the sociotechnical system and then the more general open-system definition of organizations.

The idea of a sociotechnical system, as put forth by Trist,[10] implies that any productive organization or part thereof is a combination of technology (task requirements, physical layout, equipment available) and a social system (a system of relationships among those who must perform the job). The technology and the social system are mutually interactive, and each determines the other. In keeping with this concept, it would make just as little sense to say that the nature of the work will determine the nature of the organization which develops among workers as it would be to say that the sociopsychological characteristics of the workers will determine the manner in which a given job will be performed. The Hawthorne studies and Trist's coal mining studies have shown that each determines the other to some degree.[11]

The open-system model of organizations, as discussed by Rice,[12] argues that any given organization imports various things from its environment, utilizes these imports in some kind of conversion process, and then exports products, services, and waste materials which result from the conversion process. One important

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import is the information obtained from the environment pertaining to the primary task, that is, what the organization must do in order to survive. Other imports are the raw materials, money, equipment, and people involved in the conversion to something which is exportable and meets some environmental demands.

When the ideas of Trist and Rice are combined, the importance of multiple channels of interaction between the environment and the organization emerges. The organization must deal not only with the demands and constraints imposed by the environment on raw materials, money, and consumer preferences, but also with the expectations, values, and norms of the people who must operate the work organization. The capacities, preferences, and expectations of the employee are, from this point of view, not merely something he brings with him; they are also influenced by the nature of the job and the organizational structure during his working career. Consequently, an organization's concern must not only be directed toward better selection or training techniques, but also toward the design of the organization, taking into account the nature of the job (the technical system) and the nature of the people (the social system).

Alfred Chandler

Alfred Chandler's method is the comparative analysis of the case histories of a few pioneering firms,

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supplemented by a brief review of the administrative histories of nearly one hundred other major U.S. companies.[13] The basic thesis is deceptively simple: Organization structure follows from, and is guided by, strategic decisions.

Chandler sees new strategic choices arising from environmental changes: "Strategic growth resulted from an awareness of the opportunities and needs--created by changing population income, and technology--to employ existing or expanding resources more profitably."[14] Throughout his study Chandler makes it clear that he sees different kinds of organization as necessary for coping effectively with different strategies and environments. He cites the role of environmental change as the key factor in the choice of appropriate structure:

> As long as an enterprise belonged in an industry whose markets, sources of raw materials, and production processes remained relatively unchaged, few entrepreneurial decisions had to be reached. In that situation, such a weakness was not critical, but where technology, markets, and sources of supply were changing rapidly, the defects of such a structure became more obvious.[15]

Unlike the authors discussed previously, Chandler focused on the large and relatively infrequent strategic shifts in major corporations. In this sense he was not interested in the differences created by technologies, functional specialization, or environmental congeniality. Nevertheless, he concluded that different environmental conditions demand different structures. To Chandler also,

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it was the rate of environmental change--in technology, markets, and source of supply--that created the pressure for strategic and subsequently structural change.

Stanley Udy

Stanley Udy employed a strikingly different method for examining the relationship between technology and organization structure.[16] He sought broad generalizations about variation in organization structure relative to its social setting and the technology involved. He decided to study nonindustrial societies and drew his evidence primarily from the Human Relations Area Files, a compilation of anthropological descriptions of some 150 separate societies. From this source Udy developed a sample of 426 organizations carrying out various forms of agricultural work, hunting, fishing, collection, construction, manufacturing, and stock-raising. The societies, scattered throughout the world, represented all major social groups and several widely separated periods of history. He categorized the attributes of each of these organizations as well as the technology and the social setting.

Udy's major conclusion concerned the strength of the association between organization and technology:

> Given a systematization of the possible range of variation of technological processes, it was found that certain aspects of authority, division of labor, solidarity, proprietorship, and recruitment structure could be predicted as to general trend from technology alone.[17]

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Across the full sweep of the known nonindustrial societies, Udy's evidence clearly indicates that the facts of technology alone have a distinct and persistent influence on the structure of viable organizations.

Since Udy focused on organizations doing nonindustrial tasks, probably under relatively stable technical and market conditions, we cannot make direct and specific connections between his study and the others described here. But his very broad-based work does lend impressive support to the very general conclusion that organizations doing different tasks must be structured differently. Beyond this general point, his findings also are particularly relevant for the design of any modern international organization operating in many cultural settings.

R. H. Hall

A study by R. H. Hall contrasted organizational structures of two fundamentally different kinds in ten organizations, focusing on task technology at the departmental level rather than at the level of an entire organization.[18] His research was based on two hypotheses. First, departments dealing with uniform events and traditional skills (for example, an assembly line) require different organizational arrangements than do departments engaged in tasks that require nonuniform and nonroutine social and creative skills (such as research,

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sales, or advertising). Second, hierarchical organizational levels whose tasks are not uniform require different organizational arrangements than those whose tasks are uniform.

Hall further hypothesized that departments and levels characterized by routine tasks are also characterized by Max Weber's bureaucratic model of organization. According to Weber,[19] the most effective organization (the bureaucratic) has several elements:

1. a well-defined hierarchy of authority;
2. a division of labor based on functional specialization;
3. a system of rules covering the rights and duties of position incumbents;
4. a system of procedures for dealing with work situations;
5. impersonality of interpersonal relationships; and
6. selection for employment and promotion based on technical competence.

Hall examined the degree to which each of the above characteristics was present in different departments and at different organizational levels by conceiving of each characteristic as a dimension. He developed a scale for each, designed to measure employee perceptions of the organization. These scales were administered to a random sample of personnel in ten organizations, five profit-making and five governmental.

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Hall found that, consistent with his first hypothesis, nonroutine departments were perceived to be significantly different from routine departments in hierarchy of authority, division of labor, and specified procedure. No significant differences were found in the remaining three dimensions (specified rights and duties, impersonality, and criteria for hiring and promotion).

To test his second hypothesis, Hall administered his scale statements to 116 executives and 187 nonexecutives. Here he assumed that, because their tasks are less routine, executives work in a less bureaucratic setting. He found his assumption to be true for four of the dimensions: emphasis on hierarchy, division of labor, specified procedure, and impersonality.

From the studies by Joan Woodward and P. R. Lawrence and G. W. Lorsch, to be reviewed later, one will see variations within and among organizations; from the Hall study one sees variations within organizations. Task technology within an organization appears to have an effect on organizational procedure similar to the effect of technology within an industry.

Harold Leavitt

Harold Leavitt and his colleagues used small groups to conduct various problem-solving activities under experimentally controlled conditions.[20] The situation with which they experimented most extensively involved

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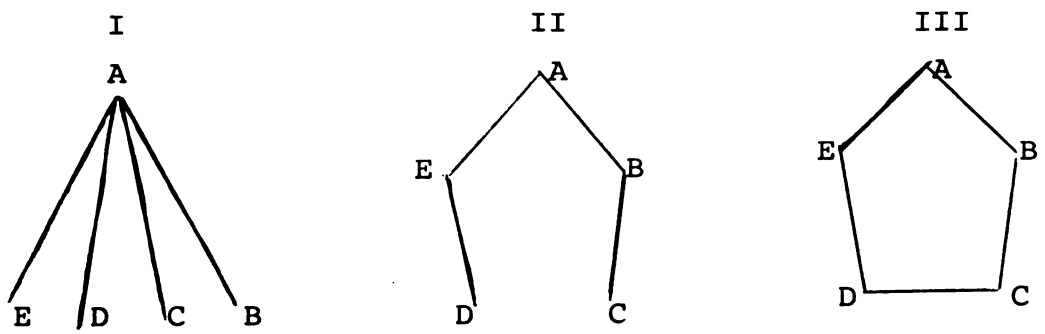
five people, each of whom was given a cup containing five marbles of different colors. One marble was duplicated in all five cups, and subjects were asked to exchange written communications until all five had learned which color marble they had in common. The experimental variations on this problem were introduced by controlling the channels available for communication. (See Figure 2.5.)



Source: H. Leavitt

Figure 2.5. Three Communications Networks.

Using one of the three networks shown in Figure 2.5, each group worked through the problem again and again, with a new set of marbles each time.

Leavitt found that on these simple tasks, Network I was far more efficient that II, which in turn was more efficient than III. However, when the researchers asked their subjects how they felt about their experiences, they received quite a different picture. Network III people were happier, on the average, than Network II or I people. Furthermore, when a bright new idea for improvement of operations was introduced into each of the

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networks, the rapid acceptance of the new idea was more likely in III than in I.

These observations led to an additional experimental change. The researcher introduced "noisy" marbles--marbles of unusual colors for which there were no common names. They again found that Network III had certain advantages over I: It was able to adapt by developing a new code, some agreed-upon set of names of the colors. Network I seemed to have much greater difficulty in adapting.

Leavitt summarized these findings as follows:

> So by certain industrial engineering-type criteria (speed, clarity of organization and job descriptions, parsimonious use of paper and so on), the highly routinized, noninvolving, centralized Network I seems to work best. But if our criteria of effectiveness are more ephemeral, more general (like acceptance of creativity, flexibility in dealing with novel problems, generally high morale, and loyalty), then the more egalitarian or decentralized Network III seems to work better.[21]

These experimental findings fit very neatly with some of the studies reviewed here. Different kinds of organizations are required to perform different kinds of tasks efficiently. Broad speaking, if tasks and technology suffer the impact of environmental changes, structure must necessarily adapt to those changes.

Robert Blauner

Robert Blauner made a very interesting study about the relationship of one environmental variable, type of

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technology, to the degree of alienation of industrial workers.[22] Of the four types of industrial workers studied, he found evidence for different patterns of alienation depending upon the nature of the technology involved in their work.

He defined alienation as being the result of four different psychological states which are in principle independent of each other: (1) sense of powerlessness or inability to influence the work situation; (2) loss of meaning in the work; (3) sense of social isolation, or lack of feeling of belonging to an organization, work group, or occupational group; and (4) self-estrangement or a sense that work is merely a means to an end, lack of any involvement with work.

The main findings of Blauner's study are that automobile workers on assembly lines are alienated by all four criteria. At the other extreme, members of the printing trades felt a sense of influence, meaning, and integration into their occupational group and deep involvement in their work. Textile workers' attitudes resembled those of automobile workers, but they were highly integrated into communities in which the traditional values taught them not to expect a sense of influence or meaning. These values, in combination with paternalistic management practices, made them feel reasonably content with their lot despite the strong forces encouraging alienation. The fourth group, chemical

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workers have a great deal of responsibility for controlling the process, considerable autonomy and freedom, a close sense of integration with others on the shift and in the plant, and high involvement in the work because of the high responsibility.

The variation among these four types of workers illustrates the danger of generalizing about alienation among factory workers and the utility of more refined concepts of alienation and technology, even beyond the ones Blauner has developed.

Relevant Contributions Toward a Contingency Theory of Organizations

Philip Selznick

For Philip Selznick, the organization is an adaptive social structure.[23] It is a technical instrument for mobilizing human energies and directing them toward set aims. It is a mechanism which adapts to its environment and is molded by forces tangential to its rational, ordered structure and stated goals. The organization may be viewed as a dynamic conditioning field which shapes the behavior of those at its helm and as a living social unit which must come to terms with the environment. Thus, Selznick's work is consistent with the natural system point of view.

The core of Selznick's theory is the focus on external organizations and how they may be fundamentally

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important in defining the nature of the organization. He introduces the concept of cooptation as an adjustment process which facilitates the probabilities of survival of the organization. This mechanism is used when the structure of the organization is inconsistent with the external environment imposing pressures on it. It is the process of absorbing new elements into leadership or policy determination positions in an attempt to accommodate to the existing environment. In effect, through cooptation, power is shared with other interest groups.

A flow of information may be provided to those who have been coopted, and the organization benefits from the group resources thus provided. Cooptation also allows adaptation of decisions to lower, or local, levels of the organization. Therefore, other organizations within the environment which have been coopted share the characteristics and the nature of the coopting organization.

Another variable which Selznick analyzes is ideology. He claims that organizations are like people, searching for stability and meaning. Instability in the environment results in the development of a sustaining ideology, especially when the organization is threatened by the surrounding environment. This ideology, which must be based on accepted political and moral values, serves as a parameter for decisions.

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Selznick also points out the unanticipated consequences of individual activities in an organization and highlights the problems that could occur.

Selznick does not describe alternative organization forms that might be appropriate in various types of environment. He simply describes the need for adaptation and some mechanisms by which it might occur.

T. Burns and G. M. Stalker

Victor Thompson pointed out the impact of an environmental variable, while Selznick described the need for organizational adaptation and some mechanisms of adaptation. Tom Burns and G. M. Stalker go one step further,[24] providing important insights into alternative organization forms. Their work suggests that in the analysis of organizations the important variable to be considered is the environment. Essentially, in a relatively stable situation, a mechanistic (or bureaucratic) structure may be substantially more effective than one which approaches a more democratic ideal. However, in a highly variable or volatile environment, more flexible forms, which Burns and Stalker call organic, would be appropriate.

They state that both types (mechanistic and organic) represent a "rational" form of organization, for they both may be explicitly and deliberately created and maintained to exploit the human resources of a concern in

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the most efficient manner feasible under given circumstances. They emphasize the need to avoid the suggestion that either system is superior under all circumstances to the other: "In particular nothing in our experience justifies the assumption that mechanistic systems should be superseded by organic in conditions of stability."[25] "The beginning of administrative wisdom is the awareness that there is no one optimum type of management system."[26]

Charles Perrow

The theory developed by Charles Perrow form his personal observation and research adds more to the constructs of Selznick and Burns and Stalker.[27] He presents an idea not developed elsewhere, for although his formulation includes the extreme ends of the organization spectrum, he also describes "mixed" forms and some attendant problems for participants in them.

He conceives of variability and certainty as dimensions of the variable technology. Perrow considers that the individual who is assigned to do a specific task receives stimuli to which he must respond. He searches his mind to decide what kind of a response to make. If the stimulus is familiar, little search behavior is required, and an automatic response is given. In this case, the problem would be analyzable. If the stimulus is unfamiliar, considerable search behavior is required, and the individual would confront an unanalyzable problem.

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Therefore, certainty involves for him two possible states, both related to the familiarity of stimuli.

The other dimension of technology, variability, also assumes two states, high and low variability, reflecting the degree of stability of the tasks performed by the individual.

Perrow combines these two dimensions and their possible states in a two-by-two matrix, the cells being organizational forms which emerge from the four combinations of the dimensions. (See Figure 2.6.)

If one were discussing only routine and non-routine organizations, or bureaucratic and nonbureaucratic structures (mechanistic and organic in Burns's and Stakler's terms), only cells 4 and 2 of Figure 2.6 would be relevant. However, organizations can fall into categories 1 and 3, although they would cluster rather close to the center of the figure (center of the continuum line).

To analyze the relationship between technology and structure of the organization, Perrow established four dimensions for the variable structure and two management groups. The four dimensions of structure are: (1) discretion of subgroups; (2) power of subgroups; (3) basis of coordination within a group; and (4) interdependence of groups. The two management groups are middle management (technical level) and lower management (supervisory level). He then builds up a new matrix to represent

Degree of Variability

Degree of Certainty		FEW EXCEPTIONS	MANY EXCEPTIONS
	UNANALYZABLE SEARCH	CRAFT 1	NONROUTINE 2
	ANALYZABLE SEARCH	ROUTINE 4	ENGINEERING 3

CONTINUUM

Source: Charles Perrow

Figure 2.6. Dimension of Variability and Certainty.

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states of these dimensions in both management levels for each organization type in cells 1, 2, 3, and 4. (See Figure 2.7.)

Perrow's concept of variability of particular environmental sectors and of the way this is linked to structure and its dimensions is basic and important in the theory he develops. He makes clear that structure decisions may not be at the discretion of individuals inside the organization.

Joan Woodward

The studies reported by Joan Woodward are perhaps some of the most revealing comparative studies of organizational structures to date.[28] She and her associates studied one hundred British firms, ranging in size from one hundred to eight thousand employees. The focus was on formal organizational structure and operating procedures.

The firms were divided into three groups, according to their degree of success: average, above average, and below average. Every attempt was made to base the assessment of success on objective material, although the researchers had to use their own judgment in weighing various factors.

After some preliminary attempts to correlate success with form and size of organization, Woodward and associates hit upon the idea of classifying the firms into three groups according to complexity of technology:

	DISCRETION	POWER	COORDINATION WITH GROUPS	INTER-DEPENDENCE	DISCRETION	POWER	COORDINATION WITH GROUPS	INTER-DEPENDENCE
	(Craft)				(Non routine)			
Technical (Middle Management)	Low	Low	Plan	Low	High	High	Feedback	High
Supervision (Lower Management)	High	High	Feedback		High	High	Feedback	
	Decentralized 1				2 Flexible Polycentralized			
	(Routine) 3				4 (Engineering)			
Technical (Middle Management)	Low	Low	Plan	Low	High	High	Feedback	High
Supervision (Lower Management)	Low	Low	Plan		Low	Low	Plan	
	Formal Centralized				Flexible Centralized			

Figure 2.7.--Technology and Structure.

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(1) unit and small batch production, (2) large batch and mass production, and (3) long-run process production of the same product, such as chemicals. When so classified, a strong relation between organizational structure and success appeared within each group. The successful unit production firms had organizational characteristics in common with each other, as did the above average large batch production firms and the above average process production firms.

The successful firms at the top and bottom of the scale of technological complexity tended toward (1) less emphasis on clear-cut, written definition of duties, (2) greater delegation of authority, (3) more permissive management, (4) less tightly organized work forces, and (5) less organizational consciousness.

The successful firms in the middle technology group used more production administration and greater supervision of production operators. Control procedures were more elaborate, sanctions more rigorously applied, and written communications tended to be more frequent than in the firms at either of the two technological extremes.

Thus, successful large batch firms tended to be organized along classical lines, with duties and responsibilities clearly defined, unity of command, a clear distinction between staff and line, and a chief executive who confined his span of control to no more than five or six immediate subordinates. On the other hand, successful

firms in the other two categories tended to have a less classical type of organization.

As a result of these findings, Woodward suggests that the classical principles may have been drawn from observations of large batch production industries, for many people tend to regard this type of industry as typical of modern times. Within this limited range of technology, she points out, the form of organization suggested by classical theory seems to be associated with success, but outside this range, the most suitable form of organization is not bound by classical principles.

Following this analysis the Woodward investigators selected twenty firms for a more intensive study. This second study not only confirmed the link between technology and the applicability of the organizational principles, but also demonstrated that this link is causal rather than coincidental. However, it also showed that the relationships were more complex than they seemed from the preliminary study. Specifically, the investigators found that, at the extremes of the technical scale, the physical work imposed very narrow restrictions on the type of organization possible, and, in the middle range, the physical work set limits to what could be done organizationally, but left more range for management choice.

With the suggestion that successful organizations in different industries with different technologies are characterized by different organizational structure, the

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Woodward studies opened the way toward the formulation of a contingency theory of organizations.

Lawrence and Lorsch

P. R. Lawrence and J. W. Lorsch view the organization as an open system whose internal characteristics must fit external demands from the environment. They describe the internal relationship of members of the organization as intertwined and as influenced by "the nature of the task being performed, the form of relationships, rewards, and controls, and by the existing ideas within the organization about how a well-accepted member should behave."[29] It is their view that these internal factors must be integrated and function harmoniously if the organization is to perform effectively.

However, organizational differentiation, the difference in cognitive and emotional orientation among members in different functional departments, also exists. Managers in various functional units can be expected to differ from one another in goal, time, and interpersonal orientation. Furthermore, formality of structure will differ between departments and between organizations. Thus, because the members of each department develop different interests and differing points of view, they often find it difficult to reach agreement on integrated programs of action. Lawrence and Lorsch argue that the integration, which they define as "the quality of the

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collaboration," does not, as classical theorists assume, automatically follow from organizational design. For effective integration, the conflicts emerging from differing goal, time, and interpersonal differences must be resolved.

To Lawrence and Lorsch, the environment of the organization determines both character and degree of differentiation and the mode of integration. In particular, they consider two aspects of the environment as dominant: the certainty of information or knowledge about events and the dominant competitive issue in the industry. They therefore maintain that environmental uncertainty and competitive demand will affect the organization in terms of differentiation and integration: greater innovation and environmental uncertainty would be reflected in greater differentiation of goal, time, and interpersonal orientation and of organization structure.

Lawrence's and Lorsch's research was carried out in two phases. First, a series of six detailed case studies were conducted among firms in the plastics industry. These enabled a qualitative analysis of the relations among environment, differentiation, and integration. Second, a highly effective and a less effective organization in each of the plastics, food, and container industries were compared. These three industries were chosen because they displayed important differences among

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In the plastics industry, it was found that continually emerging technological developments created an environment of high uncertainty in which the dominant competitive issue for firms was the capacity to innovate. The major competitive issue in the food industry was also innovation, but to a somewhat lesser extent. In the container industry, on the other hand, the main competitive issue was the ability to provide customer service. It was also found that food and plastics firms worked under conditions of change and uncertainty, whereas container companies worked under conditions of relative stability.

With respect to differentiation, the general conclusion was that the actual amounts of goal, time, interpersonal and structural differentiation were in line with the authors' prediction that environmental factors of uncertainty and motivation would be associated with increased differentiation.

Lawrence and Lorsch discovered that the most successful organizations tended to maintain states of differentiation and integration consistent with the diversity of the parts of the environment and the required interdependence of these parts. In all three industries, high performing firms deviated less from the theoretical amount of differentiation required by the environment. Lawrence and Lorsch concluded that the more the parts of

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the environment differ in certainty and time of feedback, and the less dominant any part is, the more differentiated are the pairs of the units in the high performing organizations.

In addition to effects on differentiation, environmental factors were found to require qualitative differences in modes of integration. The highly differentiated plastics industry used formal integrating departments, the less differentiated food industry used individual integrators, and the least differentiated container industry used direct managerial contact.

It was also found that all effective integrators or integrating units had positional influence, sufficient knowledge and information to make decisions, and influence based on competence; furthermore, they all used confrontation to resolve conflict, as opposed to smoothing over or forcing.

In organizations with effective integration, the reward system emphasized unified effort rather than individual achievement.

Therefore, Lawrence and Lorsch proposed that, relative to performance, the effective organization must exhibit the degree of differentiation and integration demanded by the environment. They found that the state of differentiation in the effective organization was consistent with the diversity of the parts of the environment,

while the state of integration achieved was consistent with the environmental demands for interdependence.

D. S. Pugh

Several studies developed by Pugh and his associates aimed at a better understanding of organizational structure.[30] Initially, five primary dimensions of organization structure were defined and operationalized: (1) specialization, (2) standardization, (3) formalization, (4) centralization, and (5) configuration. From comparative data on these dimensions in fifty-two different work organizations in England, scales were constructed to measure sixty-four component variables. This made it possible to construct a profile characteristic of the structure of an organization to compare it directly with that of other organizations. Principal components analysis was used to help in the interpretation of intercorrelations among the scales. The resulting factors suggested four basic dimensions of structure, conceptualized as (1) structuring of activities, (2) concentration of authority, (3) line control of work flow, and (4) size of supportive component.

In a second step,[31] Pugh and his associates examined aspects of organizational context that had been held to be relevant to organizational structure. Seven primary concepts--(1) origin and history, (2) ownership and control, (3) size, (4) charter, (5) technology,

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(6) location, and (7) dependence on other organizations--were analyzed, and operationally defined scales were constructed. These were used as independent variables in a multivariate regression analysis to predict the underlying dimensions of organization structure previously established. The size of the correlations obtained on a sample of forty-six organizations in the English Midlands indicates that these aspects are salient. The framework of contextual and structural variables is seen as making possible processual studies on a much more rigorous comparative basis than before.

In a subsequent study,[32] Pugh presented the taxonomy of structures of work organizations based on three previously established empirical dimensions: (1) structuring of activities, (2) concentration of authority, and (3) line control of work flow. On the basis of a sample of fifty-two organizations in the English Midlands, clusters of organizations on these three dimensions were examined, and a sevenfold classification of organization structures was developed. These are: (1) full bureaucracy, (2) nascent full bureaucracy, (3) work flow bureaucracy, (4) nascent work flow bureaucracy, (5) prework flow bureaucracy, (6) personnel bureaucracy, and (7) implicity structured organizations. The characteristic contextual features of the classes of organization were demonstrated--size, technology, dependence on other organizations, and ownership--and a

possible developmental sequence was suggested. The results of this study indicate that the concept of a simple bureaucratic type is no longer useful, since bureaucracy takes different forms according to different settings. These results agree with those of the contingency theorists earlier reviewed.

Contingency Theory of Organizations: Present State of the Art

Although a substantial number of contributions have been reviewed, many have been omitted. The work of A. L. Stinchcombe, B. M. Bass, and L. E. Fouraker, the contingency studies related to conflict resolution, Fred Fiedler's work on leadership, and the research by V. H. Vroom, A. N. Turner and P. R. Lawrence, Robert Duncan, Shirley Terreberry, and many more might have been included.[33]

What was presented was the general evolution of the literature from its initial concern with environmental impact upon the organization through a more contemporary and more specific line of inquiry. These developments have generated what has been called the contingency theory of organizations, which has become a very promising area of investigation.

The basic assumption underlying such a theory is that organizational variables are complexly interrelated with one another and with conditions in the environment.[34]

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The definition of a contingency theory of organization provides a basic expository structure that constitutes only an initial strategy for the study of organizations.[35] By reading the most outstanding representatives of this theory, such as Woodward, Lawrence and Lorsch, and Thompson,[36] one realizes that there are profound differences among them. They differ in their analytic structure and in their conceptual framework, which constitutes an unsurmountable problem for integration of the theory. These differences also present a problem for the individual interested in research on contingency theory: Should he develop his own analytical and conceptual framework and thus add to the already serious lack of homogeneity?

A sound alternative would be to select a theorist whose ideas are appealing to the researcher and contribute to the development of that theory by testing propositions contained in it. Repeated efforts of this kind, to prove or challenge the legitimacy of a particular theory, would help develop a path for theoretical research. As strong inference accumulates in one area,[37] the direction of subsequent steps would become more clear.

At this juncture, a reasonable number of contingency theories of organizations are available for testing. They should be seriously scrutinized before additional "theories" are created.

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It is this task the present study proposes to undertake. Portions of J. D. Thompson's work were selected for investigation,[38] and a form of operationalization was conceived which would limit the study to feasible dimensions. For this reason, a review of Thompson's work was omitted here. In the next chapter his framework and the propositions selected from his book will be discussed.

CHAPTER II--FOOTNOTES

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[6]Barnard clearly was concerned with the environment, which was remarkable considering that the book was written in 1938.

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[8]Victor Thompson, Modern Organization (New York: Knopf, 1961).

[9]E. L. Trist et al., Organizational Choice (London: Tavistock Publications, 1963); and A. K. Rice, The Enterprise and Its Environment (London: Tavistock Publications, 1963).

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[12]Rice, The Enterprise, as quoted in Schein, Organizational Psychology.

[13]Alfred Chandler, Strategy and Structure: Chapters in the History of Industrial Enterprise (Cambridge, Mass.: MIT Press, 1962).

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[18]R. H. Hall, "Intraorganizational Structural Variation," Administrative Science Quarterly 7 (December 1967):295-308.

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[20]Harold J. Leavitt, "Unhuman Organization," Harvard Business Review (July-August 1962):90-98.

[21]Ibid., p. 95.

[22]R. Blauner. Alienation and Freedom (Chicago: University of Chicago Press, 1964).

[23]Selznick, TVA.

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[24]Tom Burns and G. M. Stalker, The Management of Innovation (London: Tavistock Publications, 1961).

[25]Ibid., p. 125.

[26]Ibid. An instance of this assumption is contained in H. A. Shepard's paper addressed to the Symposium on the Direction of Research Establishments, 1956.

[27]Charles Perrow, Organizational Analysis: A Sociological Overview (Belmont, Calif.: Wadsworth, 1970), and Complex Organizations (Glenview, Ill.: Scott, Foresman, 1972).

[28]Joan Woodward, Industrial Organization (London: Oxford University Press, 1965.

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CHAPTER III

CONCEPTUAL FRAMEWORK AND THE SCHEME OF PROPOSITIONS

Introduction

In Chapter II attention was devoted to the evolution of the literature from the early conceptualization of an open-system definition to the more recent contingency formulations. It was also pointed out that, among the many constructs, there is an enormous lack of homogeneity. It therefore seems reasonable that anyone attempting research in this area would do best to adopt one of the existing conceptual structures which he finds compatible, rather than develop a new framework and add to the present heterogeneity.

The theory developed by J. D. Thompson in Organizations in Action is selected here,[1] and its conceptual framework will be used.

Thompson's work presents several characteristics which satisfy the objectives set for this study: The theory is already developed in a propositional form, a coherent portion seems separable from the whole theory,

allowing the study to be limited to feasible dimensions, and the specific treatment given by Thompson to the nature of environmental relationships seems to be adapted to situations in developing countries.

This last judgment is based on the following reasoning. The basic question for a developing country resides in how to generate conditions to achieve and maintain a steady rate of growth. In such a context, the building of organizations becomes crucial because they will be active elements in promoting relevant increases in production and productivity. New and strong organizations are needed for the task, and old ones have to be adjusted to follow a new and dynamic path. In order to stimulate and maintain organizational growth in line with the objectives of economic development, a profound understanding of environmental politics is required. As the organization successfully trades with its operational environment, favorable conditions for survival and growth can be generated. It is precisely to this type of question--environmental politics--that Thompson addresses himself.

Conceptual Framework

The Thompsonian concepts and definitions selected for this study will be presented below. These are: task environment, domain, goals, power and dependence relationships (interdependence), and organizational assessment.

Before treating specific definitions, it seems important to explain some general aspects of Thompson's theory which would aid in comprehending the concepts.

It should be pointed out that Thompson also uses an expository structure based on an open-system strategy.[2] As the model proposed by Gouldner suggests,[3] an open-system strategy (the natural system model) assumes that the system contains more variables than we can comprehend at one time, or that some variables are subject to influences we cannot control and predict. Approached as a natural system, the complex organization is a set of interdependent parts which together compose a whole; each contributes something and receives something from the whole, which in turn is interdependent with some larger environment. Survival of the system is assumed to be goal, and parts and their relationships presumably are determined through evolutionary processes.[4]

While viewing organizations as open as opposed to closed systems or rational models, Thompson suggests that it "seems that each approach leads to some truth, but neither alone affords an adequate understanding of complex organizations."[5] He reasons that if the phenomena of rational models are indeed observable, we may want to incorporate some elements of those models, and if natural system phenomena occur, we should also benefit from the relevant theories. Therefore, he conceives "of complex organizations as open-systems, hence indeterminate and

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faced with uncertainty, but at the same time as subject to criteria of rationality and hence needing determinateness and certainty."[6]

Following Talcott Parsons,[7] Thompson sees organizations as exhibiting three distinct levels of responsibility and control: technical, managerial, and institutional.[8] At the technical level, problems focus around effective performance of the technical function. Mangerial level services serve the technical suborganization by mediating between the technical suborganization and those who use its products and procuring the resources necessary to carry out technical functions. The institutional level has the function of caring about the overall articulation of the organization and the institutional structure and agencies of the community

This study is primarily concerned with the variables and relationships proposed by Thompson for the institutional level of organizational responsibility and control. For this reason, it is important to describe the analytical structure and the conceptual framework he devised for this level of activities.

Domain

"Domain consists of claims which an organization stakes out for itself in terms of (1) range of products, (2) population served, and (3) services rendered."[9] The organization's domain identifies the points at which the

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organization is dependent on inputs from the environment. The composition of that environment, the location within it of capacities, in turn determines upon whom the organization is dependent. The capacity of the environment provides needed support and may be dispersed or concentrated. Similarly, demand for the capacity may be concentrated or dispersed; there may or may not be competition for it. If the organization's need is unique, or nearly so, we can say that demand for the input is concentrated; if many others have similar needs, we can say that the demand is dispersed. Similar distinctions can be made on the output side of the organization. Its environment may contain one or many potential customers or clients; the organization may be alone in serving them, or it may be one of many competitors approaching the client or clients.[10]

Task Environments

The concept of task environment denotes those parts of the environment which are relevant or potentially relevant to goal setting and goal attainment.[11] William Dill found the task environments of two Norwegian firms to be composed of four major sectors: (1) customers (both distributors and users); (2) suppliers of materials, labor, capital, equipment, and work space; (3) competitors for both markets and resources; and (4) regulatory groups, including governmental agencies, unions, and

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interfirm associations.[12] William Evan employs the term "organization set" for this purpose.[13]

Just as no two domains are identical, no two task environments are identical. The individuals, other organizations, and aggregates which constitute the task environment for a particular organization are determined by the requirements of the technology, the boundaries of the domain, and the composition of the larger environment.

The relationship between an organization and its task environment is essentially one of exchange; unless the organization is judged by those in contact with it as offering something desirable, it will not receive the inputs necessary for survival.

Domain Consensus

Domain consensus defines a set of expectations both for members of an organization and for others with whom they interact about what the organization will and will not do. It provides, although imperfectly, an image of the organization's role in a larger system, which in turn serves as a guide for the ordering of action in certain directions and not in others. Using the concept of domain consensus, we need not assume that the formal statement of goals found in charters, articles of incorporation, or institutional advertising is in fact the criterion upon which rationality is judged and choices of

action alternatives are made. The concept of domain consensus can be clearly separated from individual goals or motives.

Interdependence

Task environments of complex organizations turn out to be multifaceted or pluralistic, composed of several or many distinguishable others potentially relevant in establishing domain consensus. This pluralism is significant for complex organizations because it means that an organization must exchange with not one but several elements, each of which is itself involved in a network of interdependence, with its own domain and task environment. In the process of working out solutions to its problems, an element of the task environment may find it necessary or desirable to discontinue support of an organization. Thus, task environments pose contingencies for organizations.

Task environments also impose constraints. The capacities of supporting organizations and the absence of feasible alternatives may fix absolute limits to the support which may be available to an organization at a given time. Richard Carlson notes that some organizations have no control over selection of clientele, and that the clientele likewise lacks an option.[14] He refers to these as "domesticated" because they are not compelled to attend

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to all of their needs, since society guarantees their existence.

Since the dependence of an organization on its task environment introduces not only constraints but also contingencies, Thompson expects that organizations subject to norms of rationality will attempt to manage dependence.

Building on a conception advanced by Richard Emerson,[15] Thompson says that an organization is dependent on some element of its task environment (1) in proportion to the organization's need for resources or performances which that element can provide and (2) in inverse proportion to the ability of other elements to provide the same resource or performance.

Emerson points out that dependence can be seen as the obverse of power. Thus, an organization has power, relative to an element of its task environment, to the extent that the organization has capacity to satisfy needs of that element and to the extent that the organization monopolizes that capacity. This approach to dependence and power frees us from the necessity of viewing power as resulting from a set of relationships between the organization and the several elements of its pluralistic task environment. Also, the power-dependence concept advanced by Thompson provides an important escape from the "zero-sum" concept of power, which assumes that in a system composed of A and B, the power of A is power gained at the expense of B. By considering power in the

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context of interdependence, Thompson admits the possibility of A and B becoming increasingly powerful with regard to each other, that is, the possibility that increased interdependence may result in increased net power. It is this possibility on which coalitions rest.

The concepts of domain, task environments, and interdependence as advanced by Thompson form a basis for a series of propositions made in Chapter III of his book. Adding to these the concepts of goals and of the assessment of organizations, we can compose a whole that seems to be very comprehensive. In the relationships between organizations and task environment elements the basis for the establishment of a certain configuration for the definition of power and dependence is the issue of goals and domain determination. Contingencies and constraints posed by task environment elements refer specifically to this issue. If goals and domain become important elements of this relationship between the organization and task environment elements, it seems that those elements will be constantly evaluating the focal organization. (See Figure 3.1.) Therefore, the assessment of organization, as proposed by Thompson, is also taken into the conceptual framework used in this research. This concept and that of goals remain to be defined.

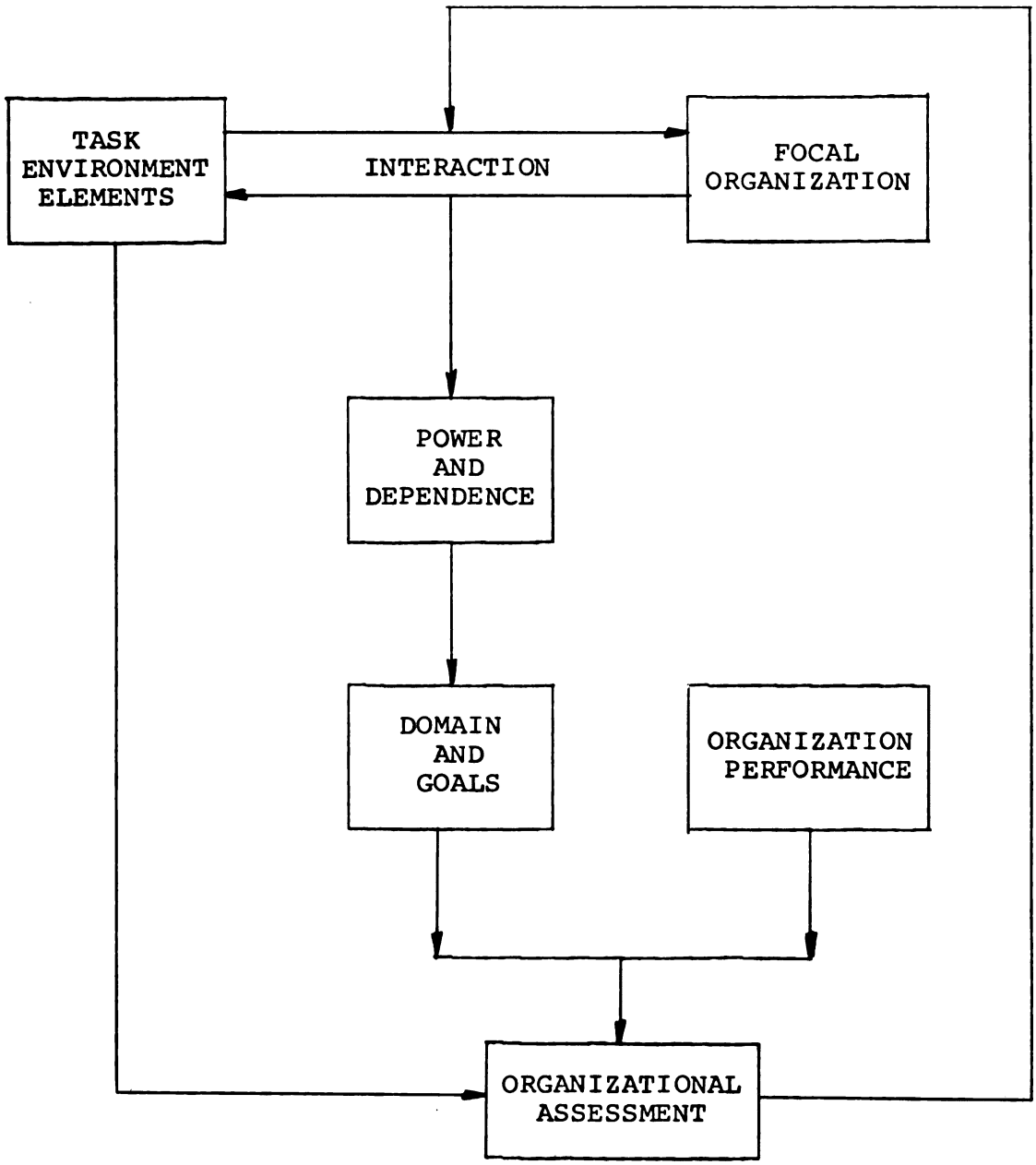

Figure 3.1.--Thompson's Conceptual Framework (Normative Model).

The Concept of Goals

Thompson uses "goal" to refer only to some imagined state of affairs which may conceivably be attained or approached at some future time. He considers goals for an organization as intended future domains for the organization.[16] Goals for the organization will usually be held by individuals or categories having no affiliation with the organization.

But his fundamental definition is that organizational goals are the future domains intended by those in the dominant coalition.[17] By this he means organizational goals are established by individuals, but interdependent individuals who collectively have sufficient control of organizational resources to commit them in certain directions and to withhold them from others. The dominant coalition is composed of individuals in a focal organization and, in its task environment, of organizations which act in a combination or joint venture. Their interest in controlling policies for resource allocation within the focal organization defines a pattern for their combined behavior. This is entirely consistent with the view of Richard Cyert and James March,[18] who insist that "side payments, far from being the incidental distribution of a fixed, transferable booty, represent the central process of goal specification. That is, a significant number of these payments are in the form of policy commitments."[19]

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The Assessment of Organizations

As purposive entities, complex organizations are constantly being evaluated both by elements of the task environment and by components of the organizations themselves. According to Thompson, under norms of rationality we might expect organizations to be evaluated in terms of maximum attainment of purposes. The assumption that organizations maximize, or seek to, is frequently made about organizations engaged in the private sector of the economy. The maximizing assumption is challenged, however, by those who believe organizations satisfice, or seek to attain acceptable or desirable states.[20] Even if we concede that organizations sometimes maximize, the organizational question is whether the organizations has any way of knowing that it has done so.

Variables of Assessment

Assessment inevitably involves some standard of desirability against which actual or conceivable effects of causal actions can be evaluated. Assessment also requires knowledge of effects.

Cultures provide general standards of desirability. In Western culture, for example, it is considered normal to prefer health over illness, wealth over poverty, life over death, rationality over irrationality, success over failure. Difficulties can arise when we are asked to

choose between health and wealth, for this involves a comparison of two dimensions rather than high and low points on a single dimension. People, and organizations, do make choices in multidimensional situations, using some sort of calculus which facilitates preferential ranking of effects regardless of the dimension on which they occur. Thompson, therefore, considers that it is not unrealistic to conceive of the variable standard of desirability as varying from crystallized to ambiguous.

In simple closed systems, knowledge of cause and effect relationships may be complete. In the complicated open system, however, causal actions often have multiple effects, and the knowledge of cause and effect relationships may be incomplete. Thus, the variable knowledge about cause and effect may vary from complete to incomplete.

By combining the two dimensions of assessment and working with their extreme values, Thompson classifies four types of assessment situations. These are shown in Figure 3.2.

In Cell I, where cause and effect understanding is believed complete and a standard of desirability is crystallized, we would expect the maximizing approach to assessment. In operational terms this generally is known as the efficiency test and refers to the degree to which perfection is approached.

		Beliefs about cause/effect knowledge	
		Complete	Incomplete
Standards of Desirability	Crystallized	I	II
	Ambiguous	III	IV

Figure 3.2. Thompson's Four Assessment Situations.

In Cell II, where a standard of desirability is crystallized but the assessor believes his knowledge of cause and effect is incomplete, the efficiency test is inappropriate, for there is no way of assessing the net effects of causal action. In this case, the appropriate test is not the economic but the instrumental one--whether a desired state of affairs is achieved. In the instrumental test, the assessor is forced to seek another standard of satisfactoriness.

When standards of desirability are ambiguous (Cells III and IV) the assessor must find other means of resolving his dilemma. When standards of desirability are ambiguous, or when cause and effect knowledge is believed incomplete, organizations turn to social reference groups.

Problem Definition

Within the context of the conceptual framework proposed by Thompson, the general problem is to investigate the relationships of one organization with its task environment. More specifically, the objective of this project is to develop a case study of a Brazilian public research and development institute in order to investigate (1) the configuration and nature of task environment relationships; (2) the process of goal formulation and domain determination; and (3) the way organizational assessment is developed.

The results of the investigation will then seek to determine whether or not, and to what extent, the selected organization appears to be operating according to Thompson's prescriptions. Therefore, his conceptual framework and his propositions constitute a "normative model," a pattern through which the collected data will be analyzed.

However, discrepancies from the "normative model" may be found. Where they exist, a deeper analysis will be required to identify (1) whether the organization could achieve greater gains in effectiveness by conforming to the pattern, (2) or whether success, despite the violation, means that some modification of Thompson's propositions is in order.

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Consequently, the study is not designed primarily as a test of Thompson's theory, nor is it aimed primarily at the assessment of the selected organization. Rather, it seeks to speculate about both questions.

Propositions

The selection of propositions was guided primarily by the intent to develop an investigation geared toward the institutional level of organizations. This level seems to be of deep significance to the question of economic development.

Second, an attempt was made to select propositions which would compose a comprehensive and coherent whole constituting a clear and unambiguous basis for the research study.

Therefore, the following propositions were selected. These seemed, to the author, to meet the above requirements.

Task Environment, Domain, and Interdependence

From Thompson's Chapter 3, "Domains of Organized Action," several propositions may be drawn.

Proposition 1: Under norms of rationality organizations seek to minimize the power of task environment elements over them by maintaining alternatives.

Since dependence introduces constraints or contingencies, the problem for the organization is to avoid becoming subservient to elements of the task environment.

Proposition 2: Organizations subject to rationality norms and competing for support will seek prestige.

Acquiring prestige is the easiest way to acquire power. To the extent that an environmental element finds it prestigious to exchange with an organization, the organization has gained a measure of power over that element without making any commitments; that is, it has gained power without yielding power.

Proposition 3: When support capacity is concentrated in one or a few elements of the task environment, organizations under norms of rationality seek power relative to those on whom they are dependent.

The proposition assumes that power is a way of handling what would otherwise be serious contingencies, and that rationality is not achieved by completely powerless (dependent) organizations. It is expected, therefore, that organizations subject to rationality norms and constrained by monopolized or nearly monopolized capacity for support, will maneuver toward achieving a balance of power.

Proposition 4: When support capacity is concentrated and balanced against concentrated demands, the organization involved will attempt to handle their dependence through contracting.

Contracting refers here to the negotiation of an agreement for the exchange of performances in the future.

Proposition 5: When support capacity is concentrated but demand dispersed, the weaker organization will attempt to handle its dependence through coopting.

Coopting has been defined as the process of absorbing new elements into the leadership or policy determining structure of an organization as a means of averting threats to its stability or existence.[21] Coopting increases the certainty of future support by the organization. It is a more constraining form of cooperation than contracting, for to the extent that cooperation is effective, it places an element of the environment in a position to raise questions and perhaps exert influence on other aspects of the organization.

Proposition 6: When support capacity is concentrated and balanced against concentrated demands, but the power achieved through contracting is

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inadequate, the organizations involved will attempt to coalesce.

Coalescing refers to a combination or joint venture with another organization or organizations in the environment. A coalition may be unstable or may have a stated terminal point, but to the extent that it is operative, the organizations involved act as one with respect to some operational goals. Coalition not only provides a basis for exchange but also requires a commitment to future joint decision making. It is therefore a more constraining form of cooperation than coopting.

Proposition 7: The more sectors in which the organization subject to rationality norms is constrained, the more power the organization will seek over remaining sectors of its task environment.

The management of interorganizational relations is just as political as the management of a political party or of international relationships. It can also be just as dynamic, as environments change and propel some elements out of and new elements into a task environment.

Proposition 8: The organization facing many constraints and unable to achieve power in other sectors of its task environment will seek to enlarge the task environment.

Captive organizations frequently find themselves boxed in on several sides, to the point where norms of rationality are threatened or overwhelmed. It is at this point that captive organizations often join forces to establish noncaptive, evaluating organizations which develop yardsticks of rationality and set standards of accreditation.

The Assessment of Organizations

From Thompson's Chapter 7, "The Assessment of Organizations," several propositions arise.

Proposition 9: Under norms of rationality, assessors prefer efficiency tests over instrumental tests, and instrumental tests over social tests.

Where efficiency tests are valid, they provide a tangibility that is indisputable. Assessment cannot be challenged, and the test is the strictest possible. With the instrumental test, however, assessment (and hence assessors) can be uneasy, for there always is the possibility that a better way exists. Where social referents are involved, differences of opinion are possible; moreover, the referrent may be rather unstable.

Proposition 10: At the institutional level, organizations subject to norms of rationality measure

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Organizations face futures which by definition are uncertain. They can never be sure what effects they would like to bring about in this uncertain future.

The organization's fitness is also of concern to task environment elements. These elements contribute in various ways to the organization and have different interests to be satisfied through the relationship. Thus, the complex organization is constantly being assessed by a variety of assessors, each inclined to employ a different kind of yardstick. On the question of fitness of the organization for future action, organizations must resort to satisficing measures. But from what sources do they draw their standards of satisfactoriness?

Proposition 11: Under norms of rationality, organizations facing relatively stable task environments seek to demonstrate fitness for future action by demonstrating historical improvement.

Lacking an absolute or crystallized scale for evaluation, the organization must find a relative one, and the reference group in this case is the organization itself, at an earlier period. Because the historical

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improvement test is widely used, growth of an organization is often considered a sign of health.

Proposition 12: Under norms of rationality, organizations facing dynamic task environments seek to score favorably in relation to comparable organizations.

Lacking absolute criteria of fitness, and being unable to assume that improvement over its past capability is a reflection of its future, the complex organization turns to social references to demonstrate that it is doing as well as or better than others in its category. But with multiple assessors to be satisfied and scarce resources, the organization may not be able to demonstrate improvement on all criteria.

Proposition 13: When the organization cannot hope to show improvement on all relevant dimensions, it seeks to hold constant on some and show improvements on those of interest to task environment elements on which the organization is most dependent.

When the organization needs a task environment element more than the element needs the organization, the organization will attempt to score well on dimensions of interest to that element.

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Proposition 14: Under norms of rationality, complex organizations are more alert and emphasize scoring well on those criteria which are most visible to important task environment elements.

Proposition 15: When organizations find it difficult to score on intrinsic criteria, they seek extrinsic measures of fitness for the future.

Proposition 16: When task environment elements lack technical ability to assess performance, organizations seek extrinsic measures of fitness for future action.

Proposition 17: When cause and effect knowledge is believed incomplete, organizations seek extrinsic measures of fitness for future action.

Finding it difficult to judge the quality of its output, an organization seeks to measure its output primarily in terms of the requirements of the task environment. But it might be that an organization could be engaged in such a specialized undertaking with highly refined technology that few elements of its task environment would be capable of evaluating it. Thompson tries to predict these situations in the above four propositions.

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From Thompson's Chapter 9, "Discretion and Its Exercise," the following propositions may be adduced.

Proposition 18: The more dynamic the technology and task environment, the more rapid the political process in the organization and the more frequent the changes in organizational goals.

Thompson assumes that changes in technology or task environment provide an opportunity to adjust the power structure. He expects the task environment to signal, more less rapidly, the emergence of new dependencies and thus the basis for new power positins. These ultimately will be represented by changes in organizational goals.

Summary

Propositions 1 to 18 are to be evaluated by this study within the limits of one specific organization, focusing on its relationships with task environment elements.

Propositions and Interview Questions

Analysis of documents and personal observation are used in case study methodology; they will be employed

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here as extensively as possible. However, interviews will be the main source for data. Hence, interview questions have been devised in order to operationalize concretely the above propositions, providing a means for coherent and organized investigation.

The delimitation of the sample to one single organization automatically defined the subjects to the interviewed: (1) members of the top administrative group of the focal organization and (2) members of the task environment organizations involved in direct interaction with the focal organization. Accordingly, two questionnaires were constructed to account for the different location of the interview subjects. (See Appendices A and B.)

Questions were formulated to allow relative flexibility in the interview. This was done in order to facilitate the reporting of instances and facts peculiar to the subject's experience. Purely objective answers would not permit a thorough understanding of the situation, which would make it difficult or impossible to relate data to some of the propositions.

Both questionnaires are similar and follow the same organization. Interview questions in Section A identify the subject's position and the nature of his interaction within the focal organization or task environment. The objective is to obtain a clear configuration

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of the present task environment for the focal organization so that relationships can be mapped out with some accuracy.

Section B was designed to provide data for an understanding of relationships between the focal organization and each element of its task environment. Most of the questions seek precise answers within a five-point scale in order to determine objectively the nature of power and dependence relationships. However, some examples are asked for to illustrate the answers given.

The interrelated questions of Section C focus on the subjects' ideas about future intended changes, or possible ideal changes, in the organization's task environment. Inquiry is also made into past changes.

Identification of the focal organization's present domain and its process of goal formulation are investigated by questions contained in Section D.

Finally, Section E was designed to elicit the subject's perception of the process of assessment of the focal organization.

Both questionnaires were designed to generate sufficient data from Sections A through D to evaluate propositions 1 to 8 and proposition 18. The questions contained in Section E sought to test propositions 9 to 17.

An important strategy allowed by both questionnaires is the comparison of perceptions of subjects within

the focal organization with each other, and with subjects located in the task environment. This permits a continuous checking of the information provided.

To conclude, it should be mentioned that the design formulated by this study was initially inspired by Lawrence's and Lorsch's environmental questionnaire and by Robert Kahn's and associates' design for role-set questionnaires.[22]

CHAPTER III--FOOTNOTES

[1]Thompson, Organization in Action.

[2]The term here is given the dimensions established in Krupp, Pattern in Organizational Analysis.

[3]Alvin W. Gouldner, "Organizational Analysis," in Robert K. Meaton, Leonard Broom, and Leonard S. Cottrell, Jr., eds., Sociology Today (New York: Basic Books, 1959).

[4]Thompson, Organizations in Action, pp. 6-7.

[5]Ibid., p. 8.

[6]Ibid., p. 10.

[7]Talcott Parsons, Structure and Process in Modern Societies (New York: Free Press, 1960).

[8]Thompson, Organizations in Action, p. 10.

[9]Ibid., p. 26.

[10]Ibid., p. 27.

[11]Ibid., p. 27.

[12]William R. Dill, "Environment as an Influence on Managerial Autonomy," Administrative Science Quarterly 2 (March 1958):409-43.

[13]William M. Evan, "The Organization-Set: Toward a Theory of Interorganizational Relations," in James D. Thompson, ed., Approaches to Organizational Design (Pittsburgh: University of Pittsburgh Press, 1966).

[14]Richard O. Carlson, "Environmental Constraints and Organizational Consequences: The Public School and Its Clients," in Behavioral Science and Education Administration (Chicago: National Society for the Study of Education, 1964), 262-76.

[15]Richard M. Emerson, "Power-Dependence Relations," American Sociological Review 27 (February 1962):185-209.

[16]Thompson, Organizations in Action, p. 127.

[17]Ibid., p. 128.

[18]Richard M. Cyert and James G. March, A Behavioral Theory of the Firm (Englewood Cliffs: Prentice-Hall, 1963).

[19]Ibid., p. 30.

[20]This view is represented by Herbert A. Simon in Models of Man, Social and Rational (New York: John Wiley & Sons, 1957); James G. March and Herbert A. Simon, Organizations (New York: John Wiley & Sons, 1958); Cyert and March, Behavioral Theory of the Firm; W. J. Baumol, Business Behavior, Value and Growth (New York: Macmillan, 1959); and Julius Margolis, "The Analysis of the Firm: Rationalism, Conventionalism and Behavioralism," Journal of Business 31 (July 1958):187-99.

[21]Selznick, TVA.

[22]Lawrence and Lorsch, Organization and Environment; and Robert L. Kahn; Donald M. Wolfe; Robert P. Quinn; and J. D. Snoek, Organizational Stress: Studies in Role Conflict and Ambiguity (New York: John Wiley & Sons, 1964).

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CHAPTER IV

CASE STUDY: A BRAZILIAN INSTITUTE OF RESEARCH

This chapter's objective is to present, in a systematic manner, the information collected according to the case study methodology. The basic information source was interviews with members of the top administration of the focal organization and of elements of its task environment. Questionnaires were developed for this purpose. Responses to the questions as well as selected focal organization documents and the personal observation of the researcher will be reported upon in order to provide insight into the analysis of the propositions presented in the previous chapter.

The information gathered will be reported in the following sequence: (1) brief history of the focal organization; (2) description of the internal organization; (3) identification of task environment elements and description of the nature of the relationship; (4) perceptions of the top administrative group of the focal organization;

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(5) perceptions of the task environment elements; and

(6) the researcher's own perceptions.

Brief History of ITAL

The Instituto de Tecnologia de Alimentos (Institute of Food Technology) or ITAL, is the organization selected for this study. Still in an embryonic state, ITAL came into existence on 27 January 1963. At that time a Laboratory of Food Technology was created as a research unit within the Instituto Agronômico, an agricultural research organization subordinated to the Secretary of Agriculture of the State of São Paulo and located in the city of Campinas.[1]

The Laboratory of Food Technology acquired autonomous status on 18 December 1964.[2] At that time it became a new organization under the State Secretary of Agriculture. This autonomy resulted from an agreement between the Brazilian government and the United Nations. The new organization took the name Centro Tropical de Pesquisas e Tecnologia de Alimentos (Tropical Center of Research on Food Technology). The parties involved in the agreement were the Government of the State of São Paulo, representing the Brazilian government, the Food and Agriculture Organization (FAO), and the United Nations Development Program.[3]

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On 14 July 1969 decree number 52,167 of the Governor of the State of São Paulo reorganized the Tropical Center of Research on Food Technology into the Institute of Food Technology, or ITAL, with the following official objectives:[4]

--To promote research and implementation of techniques and methods of preparation, storage, processing, packing, distribution, and utilization of foodstuffs.

--To cooperate with universities in the training of specialists on food technology.

--To cooperate with organizations engaged in the training, at various levels, of industry, personnel, students, and graduates.

--To advise official credit institutions of the financing of projects related to the food industry.

--To perform related tasks as deemed necessary.

Presently, ITAL's physical facilities occupy an area of 60,000 square meters. Its location in the city of Campinas, about 60 miles from the São Paulo metropolitan area, makes its research resources easily accessible to a large concentration of agricultural enterprises and also to the majority of enterprises in the food production business. ITAL's modern equipment and buildings represent a total investment of US$5.6 million to date, of which US$2.1 million was contributed by the Brazilian

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government.[5] The organization's physical facilities include 13 pilot plants, 13 specialized laboratories, and areas where administrative units operate.

As part of the international agreement ITAL and FAO work together in a joint program of research and development to aid the expansion and improvement of the Brazilian food industry. The United Nations also provides technical assistance to ITAL in the form of visiting international experts, fellowships for training of ITAL personnel in foreign universities, and equipment, machinery, laboratory instruments, fixtures, technical publications, and so forth.[6]

ITAL is presently qualified to offer the Brazilian food industry the following services:

--Chemical, biochemical, and microbiological analysis of raw materials of agricultural and animal origin.

--Sensory evaluation of processed foods.

--Quality control of processed products and determination of standards.

--Research and development on canned food, cold preservation, freezing, fermentation, food dehydration, breadmaking, and noodles.

--Advice on artificial ripening of fruits under controlled temperature and humidity conditions.

--Studies on the feasibility of new production processes.

--Improvement in food production methods.

--Formulation of high protein content and low cost foods.

--Improvement in traditional products formulas.

--Processing of significant quantities of food products for market trial purposes.

--Technical advice on transportation and handling of fruits and vegetables, grain, storage, roots, packing materials, and so forth.

--Equipment specification and design of plans for new industrial plants.

--Short intensive courses especially designed for food industry personnel.

--Longer intensive courses for training specialized technical personnel.

--In-training service for professionals and industry personnel.

--Other research activities that are important for the development of the Brazilian food industry.

According to an FAO publication,[7] the success attained by ITAL in its endeavors has led the government of the state of São Paulo to create a Department of Food Technology at the University of Campinas (UNICAMP). Also, the government has created a technical school for education of middle level technicians. The FAO publication also

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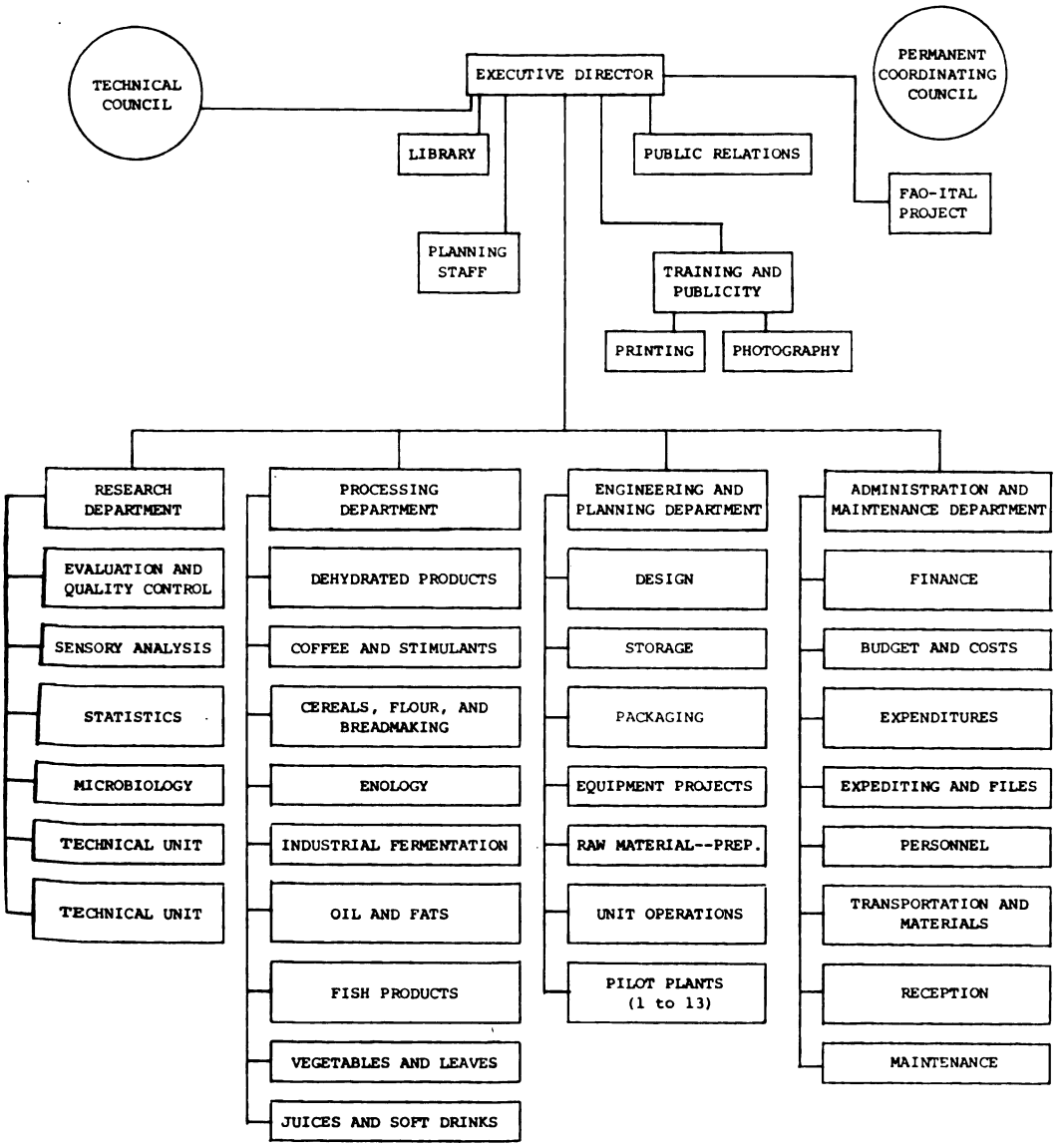
notes that ITAL has been involved in research and study agreements with other Brazilian states.[8] Furthermore, it reports that as a consequence of project contracting and agreements with other state governments, only 40 percent of ITAL's budget is composed of funds from the state of São Paulo.

Internal Organization

ITAL's organizational structure is represented in Figure 4.1. The hierarchical design shows an executive director in the top position. In direct line of subordination to him are the four self-contained units of administration: the research, processing, engineering and planning, and administration and maintenance departments. The planning staff, the library, and the training and publicity units also report to him. The three technical departments and the Department of Administration and Maintenance constitute the first line of command.

The Research Department, in charge of basic food research, has six organizational subunits under its direct control. The Processing Department is responsible for the development of industrial processes for food production and has nine subunits under its direct superivision. The Engineering and Planning Department handles industrial projects and unit operations. It is composed of six subunits. The three technical departments exercise a joint supervision over the thirteen pilot plants.



Source: Instituto de Tecnologia de Alimentos (São Paulo: Secretaria da Agricultura do Estado de São Paulo, 1972), p. 4.

Figure 4.1.--Organogram: "Institute of Food Technology."

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The Administration and Maintenance Department provides the essential services for the functioning of the three technical departments. It is in charge of support activities such as finance, budget control, and personnel.

The FAO-ITAL project was placed in a formal line of horizontal interaction with the executive director (see Figure 4.1). In fact, FAO maintains a project manager within ITAL's administrative building. This manager, ITAL's international director, handles a series of activities related to the United Nations-Brazilian government agreement.

The Permanent Coordinating Council is composed of members of ITAL's top administrative group (executive director and the department managers) representatives of the federal and state governments, and representatives of the food industry. Basically, this council supervises the international aid programs dealing with (1) visits of international experts to ITAl; (2) allocation of scholarship funds for ITAL's experts to study abroad; (3) supervision of equipment and machinery for ITAL's laboratories and pilot plants; and (4) the program of technical publications.[9] The council usually meets once a year.

The Technical Council is also under direct command of the executive director. This council is composed of the following members: (1) the directors of the three technical departments; (2) the planning staff manager;

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(3) the director of the administration and maintenance department; and (4) the executive director. Meetings are held at least twice a month to deliberate on such issues as hiring new technical personnel, administrative control of scholarships for study overseas, technical trips in Brazil or abroad, changes in work programs, and evaluation of project proposals.

The FAO-ITAL project manager participates in top management meetings in which all members of the Technical Council participate. These meetings are held as they become necessary to discuss general policy issues for the organization.

The directors of the technical departments hold weekly meetings with their subunit managers and the technical personnel under their supervision. The objective of these meetings is to control and discuss projects being developed and all other scientific or technical problems in the department. The publication of relevant research results is also discussed.

External relationships are conducted primarily by the executive director, either by telephone or personally as it seems necessary. It was observed that department directors also maintain direct contacts with environment elements. Nevertheless, these interactions occur under the supervision of, and within the directives established by, the executive director. There is an almost continuous

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interaction with food industry representatives as a consequence of industrial project development. Furthermore, a constant interaction has occurred with the various units of the state and federal governments. A representative of the federal government is in contact with ITAL's top administration at least once every fifteen days.

An interesting development within ITAL's organizational structure was the creation of project committees. Although these are not represented in the formal organogram, they have permeated the traditional vertical lines of command. Basically, such a committee's main objective is to control, follow up, and correct the development of research projects for which ITAL is responsible. Operational rules were set up as follows:

--For each research project contracted by ITAL, a team is organized. This team is composed of members of the technical areas involved in the project. Each becomes responsible for performance in the technical areas under his responsibility.

--A project manager is nominated with the consent of the technical departments, the executive director, and the planning staff manager. The project manager thus becomes responsible for the development of the entire project. He must establish the research plan and divide the

research into specific tasks to be performed in each technical department. The project manager establishes schedules and controls individual performance in order to meet the planned schedules.

--The project manager then submits his plans and budget to the Technical Council.

--After the Technical Council approves, the project manager's tasks begin. He exerts horizontal supervision over the performance of various members assigned to the project. This supervision often cuts across departments and sometimes includes units belonging to other research institutes within the state administration.

--The technical and financial success of the project is a responsibility of the project manager.

Further investigation revealed that this project (or matrix) organization came into existence at ITAL as a consequence of the joint effort of a study committee formed by members of the Conselho Nacional de Pesquisas (CNPq, National Research Council), of the Ministry of Education and the National Academy of Science (USA). This committee studied technological and scientific research in Brazil, and one of its recommendations was that all

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research institute personnel should read a book by Lawrence W. Bass, The Management of Technical Programs.[10] ITAL's top management reports that Bass's book, when analyzed in small internal work groups, elicited very positive reactions from the technical personnel. Bass suggested a type of project organization with which ITAL experimented and then fully adopted when it proved so successful.

ITAL apparently has been quite successful in using a matrix organization. This is evidenced by the fact that state and federal governments have delegated to ITAL overall supervision in the planning and control of interdisciplinary research projects, even those involving other research institutes in the state of São Paulo.

Identification of Task Environment Organizations

The larger environment is usually vast, complex, and scarcely identifiable in terms of its direct impact upon the focal organization. The Thompsonian definition provides a means for operationalizing the concept of environment by narrowing it down to elements which are "potentially relevant for goal formulation" within the focal organization. The use of this concept makes it possible to identify relevant elements of ITAL's task environment. In studying the history of the relationships involved, it will be easier to relate observed internal states to specific environmental influences.

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Following the conceptual framework presented in Chapter III, interview results revealed that the present task environment for the Institute of Food technology is composed of the following major elements: (a) state government units of administration; (b) federal government units of administration; (c) international organizations; (d) the Brazilian food industry; and (e) the educational system, including universities and technical schools.

However, this initial identification is too general and imprecise in terms of the Thompsonian concept. Each of the organizations mentioned above is divided into a multitude of units which in different degrees interact with ITAL, the focal organization. This situation posed the problem of what degrees of interaction should be considered relevant. It was decided to leave the answer to this question for the future, after interviews and other information collected could better reveal who the relevant members of the task environment were.

During the almost three months during which interviews with ITAL's top management were conducted, the configuration of that organization's task environment became gradually clearer. An active external group with which the focal organization maintained a higher degree of interaction could then be identified. The following, for the purposes of this study, form the task environment for the focal organization:

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State Government--

1. The office of Coordination of Agricultural Research of the Secretary of Agriculture, state of São Paulo
2. The State Council of Technology of the Secretary of Planning, state of São Paulo

Federal Government--

1. The Brazilian Enterprise of Agricultural Research (EMBRAPA) within the Ministry of Agriculture
2. The National Integrated Plan for Food Technology (PLANITA) of the Ministry of Agriculture

International Organizations--

1. The Food and Agriculture Organization (FAO) of the United Nations
2. The United States Agency for International Development USAID)

Food Industry--

1. Various food manufacturing companies operating in Brazil

Educational Systems--

1. Universities and technical schools. Programs devoted to food science and food technology.

The Scheme of Formal Relations. To better understand the present formal configuration of ITAL's task environment, each external relationship will be analyzed

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from the viewpoint of the legal and legitimizing instruments which define its operational relationships with the focal organization.

State administration elements are present in ITAL's task environment for historical reasons, as mentioned earlier. As part of the larger state government public services, the focal organization is under direct line of command of the Secretary of Agriculture. This relationship is defined under state laws, rules, and regulations. The link with the state government extends to the Secretary of Planning, who exerts functional authority over ITAL. This role has been translated into more general policy decisions issued by the State Council of Technology, which is in charge of obtaining compliance from the various state research and development institutions with performance objectives set up by the planning agency. Completing the circle of formal links with the state administration, the state units in charge of budget control, personnel, and purchasing policies interact with the focal organization to supervise the compliance to norms and rules established by the state administration for each of these general areas.

The federal government enters the scene through an agreement with ITAL for the development of projects in the area of food technology which were considered of relevance for national policy. The terms are spelled out in the

Plano Nacional Integrado de Tecnologia de Alimentos (PLANITA, the National Integrated Plan for Food Technology). Specific projects are to be developed by ITAL for various areas of food technology in various states of Brazil. The federal government provides funds which are tied to the performance of project activities by ITAL's technical personnel.

PLANITA's execution is supervised by the Empresa Brasileira de Pesquisa Agropecuária (EMBRAPA, Brazilian Public Enterprise for Agricultural Research), a federal government corporation created to stimulate, control, and develop agricultural research in the nation. PLANITA is a five-year plan which began operation in 1973. It involves overall payments from the federal government to ITAL amounting to about 20 percent of the focal organization's present annual budget.

The Food and Agriculture Organization (FAO) of the United Nations has been the dominant international relationship, although there are others, among them associations with foreign universities. FAO has been a member of ITAL's task environment since the early days by force of the international agreement previously mentioned.

At the present moment,[11] another international agreement has just been completed with the United States Agency for International Development (USAID). It provides technical assistance programs to ITAL, and it aims to

link the focal organization to a consortium of U.S. universities. Objectives such as graduate education for ITAL's technical personnel and scientific and technical information exchange of various types constitute the basis of this agreement.

The food industry is a required member of ITAL's task environment by force of the focal organization's own official objectives. ITAL's main function is to produce relevant technology such that applied scientific knowledge can be made available to the Brazilian entrepreneurial universe. ITAL's contributions in this area are to be geared to the increase in the rate of production and productivity of the food industry in Brazil. Although the early policy directives did not make this objective explicit, at the present moment there is an intensive effort to support technological activities in the food industry.

ITAL has no legal obligation to maintain constant interaction with the educational system; however, it has already assisted the state government in its effort to create a Food Science Department at the University of Campinas. Cooperation in the installation and development of a Technical School in the same city has also been provided by ITAL.

PLANITA's objectives incorporate the desire of the federal government to secure ITAL's technical help for universities and research institutes in Northeast Brazil,

a region of economic stagnation. A formal means of interaction was thus established such that ITAL has become a center for the diffusion of scientific knowledge to other regions of the nation.

Perceptions of Task Environment Relationships

This section will report on the perceptions of members of the focal organization and task environment organizations as expressed in the interviews. Because data were collected through the case study method, the answers obtained did not lend themselves to statistical analysis. However, a means for tabulating them, whenever this seemed feasible, was developed. Thus, two criteria were used in reporting respondents' perceptions.

First, the focal organization's top management's perceptions could be grouped according to the answers given to the interview questions. Subject's situations were identical in terms of analyzing and evaluating task environment relationships. All were members of ITAL's top management group and therefore represented the internal view about these interactions. A simple means of tabulating their answers was established: (1) if all six respondents agreed on something, their perceptions were reported as "all respondents agree;" (2) if four or five respondents agreed, the term "most respondents agree" was used; (3) if three respondents agreed, "half the respondents agree" was used;

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(4) agreement by only two respondents was reported as "a minority;" and (5) if only one person provided a certain anwer, "one respondent" was the term used.

Second, tabulating the views of task environment organization respondents would make little sense here since each respondent occupies a different organizational situation. Besides, the reasoning of each interviewee could be lost through devices which would group his answers. Furthermore, this could jeopardize the possibility of tracing and checking answers with the perceptions of the top administrative group in the focal reorganization. Therefore, it was decided to report each interview with a task environment organization member in an isolated manner, an exception being made for the food industry, where the three interviews with food company's managers were grouped together.

Perceptions Revealed by the Top Administrative Group of the Focal Organization

This section presents data collected from subject's answers to questions in sections A to E of the interview guide, which were specially designed for the top management of the focal organization. (See Appendix A.)

Power and Dependence Relationships

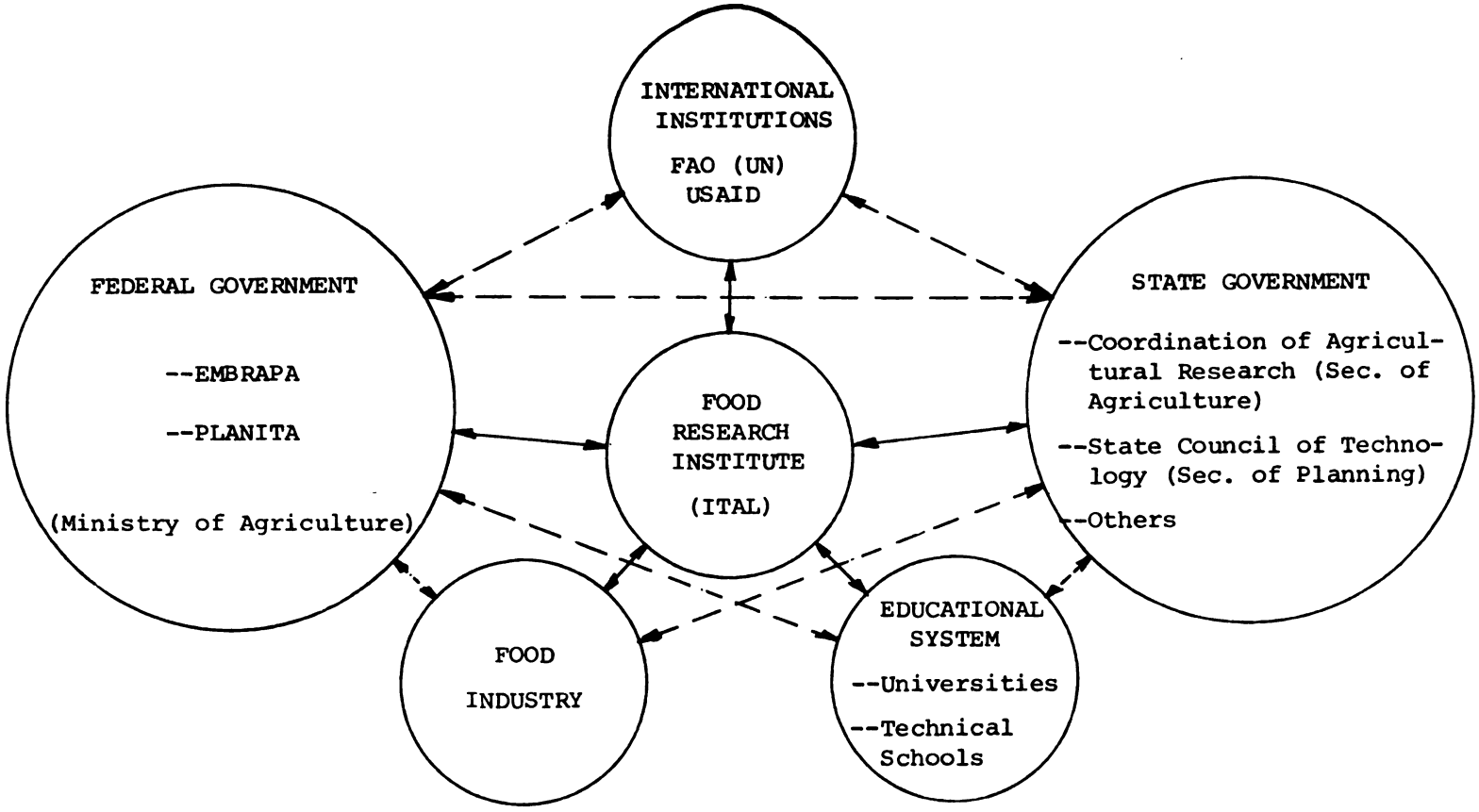
For clarity of presentation, the perceptions of power and dependence relationships of each task environment

organization will be taken separately, and the order of presentation will follow that shown in Table 4.1.

State Government

Most respondents agreed about the importance of the state government in relation to ITAL's attainment of good performance. Such a relationship was deemed extremely important in view of ITAL's position as part of the state administrative machinery and thus heavily dependent on state government funds as part of its annual budget. This situation has led to subordination to state general policies and rules in matters such as personnel, materials and equipment purchases, and budgetary procedures. Presently, the state contribution to ITAL's annual budget is approximately 60 percent.

All respondents said that interaction with state administration occurs almost constantly in the daily life of the organization. Such a relationship does not present difficulties for ITAL at the moment. Two reasons were given for this compatibility. First, positions in the state administration are now filled on the basis of technical ability. Therefore, the Secretary of Agriculture of the State of São Paulo now places in ITAL's structure individuals with similar educational backgrounds. The mentality of State officials in charge of the interaction with ITAL also has changed, and the quality of the relationship has



Interaction with task environment organizations.

Interaction among task environment elements involving subjects related to the focal organization.

Note: In this map only the direct interactions are represented; a dynamic chain of interaction may occur in situations where more than two members are necessarily involved.

Figure 4.2.--Interactions Map.

improved during the last two years. Second, the state government is now aware of the various advantages that can accrue through an objective interaction with ITAL. Consequently, there has been more flexibility in the enforcement of bureaucratic rules and rigidity, which aids in problem solving and decision making.

All respondents also agreed about the major kinds of problems ITAL has in dealing with state government administration. Basically, these problems occur in the areas of purchasing and personnel policies.

Within the state administration there is a Centralized Purchasing Committee in charge of actual procurement and purchasing procedures for the administrative units. Price quotations for given material specifications are constantly taken, and usually the lowest price bid is accepted. This policy was viewed by respondents as causing crucial delays in the development of specific research projects. Additional costs often are incurred because experiments cannot be completed without certain materials, and these are not always available when needed. However, through the development of an internal parallel purchasing budget, composed of funds generated by industrial projects, ITAL's management has been able to alleviate this problem.

Personnel policy is controlled by the office of Coordination of Agricultural Research of the Secretary of Agriculture. The basic problem is that homogeneous

treatment is given any candidate for positions in the organization, despite differences in university degrees and other personal qualifications. State personnel policies dictate that a candidate holding a Ph.D. degree be hired at the same career starting point as a technician of inferior educational background. This has ultimately resulted in a very inadequate salary policy compared to wages offered equivalent technicians and scientists in the market. Over time, respondents say, ITAL has lost extremely qualified personnel either to industry or the universities. Suggestions to alleviate this problem have even included the idea of removing ITAL from the state administration (perhaps making it a public corporation) thus achieving a higher degree of autonomy. At the moment, the aggregated contracts contained in PLANITA have enabled ITAL to pay differential increments on personnel salaries, so that a more equitable and stable situation has been attained. Respondents stated that PLANITA's main organizational aim was to create and maintain the necessary conditions for continuous participation and motivation of ITAL's technical personnel.

Thus, although the policy areas of personnel and purchasing used to be a constant source of conflict with the state administration, these potential conflicts have been smoothed over through the procedures noted above.

Concerning ITAL's budgetary dependence on state government funds, <u>all</u> respondents felt that their

organization continually needed these resources. It was also stated that competing organizations did not threaten the continuity of this support from the state. Although there are priorities in making state budget allocations, ITAL has been given priority and has received more resources than other similar organizations. One of the respondents added that this situation is a result of ITAL's widespread prestige.

All respondents said that other organizations may sometimes provide the same resources as the state. They also stated that this support by other organizations is not of inferior quality. Furthermore, ITAL has not been completely forbidden to seek additional external support. Examples to illustrate this assertion were the increased contribution of the federal government and of the food industry to ITAL's annual budget.

Relative to ITAL's importance to the state government, all subjects' agreed that the state needs services from the focal organization all the time. These take the form of research outputs which contribute toward the attainment of targets established by state development plans in the area of food technology. This relative dependence of the state government on the focal organization for the output in food research activities is not unique, for the federal government also seeks the same objectives in its interactions with ITAL. However, most respondents believe

that ITAL does not pursue a policy of stimulating competition for the use of its outputs; they did not consider the possibility of interrupting their services to the state administration. All respondents recognized that no other organization can provide such services for the state government. Therefore, respondents recognize ITAL's monopolistic position in relation to the state government.

Finally, all respondents view the relationships between the state government and ITAL as one of mutual dependence. The state provides ITAL with crucial funds for survival, and ITAL reciprocates by providing the state with the results of its research efforts, which are valuable for the achievement of state development targets. As an example, one of the respondents stated that research on food technology has contributed to agricultural development by providing the means for food industrialization, which can ultimately generate conditions for price stability in postharvest periods. Besides, food research may create new varieties of agricultural products in order to increase agricultural productivity. Thus, food research can contribute substantially to the economic development of the nation. Respondents stated that the balance of dependence between ITAL and the state government has been maintained.

Federal Government

The description of the relationship with the federal government, which follows, is based on perceptions

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that most of the respondents held about this environmental interaction.

Focal organization respondents perceive this relationship, which is developed through PLANITA (National Integrated Plan for Food Technology), as extremely important for ITAL. PLANITA provides about 20 percent of ITAL's total annual budget, and is expected that the volume of these resources will increase in the future.

Presently, interaction between the focal organization and PLANITA occurs almost constantly. The objective of the plan is to promote the development of agricultural industries through the adoption of new and improved technologies and the creation of new agricultural enterprises. Another goal is the training of experts in the area of food technology who will provide a basis for the development of new food research institutes located in less developed regions of the country.

Most respondents see ITAL in a unique position to provide the federal government with the means of attaining the mentioned objectives. In view of this crucial need of the federal government and of ITAL for supplements to its annual budget so that some internal problems can be solved, a situation of mutual dependence has been established between the two organizations. The exchange process benefits both organizations, but efforts are required from both to obtain such results.

Respondents report a very favorable relationship exists between ITAL and the PLANITA administration. No serious difficulties were pointed out, even with respect to other units of the federal government. Members of PLANITA's administration are on good terms with ITAL's technical personnel and top management. Members with similar positions often have a similar educational background and sometimes have attended the same university.

ITAL was viewed by most respondents as being in a monopolistic situation in relation to the federal government, for no other organization in the nation can produce outputs at such a level of technical quality. Nevertheless, there were no reports of negative consequences or problems created by this situation, neither in the form of abuses on the part of ITAL, nor in the form of attitudes on the part of the federal government.

International Institutions

Concerning international institutions, respondents' preferred to concentrate on relationships with the Food and Agriculture Organization of the United Nations. FAO has played a definite role in ITAL's history, as previously mentioned. The official agreement with FAO is now nearing expiration, but a similar agreement will begin to operate in the next few months with the United States Agency for International Development (USAID). No further investigation

was made of this new agreement, as no actual operational interaction had occurred at the time of the interviews.

All respondents considered the relationship with the FAO as extremely important, primarily because of its role in building ITAL. A full-time expert has been provided to ITAL the last eight years, and FAO contributions have helped ITAL purchase imported laboratory equipment. These and other efforts have made the FAO's contribution crucial to the focal organization.

The FAO expert, located within the central administration building, next door to ITAL's executive director, was considered by respondents as a definite member of the organization. He has usually been informed and has participated in decisions on most of the subjects with which the top administration deals. Therefore, interaction between both organizations occurs very frequently.

FAO's direct contribution at present is the creation of a new organizational unit responsible for the development of market research for food products (national and international markets). Other contributions have included technical assistance in the areas of packaging and food dehydration and in the hiring of international experts for the solution of specific technological and scientific problems. These experts have filled a gap when ITAL's personnel has lacked the technical ability to analyze and solve a problem. In most cases, a national counterpart is trained at ITAL during the expert's stay.

Although most respondents perceived no difficulties in the FAO-ITAL relationship, it was pointed out that at one time a certain amount of red-tape had existed in order to obtain FAO's formal authorization for expenditures. Specifically, there had been some unnecessary delays due to the need for approval of equipment purchases from the central office in Rome.

Respondents reported that FAO's budget contributions to ITAL is about 3 percent of the total. However, the FAO connection allows the focal organization to avoid some state rules and regulations and obtain necessary equipment through imports. ITAL also has been able to utilize FAO's international links and influence to solve some of its specific technical problems. FAO was reported to have acted as a "broker" for ITAL's foreign affairs.

Half the respondents, using a budgetary yardstick, stated that there is no crucial need for resources of such a small magnitude. Another half viewed the overall FAO contribution as nonquantifiable and recognized the total importance of the role it has played in ITAL's development.

All respondents did agree that other organizations, in Brazil and abroad, need the same resources and services from FAO. As the FAO-ITAL agreement nears its end, respondents expressed their hopes that the same role would be assumed by other international organizations, such as USAID, and that the quality of FAO's services would be maintained.

All respondents saw the relationship with FAO as one of mutual dependence. They reported that ITAL has needed the FAO's help, and FAO was provided with an efficient means of developing a program which contributed to the fulfillment of its main goals. In fact, FAO officially recognizes in its publications the success of the project developed at ITAL.[12]

Food Industry

Answers to interview questions revealed that all respondents agreed in the evaluation of ITAL's interaction with the food industry. The relationship was qualified as extremely important. Basically, the raison d'être of the focal organization was to make direct technological contributions to enterprises operating in the area of manufacturing of foodstuffs in Brazil.

At present, interaction with the industry is said to occur almost constantly, primarily because of specific projects being contracted with individual food producers. Proceedings from these projects, according to respondents, contribute about 20 percent to ITAL's annual budget, and most respondents indicated this percentage should be greater in the future.

All respondents engaged in a retrospective analysis of the relationship with the food industry. They said that in the early periods of organizational life the food

industry, in general, was not sure about ITAL's seriousness as a research institution. This was said to have been due to industry's widespread distrust toward governmental institutions. Respondents added that, gradually, by force of public relations efforts on the part of ITAL, clients from industry began to utilize more and more of ITAL's services. Furthermore, at the beginning, uncertainties about ITAL's performance led the food industry to fear the possibility of their industrial secrets being revealed through the development of projects at ITAL.

All respondents characterized state government attitudes at the time ITAL's management decided to develop projects for the food industry. The state was said to object to the development of industrial projects through direct contracting. Because of this attitude, ITAL personnel created a kind of private special fund for research from which payments were made for materials and services related to industrial projects. The evolution of this unofficial situation reached the point where a private foundation was established out of ITAL's personnel's own resources. Through this foundation, a parallel device was created, geared to the marketing and management of industrial projects. Respondents added that there is now no need for such a covert relationship, since the state government has changed from its previous attitude to an open recognition of the legitimacy of industrial contracts

for research and development projects. The Secretary of Agriculture is said to act now in a supervisory capacity in contracts with the food industry. Funds originated by industrial contracts are included in the budget.

According to respondents, ITAL has developed very fruitful relations with the food industry. The industry is scattered throughout the nation but ITAL's clientele is located mainly in the state of São Paulo, where a higher concentration exists. ITAL is said to have maintained a constant and valuable interaction with the Associação Brasileira das Indústrias de Alimentos (ABIA, the Brazilian Food Industry Association). All types of food manufacturing concerns utilize ITAL's facilities: multinational enterprises, large-size Brazilian enterprises, and small and middle-size Brazilian enterprises. Respondents stated that, in the future, the second and third groups will receive greater attention. Multinational corporations usually have research facilities available to them, locally or abroad, or both. Therefore, their need for ITAL's support is much less critical.

All respondents evaluated ITAL's relationship with the food industry and reported a balanced situation. The industry has had unquestionable benefits from technological projects, while ITAL has received various stimuli for the acquisition of new capabilities in research and for the expansion of its clientele.

Finally, respondents noted that ITAL has provided special training programs for industry personnel in the areas of technology required by the companies.

Universities and the Educational System

Two groups of respondents, each representing half the interviewees, held different opinions about the interaction of ITAL with universities and the educational system in general. Half of the respondents considered relationships with the educational system as not too important and saw the only motive for interaction as the interchange of research results. This was said normally to occur within the limits of the individual researcher's discretion and by means of publication of articles in scientific journals. This group also said that there is no substantial flow of resources from universities or from the educational system to ITAL, which makes this relationship of negligible importance. Another half of the group rated the relationship as quite important exactly because of the technical and scientific exchange. One specific example was given of a university utilizing relevant knowledge produced by ITAL. This group reasoned that the maintenance of good relations with universities can contribute to the improvement of relationships with other elements of ITAL's task environment. In other words, the

prestige of the focal organization can be increased through good interaction with the educational system.

Respondents offered additional examples of ITAL's activities being made available for use by universities and the educational system: (1) special training programs for students from universities and technical schools; (2) scientific and technological information from ITAL's own publications and its library services; (3) conferences on specific topics of food technology delivered by ITAL's technical personnel at universities and technical schools; and (4) research equipment made available, usually upon solicitation.

All respondents said that no difficulties whatsoever have occurred in the organization's interaction with universities and the educational system, with one exception. The case involved the Department of Food Technology of the University of Campinas (UNICAMP), located in the same city as ITAL, and was described by respondents with some reluctance.

The Department of Food Technology of Unicamp was created and operated in its early days as an adjunct of the focal organization. Respondents pointed out that various ITAL technicians and scientists taught courses for the department, and some classes actually took place within ITAL's classroom and laboratory facilities. A crisis caused a disruption in this harmonious relationship.

ITAL's executive director at that time (around 1970) resigned his position to become chairman of the Department of Food Technology at UNICAMP. Some ITAL scientists followed him and left the organization for faculty positions. Respondents' insinuated that the origins of the personnel crisis lay in the state government's rigid reaction against contracting industrial projects through the private foundation already mentioned. This foundation had been created under the support of the former executive director. As a consequence of the above situation, the ITAL-UNICAMP relationship was interrupted, and no interaction has occurred since. Most respondents said that this has continued to be a poor relationship primarily because the Department of Food Technology wants it that way. According to them, ITAL would welcome the reestablishment of a warm relationship.

All respondents felt the relationship with universities and the educational system was not subject to an evaluation on the basis of power and dependence.

Task Environment Changes

All respondents considered ITAL's relationships with the state and federal governments and the food industry extremely stable at the time the interviews took place. The relationship with FAO was judged not too stable. Although respondents noted that interaction with

universities occurs most frequently at the individual researcher level, most expressed the feeling that this relationship was somewhat stable.

The historical and traditional link with the state government was identified by respondents as one of the major reasons for the perceived stability of interaction with this element of ITAL's task environment, although one interviewee saw this relationship as within the limited discretion of the focal organization (ITAL). The basic questions raised by respondents were: "Who else would be willing to be responsible for the large state contribution to ITAL's total budget?" "How much would a research project really cost the food industry if it were not for the heavy state funding?" "Could projects be easily sold to the industrial clientele on the basis of real costs?"

Another factor contributing to the stability of the interaction with the state government was suggested by one respondent. He pointed out that FAO and USAID are always more inclined to allocate resources to organizations which are under direct governmental control. Thus, as shown in all the comments, there is a perception of secondary benefits which flow to the focal organization as a consequence of the maintenance of stable relationships with the state government.

In terms of the federal government, the reasons for stability of the relationship were not very well defined.

There seemed to be more of an expectation of a future flow of resources and services than presently exists. Respondents saw interaction occurring mainly through contracts in which the federal government is essentially a client of the focal organization. In the future, interviewees believed ITAL undoubtedly would be able to provide satisfactory services, not only in terms of contract requirements, but also in terms of motivating behavior and shaping attitudes in order to help the federal government achieve its goals. According to respondents, this will constitute a basis for stable interaction.

FAO's participation in the focal organization's internal affairs is nearing an end, but, as was previously stated, the main objectives of such a relationship were judged to have been thoroughly attained.

The universities and the educational system were seen as continuing to receive services presently available to them. No major changes in this relationship were anticipated. Also, no relevant difficulties were foreseen for the maintenance of this and other task environment interactions.

Most respondents said that the present set of external interactions was efficient in terms of enabling the focal organization to achieve its objectives. One divergent opinion, however, was that the ideal arrangement would be one in which ITAL would enjoy greater autonomy

than at present. A majority of respondents disagreed, seeing the future as a continuation of present task environment relationships. No specific plans for change were reported, other than the growth of current activities.

As for past attempts to change the set of external relationships, two examples were mentioned by respondents. The first refers to an old idea of grouping all state research institutes into one large organization. This was seen as a device for limiting direct state control, allowing for more flexibility in decision making at the level of each individual research organization. However, it was reported that this idea was rejected by the State Secretary of Agriculture in the past because there was no disposition to transfer the control over state research institutes. The second example, already mentioned, refers to the creation of a foundation by a former ITAL executive director in order to provide a means of dealing with food industry contracts. This practice also has been rejected by the State Secretary of Agriculture.

Respondents were unanimous in the opinion that the future will bring easier and improved interactions with task environment organizations.

Domain Identification and Goal Formulation

All respondents offered a list of outputs actually produced by ITAL during the period in which the interviews took place. These are listed below.

--Laboratory analysis of different types.

--Development of new food products.

--Development of specific technology upon detailed requirements.

--Implementation of projects contracted with the food industry. This often includes complete design for equipment and plant layout, input-output specifications, plant capacity, and so forth.

--Services such as evaluation of specific packaging films, evaluation of containers, production of experimental lots of products for market research purposes, and certification of product quality to comply with export rules and norms.

--Studies for the development of special purpose machinery and equipment, including the actual fabrication by ITAL's technical personnel of some unusual equipment, based on their own design.

--Studies of specific properties of raw materials in order to obtain standardized quality or size to facilitate the manufacturing process.

--Biochemical studies for quality control of raw materials and processed products.

--Engineering studies for food production in general.

--Pilot production runs for demonstration and training purposes.

--Market trials for products developed by ITAL and for which there is a prospective industrial buyer.

--Training of industry personnel and technical school students, including courses, conferences, and actual equipment and laboratory demonstrations designed to fit clients' needs.

--Production of scientific and technical information through ITAL's technical bulletin, as well as publication of articles in international journals, books, syllabi, and so forth, for use during courses and conferences.

ITAL's main output orientation was said to be the problem solving or research and development approach. Respondents emphasized the need for applied research in view of the present stage of development of the Brazilian economy. However, ITAL's executive director pointed out that, in the near future, there will also be a parallel emphasis on basic research in order to produce relevant knowledge within Brazil's own environmental conditions. It was indicated by this respondent that a balanced emphasis which included basic research would create a

necessary expansion of knowledge in some areas, such that substantial advances could be made in applied research.

The Brazilian food industry was identified by respondents as the main user of ITAL's outputs. However, the federal government is increasingly becoming an important user. Through contracting, ITAL has intensified its training services for universities and research institutions from less developed areas of the nation, and specific products, such as high protein foodstuffs for school children and balanced meals for the military, have been developed under these federal government contracts.

Respondents also listed the inputs utilized by ITAL.

--Scientifically and technically trained personnel, usually recruited from among university graduates through a selection procedure prescribed by state government personnel rules. Certain individuals have preferred not to accept the positions because of low salaries and poor fringe benefits, and the turnover rate for scientific and technical personnel has been high.

--Training of ITAL's personnel has taken place both on the job and abroad (usually through work toward a degree in an American University).

--Equipment and machinery for pilot plants and laboratories.

--Raw materials for pilot projects and experiments.

--Laboratory materials.

--Scientific and technological information through ITAL's library services.

With respect to materials, a variety of suppliers was said to be used, according to specific needs. A number of contracts have been entered into with American and European universities and research institutions to provide a constant flow of scientific information.

The supply of technical and scientific personnel falls short of the demand, and ITAL usually must provide for internal and external training before each individual can play a productive role.

The users of ITAL's output are mostly located in the state of São Paulo, although there has been a recent increase in the number of users located elsewhere in Brazil. Suppliers, to a large extent, are located in the state of São Paulo, with a higher concentration in the area of Campinas, the exception being international purchases and personnel recruitment.

One of the respondents pointed out that changes in the input-output configuration have been characteristic of ITAL. All respondents noted that the recent increased

participation of the federal government and the food industry has required new input-output arrangements. Additional changes on the output side include the introduction of new areas of research such as meat, sea food, and dairy products.

All respondents were quite satisfied with ITAL's present input-output transactions. They believe ITAL presently is following much more closely the original policy of technological research than it has in the past. A direct contribution to the food industry is now a feasible goal, for example.

Respondents presented two different opinions about ITAL's present goals. Two reported the official goals of the organization, presented at the beginning of this chapter, as the ones ITAL was pursuing at the time of the interviews. The remaining respondents preferred to state more explicitly the present operational goals of the focal organization and the list that follows was compiled from their statements.

--To improve the interaction with external organizations through rationalization of the means of communication and operation.

--To search for a more dynamic and flexible organizational structure.

--To increase interactions with the food industry in order to ascertain the technical problems to be solved.

--To develop new research areas in response to an identified need.

--To improve the nutritional value of food and to reduce food prices in Brazil.

--To design and in some cases fabricate equipment and machinery for the food industry.

--To develop all projects contracted through PLANITA.

--To transfer specific areas of food research to regions where it can be better developed (that is, closer to raw materials).

--To stimulate cooperative contracting of research projects on the part of users.

--To create a center of documentation and retrieval of information on food science.

--To develop an aggressive sales effort in order to increase industrial project contracting and the implementation of technology already developed.

--To improve research effort on frozen and canned foodstuffs, including packaging and intrinsic quality.

All respondents said that there was no need to change ITAL's present aims, except for an additional effort to develop the capability to provide market analysis and market trials for food products. They considered the

present goals as already providing enough activities and work for the future, probably more than ITAL will be able to handle in the next three or four years.

All of ITAL's top administrative group indicated that past operational goals differ to a very great extent from present ones. In the past, the Secretary of Agriculture had a very traditional orientation, which included a strong enforcement of bureaucratic rules and a routine approach to decision making and problem solving. The increased specialization of ITAL's technical personnel and the development of its research capability has led to a change in mentality on the part of state officials and were important factors contributing to the current improvement in the quality of the interaction between both organizations. "Now there is more cooperation than ever" was a phrase used many times during the interviews. There seemed to be a predisposition among respondents for a closer integration of ITAL's services with governmental planning. According to one respondent, "ITAL, state, and federal governments have a common objective: to develop means for the economic development of Brazil." One specific example illustrates this statement. It refers to the pilot plant for research on meat products, built to provide technological support for the government's export policy. Funds were provided by the state government and FAO to cover construction and equipment costs. Thus, a new operational

goal--meat products research--was introduced because of ITAL's commitment to governmental plans.

Following the trend suggested by this example, all respondents indicated the existence of a strong relationship between organizational goals and task environment organizations' influence. ITAL's goals seem to have been established in close agreement with members of the task environment. Respondents added that the state and federal governments and the food industry have made definite and sometimes successful attempts to introduce new goals and to change or redefine old ones. Some examples suggest that there have been instances when a new industrial project was contracted and the project contractor freely purchased new research equipment to facilitate creation of a whole new area of research. The role of the state and federal governments in shaping ITAL's operational goals in relation to development plans already has been mentioned.

Respondents could not identify specific areas of administrative policy as being subject to greater influence from one particular member of ITAL's task environment. All respondents felt that governmental elements have tried to influence the organization's total administrative policy. The food industry was said to exert only incidental influence on output policy, by force of project contracting.

Regarding the expectations of task environment elements with respect to ITAL's goals and policies, the

general evaluation of all respondents was that there has been agreement to a large extent. In other words, organizations in the external set have concurred about what ITAL should or should not do. The reasons given for this consensus were: (1) ITAL has successfully performed the actions required by task environment elements; (2) the present administration has emphasized the need to satisfy task environment elements; (3) ITAL's services and output have met the task environment's expectations; and (4) the idea of achieving efficiency in the system of technology production has been an ideal binding all elements--within and without the organization--together.

The Assessment of the Organization

The investigation revealed that all members of ITAL's top administrative group perceive of their organization as a quite successful endeavor. They pointed out that most of the objectives previously established for the organization had already been attained. User satisfaction was also mentioned as an indicator of success. As one respondent said, "clients who are satisfied with ITAL's performance in past projects have contracted new projects with the organization." Furthermore, "governmental units within the state and federal administrations have demonstrated their explicit recognition of the seriousness of ITAL as a research organization in the area of food

technology." Other respondents stated: "we are now a very prestigious organization in Brazil and abroad"; "we have had a past history of real contributions made to the development of food technology in Brazil, and many external organizations and individuals have recognized this"; "we still hope to be able to contribute much more to economic development in Brazil."

In answering the set of questions on the interview guide concerning the relative importance of specific indicators of organizational performance, all respondents made similar responses. A tabulation of these answers revealed five indicators which were deemed of crucial importance: (1) improvements in the quality of output; (2) quality of the technical personnel; (3) improvements in the rate of innovation and creation of new products and services; (4) the level of the organization's contribution toward the achievement of governmental goals; and (5) the development of activities which prepare the organization for future action.

Respondents classified several indicators of performance as of secondary importance: the quality of management; the prestige of the organization with the external public; satisfactory overall performance compared to similar organizations; and improvements in the amount of physical production of research projects.

Respondents made several comments about performance indicators: "These [five] crucial indicators and ITAL's good performance in relation to them have placed ITAL in a very prestigious position in relation to governmental organizations"; "government would not have allocated funds on food technology research if ITAL were not scoring well on these indicators"; "why do clients [from industry] keep on contracting more projects with ITAL? Without a good score on the three top indicators, they would never contract for a second research project."

All respondents identified the relevant judges of their organization in the task environment and classified them in terms of their perceived importance for ITAL. The rankings are (1) state government, (2) the food industry and the federal government, and (3) international institutions and organizations.

Only one respondent even considered the universities and the educational system as a member of the judge's group.

Respondents recognized that ITAL's most recent scores on the five crucial indicators pleased task environment organizations to a considerable extent. ITAL's commitment to quality of research output and its effort to maintain and increase that quality were cited as basic reasons for the reported satisfaction of task environment organizations.

The quality of the technical personnel and the rate of innovation and creation of new products were

indicators respondents said were difficult for ITAL to score well on. As one stated, "there is a high turnover rate of technical personnel, and this has required a great deal of effort to maintain their participation, in view of higher salaries attached to other job alternatives, such as universities or the food industry." As to the second indicator, one respondent argued "the development of new products is a source of uncertainty because, in addition to quality and other technical problems, market conditions directly affect the possibility of application of research output."

All respondents answered affirmatively when asked whether the task environment organizations had the technical ability to comprehend ITAL's technical and scientific operations. State and federal government and food industry personnel were considered by respondents to be well educated, at least in relevant areas, and their technical competence was rated quite high.

Respondents' believed that ITAL's operations are predictable to a very large extent. Reasons given were ITAL's orientation toward feasible goals and its management's control and utilization of resources, so that most technical problems have been within the range of possible solutions. ITAL's orientation to applied research contributes to this predictability, respondents remarked that basic research, in general, is a source of greater risk

and uncertainty. The applied research orientation also was seen as simplifying the decision process within ITAL: "Our operations are initiated by a specific problem for which a client wants a solution," and "with very definite objectives to attain, there is no need for an elaborate decision process."

Perceptions Expressed by Members of Task Environment Organizations

Data reported here were collected from interviews with members of organizations identified as components of ITAL's task environment. Individuals were selected because they interacted directly with ITAL, and they occupied key positions in their respective organizations.

State Government

Four state government employees were selected to be interviewed. They were affiliated with two organizational units, the office of Coordination of Agricultural Research within the State Secretary of Agriculture and the State Council of Technology, a unit within the State Secretary of Planning.

Coordination of Agricultural Research

The top executive in the office of Coordination of Agricultural Research was interviewed. His educational background is in agricultural engineering. He stated that

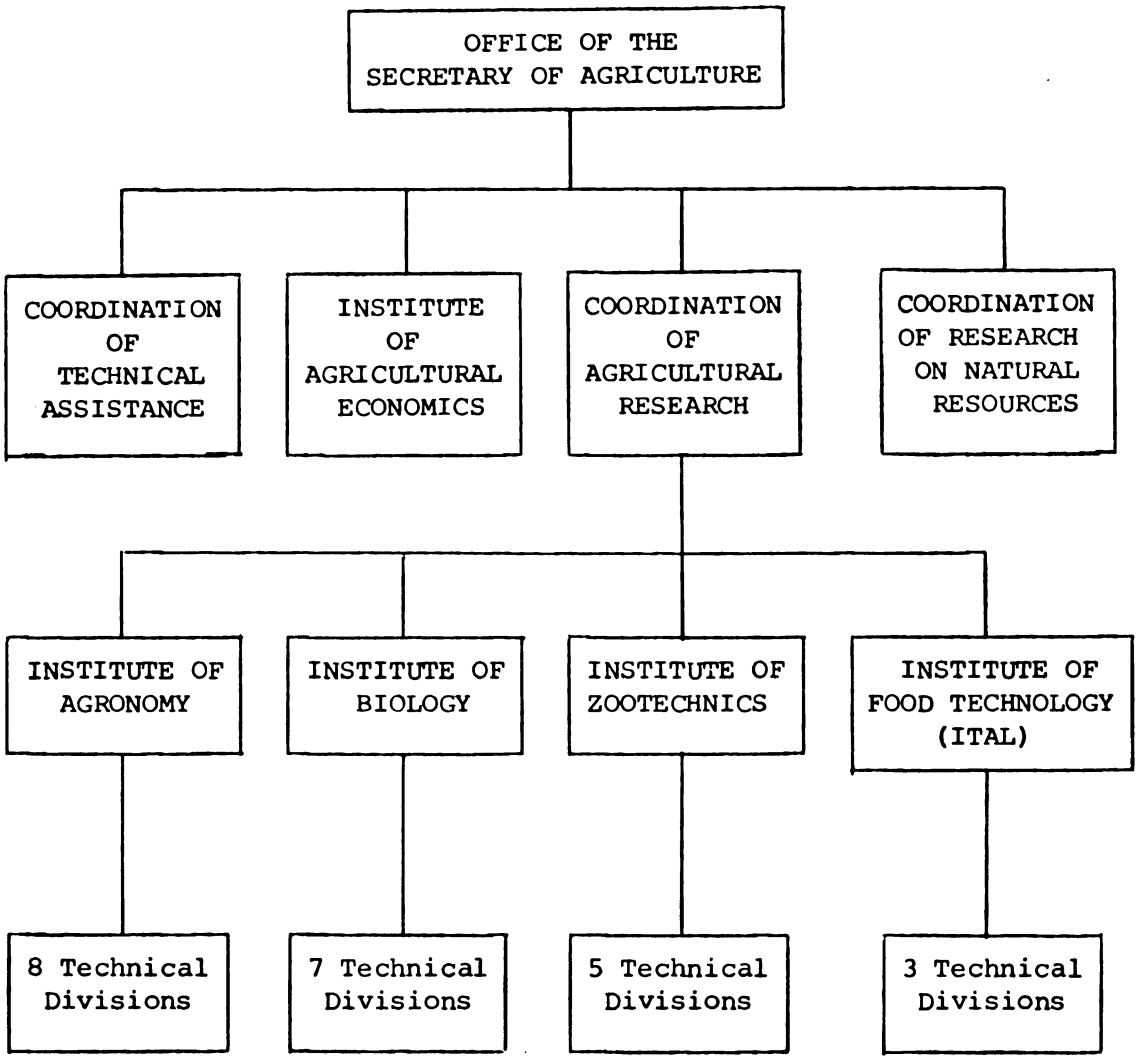
interaction with ITAL is an important part of his job, occurring primarily through direct contact with ITAL's executive director and top administrative group.

The office of the Coordinator of Agricultural Research has direct supervision of state institutes of agricultural research (see Figure 4.3), which includes ITAL's line of command.

Direct interaction between ITAL and this external organization arises over technical problems related to project development, budget planning and financial control (the coordinator's office is in charge of state allocations to ITAL, and personnel, purchasing, and other areas of organizational policy.

The office of the coordinator reported that a substantial amount of decision making is delegated to ITAl in order to accelerate the decision process on routine matters. In policy matters, the office of the coordinator exercises greater control, and in this area there has been a constant dialogue with ITAL's management.

The office of Coordination of Agricultural Research maintains a planning staff in charge of developing studies and surveys on the performance of research institutes for which it is responsible. This staff also discusses and studies the planning and programming of ITAL's and other institutes' activities, follows up performance, and evaluates results. Planning staff members have a solid technical background in the area of agricultural research.



Source: Governo do Estado de São Paulo, Diretrizes de Atuacão da Secretaria da Agricultura--Desenvolvimento Agrícola: Um Grande Desafio (São Paulo: June 1972), pp. 79-83.

Figure 4.3.--Organogram: State Secretary of Agriculture and the Coordination of Agricultural Research.

Power and Dependence Relationships.--The respondent reported having interacted with ITAL's top management at times when other individuals external to the organization also were present. Among these third parties were a Brazilian food company representative, PLANITA staff, employees of the federal government's Ministry of Planning, and representatives of the federal government's Ministry of Agriculture.

The office of Coordination of Agricultural Research has been an official organizational unit within the State Secretary of Agriculture since 1968, and the present top executive has held the position since 1971.

Among other organizations supervised by the office (see Figure 4.3), the respondent reported that ITAL is the most active in terms of its response to the requirements usually made by the office of the coordinator. Most of these requirements relate to project contracting and agreements to which ITAL is a part. He added that "ITAL has been the research institute with which I have had more interaction than any other . . . . ITAL's project turnover rate is very high; people there are rapid and efficient . . . . More than 95 percent of my decisions in relation to ITAL have been uncomplicated, because we have been in agreement most of the time . . . . I am really very proud of ITAL . . . ."

The respondent judged that the relationship between the office of Agricultural Research and ITAL is extremely

important for the latter. By definition, the coordinator's office exercises a great deal of bureaucratic control over ITAL that, if rigidly applied, could ultimately stymie the organization. However, this has not occurred, and there have been no difficulties whatsoever in dealing with ITAL.

The respondent believed the modifications that took place in ITAL's top management in 1971 were fundamental for the achievement of the present efficiency of interaction between both organizations. He added: "The work ethic in ITAL changed after the new administration took office . . . ."

The respondent reported that he and the present ITAL executive director took office at approximately the same time (1971). Shortly thereafter, a new policy for ITAL's industrial project contracting was adopted, as well as a new policy to supplement salaries of technicians and scientists. A similar philosophy on the part of the management of the two organizations has contributed to overcoming former limitations to realization of ITAL's policies.

As reported by the respondent, ITAL constantly needs resources and services from the office of coordination. Funds have flowed at an annual rate of about 70 percent of ITAL's total budget. Also, the agreements and contracts between ITAL and other public or private organizations must be approved by the office of Coordinator of Agricultural Research. The respondent did not think this

flow of resources and services to ITAL would be interrupted in the future. He also reported that there had been no competition for these resources, since they had been allocated in the execution of specific plans.

Federal government and the food industry have begun to allocate funds tied to the execution of specific projects, and their present contribution is approximately 30 percent of ITAL's total annual budget. The coordinator said his office welcomed this situation and, in fact, had directly participated in the development of these two new external relationships.

The need for ITAL to perform well was viewed as crucial by the coordinator. First, the achievement of the office's planning targets partially depends on ITAL's success. Second, ITAL's good performance offers excellent support in the office's struggle to obtain greater budget allocations from the Secretary of Agriculture. The respondent offered as an example the substantial resources recently obtained to build a new meat research plant at ITAL. In his view, if the money had been solicited for an organization other than ITAL, it probably would not have been forthcoming.

The respondent believed no other organization could provide his office with services identical to ITAL's. Furthermore, no other organization in Brazil offered the same high quality. The respondent added: "Compared to other institutes in the field of food technology, or even

in the area of agricultural research, ITAL has had the best performance."

The respondent defined the interaction between the two organizations as one of mutual dependence; both parties hold objectives in common, and each contributes to the other.

In evaluating the relationship between ITAL and the federal government, the respondent considered it crucial from ITAL's point of view. "Through this relationship," he stated, "ITAL has been able to provide a satisfactory solution to the question of payment of equitable remuneration to its technical and scientific personnel." On this matter, the respondent's office has done its utmost to help ITAL achieve success in the PLANITA agreement. Furthermore, the office of Coordination has used ITAL's example to urge other research institutes to adopt such a policy. Despite repeated urging, no positive responses have been forthcoming from these other institutions.

Task Environment Changes.--The respondent defined the relationship between the office of Coordination of Agricultural Research and ITAL as extremely stable. ITAL has been a very productive organization, maintaining high quality in research activities, something sought by the office from all organizations under its control. In addition, there is an actual supervisory link between the two. Nevertheless, the respondent pointed out that in public administration there is always a high risk of

interrupted interaction because of constant transformations. New personnel may disrupt productive functional relationships previously developed. At present, the respondent feels his office and ITAL's top management have a perfect community of objectives; personal friendships also have smoothed the interaction. Mutual loyalty and an open attitude about sharing responsibility and participating in decisions were two other contributing factors cited.

In distinguishing ITAL's top management from that of other organizations under his office's direct supervision, the respondent indicated that it is important for the management of a research institute always to be prepared to assume responsibility and produce a continuous flow of information for decision making. According to the respondent, ITAL's management does so.

The respondent also viewed as quite stable the relationship between ITAL and the food industry, the federal government, and international organizations. He mentioned that relations have been so good that other institutes of research are jealous.

The present configuration of ITAL's task environment was viewed by the respondent as efficient and sufficient, to a considerable extent, for the organization's good performance. Future changes were not considered likely. In his opinion, ITAL has found its path of development.

The respondent positively stated that he does not consider changes in ITAL's task environment desirable.

Such changes would not be welcomed by his office because the present structure has been so efficient.

In terms of past attempts to change task environment relationships, the respondent indicated the recent introduction of the federal government and the food industry. He added that before the official recognition of these two relationships, ITAL's attempts to channel contracts through a private foundation threatened the organizational links with the state administration.

Domain and Goal Formulation.--The respondent considered all of ITAL's input-output transactions important; none was more important than another. Research of a wide variety derived from contracts with the food industry and government, consultancy activities, courses for segments of the food industry or for technical schools, publications, and so forth, are the types of activities which define ITAL's operations. The respondent made clear that he is quite satisfied with ITAL's transactions, although there is always room for improvement.

The respondent offered three examples of recent output innovations at ITAL: the dairy products research plant; the meat products research plant; and the fish products research plant. Through these activities, ITAL planned to expand into new food research fields. The office of Coordination of Agricultural Research was an active participant in the effort to develop the new projects. Through them, ITAL learned better methods for planning and

scheduling its activities. At the time of the interview, a five-year plan for ITAL was in preparation; it included these three new areas of research and others.

The respondent reported being considerably familiar with ITAL's goals and policies. In fact, he considered it extremely important for his organization to keep abreast of these matters. The three new areas of food research (meat, dairy, and fish products) were cited as examples of the involvement and participation of his organization. The coordinator believes his office has influenced the determination of ITAL's goals and policies to a very great extent. This was also said to be true for other areas of policy, such as personnel, finance, and purchasing.

The respondent stated that he does not desire future changes in ITAL's goals and policies, at least in the short run. Present goals and policies might be improved upon, but major changes would not be welcomed.

Finally, the respondent felt that the office of Coordination of Agricultural Research and the other members of ITAL's task environment are in agreement about what ITAL's goals and policies should be. This is because governmental and food industry policies are directed toward economic development, and ITAL has provided both with the tools to achieve important targets.

Organizational Assessment.--The respondent viewed ITAL as an extremely successful organization in relation to the management of its scientific activities. However,

he said that ITAL was not the best research institute under the office of Coordination of Agricultural Research in terms of the management of bureaucratic or routine activities. Referring to his career experience, the respondent said that the best research organization in terms of technical and scientific activities usually is the worst in adjusting to state bureaucratic rules, and vice versa.

The respondent ranked ITAL's indicators of performance as follows: (1) quality of technical personnel; (2) contribution toward the achievement of governmental goals; (3) overall improvement through time; (4) overall performance satisfactory compared to similar organizations; (5) prestige with the external public; and (6) improvement in the rate of innovation and creation of new products and services.

The respondent said that ITAL has shown improvements in terms of these six indicators and that recent scores have pleased his office considerably. He also stated that his office and its technical personnel have been able to understand ITAL's technical activities to a considerable extent.

Generally speaking, the respondent added, at ITAL it has not been difficult to plan for the achievement of objective and measurable goals. It has been harder to elaborate on and predict the details of activities to achieve larger objectives. Nevertheless, the decision process at ITAL was judged, to a considerable extent, as being generally simple and efficient. This was attributed

to the guidelines contained in state and federal plans concerning food technology. Aside from planned targets, ITAL's top management must define programs and schedules for future needs, but it has been an active participator in the formulation of food technology goals at the state and federal levels.

State Council of Technology

Respondents from the State Council of Technology (SCT) were members of its team of technical experts. Their educational background includes university degrees in the areas of engineering and economics. They reported being in direct interaction with ITAL through the nature of their jobs. It was indicated that other SCT personnel have interacted with ITAL, primarily during the development of projects for technological research contracted by ITAL with the food industry and through the PLANITA contract, to which SCT has contributed about 25 percent of the funds.

In conjunction the state government's Project for Science and Technology,[13] SCT launched, in 1971, a program called "Counter of Technology."[14] The objective was to establish a link between state institutes of research, the supply side for technology, and Brazilian industrial organizations, the demand side. The program was basically a tremendous marketing effort to inform Brazilian enterprises about the availability of technology and related services in state research institutes. This program was

said to have facilitated group interaction between ITAL, the food industry, agencies of the state administration, and the sources of financing. A number of seminars were developed to fulfill this objective.

Power and Dependence Relationships.--As a direct consequence of the Counter of Technology, SCT has had constant interaction with ITAL. Respondents reported that no disagreements have emerged so far. They also stated that the link with SCT has been of fundamental importance for ITAL. SCT has budgetary control over state institutes of research, which gives it veto power over the planning and programming of internal activities.

Other state institutes of research have also required time, attention, and services from SCT. At present SCT is studying means of giving greater administrative autonomy to the research institutes. However, respondents believed all research institutes will continue to have some degree of dependence on state government.

SCT's extension services has asked ITAL to (1) create a department for diffusion of technology; (2) create an organizational unit in charge of technological forecasts; and (3) develop a realistic policy to maintain researchers' salaries at competitive levels. In general, SCT wants ITAL to become a very efficient organization in technical, managerial, and financial matters.

Respondents considered that, in the area of food technology, no other organizatin's achievements can match ITAL's. The quality of ITAL's activities is very high, and it seems unlikely that other organizations will supersede it in the future.

Respondents believed ITAL is not dependent on SCT, rather, SCT has cooperated with ITAL to achieve better interaction with industry. Some amount of bargaining occurs between the two organizations. For example, ITAL hired some specialized personnel for a demonstration project on tropical fruits in which SCT was interested. SCT wanted the project to be developed and used its influence to obtain authorization for hiring personnel from the Secretary of Agriculture. Another matter in which SCT acted positively was in developing salary supplements for ITAL's technical personnel.

Task Environment Changes.--Respondents termed SCT's relationship with ITAL as extremely stable. They added that both organizations share a similar philosophy. SCT has constantly tried to motivate state research institutes to adopt a cooperative approach in the effort to integrate units involved in the system of technology production.

Respondents believed ITAL might eventually achieve greater levels of autonomy from the state administration, but the present relationship with SCT is unlikely to be interrupted in the future.

In relation to other task environment organizations, respondents predicted the maintenance of stable relationships for ITAL. An exception was the interaction with UNICAMP's Department of Food Technology; respondents felt the deteriorated relationship would continue for some time.

A change in ITAL's task environment was predicted by respondents in the near future. A new public corporation has been created: COPEME's main objectives are to promote and develop Brazilian exports and it necessarily will interact with public research institutes to advance its objectives.

Respondents reported their desire for the development of a national network for technological information exchange to which ITAL would contribute in the area of food technology.

Domain and Goal Formulation.--Respondents stated that it is important for SCT to participate in formulating ITAL's objectives. However, SCT attempts to act as a mediator between the supply and demand for technology, rather than advance specific objectives. An example of SCT's activities as a mediator was the development of research on meat, fish, and fruit products.

Respondents added that SCT is satisfied with ITAL's outputs. A certain degree of independence and self-sufficiency in financial and administrative matters remains

to be achieved by ITAL, and the question is how to operationalize this idea in an acceptable form.

It was reported that SCT has been trying to influence the improvement of ITAL's managerial capabilities. Respondents pointed out that there was considerable agreement among task environment organizations as to ITAL's goals and policies.

Organizational Assessment.--Respondents indicated that any judgment about success or failure of ITAL depended on what aspects were taken into consideration. Using services to the community as a criterion, ITAL is a very successful organization. However, if the yardstick is some measure of economic efficiency, then ITAL is not successful, mostly because it is not a self-supporting and economically independent organization.

To become self-supporting, according to respondents, ITAL should: (1) organize and develop activities related to technological forecasting; (2) emphasize technology diffusion by being more aggresive in marketing technology; and (3) implement cost control as a basis for a pricing policy and controlling economic efficiency.

Respondents chose seven performance indicators they considered important in evaluating ITAL's activities. They preferred not to rank these in importance because a research institute is dynamic, and what is important at one time may not be relevant at others. The performance

indicators chosen were (1) prestige of the organization with the external public; (2) quality of the technical personnel; (3) quality of management; (4) improvements in the rate of innovation and creation of new products and services; (5) financial status (self-supporting); and (6) improvements in the quality of output.

SCT respondents preferred to evaluate ITAL in terms of its overall policies. At the moment, they think ITAL has shown improvement in terms of all important indicators with the exception of financial status. Cost control has not been emphasized by ITAL's management.

Respondents also felt ITAL's structure of operations allows for planning and forecasting activities. The establishment of goals has been made easier at ITAL because they are derived from state and federal government plans. Furthermore, respondents considered the decision process at ITAL as simple and thought there had been no major conflicts about what courses of action to adopt.

Project Science and Technology, State Secretary of Planning

The respondent from Project Science and Technology is a university professor in charge of the coordination of the project, developed by the Secretary of Planning and the State Council of Technology. The program is being phased out because its main objectives have been achieved. Because the project was the source for the Counter of

Technology and because the respondent was in constant direct interaction with ITAL's top management, it was decided to include him among the individuals interviewed.

Project Science and Technology sought, in relation to Brazilian business enterprises, to (1) improve the quality and degree of standardization of products; (2) adapt new technologies to Brazilian conditions; (3) develop new products and processes; and (4) develop technological research. These objectives were part of a general strategy for expanding the Brazilian export market.[15]

Brazilian businessmen were offered financing for the purchase of laboratory and quality control equipment, for personnel training (at the technical level), and for technical assistance in the areas of quality control, technological research, and new products development as well as information on sources of technology, both local and foreign.

The respondent proved to be very well informed about ITAL's activities.

Power and Dependence Relationships.--The respondent coordinated meetings between ITAL's top management and executives of the food industry, acting as a broker between the two. For example, the respondent arranged for ITAL management and representatives of the meat processing industry to discuss problems and possible solutions. The respondent brought USAID and other international agencies

into the picture to provide solutions ITAL was not prepared to offer. Accordingly, foreign advisers offered technical assistance a number of times, and the training of Brazilian counterparts also took place.

In another instance, Project Science and Technology created a link between banking and financial institutions and research organizations to provide the necessary financing of technology projects development. In this area, Project Science and Technology sought to establish a means to direct financial resources so that, seeing that financing was available, industry and the institutes of research would commit themselves to marketing research outputs. This effort was needed in view of the reluctance of some institutes to change their traditional attitude about being a state supported organization, only remotely linked to the nation's industrial development. The respondent added that the experience with ITAL in promoting such a philosophy was the most successful during his term as project coordinator.

The respondent stated that his relationship with ITAL extended over an 18-month period, from January 1972 to June 1973. During that time, he had frequent interaction with ITAL--"several times a week."

The major problem the respondent encountered related to the definition of policies for market research for food products in ITAL. The Secretary of Agriculture did not seem to agree with ITAL's intended policies, but

the matter was solved through the respondent's intervention. ITAL is now working on the organization of its market research team.

The respondent viewed his relationship with ITAL during the development of Project Science and Technology as quite important for ITAL. Efforts made during that period definitely contributed to the legitimation of ITAL's policies in relation to the external environment. Also, substantial resources have begun to flow to ITAL as a result of Project Science and Technology.

The respondent stated that his relationship with ITAL was not at all strained, although some difficulty was created when the Secretary of Agriculture became involved. Nevertheless, he felt all of ITAL's problems fall within the range of normal, a state of affairs he attributed to the top management group as a whole being loyal to the organization (which he called "institutional loyalty").

He reported that ITAL needed resources and services from him during his term with Project Science and Technology. Resources took the form of influence on budget planning and efforts to obtain funds from international agencies such as USAID. In addition, the project controlled funds for financing technology projects.

The respondent said there was never any competition for these funds because the state institutes involved always established their share in a friendly fashion. However, red tape sometimes delayed the utilization of

resources by ITAL and other institutions. For example, any contract with industry or government must have the final approval of the office of Coordinator of Agricultural Research if the contract exceeds 500.000 cruzeiros.

The respondent reported that Project Science and Technology needed a positive response from ITAL for its new policies. ITAL's acceptance could prompt a change in attitude in other state research institutes. ITAL was used for a demonstration effect so that other similar organizations would seek to open up new areas of research, be more aggressive in marketing of their specific areas of technology, and emphasize the development of products for the export market.

ITAL's overall response to Project Science and Technology was positive. However, the respondent reported that ITAL was too slow in producing new technology. He wanted ITAL to function at a pace similar to that in the entrepreneurial sector of the economy.

According to the respondent, the private sector of the economy definitely needs services from ITAL, and it has shown interest in obtaining them. The origin of this relationship occurred during the life of Project Science and Technology, when the state government wanted to reduce the state's contribution to ITAL's budget. The respondent did not agree and wanted ITAL's budget to be supplemented by an increase in contracting to compensate for the

reduction in state funds. The respondent worked with representatives of the state and federal governments, and it was agreed that funds up to 50 percent of ITAL's total budget should be provided by the private sector through project contracts with the food industry.

It was also reported by the respondent an unsuccessful attempt made by some technological research institutes to achieve the status of public corporations. ITAL also was involved in this movement to obtain more autonomy from the state administration.

During the operating life of Project Science and Technology, there was no serious dependence of ITAL on that project, according to the respondent. He felt ITAL was more dependent on the State Council of Technology and the Secretary of Agriculture, primarily because they have more long-standing and formal means of interaction with ITAL.

In evaluating other task environment relationships, the respondent stated that companies in the food industry are coming to ITAL more frequently. Therefore, ITAL generally has been passive rather than active in soliciting projects since its backlog has reached the point where it would be unwise to take on more work. "They think they may not be able to handle a substantial increase on the demand side," the respondent remarked, but he does not agree. "Being aggressive in terms of marketing does not necessarily mean that a substantial growth in the workload will occur."

He points out that a number of projects already are completely developed and the only task required would be to marketing them.

The respondent judged the relationship with the food industry, the financial sector (for project financing), and the university system as the most crucial ones for ITAL. He was unhappy about ITAL's poor relationship with the University of Campinas. He also considered the absence of an internal cost control mechanism as the source of some difficulties in the interaction with the above-mentioned crucial elements.

Task Environment Changes.--In view of the lack of stability of the respondent's interaction with ITAL, some questions in the interview guide were not applicable. Nevertheless, he considered a possible future change in ITAL's task environment might result from the diffusion of the idea of project contracting in Brazil. More specifically, he saw the development of competition to ITAL as extremely likely. The probable source will be research activities in Brazil by international institutes of research. The Stanford Research Institute, for example, is interested in sending personnel in Brazil to develop and market projects on technology. The facilities of headquarters would be available through satellite communication, which would enable more rapid and less costly responses to enterprises' needs for technology. The respondent thought

this possibility might pressure ITAL into improving its managerial and research capabilities, and he predicted that ITAL would make a positive response in such a situation.

Domain and Goal Formulation.--Project Science and Technology had a major concern in ITAL's output side, in particular, its production of food technology for the Brazilian market. This concern was especially great during the period in which the respondent's interaction occurred. Accordingly, he promoted meetings in which ITAL's top management and industry representatives exchanged information and thus provided ITAL with a general picture of the demand for food technology research. The respondent felt this influenced the formulation of ITAL's future policies. He reported having concentrated his efforts on attempts to influence ITAL's scientific, technological, financial, and personnel training policies. He stated that he was not completely satisfied with ITAL because of high costs and poor accounting procedures which failed to provide information for decision making. As a result, ITAL was not managing its financial resources efficiently.

The respondent reported using budgetary pressure to exert influence on the formulation of ITAL's policies. He also thought there is little agreement among external organizations about ITAL's future goals and policies. According to him, there should be a balance between basic and applied research efforts there. The government does

not have a comprehensive position on this subject, and decisions in this area have not been coherent.

Organizational Assessment.--ITAL was judged by the respondent to be quite successful when compared to similar organizations. However, if financial status and costs are used as criteria, it is not too successful.

The respondent selected performance indicators he thought should be used in evaluating ITAL and ranked them in order of importance: (1) financial status; (2) quality of technical personnel; (3) quality of management; (4) achievement of operational goals; and (5) level of contribution toward the achievement of national, state, or local goals.

In his opinion however, the State Council of Technology of the Secretary of Planning is not yet prepared fully to understand and evaluate ITAL's operations. "What is necessary is to train a group in the area of research management--at the Stanford Research Institute or the Denver Institute--in order to develop better means of evaluating research organizations."

The respondent believed ITAL's operations could be planned in order to achieve some measurable goals. Also, he found the decision process simple, and he thought ITAL's top management can clearly see and choose paths for action.

Federal Government

The federal government respondent, an agricultural engineer, is general coordinator of the National Integrated Plan for Food Technology (PLANITA) of the Ministry of Agriculture. He also is a member of the Brazilian Enterprise of Agricultural Research (EMBRAPA), a public corporation created to develop agricultural research institutions.

The respondent supervises planning for agriculture research in institutions all over the country. Therefore, his job requires constant interaction with ITAL's top management.

The respondent stated that PLANITA relies heavily on ITAL. "ITAL is the organization which sets the patterns for my activities of control and integration of efforts in the area of technological research." For example, if the respondent needs to issue a technical opinion on the admission of a new institute of research to EMBRAPA, he usually consults with experts from ITAL. ITAL technicians make a complete evaluation of the proposed institute and are a tremendous source of expert advice for EMBRAPA.

Power and Dependence Relationships

The respondent carefully delineated the present exchange process between ITAL and the federal government. Through PLANITA's project contracting, resources amounting to 12 million cruzeiros (US$2 million) were to flow to

ITAL during 1973-1976. In addition, federal funds from the National Fund for the Development of Science and Technology were allocated to ITAL. Basically, these two sources provide funding to ITAL through project contracts. Typical projects are research and development of high protein food contents for less developed areas of the nation, technical assistance to other food research institutes or universities in Brazil, and development of balanced meals for the military.

The respondent stated that there is very little probability this flow of funds will be interrupted. In fact, the federal government may increase allocations to ITAL if national planning requires more activities in this area. ITAL was viewed by respondents as being the main organization in its field and the only one with such a high technical level; thus it will continue to receive federal support.

Substantial federal support also is provided to ITAL's technical personnel abroad in the form of scholarships for training. This support may take the form of direct payments or efforts to obtain resources from international agencies.

From ITAL, the federal government expects to receive continuously: (1) fulfillment of agreed upon contracts; (2) support for personnel training in other similar research institutes; (3) technical assistance in creating

and organizing new institutes; and (4) permanent consulting services.

The respondent reported that his interaction with ITAL was along the line of controlled autonomy, control being exercised mostly through the flow of resources to ITAL.

Task Environment Changes

The respondent considered the interaction between ITAL and the federal government as quite stable, primarily because the exchange has been satisfying in terms of the mutual expectations. Accordingly, he did not consider likely a future interruption of this relationship. Furthermore, at the time of the interview, he stated that there were no difficulties whatsoever which might damage the relationship.

The present configuration of ITAL's task environment was viewed by the respondent as satisfying. He felt the possibility of substantial changes in the near future was very unlikely.

With respect to past attempts to change, the respondent recalled a time when the federal government began to operate within ITAL's task environment. ITAL faced a tremendous problem in 1969 because it was difficult to keep highly trained personnel due to noncompetitive salaries. Within the state government there were no means to solve the problem because of very rigid wage policies. ITAL

sought solutions, and the federal government became involved. After several meetings, in which the respondent participated, the federal government agreed to provide support through the National Fund for Development of Science and Technology. The idea was to provide support with no strings attached. At this juncture, the respondent proposed that the federal government should tie the resource flow to specific projects so that precise services would be required from ITAL. PLANITA, which resulted from the adoption of this approach, awarded a large contract for a number of research projects to ITAL.

Through this project contracting approach, the federal government became an important new member of ITAL's task environment. Salary additions to scientists and technicians were made possible on the basis of the individual's contribution to each project.

Domain and Goal Formulation

The respondent said he had spent a fair amount of effort in attempting to influence ITAL's operational goals and administrative policies. For example, research on coconuts and cashews were included in PLANITA's projects through his direct influences. Such research had relevance for the less developed regions of the nation. The respondent also influenced the adoption by ITAL of research projects in the areas of meat, dairy products, tropical fruits, and fish.

However, he said he is much more involved with the overall objectives of ITAL, such as general policies for initiating new technology. His personal influence on such matters is only informal, but ITAL's top management was said to be very receptive to his suggestions.

One of the reasons given by the respondent for harmonious relationships with ITAL is that he has occupied other public offices which involved interaction with ITAL personnel. In addition, his undergraduate training was similar to that of ITAL's management.

In his opinion, what distinguishes and differentiates ITAL from other research institutes is the dynamic response that its management offers to the stimuli which the organization receives.

As a result of integrating efforts on the part of ITAL and other external organizations, the respondent saw great homogeneity among task environment organizations in relation to ITAL's goals and performance.

Organizational Assessment

The respondent considered ITAL a quite successful organization because its performance as a whole has been satisfactory. He also gave a list of performance indicators in order of importance: (1) quality of technical personnel; (2) financial status; (3) improvements in the rate of innovation and creation of new products and

services; (4) achievement of some operational goals; (5) level of contribution toward the achievement of national, state or local goals; (6) overall performance satisfactory compared to similar organizations; (7) quality of management; and (8) prestige of the organization with the external public.

The respondent felt financial status was important for two reasons: (1) the achievement of higher levels of autonomy and a self-supporting position is directly dependent on solid financial management, and (2) the increase in project contracts, which is basic to reaching this ideal, depends on good project management, which includes efficient financial and cost control.

Finally, the respondent felt that ITAL follows more comfortably the directives stemming from interaction with the federal as opposed to the state government. In fact, he thought ITAL had been more loyal to federal government plans which influence internal policies than to any other element of its task environment.

Food and Agriculture Organization of the United Nations

The respondent, a FAO official, supervises the joint project of the FAO, the state of São Paulo, and the federal government. His title is international director of ITAL, and he has a very close interaction with the

institute's top management. He is considered a regular staff member. He has been a project manager for FAO and the United Nations Development Program (UNDP) for fifteen years. His basic function is to integrate FAO and state and federal government activities in relation to ITAL.

A high frequency of interaction with ITAL's executive director was reported by the respondent. His deep involvement, which includes participation in internal decision making, was very well received according to organization respondents. However, relations were not always so harmonious. Under the previous administration, FAO representative and the executive director diverged with respect to overall administrative policies. Now, the respondent felt, there is more of a meeting of the minds and thus everything seems to be going well.

Power and Dependence Relationship

FAO's interaction with ITAL dates from the institute's early days. The initial interest of the government of the state of São Paulo in establishing a food research institute was channeled to FAO. An earlier state project funded at US$40,000 was converted, through FAO's intervention, into a US$5,000,000 project. The University of California's Department of Food Science was contracted to produce improved plants and equipment plans. FAO's project idea was to provide all means necessary for the solution of technological problems for the Brazilian food industry.

The initial agreement called for five years of FAO participation. Two extensions increased the period to eight years. The agreement was to expire in December 1973 and was not to be extended because FAO considered ITAL sufficiently developed to follow its own path without direct and constant external support.

FAO's assistance to ITAL has been in three basic areas. First, it offered financial support for the hiring of international experts in food science. These came to ITAL to solve a specific research problem, put a laboratory in operation, train ITAL's personnel, and suggest improvements in their areas of specialization. Among others, FAO brought in experts on food preprocessing and cashews. Second, FAO provided financial resources for the purchase of modern machinery and equipment of all sorts manufactured abroad. The respondent estimated that FAO contributed above US$500,000 in such equipment. Third, FAO scholarships enabled ITAL personnel to pursue M.A. and Ph.D. degrees abroad.

FAO has acted very selectively to provide help that no one else could. Where possible, other international organizations were called upon for needed support.

The respondent saw FAO's participation as extremely important for ITAL and gave an example. When an international specialist on sensorial analysis was hired to solve some problems at ITAL, his extremely rare capabilities were not used by ITAL for training its own personnel, or

for any other important activity beyond the limits of the specific problem he was solving. The FAO participant pointed out that in the future such specialists should be used for in-house training, and this important procedure was incorporated into ITAL's policy.

Although FAO has provided resources and has acted as a broker for ITAL internationally, its only requirement is that the institute develop a high degree of capability and quality of research. ITAL's success as an organization is a source of pride to FAO personnel and gives them the feeling that their organization has made a sound contribution to Brazil.

The respondent did not view the FAO relationship with ITAL as requiring the dependence of that organization. Basically, there was a substantial amount of mutual cooperation. Initially there was some dependence on FAO because of lack of Brazilian "know-how" in the area of food technology.

The respondent stated that ITAL has had very amiable and efficient relationships with other elements of its task environment. His own personal forecast is that the federal government will gradually assume a position of greater importance than the other task environment organizations. As to the university system, the respondent confirmed the existence of poor relationships, and he sees no possibility of immediate change.

Task Environment Changes

The respondent reported extreme stability in the ITAL-FAO relationship during the agreement period. No major difficulties existed except for those mentioned with the previous executive director, who was more traditional and closed minded in his attitudes. The present director is dynamic and open minded, and this fact, added to FAO's knowledge of ITAL's problems, has created good and efficient interaction between both organizations.

The respondent also viewed as quite stable the relationships ITAL maintains with other task environment elements. This is due to a conscious policy of managing the external environment and to the existence of a high degree of understanding and cooperation on the part of the external organizations. Thus the respondent judged the present arrangement of ITAL's task environment as ideal to a considerable extent. "It seems to be a very logical arrangement given the present conditions," he said.

Nevertheless, he predicted that one major change was likely to occur. There will be a greater interest on the part of international institutions in using ITAL's facilities due to the increase in competition in the export market for processed foodstuffs. The emphasis on quality control will be greater, and this will require improved technical ability. Therefore, agreements with international

agencies will occur more frequently than before in view of the need to improve quality. The respondent thought this change would be very beneficial to ITAL.

Domain and Goal Formulation

In relation to ITAL's present output policies, the respondent stated that he is only somewhat satisfied. Although much has been done in the area of food technology in Brazil, he personally did not agree with the constant addition of new areas of research, such as meat, dairy products, and fish. Rather than diversify, ITAL should increase the depth of its knowledge and capabilities in the areas already developed. Otherwise, in the long run, ITAL will necessarily be subdivided into smaller institutes of research. The respondent argued that is very difficult to obtain positive results when so many areas of research are involved. Nevertheless, he conceded that present output--research results, publications, courses, project contracts, and training of industry personnel--has been of an acceptable level of quality.

Unrestricted collaboration was reported by the respondent as his attitude toward meetings with ITAL's top management. This attitude has been the norm rather than a definite attempt to determine operational objectives.

As a member of the Board of Directors of the ITAL-FAO project and as ITAL's international director, the respondent reported that he knew the other members of the

organization's task environment very well. In his opinion, there is agreement to a very great extent among those organizations on the present goals and policies pursued by ITAL's top management.

Organizational Assessment

ITAL was viewed by the respondent as an extremely successful organization, notwithstanding the substantial difficulties it faces. In the past, there were too many changes of government officials, executive directors, and FAO project managers. This severely hampered the organizational effort to achieve efficiency and productivity.

ITAL has been successful primarily because of the following factors: (1) positive impact upon the food industry; (2) positive impact upon food technology education in Brazil; (3) successful production of balanced meals formulas for soldiers, school children, and workers, upon government solicitation; and (4) successful execution of experiments and their publication in international journals of food science.

In analyzing the list of indicators of success contained in the interview guide, the respondent provided the following rankings: (1) improvements in the quality of output; (2) improvements in the rate of innovation and creation of new products; (3) quality of technical personnel; (4) quality of management; (5) development of activities which prepare the organization for future action;

(6) prestige of the organization with the external public; and (7) overall improvement through time.

The respondent also added that ITAL's contribution to the food industry's development was another important indicator of the organization's performance.

Food Industry

To elicit the perceptions of the food industry concerning ITAL's activities, three companies were interviewed, a middle-size and a large Brazilian firm and a large multinational food producer. Size was determined on the basis of number of employees: up to 100 was small, from 101 to 500 was middle sized, and over 500 employees was considered large.

The answers their representatives provided to the questions contained in the interview guide will be presented in a tabulated form, following the scale previously established.

The Brazilian middle-size company's president was the respondent. He reported having interaction with ITAL from time to time as necessary for the development of projects. He had been informed by people in the trade about ITAL's existence. At the first contact the respondent was surprised by the fact that a state organization would welcome and offer to be of service to its clients. His previous experiences with government organizations were not quite similar to this. Since that time, ITAL has

improved four company products and completely developed one. As this last product is a basic component in manufacturing other products, it usually is produced in large lots. ITAL offered its facilities for this processing so that the company did not need to install the necessary productive capacity for one or two years in the future.

The manager of the Research and Quality Control Department was the interviewee from the Brazilian large-size company. He reported that his job requires direct interaction with ITAL's top management and technicians, and this has been continuous since ITAL's inception. At that time ITAL was utilizing some of the company's research equipment, and the company later used some of ITAL's equipment. Concerning the development of company products through ITAL, the respondent stated his company worries about industrial secrets. This is not because the firm distrusts ITAL, but because ITAL may develop some capabilities which would make it easier for competitors to develop a new product through project contracting. For this reason, the company prefers to utilize ITAL's services mostly in terms of isolated pieces of analysis which his department then puts together. "Besides, there are instances when we prefer to buy foreign know-how, a more rapid solution to our problems in acquiring technology."

The respondent from the multinational company was the head of the Department of New Products. He reported interactions with ITAL's management primarily for reasons

of public relations and in meetings of technical associations. His company has its own research and development capacity, locally and at headquarters, and it has never used ITAL's services. Nevertheless, he noted approval of ITAL's activities and has provided moral support to it.

Power and Dependence Relationships

The respondent from the Brazilian middle-size enterprise stated that the relationship with ITAL is very important for his company. The firm has no research facilities and uses ITAL's services to solve its technological problems. This relationship was said to present no difficulties. The cost of projects was said to be very reasonable. In fact, costs were much lower than if the company developed its own projects, in view of the high investment required and the possible low percentage of utilization in a middle-size enterprise. The respondent recognized that for these reasons his company is technically dependent on ITAL, for no other organization provides the services ITAL can. No concern whatsoever was shown that the firm's competitors could take advantage of ITAL's capabilities acquired through project contracting.

The Brazilian large-size firm's respondent stated that interaction with ITAL occurs about twice a month, depending on the number of projects being processed. He did not know whether this frequency would increase in the future. This doubt was expressed because his company

thinks that there must be a clearer understanding about protecting firms' know-how before industry-ITAL interaction can proceed. Laboratory analysis, various types of research, and policies for the industry are frequent reasons for interaction with ITAL. The relationship with industry was considered very important for ITAL from the viewpoint of this respondent. ITAL does have a weak point: "It does not do sufficient practical work for industrial application."

This same respondent characterized the interaction with ITAL as smooth. He reported that there is an insignificant flow of resources from his company to ITAL. Although the technical quality of ITAL's work is very high, industry is still reluctant to deal with governmental organizations. He added that if government could develop a very efficient management at ITAL and other similar organizations, there would probably be an increase in the resource flow from industry. The university system offers no competition to ITAL because it has done little in applied research. However, the company often has used the services of foreign consultants, and they have provided quick and sometimes complete solutions. Because of the availability of these services, the respondent thought a more feasible area for ITAL would be in research on tropical food products for which there is little foreign know-how. The relationship with ITAL was characterized by the respondent as not involving any degree of dependence.

The multinational company respondent saw no situation of dependence because, as was stated, the firm does not utilize ITAL's services. He reported no concern about the aid ITAL can provide other food producers by developing similar or substitute products. ITAL's services were considered of very high quality, superior to those of other similar organizations in the country.

Task Environment Changes

The Brazilian middle-size company respondent rated his firm's interaction with ITAL as quite stable, and he said it was desirable that it should continue so in the future. He would like to see better interaction between ITAL and smaller enterprises. Also, he thought that ITAL should develop a better system for helping industry to register and certify product formulas. This would mean ITAL's greater involvement with the government agencies presently in charge of this task. "To be of real service to smaller enterprises, ITAL would have to take upon its shoulders the responsibility for legal advice on registration procedures and on the market for food products."

As for the Brazilian large-size company, the ITAL relationship was considered somewhat stable. The respondent indicated that it could be intensified in the future through the development of a larger number of projects at ITAL. He considered it important for ITAL to establish new links with research institutes operating in other areas,

such as soil science, weather, and agriculture. Because these links do not now exist, ITAL is required to develop research in these auxiliary areas. "This is a waste of time and resources." Furthermore, "ITAL should be geared to increase its support to industry by solving more simple and practical problems of food technology." However, he thought the institute is doing a good job, mainly in assisting in the training of middle-level industry technicians.

The multinational company respondent suggested ITAL's resource flow should be based on three elements: the federal and state government and multinational companies. Considering that the third group accounts for 80 percent of the total food industry in Brazil, ITAL should develop better means of interacting with it. However, the respondent believed that, in the future, the federal government will become the dominant external element in ITAL's environment.

Domain and Goal Formulation

The respondent from the Brazilian middle-size company said his firm lacks power to attempt to influence goals for ITAL by itself. However, through project contracting, his company has made ITAL enter new research fields.

At the Brazilian large-size firm, the respondent indicated industry's concern with its larger environment

and the role ITAL can play. In his view, ITAL should provide more perfect information to the food industry, for example, pure research on specific Brazilian conditions for foodstuffs production. Another area would be standards and norms for the food industry. "Here, there are no technical elements operating in crucial governmental positions. ITAL should try to exert influence on the determination of technical norms and standards." Furthermore, "up to now, ITAL has obtained suggestions and information from the industry." He would like to see a reversal of this situation, with the flow moving from ITAL to industry.

The multinational company's respondent expressed his satisfaction with the publication of research results by ITAL and with the servicds of its library. His company has used these along with courses taught by ITAL personnel for training middle-level technicians. The respondent criticized three ITAL projects. The banana sauce project was devised to boost the economic development of a region producing high quantities of this fruit. ITAL produced the sauce, but it was too dark. The respondent asked: "Will any consumer ever be motivated to buy such a product?" "Which company will want to produce and market it?" The second project was a large-scale research effort to improve wine, but the respondent knew of no adoptions of the new processes and technologies suggested. The third project used manioc flour as a bread ingredient. The result was a loaf of bread so heavy that the respondent wondered how

it could ever be marketed. The respondent thus registered his concern that many of ITAL's efforts were not geared to industrial applications and consumer tastes. He recognized he has little power to influence internal policy in this direction.

Organizational Assessment

The Brazilian middle-size company's executive rated ITAL as quite successful. The quality of its output was the reason given. He also ranked the indicators of success applicable to ITAL: (1) quality of technical personnel; (2) amount of technical and legal information made available to industry; (3) quality of management; and (4) financial status.

He was quite satisfied with ITAL's scores on these indicators, with the exception of the second where he thought there was still room for improvement.

The respondent also reported that ITAL's management is very interested in clients: "We have had business contacts also by private telephone, and sometimes in the evening . . . . ITAL's directors are very amiable . . . they even visited our plant once."

As for the Brazilian large-size company, the respondent said ITAL is very successful. He said the more important indicators of success were financial status and quality of technical personnel. He said that although many indicators can be used to measure ITAL's achievements, it

is important to look for those which are more quantifiable. "Without sound financial management, nothing good can be done," he stated.

In addition, he said that the quality of ITAL's products has been satisfactory. In his view, ITAL's personnel is too theoretical. The staff is too young and needs more experience and familiarity with industrial applications.

The respondent from the multinational company also considered ITAL quite successful. He ranked the success indicators as follows:

1. Improvements in the rate of innovation and creation of new products and services. Evaluation: Good. ITAL has created some new products with industrial applications, such as tomato sauce.
2. Improvements in the quality of output. Evaluation: Good. An example was the improvement of the quality of pineapple juice for industrial application.
3. Level of contribution toward the achievement of government goals. Evaluation: Good. An illustration is the national integrated plan for food technology (PLANITA).
4. Quality of technical personnel. Evaluation: Excellent.

The respondent added that there is still a need for improvement, particularly in autonomous generation of new ideas for new product development and their application.

Summary of the Data

Interview data are summarized in Tables 1 to 8. In general, there was a great deal of agreement between ITAL's top management and task environment member responses. However, small differences were identified:

Tables 1 and 5 contain simplified responses of interviewees on power and dependence relationships. If they are compared, it becomes evident that there is a discrepancy in the percentage of state funds in ITAL's total budget. ITAL's top management indicated 60 percent, while the coordinator of Agricultural Research sets the figure at 70 percent.

The same tables indicate that the coordinator of Project Science and Technology foresaw future competition by the Stanford Research Institute. ITAL's top management, in Table 1, did not acknowledge this possibility.

In Table 5, all task environment respondents indicated a balance of power and dependence, with the exception of the federal government, which indicated "controlled autonomy through the management of the flow of resources."

ITAL's top managers pointed out that no future changes in task environment configuration were predicted,

except for the exclusion of FAO at the end of their agreement (see Table 2). The same view is shared by the office of Coordinator of Agricultural Research and the federal government (Table 6).

In Table 6, indications of task environment changes can be found. The State Council of Technology mentions COPEME, the new public corporation in charge of the promotion of exports. FAO said that new international agreements were forthcoming, and the food industry said that the federal government would become the dominant task environment element in the future.

Tables 4 and 8 register agreement of the office of Coordination of Agricultural Research, the federal government, and ITAL's management as to the most important indicator of performance for evaluating the focal organization. SCT and Project Science and Technology heavily emphasized cost control.

Perceptions and Observations Made by the Researcher

Power and Dependence Relationships

It seems that ITAL is definitely dependent on external organizations. Specifically, dependence is concentrated on the federal government, represented by PLANITA, and one element of the state government, the office of Coordination of Agricultural Research of the Secretary of Agriculture. As for the former, dependence

results from the receipt of substantial funds through project contracting and a promise of maintaining and increasing this flow in the future. As to the latter, dependence stems from traditional supervisory links, the provision of important resources, and the office's ability to overcome governmental red-tape when necessary.

The manipulation of crucial resources and services by these two elements of ITAL's task environment places them at a perceptible advantage in relation to other environmental organizations. Without PLANITA's resources ITAL would not have been able to keep some of its important technicians and scientists, without the office of Coordination's approval, PLANITA would not have been able to initiate the developments which have taken place since 1970.

To state that there are two crucial environmental organizations does not mean that other external elements are of negligible importance for ITAL's survival. The Food and Agriculture Organization of the United Nations was the crucial task environment organization during an earlier period. It was formally absorbed into the decision process at ITAL, and this fact alone suggests FAO's importance in the initial stages.

Even before 1970, the food industry received special attention. Project contracting, which was impossible within the limits of state regulations, occurred through a special parallel device. The foundation

arrangement devised by ITAL enabled it to generate resources for salary increments for technicians and scientists. But this was only a temporary solution, and now, with the state government's approval of industrial project contracting, the food industry is in constant interaction with ITAL. This relationship probably will be intensified in the future.

The State Council of Technology has played a major role in ITAL's environment. Its support has emphasized the marketing and financing of technology for Brazilian industry. As a consequence of Program Science and Technology, ITAL is now engaged in the development of an operative market research unit.

Therefore, all elements of ITAL's task environment have had varying degrees of impact on the organization. However, it seems that PLANITA and the office of Coordination of Agricultural Research are the dominant forces in the present task environment, with a slight advantage for the former. In interviewing ITAL's top management it seemed that the managerial group is more concerned with and more prepared to provide rapid responses to the federal government requests made through PLANITA.

Three important phases of dominant dependence seemed to have occurred in ITAL's organizational history. In the early stages, FAO was the main task environment element. It had the knowledge and ability no one else could provide. In a second phase, with the basis of

technical ability already formed, the dominant element was the state administration, primarily because it posed restraints on organizational development through bureaucratic and budgetary control. The state administration gave ITAL routine treatment similar to that given more traditional and older research organizations. ITAL's efforts to overcome these restraints, which finally resulted in a change in personnel in state administration positions, brought about a change in the composition of its task environment. The introduction of the federal government in the rather new role of project contractor seemed to provoke a change in dependence relationships.* Now it appears that the federal government gradually will become the important task environment organization. To the extent that PLANITA encourages ITAL to adapt the goal of industrial application of research results, the food industry will probably improve its position among other task environment organizations.

Task Environment Changes

As mentioned above, the period immediately before 1970 was one of total dependence of ITAL on the state administrative machinery. It was a time of constraints and limitations in view of the emphasis on compliance with

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*The role is considered new because the traditional attitude was to allocate money wherever it was deemed necessary, but without establishing performance requirements.

bureaucratic norms. Because of these constraints, ITAL had to develop alternative solutions for its personnel problems. To retain technical and scientific staff, an attempt was made to enlarge the organization's task environment by contracting projects with the food industry. However, as state regulations were not sufficiently flexible to allow direct contracting, ITAL's administration sought to create a private foundation to handle industrial projects with funds provided by its technical and scientific personnel. Not only the attempt failed, but also this questionable policy made the position of the executive director extremely difficult.

A change of individuals in the state government brought a technically capable and motivated group into the office of Coordination of Agricultural Research. Also, a new executive director at ITAL ushered in new cooperative forms of interaction. It seems this new spirit of cooperation was due to a coalition of ITAL's top management and the new group in charge of the office of Coordination of Agricultural Research. The analysis of this coalition will be presented in more detail at the end of this chapter.

The important point seems to be that ITAL's task environment was opened to change after 1970 by virtue of modifications in the state administration. Two new elements then entered the task environment: the food industry and the federal government. It seems that these changes alone can explain the recent developments that have occurred within ITAL.

It also appears that no changes are planned for the near future. There is a reasonable degree of satisfaction with the composition of the present task environment.

Domain and Goal Formulation

Based on interviews and the researcher's personal observations, it seems possible to relate some of ITAL's actual goals to the influence of task environment elements. Also, present domains for organizational action seem to have been established through a process of exchange with the external environment. The trend seems to be that the federal government will eventually become the more important element within the task environment group influencing goal determination. Of secondary importance is the state government, primarily because the policy of the office of Coordination of Agricultural Research is to provide the structural means for implementing federal development plans. Added to this is the perfect agreement of these two task environment elements as to the objectives to be achieved in the area of food research.

Organizational Assessment

It seems that the elements of the task environment technically able to understand ITAL's operations are the PLANITA administration at the federal level, the office of Coordination of Agricultural Research at the state level and the food industry.

Basically, instrumental measures were emphasized more frequently than efficiency measures in assessing ITAL's success. Although the State Council of Technology and Project Science and Technology advocate efficiency measures of cost control, this indicator seemed not to be given similar importance by the PLANITA administration or the office of Coordination of Agricultural Research. The food industry revealed its special preoccupation with the quality of research output.

ITAL's top administration seemed to place a greater stress on instrumental measures. In fact, the researcher observed that the poorer aspects of administration policy were related to problems of efficiency such as cost control, inventory control, and financial management. Nevertheless, observations revealed a growing concern with these areas, and in two or three years they may receive more emphasis from the more powerful task environment elements. Financial self-sufficiency was mentioned by all parties as an ideal to be attained in the future.

Only once, and without much emphasis, did a task environment member mention that a comparison of ITAL with other similar organizations could be a basis for assessment. In general, the present basis for evaluation is instrumental criteria, with some indication that more specific measures will be used in the future.

Coalition Identification

The utilization of interviews as the basis of data collection fostered closer personal contact with respondents. Informal questioning often led to dialogues which revealed additional information.

Through the informal interaction of the researcher with respondents, it was learned that a coalition seems in process of developing within ITAL, with links to task environment organizations. The members of this coalition are ITAL's top management, the manager of PLANITA, and the office of Coordinator of Agricultural Research.

The investigation revealed a similar outlook or philosophy shared by members of this coalition. Those who did not share these attitudes were thus identified as not being part of the coalition and were excluded from subsequent investigation.

The coalition was formed around 1970 when changes occurred in ITAL's top administration and in the office of Coordination of Agricultural Research. It originated from the need for a rapid solution of ITAL's technical personnel problems. The solution was reached with the involvement of the federal government and the development of PLANITA.

The following conditions seemed to favor the formation and development of the coalition:

1. The individuals involved had the same technical background.
2. They had studied in the same university.

3. In many cases they had worked together previously.
4. There was a crisis situation into which these people were plunged, representing different organizations, to face a problem of substantial importance.
5. The immediate problem was solved, and they saw the possibility of continuing a joint decision-making process to the advantage of all individuals and organizations involved.
6. There is a continuous process of formal and informal interaction among the members of the coalition, although their organizational affiliations are different.
7. There continues to be a great deal of consultation among them.
8. All members seem to hold a very similar set of values with respect to the role of food research in Brazil.
9. Members of the coalition recognize that this similarity in outlook and philosophy has been an important factor in holding the coalition together.
10. All members are practical men and have worked directly in implementing their joint decisions.

Individual Power in the Coalition

From the viewpoint of a member of ITAL's top administration, to participate in the coalition is a means

of acquiring more recognition, thus enhancing his personal power. From the standpoint of other participants in the coalition, power is also gained when organizational goals can be achieved more easily through this cooperation. This can improve their status in the government hierarchy and thus their career security. This is what seemed to occur in the researcher's observation.

Coalition Philosophy

Some traits basic to the common philosophy of the coalition were:

1. Food research output should be a relevant tool for use in the government's development plans;
2. research should be of very high quality;
3. personnel training is fundamental, including study in foreign universities;
4. research output is only relevant when an enterprise can use it in its marketable products;
5. ITAL's personnel should be paid competitive salaries;
6. industry should be motivated to use more and more of ITAL's services; and
7. applied research must be ITAL's major output although basic research on specific Brazilian conditions should always be developed.

TABLE 1.--Summary of Top Management's Responses on "Power and Dependence Relationships" in Relation to Task Environment Organization.

Topics of Investigation \ Task Environment Organization	State Government	Federal Government	International Institutions (FAO)	Food Industry	Universities and Educational System
1. Perceived degree of importance of the relationship	Extremely important (5)	Extremely important (5)	Extremely important in the past (6)	Extremely important (6)	Two clusters of perceptions: 1. Not too important (3) 2. Quite important (3)
2. Perceived frequency of interaction	Almost constantly	Almost constantly	Almost constantly	Almost constantly	Few times a month
3. Perceived reason of interaction	Direct line of subordination to state administration	PLANITA (formal research contract)	International agreement with FAO	Project contracting Training programs Technical cooperation Publications Industry associations	Training programs Scientific and technological information exchange
4. Perceived degree of difficulty of interaction	Not difficult at all (6) Problem areas: Purchasing Personnel policies	Not difficult at all (6)	Not difficult at all (6) (Reported: FAO's red tape for expenditures release)	Not difficult at all (6) (Reported efforts to increase interaction)	Not too difficult (6) (Exception: UNICAMP)
5. Stated budgetary contribution to ITAL (% of total budget)	60%	± 20%	3%	± 20% (increase in future)	None at all
6. Stated ITAL contribution to task environment organization	Research outputs for attaining planning targets Training courses Publications Technology production	Development of agricultural industries New technology Development of other food research institutes	Actualization of a program to allow FAO to fulfill its objectives	Research projects Training of industry personnel Technical exchange Publications	Training of students Library services Conferences on technical subjects Research facilities
7. Perceived degree of competition for funds from task environment organization	Not at all (in the area of food technology)	None at all (in the area of food technology)	Recognized competition from abroad	Competition from industry's own research organization. Not too much relevant, however.	Not relevant
8. Perceived degree of competition for performance from ITAL	None at all	None at all	None at all (FAO's attitude toward international aid)	None at all	Not relevant
9. Perceived power or dependence (evaluation of the relationship)	Mutual dependence	Mutual dependence	Mutual dependence	Balance of power and dependence	Not relevant

Note: Numbers in parentheses show number of respondents who provided one specific answer.

TABLE 2.--Summary of Top Management's Responses on "Task Environment Changes."

Topics of Investigation / Task Environment Organization	State Government	Federal Government	International Institutions (FAO)	Food Industry	Universities and Educational System
1. Perceived degree of stability of the relationship	Extremely stable (6)	Extremely stable (6)	Not too stable (6)	Extremely stable (6)	Somewhat stable (5)
2. Perceived instrument of support for stability/instability	Traditional link of subordination Prestige and secondary benefits for ITAL Heavy state funding	Contracting through PLANITA Quality of ITAL's performances and motivated behavior	End of agreement in near future	Project contracting: ITAL services are needed	Services ITAL renders
3. Perceived degree of difficulty in maintaining stability	None at all	None at all	None at all	None at all	None at all
4. Perceived possibility of discontinuation in interaction	None at all	None at all	Affirmative	None at all	None at all
5. Perceived possibility of future changes in relationship	Improvement	Improvement	Discontinuation	Improvement	Improvement
6. Perceived operational efficiency of relationship*	Efficient	Efficient	Efficient	Efficient	Efficient

Note: Numbers in parentheses show number of respondents who provided one specific answer.

*No specific plans for change in present task environment configuration were reported.

TABLE 3.--Summary of Top Management's Responses on "Domain and Goal Formulation."

Topics of Investigation	Respondents' Perceptions	Additional Comments
1. Organization's main output orientation	Applied research--development of technologies (R & D)	Will be a parallel emphasis on basic research in the future
2. Main users of the organization's output	Food industry and federal government	Project contracts and PLANITA agreement
3. Changes in output production	Recent addition of new areas of research (meat, seafood, dairy)	Changes related to the expectations of task environment organizations
4. Degree of satisfaction with INPUT-OUTPUT transactions	Quite satisfied	Recognition of doing the right thing
5. Need for future changes in organizational goals	Not recognized	Exception made for the addition of a market analysis department.
6. Comparison between past and present organizational goals	Different to a great extent	Difference was related to a change in occupants in ITAL's administration and in relevant positions in state and federal governments
7. Degree of relationship between organizational goals and the influence of task environment organizations	Strong	Federal and state governments were said to influence global policies Food industry influences were related to the diversity of contracts
8. Degree of agreement among task environment organizations about ITAL's goals and policies	Agreement was reported to exist to a large extent	REASON: Existence of a common set of ideals which binds together the individuals involved

TABLE 4.--Summary of Top Management's Responses on "The Assessment of the Organization."

Topics of Investigation	Respondents' Perceptions	Additional Comments
1. Degree of organizational success attributed to ITAL	Quite successful	REASONS: 1. Attainment of objectives 2. User's satisfaction 3. Contribution to economic development plans
2. Crucial indicators of performance selected to evaluate ITAL	Indicators related to instrumental measures	Quality of output Quality of personnel Improvements in rate of innovation Contribution to governmental goals Preparation for future action
3. Relevant judges of ITAL as an organization (simple indication)	1. State government 2. Food industry 3. Federal government	Universities and the educational system were considered not very relevant judges
4. Perceived degree of satisfaction of task environment organizations with ITAL's recent scores in crucial indicators	Satisfied, to a considerable extent	BASIC REASON: The high quality of ITAL's output
5. Indicators which were perceived as difficult for ITAL to score well on	1. Quality of technical personnel 2. Innovation and creation of new products	REASONS: 1. High personnel turnover rates 2. Uncertainties normally attached to new product development
6. Evaluation of ITAL's performance in relation to crucial indicators	Good	A prognosis of continuous improvement was made
7. Identification of the more important indicators of performance	1. Quality of technical personnel 2. Quality of research output	
8. Evaluation of task environment organization's ability to understand ITAL's operations	Ability recognized	
9. Perceived degree of predictability of ITAL's operation	Predictable, to a very large extent	REASONS: 1. Orientation towards feasible goals 2. Managerial ability 3. R & D orientation--basic policy

TABLE 5.--Summary of Task Environment Organizations' Responses on "Power and Dependence Relationships."

Topics of Investigation / Task Environment Organization	State Government			Federal Government	Food and Agriculture Organization	Food Industry
	Coordination of Agricultural Research	State Council of Technology	Project Science and Technology			
1. Perceived degree of importance of relationship of ITAL	Extremely important	Quite important	Quite important	Quite important	Extremely important	Very important
2. Perceived frequency of interaction	Almost constantly	Few times a month	Several times a week (during the period of interaction)	Almost constantly	Almost constantly	Frequency determined by project needs
3. Perceived degree of difficulty of interaction	Not difficult at all	Not difficult at all	Not difficult at all	Not difficult at all	Not difficult at all	Not difficult at all
4. Stated budgetary contribution to ITAL	70%	1/4 of 20% (in the PLANITA agreement)	Influence on state budgetary allocation	20%	3%	Not determined
5. Perceived probability of interruption of flow of funds and performances to ITAL	None at all	None at all	Not relevant	Very little probability	Relationship will soon come to an end (contractual)	None at all
6. Stated ITAL contribution to task environment organization	Good performance to achieve planned targets	Efficient performance	Efficient performance	Technological support High quality of performance	High quality of research output	Not relevant
7. Perceived degree of competition for funds from task environment organization	None at all	Not relevant	Stanford Research Institute	None at all	High. FAO resources can be allocated to areas of greater need	Not relevant
8. Perceived degree of competition for performance from ITAL	None at all	Not relevant	None at all	None at all	Not relevant	Not relevant
9. Perceived power or dependence (evaluation of the relationship)	Mutual dependence	Mutual cooperation	ITAL was not seriously dependent on the project	Controlled autonomy through the management of resource flow	Mutual cooperation	No situation of dependence was reported

TABLE 6.--Summary of Task Environment Organizations' Responses on "Task Environment Changes."

Topics of Investigation / Task Environment Organization	State Government			Federal Government	Food and Agriculture Organization	Food Industry
	Coordination of Agricultural Research	State Council of Technology	Project Science and Technology			
1. Perceived degree of stability of the relationship	Extremely stable	Extremely stable	Lack of stability	Quite stable	Extremely stable	Stable
2. Perceived instruments of support for stability/ instability	Supervisory link Community of objectives Mutual loyalty Sharing of responsibility	Identity of philosophy	Project is already finished	Satisfactory exchange for both parties	New director's behavior	ITAL's servies
3. Perceived degree of difficulty in maintaining stability	None at all	None at all	Not relevant	None at all	None at all during FAO's agreement	None at all
4. Perceived possibility of discontinuation of interaction	None at all	None at all	Certainty of discontinuation	None at all	Certainty of discontinuation	None at all
5. Perceived possibility of future changes in relationship	Not too likely	Not too likely	Very likely	Not likely	Very likely	Likely improvement of interaction
6. Perceived operational efficiency of relationship	Efficient	Efficient	Efficient during project life	Satisfactory	Efficient during life of agreement	Efficient
7. Perceived future changes in task-environment configuration	None at all	COPEME--new public corporation in charge of the promotion of exports		Substantial changes are not likely in the future	Agreement with international agencies will occur	Federal government will become dominant in the future

TABLE 7.--Summary of Task Environment Organizations' Responses on "Domain and Goal Formulation."

Topics of Investigation / Task Environment Organization	State Government			Federal Government	Food and Agriculture Organization	Food Industry
	Coordination of Agricultural Research	State Council of Technology	Project Science and Technology			
1. Perceptions of ITAL's main output	Research Consultancy Courses Publications	Applied and basic research	Production of food technology for the Brazilian market	Research Consultancy Courses Publications	Research Publications Courses Consultancy	Project development Research Courses
2. Degree of satisfaction with ITAL's INPUT-OUTPUT transactions	Quite satisfied	Quite satisfied	Not completely satisfied	Quite satisfied	Somewhat satisfied	Somewhat satisfied
3. Degree of familiarity of task environment organization with ITAL's goals and policies	Familiar to a considerable extent	Familiar to a great extent	Familiar to a considerable extent	Familiar to a great extent	Familiar to a great extent	Somewhat familiar
4. Degree of participation in the formulation of ITAL's OUTPUT innovations	Participates to a great extent	Participates as a mediator between supply and demand	High during the life of the project	Participates to a very great extent	Participates in all decisions	Little participation
5. Perceived degree of influence on ITAL's goals and policies	Influences to a very great extent	Influences to a considerable extent	Influence through a survey of demand for research on food technology	Influences to a very great extent	Attitude of collaboration rather than attempt to influence	Little power of influence
6. Need of future changes in ITAL's goals and policies	No need in the short run	Improvement of ITAL's managerial capabilities	Improvement of costs Information for decision making Managerial abilities	Not indicated	Increase the depth of knowledge in the areas of research already developed	Standards and norms Pure research More industrial applications
7. Perceived degree of agreement among task environment organizations about ITAL's goals and policies	Agreement to a great extent	Agreement to a considerable extent	Not too much agreement	Agreement to a great extent	Agreement to a very great extent	Not answered

TABLE 8.--Summary of Task Environment Organizations' Responses on "the Assessment of the Organization."

Topics of Investigation / Task Environment Organization	State Government			Federal Government	Food and Agriculture Organization	Food Industry
	Coordination of Agricultural Research	State Council of Technology	Project Science and Technology			
1. Degree of organizational success attributed to ITAL	Extremely successful	Services: very successful Economic Efficiency: not successful	Quite successful (not successful in terms of costs and finance)	Quite successful	Extremely successful	Quite successful
2. Crucial indicators of performance selected to evaluate ITAL	Quality of personnel Contribution to governmental goals Improvement through time Satisfactory performance Organizational prestige Rate of innovation	Organizational prestige Quality of personnel Quality of management Rate of innovation Financial status Quality of output	Financial status Quality of personnel Quality of management Achievement of goals Contribution to governmental goals	Quality of personnel Financial status Rate of innovation Achievement of goals Satisfactory performances Quality of management Organizational prestige	Quality of output Rate of innovation Quality of personnel Quality of management Preparation for future Prestige Improvement through time	Financial status Plus other instrumental measures
3. Degree of satisfaction with ITAL's recent scores in crucial indicators	Satisfied to a considerable extent	ITAL has shown improvements in all important indicators except for the financial status	Somewhat satisfied	Satisfied to a considerable extent	Satisfied to a great extent	Quite satisfied (need for improvement)
4. Indicators which were perceived as difficult for ITAL to score well on	None were reported	Cost control and financial indicators	Cost and financial control	None were reported	None were reported	None were reported
5. Evaluation of ITAL's performances in relation to crucial indicators	Good	Good with the exception of financial indicators	Good	Good	Excellent	Good
6. Perceived degree of predictability of ITAL's operations	Not difficult to plan for measurable goals	Structure of operations allows for planning and forecasting	Planning is possible at ITAL	Not answered	Not answered	Not answered

CHAPTER IV--FOOTNOTES

[1]See Secretaria da Agricultura do Estada de São Paulo, Instituto de Tecnologia de Alimentos (São Paulo: 1972), p. 3.

[2]Ibid.

[3]Ibid.

[4]Ibid., p. 4.

[5]Food and Agriculture Organization (FAO), O Que é e Como Atua, Associação Brasileira de Crédito e Assistência Rural (São Paulo: 1970), p. 7.

[6]Instituto de Tecnologia de Alimentos, p. 6.

[7]O Que é e Como Atua, p. 6.

[8]Ibid., p. 6.

[9]Instituto de Tecnologia de Alimentos, p. 6.

[10]Lawrence W. Bass, Direção de Programas Técnicos - Com especial referência às necessidades dos países em desenvolvimento - translated unpublished manuscript in the portuguese language.

[11]Data were collected between April and August 1973. Any references to present dates from now on will assume this period when the investigating took place.

[12]O Que é e Como Atua, p. 6.

[13]Secretaria de Economia e Plannejamento, Conselho Estadual de Tecnologia and Governo do Estado de São Paulo, Projeto Ciência e Tecnologia (São Paulo: 1972).

[14]Secretaria de Economia e Plannejamento, Conselho Estadual de Tecnologia and Governo do Estado de São Paulo, Balcão de Tecnologia (São Paulo: 1972).

[15]Projeto Ciência e Tecnologia.

CHAPTER V

CONCLUSIONS

This chapter offers conclusions based on the data contained in Chapter IV.

The conclusions are presented in two parts. In the first a comparison is made between the data collected and the normative model derived from the Thompsonian propositions. It analyzes the propositions within the context of the focal organization. The second part attempts to evaluate the focal organization's performance, using the normative prescriptions suggested by the model.

Main Findings Regarding the Thompsonian Propositions

This dissertation focuses, in a broad sense, on the contingency theory of organizations. A basic assumption is that empirical data should be gathered to help evaluate that theory. This investigation uses the conceptual framework and propositions of one contingency theoretician, James D. Thompson.

It is also assumed that Thompson's approach can contribute reasonably well to an understanding of organizations operating within the context of a developing society.

The propositions presented in Chapter III were explored through a case study of a Brazilian public research institute. Data were collected through interviews with six top executives of that organization and nine others working for organizations which interact directly with the institute. A survey of documents and personal observations by the author were also used. Chapter IV presented the data, and this chapter will analyze its relevance in supporting or reformulating Thompson's propositions.

Proposition 1

The first proposition stated: "Under norms of rationality organizations seek to minimize the power of task environment elements over them by maintaining alternatives." The data support this proposition.

During the earlier periods of its history, ITAL was extremely dependent on one element of its present task environment, the state government. This dependence, as revealed through interviews, was basically in financial matters, with deep repercussions in the personnel and technical areas. Attempts were made to develop alternative arrangements: (1) transform ITAL into a public

corporation; (2) set up a foundation which would handle industrial contracts in order to circumvent state government prohibition; and (3) enter into contracts with industry and the federal government through the PLANITA agreement, the successful course eventually followed. Thus, ITAL tried to decrease its total dependence on the state government and pursued several alternatives until a successful one was found. This modification of the dependence situation is manifested by the fact that budgetary contributions (see Table 1) presently are derived from three task environment elements--state government, the food industry, and the federal government--a definite change from the original situation.

The data also show that the successful alternative which altered the original dependence structure was developed with the active participation of state and federal governments. The coalition currently in the making in ITAL's task environment was instrumental in accomplishing the change.

The original Thompsonian proposition thus can be slightly altered to include an hypothesis about organizations developing such alternatives: Modification to proposition 1: Under norms of rationality, organizations seek to minimize the power of task environment organizations over them by actively developing alternatives.

The general conclusion is that in the past ITAL used norms of rationality when it sought to minimize the

power of the state government over it by maintaining alternative solutions for the flow of resources to the organization. Presently, ITAL has developed and implemented one specific alternative and, therefore, the balance of dependence has changed. In view of the continuation of the coalition developed during the process of task environment change, it seems that the proposition hardly applies to ITAL's present situation.

Proposition 2

The second proposition states: "Organizations subject to rationality norms and competing for support seek prestige." The interviews revealed an intensive effort on the part of ITAL's top administration to enhance the prestige of the organization with its external public--the task environment organizations. The most salient observations were made when interviewees were asked to assess the organization. The mentioned indicators were the quality of ITAL's research output and other instrumental measures, such as its official policy of training technical personnel abroad and management's encouragement of publication in internal journals (see Tables 4 and 8). These seemed to be activities geared to the management of prestige. Other examples are ITAL's policy of seeking support from industrial and governmental clients and its stated intention to acquire a national and international reputation. It seems, however, that merely seeking

prestige is not enough. ITAL would not have gained prestige without developing sound, environmental based, internal policies. Successful efforts in personnel management, scientific training, and scientific output production enabled ITAL to present itself as an organization of high quality to its task environment and thus as deserving of prestige.

It seems that the search for prestige actually enhanced ITAL's already successful management of its basic areas of operation. There would be no solid basis upon which to seek prestige without having a certain degree of organizational success. The data showed efforts to acquire prestige occurring during times in which there was a consensus about ITAL's organizational success.

The rather obvious second Thompsonian proposition thus is supported. However, it may be suggested that there must be a certain degree of recognized success before a policy of seeking prestige can be pursued. In view of the above, the recognition of success constitutes a basis for the management of prestige. The data do not indicate whether or not success must be real before prestige can be acquired, but it seems that, at the very least, external elements in the task environment must perceive the organization as successful.

Although ITAL does not have direct competitors in its area of operation in Brazil, competition does exist. It competes with other organizations, including

international research institutes, for state and federal projects. Thus, the effort to acquire prestige is justified; by publicly promoting its successful performance ITAL acquires power by receiving greater budgetary allowances from the governmental elements of its task environment.

Proposition 3

Proposition 3 states: "When support capacity is concentrated in one or a few elements of the task environment, organizations under norms of rationality seek power relative to those on whom they are dependent." The data support this proposition.

Support for ITAL is concentrated in the state and federal governments. They are the elements on which ITAL is dependent, and the case study shows that ITAL seeks to acquire power relative to those elements. Support for basic and applied research has come primarily from the government. The organizational effort to develop relations with the food industry is a means of creating favorable reactions among governmental elements. By developing relevant research outputs for industry, ITAL helps the government achieve development targets and thus gains power in relation to its main supporters.

As the federal government is perceived as a strong source of organizational support, it can be predicted from proposition 3 that ITAL will concentrate on

developing means to offset a greater dependence on that member of its task environment.

The reverse of proposition 3 also was supported by the data. Since the universities and the general educational system provided no financial support and thus there was no dependence link, ITAL made no efforts to gain power in relation to that element. However, the schools and universities did seem to play some part in ITAL's effort to acquire a good technical reputation and prestige. That is, ITAL would like to be well thought of in those circles.

Proposition 4

Proposition 4 reads: "When support capacity is concentrated and balanced against concentrated demands, the organizations involved will attempt to handle their dependence through contracting." The data support this proposition.

At the time the data were collected, support for ITAL was primarily concentrated in the state and federal governments. The demand for support was also concentrated in ITAL and a few other less important food research organizations in the country, that is, in a sense ITAL was in a monopoly position. The dependence situation was therefore handled through contracts, such as the ones related to PLANITA projects.

Proposition 5

Proposition 5 states: "When support capacity is concentrated but demand dispersed, the weaker organization will attempt to handle its dependence through coopting."

The situation pictured by this proposition was present in the very beginning of ITAL's organizational life. At that time, the Food and Agriculture Organization was the greatest source of support--in view of the absence of know-how on food technology in the country. Since that organization faces demand for support from numerous countries, the situation was one of dispersed demand. This exact situation is pictured by proposition number 5.

The data show that a formal cooptation process occurred in relation to FAO. In fact, an FAO technician was formally absorbed into ITAL's organizational structure as the international director and for eight years he was directly involved with decision making at the top management level.

In view of the coalition which existed at the time the data were collected, proposition 5 does not apply, for the conditions to which it refers were not present.

Therefore, proposition 5 is supported, but only for the earlier period of ITAL's history. Cooptation was a mechanism which was used as the Thompsonian propositions predicted.

Proposition 6

Proposition 6 states: "When support capacity is concentrated and balanced against concentrated demands, but the power achieved through contracting is inadequate, the organizations involved will attempt to coalesce." The study provides evidence in support of this proposition.

The observations of the researcher and the interviewees' responses indicated a spirit of joint involvement among ITAL, the office of the Coordination of Agricultural Research, the State Council of Technology, and the Federal Government.

At the time data were collected, a great national effort was being developed to improve the capability of Brazilian organizations in the area of scientific and technological research.[1] A cooperative spirit of channeling the country's scientific and technological system toward this end was present throughout the research community. A new government plan was developed,[2] aimed at integrating these various organizations.

The pressure to develop new exportable products created many tasks in the area of food technology. During this time ITAL was building its dairy and meat plants and planning a seafood research plant. A new Department for Market Analysis was also being established.

These internal developments, created in response to environmental pressures and opportunities, could not

be dealt with through contracting alone; assistance from many other sectors of the economy and the governmental administration was required. The actions taken during this period seemed definitely inspired by a common outlook or spirit of joint venture, and thus a coalition, in Thompson's sense of the word, was formed.

A significant number of interviewees seemed imbued with a spirit of doing something important for Brazil's development through food technology. This was certainly true of ITAL's top management, state government officials, and the federal government.

The identification of the coalition and the conditions present at ITAL conducive to its formation were mentioned in Chapter IV. Recall that it was indicated that ITAL and its task environment members "saw the possibility of continuing a joint decision-making process, to the advantage of all." A situation in which gains are perceived as possible for all participants defines a "non-zero-sum" concept of power, and for Thompson this is the concept on which coalitions rest.

Therefore, it seems the study has shown evidence in support of proposition 6.

Proposition 7

Proposition 7 reads: "The more sectors in which the organization subject to rationality norms is constrained, the more power the organization will seek over

remaining sectors of its task environment." The data do not support this proposition.

ITAL's situation during the time the study took place was not characterized by constraints. In fact, a coalition was in the making, as was already pointed out. In the past ITAL faced only one specific constraint: In its early history it was systematically barred by the office of the Coordination of Agricultural Research in all attempts to conduct technological research for a client. This constraint led the organization to seek to enlarge its task environment to include the food industry and the federal government.

Thus, the conditions required by proposition 7 were not present at ITAL; therefore, data are lacking for its evaluation in this study.

Proposition 8

Proposition 8 states: "The organization facing many constraints and unable to achieve power in other sectors of its task environment will seek to enlarge the task environment." The study shows evidence in support of this proposition.

Although a reasonable degree of balance between power and dependence seems to have been achieved by ITAL, there was a period when it was highly dependent on the office of the Coordination of Agricultural Research.

This example was cited in support of proposition 1. However, it now needs to be analyzed in terms of the constraints arising from dependence on one single element of the task environment.

Since there were no other sectors of the task environment in relation to which ITAL could attempt to achieve power, it had no choice but to attempt to enlarge its task environment. The addition of the food industry and the federal government to ITAL's task environment shows the organization made use of the rationality contained in proposition 8.

Proposition 9

Proposition 9 reads: "Under norms of rationality assessors prefer efficiency tests over instrumental tests, and instrumental tests over social tests."

The data revealed that ITAL evolved from an initial situation of closure in relation to the environment to a situation of openness; it then sought cues from its newly developed task environment to establish new goals and objectives. As the new interactions developed, a tendency toward a certain degree of closure again took place, and it was at this point that the interviews occurred. Most of the external interviewees saw a certain predictability in ITAL's current operations. The ability to predict implies that definite measures of assessment are being used.

Respondents used efficiency measures such as financial status and cost control in their evaluation of ITAL. However, most of them indicated instrumental measures and social measures, showing a preference for these rather than for efficiency measures (see Table 8). The reasons for this preference could not be determined.

There was thus no concrete evidence fully supporting proposition 9. However, in view of the indicators of performance selected by the assessors, there is evidence to support the assertion that assessors prefer instrumental tests over social tests. Consequently, it can be said that the data only partially support proposition 9.

Proposition 10

Proposition 10 says: "At the institutional level, organizations subject to norms of rationality measure their fitness for future action in satisfying terms." The data do support this prediction. ITAL's top management revealed a definite preference for instrumental measures of organizational success. The summary of the interviews contained in Table 4 shows the evidence in support of proposition 10.

Propositions 11 and 12

Proposition 11 states: "Under norms of rationality, organizations facing relatively stable environments seek to demonstrate fitness for future action by demonstrating

historical improvement." Related to the other end of the environmental continuum, proposition 12 states: "Under norms of rationality, organizations facing dynamic task environments seek to score favorably in relation to comparable organizations."

ITAL faces a relatively stable task environment. The perceptions of the respondents were that no substantial changes would occur (see Tables 2 and 6). Thus, evaluation of proposition 12 is irrelevant in the context of the case study developed here.

However, proposition 11 was not clearly supported. Although there was reference made to prestige linked to the historical improvement of the organization, there was no definite and clear emphasis on this measure of success. Quality of output, quality of personnel, improvements in the rate of innovation, contribution to governmental goals, and preparation for future action were the indicators chosen by ITAL's top administrative group to assess their organization. In a sense, these indicators are connected to historical improvement and growth. However, as no definite emphasis was placed on improvement through time, which was a choice presented in the interview, the conclusion is that the data do not definitely support proposition 11.

Proposition 13

Proposition 13 reads: "When the organization cannot hope to show improvement on all relevant dimensions, it seeks to hold constant on some and show improvement on those of interest to task environment elements on which the organization is most dependent." This proposition is supported by the data.

ITAL has not shown improvement along all relevant dimensions. It still lacks demonstrable financial efficiency, and it has not yet produced the desired impact upon the food industry in Brazil. Furthermore, when one considers that ITAL is most dependent upon the state and federal governments, the situation pictured in proposition 13 is relevant to the case study.

An examination of Tables 4 and 8 reveals the similarity of indicators chosen by the office of Coordination of Agricultural Research, the federal government, and ITAL's top management. All three selected the quality of technical personnel, a social or extrinsic criterion, as first in hierarchy of importance. Thus, the evidence indicates that ITAL scores well on the dimensions most relevant to the elements on which it is most dependent. Consequently, proposition 13 is supported by the data.

Proposition 14

Proposition 14 asserts: "Under norms of rationality, complex organizations are most alert and emphasize scoring well on those criteria which are most visible to important task environment elements." This proposition is supported by the case study.

Although ITAL has a limited task environment compared to a private industrial enterprise, it has tried to score well on criteria which are important to the state and federal governments and the food industry (see Table 8). The introduction of the criterion of financial standing by those elements of the task environment, for example, has led ITAL to develop a concern for project management and cost control. Also, instrumental measures, which at the time of the study were still major criteria for assessing ITAL, were being emphasized.

Propositions 15, 16, and 17

Proposition 15: "When organizations find it difficult to score on intrinsic criteria, they seek extrinsic measures of fitness for the future." This was supported by the data.

Proposition 16: "When task environment elements lack technical ability to assess performance, organizations seek extrinsic measures of fitness for future action." This proposition was not supported, and it is not relevant for ITAL's situation.

Proposition 17: "When cause/effect knowledge is believed incomplete, organizations seek extrinsic measures of fitness for future action." This was supported by the data.

ITAL clearly emphasizes extrinsic measures of its fitness for future action. But the claims about quality of output came from statements made by ITAL's management or others in the task environment; no comparative statistics were presented to support these claims. The same can be said concerning statements about the quality of technical personnel, improvements in the rate of innovation, or other measures ITAL's top management and other respondents selected as criteria for assessing the organization.

It is somewhat difficult for ITAL to score well on intrinsic measures of success to demonstrate its fitness for future action. This is partly because its work is in the area of research, where knowledge of cause and effect is incomplete. The use of extrinsic measures seems justified in terms of rationality. Thus, propositions 15 and 17 reflect the situation of the focal organization at the time of the interviews, and the data support these propositions.

On the other hand, proposition 16 received no support. Respondents indicated that task environment elements were capable of assessing ITAL's performance, but intrinsic rather than extrinsic measures were used for assessment.

The explanation for this apparent inconsistency of findings may lie in the fact that ITAL is in an almost monopolistic position in Brazil. Task environment organizations lack comparative data for assessing ITAL on intrinsic measures. Furthermore, although technically able, task environment elements lack available means of emphasizing intrinsic measures of fitness for the future.

Proposition 18

Proposition 18 reads: "The more dynamic the technology and task environment, the more rapid the political process in the organization and the more frequent the changes in organizational goals." This proposition was only partially supported by the data.

ITAL's task environment was stable at the time the interviews took place. Thus, one condition for proposition 18 was not present. However, technology at ITAL is dynamic and the organization's main objective is constantly to change its technology through research.

Organizational goals were changing rapidly. The dairy, meat, and seafood research plants represented a shift in goals. In addition, the political process was changing with a coalition in the making. It seems, therefore, that proposition 18 is supported only with respect to technology.

Restatement of Propositions

As a result of the findings detailed in Chapter IV, the propositions which were supported by the study are restated below with any modifications suggested by insights gained during the research.

Proposition 1:

Under norms of rationality, organizations seek to minimize the power of task environment elements over them by maintaining alternatives.

Proposition 1 modified:

Under norms of rationality, organizations seek to minimize the power of task environment elements over them by actively developing alternatives.

Proposition 2:

Organizations subject to rationality norms and competing for support seek prestige.

Proposition 3:

When support capacity is concentrated in one or a few elements of the task environment, organizations under norms of rationality seek power relative to those on which they are dependent.

Inverse of Proposition 3:

When support capacity is concentrated in one or a few elements of the task environment

organizations under norms of rationality do not seek power relative to those on which they are not dependent.

Proposition 4:

When support capacity is concentrated and balanced against concentrated demands the organizations involved will attempt to handle their dependence through contracting.

Proposition 5:

When support capacity is concentrated but demand dispersed, the weaker organization will attempt to handle its dependence through coopting.

Proposition 6:

When support capacity is concentrated and balanced against concentrated demands, but the power achieved through contracting is inadequate, the organizations involved will attempt to coalesce.

Proposition 8:

The organization facing many constraints and unable to achieve power in other sectors of its task environment will seek to enlarge the task environment.

Proposition 9, modified:

Under norms of rationality assessors prefer instrumental tests over social tests.

Proposition 10:

At the institutional level, organizations subject to norms of rationality measure their fitness for future action in satisficing terms.

Proposition 13:

When the organization cannot hope to show improvement on all relevant dimensions, it seeks to hold constant on some and show improvement on those of interest to task environment elements on which the organization is most dependent.

Proposition 14:

Under norms of rationality complex organizations are most alert to and emphasize scoring well on criteria which are most visible to important task environment elements.

Proposition 15:

When organizations find it difficult to score on intrinsic criteria, they seek extrinsic measures of fitness for future.

Proposition 17:

When cause/effect knowledge is believed incomplete, organizations seek extrinsic measures of fitness for future action.

Proposition 18, modified:

The more dynamic the technology, the more rapid the political process in the organization and the more frequent the change in organizational goals.

These propositions were supported by data gathered in this study.

ITAL's Performance and the Predictions of the Normative Model

ITAL's performance is now analyzed in terms of the patterns derived from the Thompsonian propositions and included in the normative model. The analysis incorporates historical and more recent data, in order to provide a wider basis for organizational evaluation of ITAL.

As previously indicated, there is evidence that in earlier periods ITAL was strongly dependent on the state government (more precisely, on the office of Coordination of Agricultural Research). Dependence was basically a consequence of the total financial support provided ITAL by that task environment interaction. State government power over ITAL at that time was manifested in the personnel, purchasing, and budgeting constraints imposed on the

organization. The interviews indicated some effects of this dependence upon ITAL's management: (1) rigidity in relation to problem solving and decision making; (2) behavior guided by bureaucratic rules and regulations; (3) difficulties in sensitizing the office of Coordination of Agricultural Research to ITAL's new opportunities; (4) lack of decision-making power in view of the considerable centralization of decisions in the office of the Coordinator of Agricultural Research; (5) substantial amount of red-tape in the purchasing process; and (6) total subordination to, among others, state wage and personnel policies.

During this period there were intensive training activities at ITAL by force of the agreement with FAO. Technical development of the organization was fostered by increasing numbers of experts and specialists being educated abroad. Also, direct technical assistance provided by FAO experts was a critical factor in ITAL's acquisition of new technical capabilities.

After obtaining degrees abroad, ITAL's returning specialists brought a new outlook derived from their intensive technical training. These new specialists were not paid market salaries and faced severe limitations in their effort to put their knowledge into productive use within ITAL.

Respondents also reveal the existence of conflict between ITAL and the office of Coordination of Agricultural

Research during the time of total dependence on state funding. ITAL's management made constant efforts to avoid becoming completely subservient to the state government. The conflict produced various outcomes: (1) many specialists left ITAL; (2) the former executive director left ITAL and was hired by the University of Campinas (UNICAMP); (3) ITAL was barred from contracting projects with the food industry; (4) a private foundation was created by ITAL's technicians from personal funds in order to handle industrial contracts; and (5) ITAL's management pressed for more autonomy in many different ways such as attempts to transform ITAL into a public corporation).

All this evidence indicates that ITAL was a captive in relation to state government. ITAL's management tried to develop alternative sources of support in an effort to diffuse dependence and prevent the concentration of state power over it. In addition, based on its newly developed technical capabilities, management pursued a policy of acquiring widespread organizational prestige.

During this period, normative prescriptions derived from Thompson's propositions 1, 2, 3, 4, and 5 were followed by ITAL. Propositions 1, 2, 3, and 4 are part of a set defined by Thompson as "Competitive Strategy." Proposition 5--the use of a cooptation mechanism in relation to FAO--is part of his "Cooperative Strategy." It becomes evident, then, that ITAL used a mixed strategy in its earlier periods: competition in relation to state

government, and cooperation in relation to FAO. ITAL adopted a strategy which was in complete accordance with Thompson's propositions, but he is not explicit about the possibility of a mixed strategy.

The data show that, at the same time, the office of Coordination of Agricultural Research was using conformity to rules and regulations as an assessment criterion for ITAL's performance. According to Thompson, this is an instrumental test, found in cell II of the assessment matrix shown in Chapter III.

Prevailing conditions in cell II are crystallized standards of desirability and incomplete knowledge of cause and effect. However, the data show that standards of desirability were not crystallized at that time; the conflicts pointed out by respondents indicate an ambiguity of standards of desirability. Different utility scales (bureaucrats versus trained specialists) were held by the office of Coordination of Agricultural Research and ITAL's personnel.

ITAL's specialists had been exposed to a different culture and had acquired different values and attitudes in their training abroad. They were unwilling to adhere to rigid bureaucratic rules. At the same time, the office of Coordination was assessing the organization in terms of its conformity to these rules and regulations, although its knowledge of cause and effect was incomplete. By using this incongruent pattern of assessment, the office

of Coordination imposed constraints upon ITAL, which suffered important personnel losses as a consequency.

ITAL's management then used an open system strategy as it pressed for new support alternatives and sought prestige through the many devices reported on in Chapter IV. It also developed formal cooptation with FAO, and after some time reached its dependence problem. The general behavior of ITAL's management was, therefore, in agreement with the predictions one would make for this period of its history according to the Thompsonian model.

The enlargement of ITAL's task environment which occurred after this earlier period could also be predicted by the normative model, based on Thompson (proposition 6). It seems worthwhile to analyze in some detail how the task environment was enlarged.

The data show that industry contracts were barred by the office of Coordination. Cooptation was a strategy which could not be used because it requires a situation of dispersed demand--according to Thompson--not present in this case. Thus, the fact that a coalition would be forming at ITAL could be predicted, and this was borne out by the data.

As the coalition process progressed, organizational objectives and goals changed. The construction of new research plants and the desire to make a real contribution to the economic development of the nation through food research are evidence of that change. Also,

respondents felt actual gains were being derived from the coalition (a nonzero-sum approach to power), a situation the normative model predicts.

Furthermore, the dynamics of the new patterns of interaction in the coalition required different types of assessment on the part of the task environment. The indicators listed in Table 8 are characteristic primarily of cell II and less of cells III and IV of the assessment matrix shown in Chapter III. Quality of personnel, organizational prestige, contribution to the achievement of governmental goals, and so forth, are measures which reflect the use of instrumental tests and of a social reference group in the assessment of the organization.

Also, the data show ITAL emphasized instrumental and social patterns of assessment (see Table 4). This prediction can be made from proposition 10, which forecasts "a search for satisfactory scores at the institutional level."

In general, the case study finds a high frequency of situations in which behavior accords with the predictions of the normative model. The remaining question is: What does such evidence mean in the face of other findings showing that ITAL still has some managerial problems?

First, it is important to bear in mind that the Thompsonian propositions selected refer to the institutional level of the organization. The use of rationality at the institutional level should not be confused with

efficiency at the managerial level. This study did not attempt to measure efficiency at the managerial level.

Second, ITAL's use of an open system strategy means that its policy is to watch for environmental opportunities and transform the selected ones into routinized activities within the organization. Good performance at the institutional level will not necessarily be translated immediately into good performance at the managerial level. It also may be possible that ITAL was in the midst of transformation at the time the data were collected and was still in the process of improving its internal activities. The creation of new internal activities (planning, marketing, and so forth) was mentioned in the interviews.

Finally, the coalition which has been discussed was formed only recently. Thompson indicates that a coalition has its own dynamics and is in a constant process of mutation. Due to study design limitations and the finite period of investigation, it was not possible to analyze in depth the coalition process. Certainly, more research on ITAL is necessary to understand the ongoing situation and to acquire a better measure of its conformity to the normative model.

Concluding Comments

Some propositions were clearly supported by the data, whereas for others there was no evidence either for or against. Thus, in general, the normative model based

on Thompson's propositions, proved its predictive power. This overall conclusion is not unexpected because Thompson's creative insights in Organizations in Action drew from empirical research performed by others.

From Thompson's propositions it is possible to derive normative directions and, based on them, to conceive a guide for analyzing the development of efficient organizational interactions with specific task environment elements, but problems of operationalization still exist. Questions related to how much power and prestige should be sought or the optimum member of alternatives to be maintained, and others, remain to be answered.

Nevertheless, Thompson's theory was useful in analyzing the focal organization selected for the case study and it may be useful if applied more extensively to managerial situations.

The management of environmental relations has been given little attention by practitioners. Despite an increased interest in information about organizational clients and suppliers, environmental politics have not been approached systematically. This author believes it is possible to improve this area of management through consistent efforts for operationalizing Thompson's theory.

CHAPTER V--FOOTNOTES

[1]As an example, see the proceedings of the National Symposium of Industrial Technology in Simposio Nacional de Tecnologia Industrial. Idort. Livraria Francisco Alves, 1973.

[2]PBDCT--Plano Básico de Desenvolvimento Científico e Tecnólogico. Basic Plan for Scientific and Technological Development.

APPENDICES

APPENDIX A

QUESTIONNAIRE FOR TOP ADMINISTRATIVE GROUP OF THE FOCAL ORGANIZATION

QUESTIONNAIRE FOR TOP ADMINISTRATIVE

GROUP OF THE FOCAL ORGANIZATION

Section A--Identification of Task Environment Components

A1--What formal position do you occupy in this organization?

A2--Briefly describe the functions and activities involved in your job.

A3--List the people you commonly deal with in the performance of your job.

A4--Select from among them those who are external to your organization.

A5--Indicate their respective organizational affiliations and the positions they occupy.

A6--Are there any other external organizations which interact with your organization through other internal personnel? List them.

A7--To whom should I talk in the external organization to get their views on their relationship with your organization?

Section B--Power and Dependence Relationships with Task Environment Components

B1--Some of these external relationships you just listed are probably more important to your organization and/or your job performance. How important do you consider each of them? (Not at all important; not too important; somewhat important; quite important; extremely important.)

B2--Why did you make the selection in B1 for each relationship?

B3--How often do you or other people in your organization interact with each of them? (Almost constantly; several times a day; once or twice a day; several times a week; about once a week; a few times a month; less often than a few times a month.)

B4--Briefly describe the history of each relationship with external people and organizations.

B5--Evaluate each relationship with an external organization in terms of the difficulty of interaction with your organization. (Not at all difficult; not too difficult; somewhat difficult; quite difficult; extremely difficult.)

B6--What were the reasons for each of your answers in question B5?

B7--List the major kinds of problems with which you and the external set of people and/or organizations deal.

B8--How do you usually solve these problems?

B9--Which external relationships do you think you should concentrate upon? Why?

Evaluate each external organization in terms of the following statements:

B10--My organization needs resources and services from this organization for its normal functioning.

(Not at all; not too often; sometimes; quite often; all the time.)

B11--If yes to B10 in any degree, what kinds of resources and services?

B12--Other organizations need the same resources and services, which means support to my organization can be interrupted.

(Not at all; not too often; sometimes; quite often; all the time.)

B13--Other organizations can provide the same resources and services to my organization.

(Not at all; not too often; sometimes; quite often; all the time.)

B14--The level of quality of the resources and services provided by other organizations is not sufficient for my organization.
(Not at all; not too often; sometimes; quite often; all the time.)

B15--Although other organizations can provide satisfactory support in terms of resources and services, it is impossible for my organization to utilize them.
(Not at all; not too often; sometimes; quite often; all the time.)

B16--Give me the reasons for your answers to questions B12, B13, B14, and B15.

B17--This [particular external] organization needs resources and services from my organization for its normal functioning.
(Not at all; not too often; sometimes; quite often; all the time.)

B18--If yes to B17, in any degree, what kinds of resources and services?

B19--Other organizations need the same resources and services from my organization, which means the support we give this [particular external] organization can be interrupted.
(Not at all; not too often; sometimes; quite often; all the time.)

B20--Other organizations can provide the same resources and services to this [particular external] organization.

(Not at all; not too often; sometimes; quite often; all the time.)

B21--The level of quality of the resources and services provided by other organizations is not sufficient for this [particular external] organization.

(Not at all; not too often; quite often; all the time.)

B22--Although other organizations can provide satisfactory support in terms of resources and services for this [particular external] organization similar to what my organization provides it is impossible for this [particular external] organization to utilize them.

(Not at all; not too often; sometimes; quite often; all the time.)

B23--Elaborate on your answers to questions B19, B20, B21, and B22.

B24--My organization is dependent on this [particular external] organization.

(To a very great extent; to a considerable extent; to some extent; to a small extent; to a very little extent; not at all.)

B25--Provide some examples to illustrate your answer to question B24.

B26--Are there instances in which you interact with more than one external organization at the same time?

B27--If yes to B26, name such organizations and the reasons why this type of interaction occurs?

Section C--Task Environment Changes

C1--Concerning each external organization you named in Section B, how stable a relationship do you think you have with it?
(Not stable at all; not too stable; somewhat stable; quite stable; extremely stable.)

C2--What reasons would you give to support your answers to question C1?

C3--How difficult would you say it is to maintain the stability of each relationship?
(Not difficult at all; not too difficult; somewhat difficult; quite difficult; extremely difficult.)

C4--Why?

C5--For each external relationship, can it be interrupted in the future?

Yes _____ No _____

C6--Under which circumstances would it be interrupted or maintained in the future?

C7--To what extent would you say the present set of external relationships is ideal for the efficient performance of your organization? (To a very large extent; to a considerable extent; to some extent; to a small extent; to a very little extent; not at all.)

C8--Why?

C9--How likely, in your opinion, are future changes in the present set of external relationships of your organization?
(Not likely at all; not too likely; somewhat likely; quite likely; extremely likely.)

C10--Why?

C11--Do you consider some changes in these future relationships desirable?
Yes _____ No _____

C12--If yes to C11, which changes?

C13--Would you say that your organization has specific plans to implement some changes?
Yes _____ No _____

C14--If yes to C13, which changes, and why?

C15--What would you expect the reactions of the external organizations to be toward these changes you intend to make?

C16--Have there been past attempts on the part of your organization to change the external set of relationships?

Yes _____ No _____

C17--If yes to C16, describe the facts surrounding such attempts and their consequences.

C18--Do you think the future will bring easier relationships with external organizations?

C19--Why?

Section D--Domain Identification and Goal Information

D1--What are the outputs (goods and services) flowing from your organization? What are the inputs?

D2--Elaborate on the specific uses of this output and identify the users. Do the same with inputs and their suppliers.

D3--Indicate the geographic location of users of output and suppliers of inputs.

D4--Have there been any changes through time in the composition of the user group? Of the supplier group?

D5--Have there been any changes through time in the production of outputs by this organization? In the consumption of inputs?

D6--Provide examples of the types of change mentioned above.

D7--How satisfied are you with the present input/output transactions that your organization carries on?
(Not satisfied at all; not too satisfied; somewhat satisfied; quite satisfied; extremely satisfied.)

D8--Why?

D9--What are the present goals of your organization?

D10--To what extent do you feel there is a need to change goals in your organization?
(To a very great extent; to a considerable extent; to some extent; to a small extent; to a very little extent; not at all.)

D11--Why?

D12--To what extent would you say that past goals differ from present ones?
(To a very great extent; to a considerable extent; to some extent; to a small extent; to a very little extent; not at all.)

D13--What are the reasons for your answer to question D12?

D14--To what extent are changes in goals in your organization related to the influence of organizations belonging to the external set?

(To a very large extent; to a considerable extent; to some extent; to a small extent; to a very little extent; not at all.)

D15--Give some examples to illustrate your answer to question D14.

D16--This [particular external] organization influences the determination of goals and policies within my organization in relation to:

a. Personnel policy

b. Financial policy

c. Production policy

d. Purchasing policy

e. Marketing policy

f. Technological policy

g. Scientific policy

h. Other (specify)

(For each item from a. to f. and for each organization, please indicate whether to a very large extent; to a considerable extent; to a small extent; to a very little extent; not at all. Give examples.)

D17--Does this organization formally participate in the decision-making process in your organization?

Yes _____ No _____

D18--If yes to D17, what is the formal mechanism of participation? Describe it.

D19--If no to D17, are there informal means of exerting influence over your organization? Provide some examples.

D20--Is there agreement among components of the external environment as to which goals, policies and objectives your organization will have?

(To a very great extent; to a considerable extent; to some extent; to a small extent; to a very little extent; not at all.)

D21--What are the reasons for the agreement or disagreement?

Section E--The Assessment of the Organization

E1--Is your organization successful?

(Not successful at all; not too successful; somewhat successful; quite successful; extremely successful.)

E2--What are the reasons behind your answer to question E1?

E3--How important are the following performance indicators for your organization?

a. Profits, return on investment, or financial status.

b. Improvements in the amount of physical production.

c. Improvements in the quality of output.

d. Improvements in the rate of innovation and creation of new products and services.

e. Compliance with budgetary prescriptions.

f. Achievement of some operational goals.

g. Level of contribution toward the achievement of national, state, or local goals.

h. Compliance with rules and norms.

i. Overall performance satisfactory compared to similar organizations.

j. Quality of technical personnel.

k. Quality of management.

l. Development of activities which prepare the organization for future action.

m. Prestige of the organization with the external public.

n. Overall improvement through time.

o. Other factors (specify).

(For each item on the list, define your judgment as not at all important, not too important, somewhat important, quite important, extremely important.)

E4--Give reasons for your answers to E3.

E5--Who are the important judges of your organization? What do they look for in assessing your organization?

E6--Give reasons for your answers to question E5.

E7--To what extent have the most recent scores of your organization on those important indicators listed in E3 pleased the organizations in the external set of relationships?
(To a very great extent; to a considerable extent; to some extent; to a small extent; to a very little extent; not at all.)

E8--What are the reasons for your answer to question E7?

E9--On which indicators is it more difficult for your organization to score well? Why?

E10--Using the more important indicators noted in Questions E3 and E5, has your organization shown improvements on all these dimensions?

E11--How do you handle the situation when you have not shown improvement according to these indicators? Give examples.

E12--If your organization does not score well on all indicators, and given a choice, on which ones would you concentrate your effort? Why?

E13--Evaluate each member of the external set in terms of the following statement: This [particular external] organization has the technical ability to understand the operations of my organization.

(Not true at all; not very true; somewhat true; quite true; extremely true.)

E14--Are there any comments or examples which illustrate your answer to question E13?

E15--To what extent are the operations of your organization predictable enough to make planning to attain objective and measurable goals easy?

(To a very large extent; to a considerable extent; to some extent; to a small extent; to a very little extent; not at all.)

E16--Elaborate on your answer to question E15.

E17--To what extent is the decision process in your organization simple, that is, it makes clear which course of action to take and which results to look for?

(To a very great extent; to a considerable extent; to some extent; to a small extent; to a very little extent; not at all.)

E18--What are the reasons for your answer to question E17?

APPENDIX B

QUESTIONNAIRE FOR TASK ENVIRONMENT ORGANIZATION MEMBERS ABOUT THEIR INTERACTION WITH THE FOCAL ORGANIZATION (ORGANIZATION X)

QUESTIONNAIRE FOR TASK ENVIRONMENT ORGANIZATION MEMBERS ABOUT THEIR INTERACTION WITH THE FOCAL ORGANIZATION (ORGANIZATION X)

Section A--General Description of the Relationship with Organization X

A1--What formal position do you occupy in your organization?

A2--Does your job require interaction with organization X?

A3--To whom do you usually talk in organization X? For what reasons?

A4--Do other people in your organization also interact with people in organization X? Who? For what reasons?

Section B--Power and Dependence Relationships with Organization X

B1--Are there instances in which you interact with organization X together with other people also external to it?

B2--If yes, what are their names, organizational affiliations, and the reasons why this type of interaction occurs?

B3--Briefly describe the history of the relationship of your organization with organization X.

B4--How often do you or other people in your organization interact with organization X? (Almost constantly; several times a day; once or twice a day; several times a week; about once a week; a few times a month; less often than a few times a month.)

B5--Do you think this frequency is enough? Why?

B6--What are the major problems with which you deal in your relations with organization X?

B7--How are these problems usually solved?

B8--Is your relationship with organization X a difficult one?
(Not difficult at all; not too difficult; somewhat difficult; quite difficult; extremely difficult.)

B9--What are the reasons for your answer to question B8?

Evaluate each of the following statements:

B10--Organization X needs resources and services from my organization for its normal functioning.

(Not at all; not too often; sometimes; quite often; all the time.)

B11--If yes to B10 in any degree, what kinds of resources and services?

B12--Other organizations need the same resources and services, which means that the support my organization gives to organization X can be interrupted.

(Not at all; not too often; sometimes; quite often; all the time.)

B13--Other organizations can provide the same resources and services to organization X.

(Not at all; not too often; sometimes; quite often; all the time.)

B14--The level of quality of the resources and services provided by other organizations is not sufficient for organization X.

(Not at all; not too often; sometimes; quite often; all the time.)

B15--Although other organizations can provide satisfactory support in terms of resources and services, it is impossible for organization X to utilize them.

(Not at all; not too often; sometimes; quite often; all the time.)

B16--What are the reasons for your answers to questions B12, B13, B14, and B15?

B17--My organization needs resources and services from organization X for its normal functioning.
(Not at all; not too often; sometimes; quite often; all the time.)

B18--If yes to B19, in any degree, what kinds of resources and services?

B19--Other organizations need the same resources and services from organization X, which means that the support to my organization can be interrupted.
(Not at all; not too often; sometimes; quite often; all the time.)

B20--Other organizations can provide the same resources and services to my organization.
(Not at all; not too often; sometimes; quite often; all the time.)

B21--The level of quality of the resources and services provided by organizations other than X is not sufficient for my organization.
(Not at all; not too often; sometimes; quite often; all the time.)

B22--Although other organizations can provide satisfactory support in terms of resources and services, it is impossible for my organization to utilize them.
(Not at all; not too often; sometimes; quite often; all the time.)

B23--Elaborate on your answers to questions B19, B20, B21, and B22.

B24--Organization X is dependent on my organization. (To a very great extent; to a considerable extent; to some extent; to a small extent; to a very little extent; not at all.)

B25--Give examples to illustrate your answer to question B24.

B26--Do you know of other organization(s) which also interact with organization X?

B27--What are their names?

B28--What do you know about the relationship between organization X and each of these other organizations? Provide some illustrative examples.

B29--Which organizations do you consider as more crucial for organization X?

B30--Why? Give examples.

Section C--Task Environment Changes

C1--How stable is your organization's relationship with organization X?
(Not stable at all; not too stable; somewhat stable; quite stable; extremely stable.)

C2--What are the reasons for your answer to question C1?

C3--Under what circumstances would you say this relationship could be interrupted in the future?

C4--How difficult is it to maintain the stability of such a relationship?

(Not difficult at all; not too difficult; somewhat difficult; quite difficult; extremely difficult.)

C5--Why?

C6--What actions are usually required from you to maintain this relationship?

C7--How stable is the relationship between organization X and each of the other external relationships mentioned in Section B?

(For each relationship, please indicate whether not stable at all; not too stable; somewhat stable; quite stable; extremely stable.)

C8--What are the reasons for each answer to question C7?

C9--Considering the relationships you mentioned in question C7, to what extent are they sufficient for the ideally efficient performance of organization X?

(To a very large extent; to a considerable extent; to some extent; to a small extent; to a very little extent; not at all.)

C10--Why?

C11--How likely are future changes in the members of the external set of relationship of organization X?

(Not likely at all; not too likely; somewhat likely; quite likely; extremely likely.)

C12--Why?

C13--Do you consider future changes in these relationships desirable?

Yes _____ No _____

C14--If yes to C13, which ones?

C15--Do you think organization X or other external members are planning to implement changes?

Yes _____ No _____

C16--If yes to question C15, which ones and what would be your attitude toward them?

C17--Do you know of past attempts by organization X to change external relationships?

Yes _____ No _____

C18--If yes to question C17, give examples.

Section D--Domain and Goal Formulation

D1--Given the range of outputs and inputs of organization X, which do you consider important from the standpoint of your organization? Why?

D2--Are you satisfied with the input/output transaction that organization X carries on?
(Not satisfied at all; not too satisfied; somewhat satisfied; quite satisfied; extremely satisfied.)

D3--What are the reasons for your answer to question D2?

D4--Looking at the history of your relationship with organization X, do you recall any general changes in input/output transactions?

D5--If yes to D4, elaborate on those instances and, where possible, relate these to the interests and attitudes of your organization.

D6--To what extent are you familiar with the goals and policies of organization X?
(To a very great extent; to a considerable extent; to some extent; to a small extent; to a very little extent; not at all.)

D7--How important is it for your organization to keep pace with developments in the policies and goals of organization X?
(Not important at all; not too important; somewhat important; quite important; extremely important.)

D8--Give reasons for your answer to question D7.

D9--To what extent does your organization influence the determination of goals and policies in organization X?

(To a very great extent; to a considerable extent; to some extent; to a small extent; to a very little extent; not at all.)

Answers are to be given in relation to each of the following items:

a. Personnel policy

b. Financial policy

c. Production policy

d. Purchasing policy

e. Marketing policy

f. Technological policy

g. Scientific policy

h. Other (specify)

D10--My organization formally participates in the top decision-making process of organization X.

Yes _____ No _____

D11--If yes to D10, what is the formal mechanism of participation? Describe it.

D12--If no to D10, is there an informal means of exerting influence over organization X? Give some examples.

D13--To what extent do you presently desire changes in the goals and policies of organization X?

(To a very great extent; to a considerable extent; to some extent; to a small extent; to a very little extent; not at all.)

D14--Elaborate on your answer to question D13 and give examples.

D15--To what extent does your organization and the other members of the external set of relationships agree as to the future goals and policies of organization X?

(To a very great extent; to a considerable extent; to some extent; to a small extent; to a very little extent; not at all.)

D16--What are the reasons for such agreement or disagreement?

Section E--The Assessment of the Organization

E1--Is organization X successful?

(Not successful at all; not too successful; somewhat successful; quite successful; extremely successful.)

E2--What are the reasons for your answer to question E1?

E3--How important would you say the following indicators of performance are in your evaluation of organization X?

a. Profit, return on investment, or financial status.

b. Improvements in the amount of physical production.

c. Improvements in the quality of output.

d. Improvements in the rate of innovation and creation of new products and services.

e. Compliance with budgetary prescriptions.

f. Achievement of some operational goals.

g. The level of contribution towards the achievement of national, state, or local goals.

h. Compliance with rules and norms.

i. Overall performance satisfactory compared to similar organizations.

j. Quality of technical personnel.

k. Quality of management.

l. Development of activities which prepare the organization for future action.

m. Prestige of the organization with the external public.

n. Overall improvement through time.

o. Other factors (specify).

(Take each item of the list and define your judgment in terms of not at all important; not too important; somewhat important; quite important; extremely important.)

E4--Classify the items in question E3 according to their order of importance in your evaluation of organization X's performance.

E5--Considering your choice of the more important indicators (E3), along which dimensions do you think organization X has shown improvements?

E6--To what extent have the most recent scores of organization X on those important indicators (E3) pleased you?

(To a very great extent; to a considerable extent; to some extent; to a small extent; to a very little extent; not at all.)

E7--What are the reasons for your answer to question E6?

E8--To what extent is your organization generally able to understand the operations in organization X, so that a fair evaluation of performance can be made?

(To a very great extent; to a considerable extent; to some extent; to a small extent; to a very little extent; not at all.)

E9--Elaborate on your answer.

E10--To what extent are the operations in organization X so predictable that it is easy for it to plan the attainment of objective and measurable goals?

(To a very great extent; to a considerable extent; to some extent; to a small extent; to a very little extent; not at all.)

E11--Elaborate on your answer.

E12--To what extent is the decision process simple in organization X, that is, it makes clear which course of action to take and which results to look for?

(To a very great extent; to a considerable extent; to some extent; to a small extent; to a very little extent; not at all.)

E13--Give the reasons for your answer to question E12.

APPENDIX C

QUESTIONNAIRE COMPLETED BY THE COORDINATOR OF AGRICULTURAL RESEARCH, SECRETARY OF AGRICULTURE, STATE OF SÃO PAULO

QUESTIONNAIRE COMPLETED BY THE COORDINATOR OF AGRICULTURAL RESEARCH, SECRETARY OF AGRICULTURE, STATE OF SÃO PAULO

Section A--General Description of the Relationship with ITAL

A1--What position do you occupy in the Secretary of Agriculture?

Answer--I am the Coordinator of Agricultural Research. I have a degree in agricultural engineering.

A2--Does your job require interaction with ITAL?

Answer--Yes. In fact, my office is in charge of direct supervision of that organization, according to the organizational structure of the Secretary of Agriculture.

A3--Who do you commonly talk with in ITAL, and for what reasons?

Answer--I talk more frequently with the executive director, but I also talk with other directors, staff members, and technicians. Basically, the reasons for the interactions are: (1) functional, in terms of supervision; (2) technical, when

there are projects in which I have a personal interest; (3) budgetary, when there is a decision on resource allocation; and (4) personnel and purchasing policies. I would like to add that I delegate a great deal of authority in relation to ITAL, reserving some specific issues for decision.

A4--Are there others in your organization who also interact with ITAL personnel? Who? For what reasons?

Answer--My planning staff collects data at ITAL and also discusses their planning, programming, and evaluation system. There are many technicians involved in this interaction. On the bureaucratic side, personnel in my Division of Administration and Finance also interact with their counterparts at ITAL.

Section B--Power and Dependence Relationships with ITAL

B1--Are there instances in which you interact with ITAL together with other people also external to it?

Answer--Yes.

B2--What are their names, organizational affiliations, and the reasons for the interactions?

Answer--Dr. José Pastore, because of Project Science and Technology of the State Secretary of Planning.

CICA Industries, representatives when their projects are being discussed at ITAL.

Dr. Maurício Rangel Reis, from the Ministry of Planning, federal government, for discussion of PLANITA.

Dr. José Pelúcio, President of FINEPE, for discussion of PLANITA and other projects in which his organization is involved.

The Minister of Planning and the Minister of Agriculture, federal government, because of PLANITA and other issues related to ITAL.

Dr. Carneiro and Dr. Cajueiro, from EMBRAPA, a federal public corporation, because of PLANITA.

B3--Briefly describe the history of the relationship of your office with ITAL.

Answer--The office of Coordination of Agricultural Research was created after a recent administrative reform at the State Secretary of Agriculture in 1968. This office was an organizational unit imposed upon the institutes of research. Before 1968, the Secretary of Agriculture was in charge of direct supervision of all state institutes of research in his

area. I have been in this office (the Coordination of Agricultural Research) since 1971, which coincides with a change in executive directors at ITAL.

B4--How often do you or other people in your office interact with ITAL?

Answer--Almost constantly. Normally, we have daily contacts.

B5--Is this frequency enough? Why?

Answer--Yes. It is necessary if the office wants to do a good job.

B6--What are the major problems with which you deal in your relations with ITAL?

Answer--Managerial and technical problems. ITAL is one of the more active units under my supervision; it requires constant attention from my office, mostly in relation to research contracts and agreements. It is also the unit with which I have had more technical interaction because of the high turnover rate of their projects and the growing demand for their research.

B7--How are these managerial and technical problems usually solved?

Answer--More than 95 percent of my decisions in relation to ITAL are reached in a peaceful manner because we are in agreement. In fact, I am very proud of ITAL.

B8--Is your relationship with ITAL important from the viewpoint of that organization?

Answer--Extremely important.

B9--Why?

Answer--If I want to I can make ITAL come to a stop. I control their budget and make allowances for technicians' salary supplements.

B10--Is your relationship with ITAL a difficult one?

Answer--Not difficult at all. The relationship with ITAL is the best I have with institutes under my supervision.

B11--What are the reasons for your answer to the previous question? Give examples.

Answer--The change in the top executive office at ITAL was a decisive factor in the improvement of relationships. Actually, the work ethic has changed a great deal since then . . . . The Secretary of Agriculture, myself, and ITAL's executive director took office at the same time. At the Secretary of Agriculture the philosophy was a technical outlook which considered the urgent need for integrated action with the private sector of agriculture. This outlook has influenced the decision to open ITAL's facilities for research contracts with the food industry. Therefore, a previous dysfunctional situation was positively solved.

B12--Does ITAL need resources and services from your office for its normal functioning?

Answer--All the time.

B13--What kinds?

Answer--Agreements and contracts with public and private organizations have to be approved by my office. The coordinator also approves ITAL's budgets, allocating state funds for that organization.

B14--Do other organizations need the same resources and services from the office of Coordination, which means that the support it gives ITAL can be interrupted?

Answer--Not at all. About 70 percent of the total resources of this office are allocated to "compromised expenses," basically payroll, which I cannot question. My discretion is exerted over the remaining 30 percent, which is very little to distribute. Usually, this 30 percent is distributed aiming at minimization of risks for the work being developed. There are instances when I have to reduce some allocations already made because of reductions that the office suffers.

B15--Can other organizations provide the same resources and services to ITAL?

Answer--All the time. The federal government and the food industry can.

B16--Is the level of quality of the resources and services provided by other organizations not sufficient for ITAL?

Answer--Not at all.

B17--Although other organizations can provide satisfactory support in terms of resources and services, is it impossible for ITAL to utilize them?

Answer--Not at all. This was true before I took office. At that time ITAL was forbidden to undertake contracts with the food industry. ITAL's members created a foundation to engage in such contracts. This was certainly an attempt to become independent. However, they had to cover the 70 percent of "compromised expenses." . . . Since I have taken office, ITAL's budget has been doubled.

B19--Does your office need resources and services from ITAL for its normal functioning?

Answer--All the time. ITAL's job is part of the objectives of the present state administration. The important thing is to have ITAL working hard and well. Another point is that the volume of resources with which the office is provided depends on ITAL's good performance. With good performance I can persuade my superiors of the need for greater amounts of resources. I can give an example which happened this year: I

received additional funds in order to build a meat plant at ITAL. If I had asked for funds for some other activity, I am sure I would not have succeeded.

B21--Do other organizations need the same resources and services from ITAL, which means that the support to the office of Coordination can be interrupted?

Answer--Not at all. The federal government and the food industry need services from ITAL, but we have not had problems of competition for ITAL's outputs. The only problem I can foresee would be if an industry became monopolistic in the use of ITAL. This has not happened during the time I have been in office.

B22--Can other organizations provide the same resources and services to the office of Coordination?

Answer--Not at all. In Brazil there is no other alternative with a level of quality as good and reliable as ITAL's.

B26--Is ITAL dependent on the office of Coordination?

Answer--What occurs is mutual dependence with common objectives. I have power to halt ITAL, and ITAL has power to put me out of my office.

B28--Do you know of other organizations which also interact with ITAL?

Answer--Besides the other interactions I have already mentioned, I would include international organizations, such as FAO and USAID, and organizations within the food industry, of which there are many.

B30--What do you know about the relationship between ITAL and each of these organizations? Provide some examples.

Answer--ITAL has had very good relationships with all these organizations. The reason has been the good quality of ITAL's work and a sort of common interest of all parties involved. It has been very easy for ITAL to receive resources from these organizations, and this fact alone demonstrates the quality of their interaction with ITAL. For example, I can say that PLANITA and the federal government agencies have helped ITAL solve the problem of technicians' wages. The office of Coordination has also helped a lot. ITAL receives privileges which denote a degree of satisfaction on the part of external people with the work that has been developed at ITAL. I can say that the situation has been the same with all of ITAL's other interactions.

B31--Which organizations do you consider as more crucial for ITAL?

Answer--I would say that all of these organizations are crucial interactions for ITAL.

Section C--Task Environment Changes

C1--How stable has your relationship with ITAL been?

Answer--Extremely stable.

C2--What are the reasons for your answer?

Answer--First, I think the stability of the relationship is a consequence of the high technical quality of ITAL's output. Second, there is a basic reason related to the fact that ITAL belongs to the state administrative machinery, to which it is subordinated.

C3--Under which circumstances could this relationship be interrupted in the future?

Answer--There is always a risk of interruption inherent in public administration. However, I have very good personal relationships with people at ITAL, and mostly with the executive director; we have common objectives, and I am satisfied with the performance of the organization. A very remote possibility of interruption would be a change in occupants of offices at ITAL and at the office of Coordination.

C4--How difficult is it to maintain the stability of the relationship with ITAL?

Answer--For me, it is not difficult at all. I think the reasons were already expressed in terms of unity of objectives of the people involved in the interaction. Besides, there has been mutual loyalty between myself and the executive director and a great disposition to take on responsibility and solving problems. As you can see, in our work we have had behavioral patterns which are quite different from the traditional state bureaucratic officials. For me, it is very important that the institute director take on responsibility. ITAL's executive director has been doing that. He brings me a lot of information for analysis when there is a decision to be made. He also brings alternative solutions. We study problems together and make decisions in a climate of mutual respect. I have been very pleased with the fact that the executive director has shown extreme dedication and ability in solving problems.

C7--How stable is the relationship between ITAL and its other external relationships?

Answer--The relationships have been quite stable. This is true for all of the interactions--federal and state governments, international institutions, and the food industry.

C8--Why have these relationships been quite stable?

Answer--I think I already offered the reasons for this when I talked about the office of Coordination and its relationships with ITAL. The reasons are the same, as I see it.

C9--To what extent are these relationships sufficient for an ideally efficient performance of ITAL?

Answer--They are sufficient to a considerable extent.

C10--Why?

Answer--Today things are at a good equilibrium at ITAL. Eighty percent of what ITAL does interests directly the federal and state governments, and 20 percent represents contracted research with the private economy.

C11--How likely are future changes in the external set of relationships?

Answer--Not likely at all.

C12--Do you consider some future changes in these relationships desirable?

Answer--No, I do not think so, at least at the present moment.

C15--Would you say that ITAL, or other external members, is planning to implement some of these changes?

Answer--No. I am sure they are not doing that.

C17--Do you know of past attempts to change the relationships?

Answer--Yes.

C18--Could you offer examples?

Answer--In the past, ITAL's management tried to operate a private foundation in order to handle contracts with industry. Of course, this attempt was frustrated because there was no agreement between ITAL and the office of coordination about research contracts with private enterprises.

Section D--Domain and Goal Formulation

D1--Given the range of ITAL outputs and inputs, which do you consider important from ITAL's point of view? Why?

Answer--Whatever ITAL does has an importance if viewed as a whole, and not as a specific part. On the output side, all research activities are linked with the quality of consultancy jobs, with the quality of performance in contracts with industry, with quality of its training courses, and so forth. And the quality of outputs is directly related to the quality of inputs, such as human resources, laboratory facilities, availability of financial resources, and so forth. The way I see it all of ITAL's present inputs and outputs are important to make a homogeneous whole.

D2--Are you satisfied with the input/output transactions that ITAL carries on?

Answer--Quite satisfied. But I still think there are improvements to be made.

D3--What are the reasons for your satisfaction?

Answer--Basically, I could say that the overall results are coherent and geared to obtain high performance standards.

D4--Do you recall any general changes in input/output transactions that have occurred in ITAL's history?

Answer--Yes. I was very much involved in the decision to build the dairy, meat, and fish pilot plants. I offered the complete support of this office for the development of those three projects (financial support included). Another case was a project for the aseptic processing of banana products. I can say that evolution at ITAL occurs not only in relation to new products. ITAL is now planning and programming its activities. There is a five-year plan which I consider to be an important improvement.

D6--To what extent would you say you are familiar with ITAL's goals and policies?

Answer--To a considerable extent. The examples provided above corroborate my answer.

D7--How important is it for the office of coordination to keep pace with developments in ITAL's goals and policies?

Answer--Extremely important, for the reasons I have already indicated.

D9--To what extent does your organization influence the determination of goals and policies in ITAL?

Answer--To a very great extent, in relation to the areas of personnel, finance, production, purchasing, marketing, technology, and scientific policies. However, there is greater influence in the areas of technological and scientific policy, personnel, and purchasing policies.

D10--Does your organization formally participate in ITAL's top decision-making process?

Answer--Yes. Basically, this is defined in the organization charts of the Secretary of Agriculture.

D13--To what extent do you presently desire some changes in ITAL's goals and policies?

Answer--To a very little extent. My efforts have been geared towards the improvement of ITAL's efficiency and quality of the work in general. There must also be a greater degree of integration among the institutes under my coordination. Therefore, I do not desire too many changes, but I do not reject the possibility of a few necessary changes.

D15--To what extent does your organization and the other members of ITAL's external set of relationships agree as to its future goals and policies?

Answer--To a considerable extent. And this represents a governmental policy in perfect agreement with the enterprises working in the food producing activity.

Section E--The Assessment of the Organization

E1--Is ITAL a successful organization?

Answer--If I consider the technical aspects, I would say that ITAL is an extremely successful organization. However, its administrative services are still poor and reflect the overall pattern of public administration in Brazil. The state administration has improved its technical outlook and, consequently, has developed new conceptual frameworks (the concept of systems, for example). However, we are still faced with problems of personnel (level of education) which affect directly the quality of execution of policies and programs. Within my office the best institute technically speaking is the worst in bureaucratic and routine administration, and vice-versa.

E3--How important would you say the following indicators of performance are for your evaluation of ITAL?

a. Profit, return on investment, or financial status?

Answer--Not too important.

b. Improvements in the amount of physical production.

Answer--Not too important.

c. Improvements in the quality of output.

Answer--Not too important.

d. Improvements in the rate of innovation and creation of new products and services.

Answer--Somewhat important.

e. Compliance with budgetary prescriptions.

Answer--Not too important.

f. Achievement of some operational goals.

Answer--Not too important.

g. The level of contribution toward the achievement of national, state, or local goals.

Answer--Extremely important.

h. Compliance with rules and norms.

Answer--Not too important.

i. Overall performance satisfactory compared to similar organizations.

Answer--Quite important.

j. Quality of technical personnel.

Answer--Extremely important.

k. Quality of management.

Answer--Not too important.

l. Development of activities which prepare the organization for future action.

Answer--Not too important.

m. Prestige of the organization with the external public.

Answer--Somewhat important.

n. Overall improvement through time.

Answer--Quite important.

E4--Would you classify the items above according to your preference in evaluating ITAL's performance?

Answer--1. Quality of technical personnel (j);

2. Level of contribution toward the achievement of national, state, or local goals (g);

3. Overall improvement through time (m);

4. Overall performance satisfactory compared to similar organizations (i);

5. Prestige of the organization with the external public (m);

6. Improvements in the rate of innovation and creation of new products and services (d).

E5--Considering the above list of the six more important indicators, do you think ITAL has shown improvement in all or some of them?

Answer--ITAL has shown improvement in all of them.

E6--To what extent have ITAL's most recent scores along these dimensions pleased you?

Answer--To a considerable extent. I think I have already provided the reasons for this answer.

E8--To what extent is your organization generally able to understand the operations in ITAL, so that a fair evaluation of performance can be made?

Answer--To a considerable extent. I have a planning staff in which there are three competent technicians who have been following ITAL's performance very closely.

E10--To what extent are ITAL's operations significantly predictable to make the planning and attainment of objective and measurable goals easy?

Answer--To some extent. The only difficulty is in planning details.

E12--To what extent is the decision process simple in ITAL, that is, it is always clear which course of action to take and which results to look for?

Answer--To a considerable extent. ITAL's top management plans and programs the events which will occur in the future. Their plans match the

targets defined by the national planners. Therefore, there are no doubts and indecisions, and it is always clear what is to be done.

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