SOME DETERMINANTS OF COMMUNICATION NETWORK STRUCTURE AND PRODUCTIVITY: A STUDY OF CLINIC STAFF INTERACTION IN TWO PHILIPPINE FAMILY PLANNING ORGANIZATIONS

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ABSTRACT

SOME DETERMINANTS OF COMMUNICATION
NETWORK STRUCTURE AND PRODUCTIVITY:
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By

Samuel Betty

This study approaches the problem of the place of network structure variables in developing a theory of organizational communication. It is the major assumption of the study that many of the traditional variables in the study of organizations are consequents of communication behavior. Therefore network structure is a determinant of productivity, and certain communication variables are determinants of network structure. Network structure variables are viewed as mediators between communication relationship variables and productivity.

The subjects for the study were the clinic personnel of two family planning organizations in the Republic of the Philippines. The final sample contains 41 clinics and 138 persons. The clinic personnel consist, usually, of a doctor, a nurse, and two licensed midwives. One of the agencies in the study is a private agency, and the other is governmental. The sample of clinics was not drawn randomly, but clinics at varying distances from Manila were systematically chosen to make up the sample.

The data for the study were taken from three sources: (1) from clinic records, (2) from a questionnaire designed to measure the communication relationship variables and sociometric responses on communication contact, and (3) a questionnaire designed to measure the variables upon which clinic productivity were controlled.

All of the data in the study were transformed to interval scale data. Methods used were: (1) approximations to paired comparisons (for rank data), (2) weighting by factor loadings (for Likert scale data), and (3) the method of successive categories (for multiple choice data). Statistics used were zero order or multiple correlation.

It was predicted that the higher the degree of subordinate-perceived control in the supervisor-subordinate relationship, the higher the degree of frequency of interaction in the supervisor-subordinate relationship. Agreement on information priority and information dependence were hypothesized as positively related to frequency of interaction among work group members. Information quality and hierarchy credibility were hypothesized as being negatively related to the frequency of interaction in a work group. These hypotheses are stated as hypotheses both about individuals and about groups and are tested in both forms. Additionally, as a heuristic device, a hypothesized path model is suggested as representing the direct and mediated effects in the study.

But network structure variables were also hypothesized as determinants of productivity. Group connectedness and group embeddedness were hypothesized as positively related to clinic productivity. Group dominance was hypothesized as negatively related to clinic

productivity. Clinic productivity was defined as the average number of new family planning acceptors registered by a clinic over a seven month period.

The hypotheses were tested by the t statistic for correlations based on small samples. Zero order correlations were used in testing the hypotheses. Multiple correlation was used to provide path estimates for the path model.

Two of the hypotheses were accepted. Information quality was found to be negatively related to frequency of interaction with individuals in the work group and information dependence was found to be positively related to frequency of interaction with individuals in a work group. The remaining hypotheses were disconfirmed.

Generally the study does not support the contention that network structure variables mediate between communication relationship variables and group productivity. This can be attributed to the incapacity of network variables to explain variance in productivity in the study. This incapacity suggests that either network variables may be of little value or that they must be reconceptualized if they are to take a place in the development of a theory of organizational communication.

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By

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To Paula

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CHAPTER I

INTRODUCTION: PURPOSE

Succinctly, *the purpose of this study is to define the relationship between communication relationship variables and network structure variables.* In addition, network structure, connectedness and dominance variables will be tested against the productivity of groups in the network. There are, then, three sets of variables.

Independent Variables Communication Relationship	Dependent Variables Network Variables	Dependent Variables Organizational Variables
1) subordinate perceived control of supervisor subordinate relationship	1) group connectedness (based on manipulation of frequency of interaction scores)	1) group productivity
2) agreement on information priority	2) group dominance	
3) information quality	3) group embeddedness	
4) hierarchy credibility		
5) information dependence		

From the data and relationships found, a path model describing the proposed effects of the independent variables will be tested. The path model should determine to what extent performance is directly affected by communication relationship variables or to what extent these variables are mediated by a network variable. In short, the

path model is intended as a heuristic device to test the extent to which communication networks are fit objects of study.

The study was conducted in the Philippines. The subjects were employees of two family planning organizations. All of the subjects in the study were stationed in clinics. For practical purposes the word "group" and the word "clinic" are used interchangeably in the study.

Previous research on communication networks has concentrated on roles or role perceptions of network members. The focus of this thesis is the composition of the relationships and the group networks they form.

The Problem

What should an adequate theory of organizational behavior look like? One answer to this question lies in recent systematic attempts to account for the organization as a phenomenon. Generally, these approaches have as their basis certain assumptions about man, e.g., "man the economic animal," "man the machine," "man the social being," "man the information processor." These approaches have tended to complement one another; where one fails the others fill in. But it cannot be denied that any one of them alone lacks comprehensiveness in explaining the full complexity of organizations. And where some approaches succeed in being catholic (Katz and Kahn, 1966; Stogdill, 1959), they lack unity.

Lately, social scientists have been less ambitious in their theorizing about organizations. For instance, Weick (1970) offers not so much a theory of organizations but a set of necessary conditions

or criteria that an adequate theory of organizations would have to meet. In the same vein, it is suggested that, aside from the content of such a theory, qualitatively it should be more comprehensive and yet more parsimonious. Failure along these dimensions is exemplified by March and Simon (1967). Because of their formidable effort, one is presented with a large number of hypotheses, yet one feels that the authors' concentration on the information processing function of man hurts their explanations of group behavior, among other issues.

But how can we demand greater parsimony and yet greater comprehensiveness in the same sentence? Is there no paradox here? One may avoid the dilemma by focusing on universals in the behavior of organizations and inviduals within them, and one of these universals is, of course, communication. It is the assumption of this thesis that many of the traditionally important organizational variables--motivation, performance, satisfaction, etc.--are determined by communication and communication relationships, and that we may therefore explain changes in these variables by examining aspects of communication relationships. Furthermore, the ubiquity of communicative acts may allow us to account for a wider range of phenomena.

This position is a tentatively comfortable one for two reasons. First, there is a broad acceptance of the essential importance of communication by those who write prescriptively and descriptively about organizations. Barnard (1938) and Deutsch (1952) are oft-quoted champions of the primacy of communication in determining organizational performance. Second, Chaffee (1971) has noted the failure, with but few exceptions, of individual difference research in explaining

communication behavior. Perhaps his case is somewhat overstated in mass media research, but in interpersonal communication his statement has validity.

It follows from this position that an important determinant of organizational effectiveness is the structural morphology of communication linkages which comprise the organization. It is this network which expresses the set of relationships which in turn limit or enable the organization in coordination of its functions.

Hypotheses

The variables listed in the section on Purpose are linked in the manner described by the following hypotheses.

Each of the variables will be stated in testable form later in this chapter. Accompanying these statements will be the appropriate conceptual definitions for each variable. Previous work which supports the hypotheses will be extracted from a number of different scholarly disciplines. But the hypotheses themselves are presented here to establish for the reader the purvey and scope of the study.

Hypothesis 1: The higher the degree of subordinate-perceived control in the supervisor-subordinate relationship, the higher the degree of frequency of interaction in the supervisor-subordinate relationship.

Hypothesis 1a: The higher the degree of subordinate-perceived control in the supervisor-subordinate relationship, the higher the degree to which the group is dominated.

Hypothesis 2: The higher the degree of agreement on information priority in a relationship, the higher the frequency of interaction.

Hypothesis 2a: The higher the degree of agreement on information priority within a group, the higher the group connectedness.

Hypothesis 3: The higher the quality of information transmitted in the formal message system, the lower the frequency of work related interaction with peers.

Hypothesis 3a: The higher the quality of information transmitted in the formal message system, the lower the degree to which the work group is characterized by connectedness.

Hypothesis 4: The higher the degree of perceived hierarchy credibility, the lower the rate of interaction in non-hierarchical dyads.

Hypothesis 4a: The higher the degree of group members' perceived hierarchy credibility, the lower the degree of group connectedness.

Hypothesis 5: The higher the degree of perceived information dependence, the higher the frequency of interaction.

Hypothesis 5a: The higher the degree of perceived information dependence, the higher the degree of group connectedness.

To these relationships are added secondary hypotheses which define the relationship between the group network variables and the effectiveness of the organization.

Hypothesis 6: The higher the degree of connectedness in the group, the more productive the group in task performance.

Hypothesis 7: The higher the degree to which the group is dominated, in terms of communication, the less productive the group.

Finally, we add a hypothesis dealing with the linkage of groups to the rest of the organization.

Hypothesis 8: The higher the embeddedness of the group in the organization, the higher the productivity of the group.

In the following pages each of these hypotheses is considered in its turn. Theoretical and logical support for each is given. But since the locale of the study placed unusual constraints upon the testing of the hypothesis, a description of both the physical, sociological, and scholarly environment in which the study was undertaken is a necessity.

Locale and Environment

The subjects for the study were two family planning agencies in the Republic of the Philippines. The first and largest of these was the National Comprehensive Maternal and Child Health Family Planning Project Office of the Department of Health, abbreviated to FPPO, or DOH. The second was the Institute of Maternal and Child Health, or IMCH, a private agency operating on contributions, government funds and grants from USAID.

Until recently, the FPPO was in charge of overseeing the entire family planning effort for the Philippines. However, two years ago, a special Presidential commission, the Population Commission (Popcom) was granted this responsibility and the FPPO returned to its primary goal, the offering of contraceptive services and counseling to the citizenry.

The FPPO is part of an integrated health care delivery system which functions through regional, provincial, and municipal offices. The municipal offices are termed Rural Health Units (RHU's), for they serve, in addition to the agrarian-based municipalities, the outlying barrios which make up a municipality. There are at present 1,506 RHU's, each with a clinic, usually near the main offices of the

municipality. At present, about 1,100 of the RHU's are engaged in family planning work. The remaining RHU's do not have personnel trained in family planning techniques.

The personnel complement of an RHU is normally five people. These are one Municipal Health Officer (a doctor), a Municipal Health Nurse, two licensed midwives, and a Sanitation Inspector. These people operate a number of major programs, ranging from inoculation to environmental and industrial safety to serving as the primary force in gathering vital statistics on the population. The family planning project is but one of these programs. In places where the program needs of a populace are particularly heavy, more RHU personnel are added. For instance, the RHU at Valenzuela, Bulacan, a northern suburb of Manila, has one additional doctor and eight additional midwives.

IMCH is one of the oldest family planning agencies in the Philippines. Technically, it began its work in family planning in 1967, long before there was an official governmental stance on the population problem in 1970. IMCH has been a leader in training medical personnel in family planning delivery for practicing clinicians. In addition, it sponsors approximately 325 family planning clinics in puericulture centers dispersed throughout the nation. Many of these puericulture centers have been in operation since the 1920's and 1930's and needed, in the mid 1960's, substantial updating and remodeling. The IMCH adroitly used USAID and governmental funds to accomplish this renovation and at the same time retain physicians half time (and other medical personnel full time) to staff the clinics. Many of these

clinics operate in the centers of large towns, usually near municipal offices. Occasionally there is conflict between IMCH clinics and RHU's.

The staff varies depending on the size of the clinic, but usually only three professionals make up the clinic personnel. These are a doctor, a nurse, and a midwife. The IMCH clinics are not responsible for as broad a range of programs as the RHU's; hence the smaller staff. As in the Department of Health, retaining staff is difficult. IMCH is even more underfunded than the RHU's. The result is higher turnover and a heavy training load.

In addition, IMCH is an "Asian" organization. It is very much dominated by one person, its director, a person of international renown. Her character and selflessness have had a pervasive effect on those staff who know her. In general, their motivation for IMCH to succeed matches hers.

Several conclusions should be drawn from these discussions of the organizations and personnel.

First, in a developing nation, and particularly in the Philippines, with its cultural diversity, organizational boundaries cannot function with the same degree of selectivity as they do in developed nations. Because of the difficulty in locating trained personnel, some clinics are staffed by physicians who have little knowledge of the first language and culture of their nurses or midwives. The result is that organization personnel are not as homogeneous a group as is often the case in, for instance, a North American factory. In such a situation, where there is wide divergence of attitudes and motivations, it is

quite possible that these internal individual difference variables will explain more variance than is usually the case in the U.S. One may conclude that the hypotheses suggested for the study are offered a difficult test by the constraints of the environment.

Furthermore, the values inherent in the Filipino culture may reduce the validity of responses of respondents to both open-ended and structured responses. The typical Filipino is both hospitable and loquacious, but he is also careful. The vagaries of his history and culture have instilled in him a large measure of the self-preservation instinct and, where honesty to strangers researching delicate questions lies in clnflict with the demands of self-preservation, responses may well be incomplete.

Moreover, there are obvious cultural differences between interaction in Filipino and American organizations. In the Philippines formal supervisor-subordinate relationships are more personal. The supervisor is more paternalistic and may look after, indeed is expected to care about, his subordinate's extra-organizational life.

These values, among others, have been studied diligently by Philippine schoiars in business and public administration, in addition to those in communication (UP/IMC, 1971).

But, unfortunately, nowhere in the Philippines or in Southeast Asia has there been systematic study of how these values or others affect administration and communication in family planning organizations. Generally, studies of family planning agencies have concentrated on descriptions of funding, programs and program objectives, formal linkage with government or private foundations--i.e., macro aspects of the organizations. Rogers gives an excellent summary of a number

of these studies (1973), as does Berelson (1969). In the Southeast Asian area, his survey is complemented by the work of Ingles (1971, 1972) and Ness and Ando (1971).

We can account for the macro-bias of these and other studies by two observations. First, family planning efforts are new and family planning agencies are likewise in the making. The focus of institution-building must necessarily concentrate in its first stages on the organizational environment, funding, extra-organizational attachments, and formal structure. Second, the science of demography has contributed heavily toward the definition of the population problem and goals for family planning agencies. And while there is a most important place for demography in population studies, demography does not generally concern itself with social or social psychological relationships. Its focus is broader and less specific.

One may conclude that studies of family planning have ignored intra-organizational variables out of both necessity and bias. Yet, as early as 1966, there was interest in the internal administration of family planning projects (ECAFE, 1966). In the past half decade, particularly from those writing in India, one hears a plea for supportive, enlightened management (Fifth Narangwal Conference, 1970). This is to be expected, for the Indian program is older than most and has moved from the institution or program stage to that stage where it can examine its internal functions. It must attribute its failures to itself and not to some external force; therefore, it attempts to solve problems by changing its internal structure.

With this background, we may move to the major task of this chapter, the delineation and support of the relationships defined in the hypotheses. Since all of these involve network and/or organizational variables, the dependent variables in this study, a brief preliminary treatment of these variables is a necessity.

Dependent Variables

At the organizational level, the productivity of groups will be conceptualized on one dimension. Common sense dictates that the *productivity of clinics* be measured by the number of acceptors of birth control methods per month. The number of new acceptors a month is analogous to the output or production of a work group in industry. The variable is an important one for the study, for it is necessary to relate communication variables to production variables if the relationships are to be theoretically attractive to those who study organizations. Discussion of the need to control for such a measure is postponed until Chapter II.

The literature on clinic effectiveness in the Philippines is barely nascent. Ocampo (1972) has issued a short checklist of determinants of clinic effectiveness. They are generally environment-oriented and focus on the placement of the clinic within the village, the availability of private examination rooms, general structural condition. Other determinants of effectiveness were communication-oriented (e.g., presence of posters, reading material, advertisement, etc.).

The checklist summarizes findings from a detailed series of on-site examinations of clinics done by the staff of UP/IMC (IMC-UNESCO, 1972).

A more recent and more systematic study (Veloria, 1973) sheds further light on the subject. Veloria notes a number of apparent determinants. These are number of man-hours devoted to family planning activity, agreement of staff on importance of family planning activity, presence of a low turnover rate of the staff, active support and communication from mother agency, clinic location, and "satisfactory interpersonal relations" among clinic personnel. These findings are in accordance with the hypotheses of this study and reinforce the hypothesized relationship between the organizational variables and the group network variables treated next.

The two other dependent variables in the study are *group dominance* and *group connectedness*. These are defined in terms of the communication behavior of group members. Where the group supervisor is, in terms of communication network measures, highly central to the group, then the group is dominated by him. However, when a group is characterized by no central figure and much communication between all members, then it is high in group connectedness. It is important to note that relatively low group connectedness *appears* to be a necessary condition for dominance, but low dominance does not imply high connectedness. As with the other dependent variables, a discussion of the intricacies of measurement can be found in Chapter II.

Independent Variables

Subordinate-Perceived Control and Communication Frequency

It is often proposed that "information is power" and, as is usual with cliches, there seems enough substance to such a phrase to

allow one to infer that status and questions of supervision and subordination are intimately linked with control of communication behavior. Indeed, the thrust of many of the classical theorists in the organization literature is the description or prescription of "lines" of authority and influence.

But the sociometric researcher is interested in choices, and the reality behind the cliche manifests itself in sociometry under the problem of interpretation of the meaning of unreciprocated choices, for it is one of the commonplaces of such research that "central persons" or group leaders will receive more choices from each person on the "periphery" than they will in turn make of each person on the periphery. There are two ways to treat such a finding. First, we may attribute it to forgetfulness on the part of the higher status individual toward his lower status cohorts, and in this case the problem dissolves into a methodological one, for then one must attempt to control for these mental lapses. However, one may wish to regard such mental lapses as an artifact of the preference of low status for high status individuals and attempt to explain their appearance by offering a rationale for them. If such a tack is taken, two things are in order. First, an examination and reinterpretation of important studies must be offered. Second, a theoretical rationale for the proffered reinterpretation must be provided.

There is quite a bit of evidence on the preference of low status persons for interaction with higher status persons. The question is, "How can we account for the findings?" One position is that those who have no upward status mobility use communication with their betters as

a substitute for the mobility (Festinger *et al.*, 1950). Kelley (1953) mirrors this position, but notes that the finding does not appear to be linear. In low status non-mobile groups hostility often builds and there may be a tendency to communicate about non-task matters. Avoidance of high status individuals sets in. Yet another attempt is offered by Lippitt (1952), who suggests that subjects who wish to identify with leaders attempt to interact with them more often than with other followers. Hurwitz (1956) and his co-workers emphasize the negative aspect of non-interaction and suggest that followers try to reduce the uneasiness resulting from non-interaction by seeking out the more powerful.

An excellent critique of the inconsistencies and shortcomings of these approaches is offered by Mulder (1960). But as Mulder succeeds admirably in his critique, he is less successful in his efforts at building his own theoretical base. For while he sees power as the prime satisfying agent in interaction, he does not convincingly explain why this is so. He maintains that

> "forming a psychological unit with the powerfuls leads to a feeling, I am among them, I belong to them, thus a similar power position to theirs is proper for me."

This sounds distressingly like the identification process for which he criticizes Lippitt.

It seems that one can agree with Mulder that power is the crucial variable without accepting his rationale for this being the case. What seems to be lacking in his discussion is the notion that power is important because it can be utilized to perform tasks. It is suggested that controlling the behavior of others is satisfying only when motivated by a distinct purpose.

But if one accepts this position, he must offer a theoretical framework that supports it logically and suggests intuitively how the power variable operates. Such a framework is offered by Allport's treatment of structuronomic relationships.

Allport's treatment of the notion of collective structure is particularly useful at this point.

> "Whenever there is a pluralistic situation in which in order for an individual (or class of individuals) to perform some act (or have some experience) that he 'desires' to perform (or for which he is 'set') it is necessary that *another* person (or persons) perform certain acts (either similar or different and complementary to his own), we have what can be called a fact of collective structure. The structure is either collectively actualized or 'potential', according to whether the desires are being carried out through the enabling action of the other person, or remain merely covert as sets or meanings in the individuals concerned."

In an actualized collective structure, participants in the structuring process develop cyclical interlocking behaviors that are of mutual benefit. While Allport speaks of the performance of "some act," we need not take this in a gross physical sense. If a subordinate wishes to understand his environment or complete a mental task and he needs information from his supervisor to do so, then the "act" of understanding or mental task completion is facilitated by a transfer of information. We may conceptualize the supervisor-subordinate dyad as a structure having performance related information exchange functions.

This discussion is enlightening when juxtaposed to Allport's discussion of norms.

Allport suggests that norms are not the a priori behavioral rules that govern group behavior and enable group formation, but that norms are the result of a common need and a set of shared interlocking

behaviors designed to fulfill those needs. Norms describe those behaviors and, by virtue of the underlying needs, obtain power over the participants in a dyad.

Before further discussion, a synthesis of foregoing approaches seems in order. It should be apparent from the discussion of Allport that we are considering minute atoms of social behavior--the interlocking behaviors Allport writes of. Furthermore, it is suggested that the behaviors differentially distribute power to one or another members of a relationship. Specifically, there is variation on who controls what Berlo *et al.* (1972b) have called the conversational agenda. The supervisor-subordinate relationship will be marked by variation in who may interrupt whom, who may choose the topic, who may change the topic, who ends or begins conversations, etc. It follows that if the norms give control over these dimensions to only one member of a dyad, then the other member will find interaction in the dyad less useful than his partner. This, then, supplies the connection between control and utility which Mulder failed to make. If the subordinate cannot dictate any of the terms under which conversation is held, it will probably be less relevant for him than an interaction he can direct toward his own needs.

There is evidence to suggest that the connection between control of conversation and interaction frequency is valid. First, Whyte (1959) notes that equality in the communication-relationship is essential.

> "Whenever we see a high frequency of initiation down the line and little or no initiation upward, we always find workers expressing dissatisfaction with superiors--and generally with other aspects of the work situation also."

His contention is borne out in a more recent study where equality in the conversational agenda yielded high correlations with satisfaction with conversations (Betty, 1972). Berlo *et al.* (1972b), in a recent and comprehensive study, found significant relationships for control of conversational agenda and control of conversational procedures with job ratings, perceived impact of changes in work location, the importance of working at the organization, and a number of other variables related to satisfaction.

These findings together with the theoretical framework supplied by Allport and Mulder justify the first hypothesis.

Hypothesis 1: The higher the degree of subordinate-perceived control in the supervisor-subordinate relationship, the higher the frequency of interaction in the supervisor-subordinate relationship.

The corollary to Hypothesis 1 is Hypothesis 1a:

Hypothesis 1a: The higher the degree of subordinate-perceived control in the supervisor-subordinate relationship, the higher the degree to which the group is dominated.

Subordinate-perceived control in the supervisor-subordinate communication relationship is to be defined as the degree of control of the conversational agenda perceived by the subordinate, that is, the degree to which the subordinate perceives himself to define the content (subject under discussion) and pragmatics (questioning, disagreeing) aspects of his relationship with his supervisor.

If the assumptions behind Hypothesis 1 are valid, we may assume that when perceived control of the agenda is high for all members of

the group, then they will find open and productive channels to their supervisor. When this occurs, strong attachments will be formed between group members and the supervisor, but less strong ones between the group members themselves. For if utility is a determinant of frequency of interaction and the supervisor-subordinate relationship is an equal one, then the subordinate does not have to rely on his peers for useful information. This argument is made under the assumption that communication about work is essentially governed by the need to obtain enough information to meet performance criteria set by management.

Agreement on Information Priority

In the second set of hypotheses for this study, it is suggested that agreement within a relationship about what kinds of information are important will lead to higher channel usage.

The body of literature most pertinent to this hypothesis is the large set of publications on the relationship between mental similarity, attitudinal similarity and affiliation. For the hypothesis assumes that where there are shared priorities about what kind of knowledge it is important to have, then there will be a greater degree of interaction. To say it another way, where clinic employees have similar attitudes about their jobs, and in particular about what are the more or less important aspects of their jobs, then it is likely that they communicate more than employees who disagree or have different attitudes on these issues.

The literature on mental similarity and affilitation is one of the oldest in social science. As early as 1939 (Richardson, 1939), a

review of the literature had appeared. By 1939 studies had been done testing for similarity on intelligence, memory, psychological states, associative ability, and other cognitive variables as well as attitudes. Attitude similarity and its relationship to affiliation had been tested on attitudes toward war, communism, birth control, politics, and general value orientation.

Generally, to that period, the findings were clouded. In some studies there were clear relationships between similarity and affiliation, and in others the proposed relationships were weak or nonexistent. Perhaps the most damaging study was conducted some years later when Bonney (1946) failed to find correlations between friends on the California test of personality and only weak correlations on the Bell Adjustment Inventory.

But, if there was failure on this front, there was generally positive documentation of the relationship between similarity in attitudes, beliefs and values, and affiliation, and therefore communication. With positive findings came the need to provide theoretical bases for the relationships, so that later efforts have contributed more toward theoretical understanding rather than the actual testing of the hypotheses.

The pertinence of these theories and their capacity to explain findings can be seen in the way they may be used to answer several questions. These are: *First*, what is the relationship between attitude similarity, affiliation, and *communication* practices, and which theory provides the most tenable connections between these three? *Second*, how can we conceptualize similarity profitably? *Third*, what

are the sets of values or attitudes deemed important for the study and what support can be given to the proposition that similarity on this particular set of attitudes will more profitably explain variance?

Under the first question, Lindzey and Byrne (1968) isolate two basic theoretical attempts to account for relationship between similarity and affiliation. The first of these are conceptualizations of interaction based on equilibrium or balance theorems. The three major proponents of this approach are Festinger (1957), Heider (1958), and Newcomb (1953, 1961). Of these, Newcomb's conceptualization is explicitly intended for two person interaction, while the others are only implicitly expandable to two or many person situations. Triandis (1960) summarizes Newcomb's proposition in the following way:

> "To the extent that A and B are cognitively similar (orient toward significant aspect of their environment in the same way) and there is an opportunity for communication (e.g., propinquity), communication should be effective, the relationship between A and B should be rewarding, and interaction should lead to increased liking of A for B and B for A (sociometric choice)."

The other major attempt to account for findings in the area is reinforcement theory. Byrne (1961) offers the following summary:

> "Once interaction has begun, reciprocal reward and punishment is proposed as the crucial determining factor. It has been suggested (Newcomb, 1956) that attraction between persons is a function of the extent to which reciprocal rewards are present in the interaction; perhaps dislike is a function of reciprocal punishments. A special subclass of this variable would be perceived similarity and dissimilarity of the attitudes of two individuals."

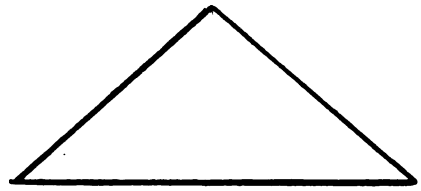
That these propositions are not conceptually mutually exclusive is obvious. Reinforcement theory may account for the presence of rewards in ABX systems. Newcomb (1953) quite explicitly suggests

"validation of social reality" as the driving mechanism in ABX systems.

It would seem, then, that Newcomb's writings on ABX systems furnish an encompassing and sufficiently relationally-oriented approach to serve as the theoretical rationale for Hypotheses 2 and 2a.

But with the acceptance of ABX propositions, a number of other issues are raised, specifically those raised in question two above. What is similarity with regard to X? And is not accuracy about X more important than agreement about X? Is not perceived similarity more powerful than "objective" similarity?

Under the first question, consider the usual diagram of the ABX systems. Most writers have noted the absolute necessity of assuring that X is the same perceptual object for both participants in the dyad.



But only recently (Chaffee, 1971) has it been argued that the similarity of judgment dimension, the dimension along which the + or - judgments are made, must be the same for both participants. Both participants in a laboratory test of ABX systems may perceive the same X, but if one judges it on its esthetic worth and the other on its utility, one cannot profitably utilize the ABX paradigm to describe their interaction.

A lucid treatment of the problem can be found in Runkel's (1956) development of the notion of co-linearity. Runkel conceptualizes the dyad as a set of two cognitive fields, each provided with a set of possible responses to stimuli received from the other. Where the structure of these fields is similar, then the set of responses from each field for a given stimulus will be much the same, that is, the responses from dyad members will be characterized by "utilization of the same underlying attributes in formation of judgments." Parties to the dyad will be "colinear."

Runkel's treatment raises the issue of whether interaction in a dyad is ruled not by agreement but by some other relational variable. Runkel suggests that shared underlying judgment dimensions are more important. Other research (Wackman and Beatty, 1967) suggests that accuracy is the result of interaction more than agreement. In short, their proposition challenges the dynamic of ABX theory. However, it must be pointed out that their study involved an X not subject to personal manipulation (the Vietnam War); thus the need to achieve agreement and coordination may have been minimized. Further, Wackman (1969) noted that the measurement of accuracy is disturbed by the well documented finding that people perceive others they like as being more similar to themselves than objective tests would indicate.* This disturbance results when, in the case of a dyad where the parties are mutual friends, and have similar attitudes, accuracy may result from exchange of these attitudes or, out of "ignorance", under the "assumption" that one's associates must be like oneself. In short,

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*Example: Newcomb (1956), Horowitz *et al.* (1951), Feidler *et al.* (1952), Byrne and Blaylock (1963), Griffitt (1966), Lundy (1958).

there will be cases of accurate judgment of another's attitude without communication. Therefore, any theory of communication effects, based on accuracy as a determinant, must account for the degree of accuracy due to such a non-communication effect.

The preceding discussion of accuracy raises another issue, the issue of perceived similarity as an alternative variable to objective similarity. Newcomb handles this issue in his writing, so theoretically there is little issue. One may rely on either or both as a determinant. As a matter of research strategy, however, one must note that the studies cited above, in the treatment of accuracy, show that perceived similarity shows closer relationship with affiliative behavior than does objectively measured similarity.

It would seem, then, that the use of assumed or perceived similarity may be more powerful. For socio-cultural reasons, this tack was avoided. To obtain measures of perceived similarity one must ask respondents to guess how other respondents will react to the questionnaire. This introduces the temptation to check up on one's guesses to insure "good" performance on the questionnaire. Furthermore, a closer look at the studies reveals that many were based on perceived similarity in personality characteristics, and not attitudes and beliefs. For this study, then, objective similarity seemed the better alternative.

Perhaps the most important question to be raised is what is the nature of the objects or attitudes on which similarity is to be tested? Since the dependent variables of the present study are performance variables, the ranking of different kinds of knowledge most

important for the job were measured. This choice of stimuli is consistent with criteria of observability and importance (Newcomb, 1956). Hopefully, it avoids the "lack of direct personal pertinence" that has obscured findings in at least one study of similarity and affiliation (Precker, 1952).

The result of measuring what kinds of information are important for the job is that for each person in the sample there is a measure of priorities the person attaches to specific kinds of information. These measures of information priority for each person can then be compared with one another to see if members of dyads value the same kind of information. Where they do, then the members of the dyad exhibit high agreement on information priority. They would be expected to communicate more frequently than in dyads in which there was disagreement on information priority.

To conclude, in the preceding discussion the case for the second set of hypotheses has been made. These are:

Hypothesis 2: The higher the degree of agreement on information priority in a relationship, the higher the frequency of interaction.

The corollary is:

Hypothesis 2a: The higher the degree of agreement on information priority within a group, the higher the group connectedness.

Agreement on information priority is defined as the similarity among respondents in ranking the importance of information about different aspects of their job (e.g., client relationship and attitudes,

policy and objectives, etc.). The support for Hypotheses 2 and 2a consists of a number of points. First, the relationship affiliation and communication, and attitude similarity is noted. Second, the general ABX paradigm is forwarded as a theoretical rationale for the hypothesis. Third, the nature of similarity and prerequisites to real agreement were explored, and actual items for agreement, in this case, the nature of important job information, were suggested.

Information Quality

In arguing for the previous hypotheses, similarity in attitude towards the job and the nature of the supervisor-subordinate relationship are asserted to affect choice or affiliation in certain ways. But these variables are, in the general sense, interpersonal. They evolve mostly from face-to-face situations, and not all of the information which flows into workgroups is interpersonal. Employees in any organization receive memos and other written or relayed verbal communication. These two affect affiliation or communication choice, and this in turn affects network morphology.

In addition to the supervisor-subordinate relationship and agreement on priority job information, intuition suggests that the performance of an organization's formal message system, specifically the quality of the information transmitted, will affect the communication behavior of employees. And although relatively little research on the quality of written messages in organizations has been done, one study suggests that the employee obtains more than half of his company related information in written form, i.e., bulletin boards, company newsletters, circulars, etc. (Habbe, 1952).

Generally, the research in this area can be divided into two groups. The first of these deals directly with relationships between information quality and related organizational variables, and the second treats correlations between formalization and organizational variables.

Under the first category, it has been shown (Berlo *et al.*, 1970) that regular employees in a bank who are satisfied with the organizational information system are significantly less likely to be afraid to turn suggestions in, to complain that the suggestion system does not work, but also to actually turn in suggestions to the system. In a related study, one done one year later on the same population (Berlo *et al.*, 1971), it was shown that those employees who left the bank for avoidable reasons more frequently reported the organization's information distribution system to be inadequate. This was also true for those employees who exhibited tardiness. On the positive side, those employees who judged the distribution system as highly effective were those who were more likely to interact frequently with their first, second, and third step supervisor. This finding is in agreement with Habbe (1952), who found that those who thought the company was doing a good job of getting information to its employees expressed a desire to know more.

In yet another study of this sort, MacDonald (1970, p. 41) relates information quality to satisfaction.

> "The present study approaches the concept of satisfaction through positing a need for timely, accurate, easily used information, obtained through appropriate channels. In a sense, the proposition is that people who have access to more work-relevant information have, in fact, more

> potential power: that having such power is self-assuring; and that people with such information will therefore report being more satisfied with the work-related system."

MacDonald cites data that show that liaisons, individuals who are communication links between work groups, generally have such information and thus he supplies a rationale for the supported hypotheses that liaisons are more satisfied with the work-related communication system.

These findings are supplemented by work on formalization as a determinant of interaction. It has been hypothesized (Hage *et al.*, 1971) that the greater the degree of formalization, the less the rate of task communication. Furthermore, the greater the degree of formalization, the higher the proportion of vertical task communication. Operationalizing formalization as the existence of job descriptions at various levels of specificity, the same authors show that the existence of a job description is negatively correlated (-.30) with participation in an organizational committee. Furthermore, the specificity of the job description is negatively correlated (-.50) with unscheduled interactions. The overall correlation between specificity of job description and communication is also negative (-.12).

We can argue that these findings are pertinent by assuming that formalization is generally accomplished by an organization's written message distribution system. Where it works well, formalization is achieved; where it fails, formalization, though intended, is not achieved.

What do these two bodies of literature show? They show first that the quality of information received through the distribution system

for written messages is probably an important determinant of behavior and second, that quality of information determines interaction as well as other kinds of organizational-related behaviors. But on one important issue, the studies disagree.

The studies by Berlo *et al.* and Habe suggest that when the formal distribution system works well, additional information needs and/or additional communication behaviors are stimulated by it. Davis' work in ECCO analysis has given rise to the same notion: formal and informal message systems complement rather than supplant each other. On the other hand, there is the evidence from the study on formalization, which suggests that the effectiveness of the formal system may be negatively correlated with frequency of interaction in the informal communication system. Although the findings are from different areas of study (job classification and communication), there is an incipient paradox in them that suggests further explanation is necessary.

Arguments from theory seem to support the latter thesis. Barnard (1938) notes that formal channels must "carry an increased burden when informal channels are limited." Blau and Scott (1962) interpret their findings in their study of consultation in the FBI in the following way: Formal channels to the supervisor were inadequate to the needs of employees for consultation on problems, thus they developed informal means. And in yet another statement of similar approach, Downs (1967, p. 114) notes that

> "Prevalence of subformal channels means that formal networks do not fully describe the important communication channels in a bureau. ...the more stringently restricted the formal channels, the richer will be the flowering of subformal ones. Thus, within every organization there is a straining toward completeness in the overall communication system."

All of these statements seem to support the same position. Formal and informal systems supplant one another: where the informal system fails, the formal system is activated and vice versa.

And yet there is the evidence from Berlo *et al.* and Habbe. One way to cut through this dilemma is to suggest that the arguments are based on different assumptions. We may explain the findings from Habbe and Berlo *et al.* by positing man as a maximizing organism. Under this assumption it is reasonable to assert that formal or written information which is timely, useful, etc., would spark the desire for more information or kindle a desire to interact. On the other hand, we may explain the theorizing from Downs and Blau and the findings of those working on formalization by positing man as a satisficing organism. Under this assumption it is reasonable to assert that high quality information would *meet* the need for task relevant information. If it did not, then other sources, perhaps the informal network, would have to be tapped to meet the need. But the crucial point is that, once the need is met by one channel then the other is not needed.

But the explication of these two assumptions still does not solve the apparent contradiction in findings. This can be accomplished only if it becomes clear that the findings were taken from different contexts in which different assumptions apply.

And this appears to be the case. Note that both Berlo *et al.* and Habbe operationally define information in a wider sense. It is apparent that they do not limit information about the company to information about the job per se. On the other hand, the evidence from Blau and Scott (1962) and from Hage *et al.* (1972) concerns work-related information only--specifically, consultation about work problems and the

presence of a specific job description. It is in the area of production, or getting the work out, that employees face judgment on external (to them) criteria. They must satisfy these criteria, but once they do, they need not necessarily maximize production. It follows that employees use information systems which allow them to meet these criteria. If one is not sufficient the other is resorted to. But once the employee obtains enough job-related information, then he need not attempt to obtain more. In other words, satisficing behavior is assumed to account for the employee's job-related information seeking behavior.

Under the satisficing assumption, an employee will seek job-related information from the informal network only if the formal message system is not operating adequately. However, if he receives high quality information from the system, then he need not depend upon the informal network for aid. Thus Hypothesis 3.

Hypothesis 3: The higher the quality of work-related information transmitted in the formal message system, the lower the frequency of work-related interaction with other group members.

The corollary is in the form of a hypothesis on group behavior.

Hypothesis 3a: The higher the quality of work-related information transmitted in the formal message system, the lower the group connectedness.

For these hypotheses, the *quality of work-related information* is defined as the judgment by an employee of the suitability of formal messages to meet the job-related information needs he has, where

suitability may be interpreted along dimensions important to the employee (i.e., specificity, clarity, timeliness, etc.).

Hierarchy Credibility

A synthesis of two discrete conceptual areas is necessary if an adequate conceptualization of hierarchy credibility is to be made. First, the nature and effects of credibility must be explored. And second, a cohesive and substantiated analysis of the general effects of hierarchy must be given.

On the nature of credibility one finds general agreement that it consists of a number of components. Moreover, there is agreement that authoritativeness or expertise and trustworthiness or safety constitute two major components of credibility (Mortensen, 1972). After these a number of other possibilities are mentioned, but they are not generally found across the factor analyses used in defining the dimensions of credibility and thus are not universally accepted.

There is a large literature surrounding credibility, and not all of it is pertinent here. Much of it is drawn from the study of impersonal sources. Other studies explore situations involving choices which are essentially devoid of risk. But some studies of the relationship between authority and credibility are important, for here the evidence suggests that authoritarian personalities are affected particularly by sources of information rather than content itself (Johnson and Steiner, 1967). In fact, studies show that high authoritarian personalities may be less able to recall the content of a message. Siegel *et al.* (1969) suggest that some individuals are "credibility

prone." That is, their response to a message is essentially determined by the identity of the source.

In another study (Zimbardo *et al.*, 1965), credibility is shown to interact with the degree of coercion placed on respondents. Attitude change, in this study, was obtained by a source who was harsh and tactless, rather than the usual sensitive, trustworthy source. The finding suggests that the effects of the trustworthiness component are diminished in compliance situations.

In a related study, Mellinger (1956) showed that middle management subordinate-supervisor paris marked by lack of trust interacted in a number of dysfunctional ways. Communication within such pairs was marked by evasion, compliance, or aggression. It is but a short step in logic to argue that under such conditions the subordinate seeks to avoid communication with his supervisor and thus must interact more fully with peers if he is to remain abreast of job affairs.

The relationship between credibility, regardless of its correlates, and sociometric choices is in doubt. Holland (1972) typifies sociometric stars as individuals with high information potential and notes that individuals with greater information potential have greater credibility than individuals with less information potential. McDonald (1970) notes that non-liaisons perceive their own liaison contacts to have more contacts than they do, and to have more generalized influence than they do. Hence, credibility seems to inspire or draw interaction.

But Schwartz's (1968) findings are different. He also showed that liaisons had more frequent and structurally more diverse contacts than non-liaisons, but his attempt to show a relationship between the

liaison role and credibility failed. Schwartz measured both the qualification and safety dimensions of source credibility, as well as general persuasiveness with secondary contacts.

What is the pertinence of these studies to the present thesis? In summing them up, one can say that there is tentative evidence that credibility affects the desire of an individual to interact with an information source. But it is not clear how the findings fit the organizational theatre where compliance operates. In any case, none of the credibility studies extends to individuals aligned in a hierarchy. And since hierarchy is one of the fundamental facts of organizational life, its effects must be studied.

Perhaps the most comprehensive and also the most damaging characterization of hierarchy and its effects is found in the work of Argyris (1964). Argyris' major concern is that the traditionally conceived hierarchy places great stock in the approval of supervisors. Under such contraint, the employee becomes passive and dependent, for his attempts to exercise initiative are thwarted or punished. Argyris lists the following behavioral implications:

> "The traditional organization, with its emphasis on rules, hierarchical authority, specialization of interests, and requirements for external control by those high in the structure over those low in it will depress each of the following behaviors:
>
> a. Taking risks and experimenting.
> b. Gathering new information.
> c. Trusting and having concern for others.
> d. Owning up to and taking responsibility for one's behaviors.
>
> This cluster of behaviors may be called 'interpersonal competence,' and its occurrence in an organization can be considered to be negatively related to the extent to which the organization subscribes to the traditional organization structure."

It is the basic assumption of Argyris' theory that the conflict between the passivity demanding organization and the active, mature human being is fundamental and unavoidable. This conflict inspires frustration and from it comes non-formal activity, e.g., unionization, informal group formation.

Now it would seem apparent that the whole notion of interpersonal competence will affect interaction rates, especially in that it is causally connected, by Argyris, to non-formal activity. But there is a question as to the generalizability of his schema. It would seem applicable to the traditional factory or bureaucracy, but what about universities, or professional agencies like those involved in this study?

The traditional hierarchy can be delinquent in ways other than those suggested by Argyris. Argyris is concerned with "over-control"--too much specialization, standardization, too many rules. But a bureaucracy can be accused by its incumbents of exhibiting "under-control." In such a case the leadership does not exhibit a firm enough grip of the organizational environment, internal and external, to support its subordinates' attempts to deal more successfully with their jobs. In such an instance, the leadership will lack credibility as a source of advice or information.

Oddly, speculation as to the results of lack of control or support leads one to a list very much like that suggested by Argyris. Passivity might be caused by over-institutionalization, and the dependency it breeds, but it can also be caused by overload accompanied by lack of support from outside sources. This speculation is all the

more convincing for other reasons as well. The culture of the Philippines disposes employees in white collar jobs to develop dependency on their supervisors, who likewise cultivate their subordinates. Protocol is more rigidly insisted upon on formal occasions, but during informal situations camaraderie dissolves official status distinctions. Hence, the Filipino is less likely to characterize his boss and the hierarchy above him as tyrannical and/or rigid, but as supportive and helpful. Generally, this works very well, but where the subordinate perceives those above him as incompetent or dishonest a profound cynicism is generated. This cynicism could be expected to turn a subordinate's interaction away from his or her supervisor to peers and thus affect network structure.

The logic of this section on hierarchy credibility can be summed up as follows: It seems likely that risk taking, or gathering new information, or trusting, or taking responsibility will affect interaction choice and rates. But "interpersonal competence" is likely to be achieved in a hierarchy which recognizes that subordinates can neither be rigidly confined nor made to work without supporting routines; a balance must be struck. Where the balance is not achieved, subordinates become overly passive and dependent. In this state, the employee is not likely to overtly challenge the expertise or trustworthiness of his supervisor. The work information related through the hierarchy becomes law. Other sources of work interaction, e.g., group interaction, are likely to be avoided. To say it another way, whether hierarchy credibility is a positive or negative attribute is entirely a relative matter. In a culture predisposed to take an authoritarian

view of hierarchies, very high hierarchy credibility can be interpreted as having an overconstraining effect.

Hypothesis 4: The higher the degree of perceived hierarchy credibility, the lower the rate of interaction among group personnel.

The corollary is Hypothesis 4a.

Hypothesis 4a: The higher the degree of group members' perceived hierarchy credibility, the lower the degree of group connectedness.

In these hypotheses, *hierarchy credibility* is defined as the degree to which organization members perceive the hierarchy above them as manifesting either expertise or trustworthiness and thus to be competent sources of advice or agents of problem-solving.

Information Dependence

Besides the independent variables previously explicated, other organizational factors will determine the degree of interaction. Perhaps the most important is the perceived nature of the job. How can this factor be best conceptualized?

An approach is suggested by Kelley's work on information dependence (1967).

> "Person A is informationally dependent upon B, if B can raise A's level of information to a higher level than A can attain from alternate sources."

Of course, this definition lacks substance without a further examination of the notion of information level.

Kelley's work finds its roots in attempts to define the crucial perceptual processes which allow us to distinguish between the world

as an external entity and the world as an attribute or internal response of the receiver. He suggests four processes:

1. *Distinctiveness*: The impression is attributed to the thing if it uniquely occurs when the thing is present and does not occur in its absence.

2. *Consistency over time*: Each time the thing is present, the individual's reaction must be the same or nearly so.

3. *Consistency over modality*: His reaction must be consistent even though his mode of interaction with the thing varies. (For example, he sees it to have an irregular outline and he feels it to be rough; or first he estimates the answer to the problem and then he calculates it.)

4. *Consensus*: Attributes of external origin are experienced the same way by all observers.

(Kelley, 1967)

Kelley's dimensions suggest that information level can be essentially defined by the distinctiveness of attributions over instances and the stability or homogeneity of attributions over instances. To quote, "Information level is high for a person who can make highly stable, but differentiated attributions."

Essentially, then, when person B can define for person A sets of consistencies or generalities which apply to reality and at the same time define very specifically the conditions under which they apply, then he can raise person A's information level and A is dependent upon him.

A quite similar approach to the same problem can be found in the literature on human information processing. In the theory of Schroeder *et al.* (1967), the type of reaction determined by certain cues are themselves determined by the rules and dimensions governing the processing of the cue. Where a cue impinges upon a mind that has several

dimensions or perspectives in which the cue can be understood, and when these dimensions can be combined or dissociated by sets of rules, then a single cue may be understood in all its complexity. As an adjunct, Schroeder *et al.* suggest that the rate at which information is processed is governed by informational load, the complexity of the incoming information, and the rate at which information impinges on the receiver.

The treatment of plans and behavior by Miller *et al.* (1960) differs from the above schema in one important way. In this treatment the flow of information is not understood in terms of a "geography" of dimensions and rules, but in terms of a cybernetic process. The TOTE system (test-operate-test-exit), by introducing the notion of test, implies that at any step of the way in the processing of cues, one dimension and the rules that surround it may be discarded for another if the former set of cue interpretations dos not lead to an adequate outcome.

The difference between the Miller *et al.* human information-processing approaches and the approach of Kelley is an essential one, for Miller *et al.* conceptualize information processing as intrapersonal, whereas Kelley suggests that it is interpersonal. Kelley proposes that, when an individual lacks the capacity to define important cues, or to define the important dimensions of a cue, or to call up from a cue the appropriate set of behaviors, then he is dependent upon others to supply these rules of interpretation for him.

An employee on a job, for instance, may not know how to perform his tasks well if they require subtlety and great discrimination in cue detection. In such an instance, he would have to rely on those working

with him to instruct him how to behave and when to enact job related routines.

We define *information dependence* as the degree to which an employee is dependent upon his supervisor or other employees for interpretations of job activity related cues: more specifically, it occurs when an employee seeks advice on the importance of a cue event, the understanding of the cue, and the behavior required by the cue. Under such a definition, the rationale of Hypothesis 5 is evident.

Hypothesis 5: The higher the degree of perceived information dependence, the higher the degree of work related interaction.

But this hypothesis is submitted only under the assumptions that govern Hypothesis 3--that is, man, the employee, is primarily occupied with *satisfying* criteria of employment. Under this assumption and in light of Hypothesis 5...

Hypothesis 5a: The higher the degree of perceived information dependence, the higher the degree of group connectedness.

Although the foregoing treatment of information dependence and human information processing constitutes adequate rationale for Hypotheses 4 and 4a, they would be bolstered by empirical findings which bear directly or indirectly upon them. Unfortunately, very few pertinent findings are available. This can be shown by short critiques of apparently related literatures.

First, it would seem that studies of prescribed laboratory communication networks, which often examine the relationship between different

kinds of tasks and network morphology, should yield pertinent evidence. But with a few exceptions (Monge, 1972; Mortensen, 1966), these studies manipulate or control on network morphology, whereas in this study the network itself is the major dependent variable. Moreover, the nature of the tasks in these studies is most unlike the task assigned to family planning clinic staff. Even the most difficult mathematics problem does not require specialization, whereas specialization is common in the work environment of this study. Moreover, it has been shown that over time participants in groups engage in even more specialized routines. Most of the groups in this study have a life history much longer than any laboratory concocted group, and it is therefore highly probable that group members have developed specialized routines.

Another body of apparently appropriate research is found in the publications about jobs that constitute an important part of organization or industrial psychology. And while task or task perception is often an independent variable here, more often performance or satisfaction are the dependent variables. The most recent development in defining correlates of task, the job enrichment studies, are concerned with a goal entirely opposite from that implied in our treatment of information dependence. The problem defined by job enrichment is how to structure the job environment so that more than a bare minimum of the employee's mental potential (cue discernment, interpretation, and rule application) is required and thus to have the employee compelled by the complexity of his job to attend more assiduously to it. The problem implied by the explication of job-information dependence is how to provide the employee with enough on line information about job

routines to permit him to standardize the way in which he handles the confusion that is his job environment.

There is, then, little basis for inference of the nature of the relationship between information dependence and interaction. However, Blau and Scott (1962) have shown that employees do not always take their problems to the most expert source of advice. Rather they spread their advice-seeking among colleagues in order to avoid indebtedness to a single expert source. Hence, it is logical to think that an individual characterized by high job-information dependence might interact with a number of sources rather than, for instance, only his supervisor, or best friend.

It would seem profitable to summarize to this point. Five variables, subordinate perceived control of supervisor-subordinate communication, agreement on information priority, information quality, information dependence, and hierarchy credibility, are hypothesized to be related to frequency of interaction about family planning in two family planning agencies in the Philippines. The geography and a short organizational overview of the agencies was supplied, and then each hypothesis was supported with empirical findings and/or theoretical background. The argument for the positive relationship between subordinate control in the supervisor-subordinate relationship and interaction was couched in a critique of available explanations of why leaders or central figures attract communication from subordinates. The argument for agreement on priority information's positive effect on interaction is presented in the context of ABX systems. The argument for information quality's negative effect on interaction is made

from empirical findings interpreted under a satisficing assumption. Hierarchy credibility is argued as negatively related to interaction. This position is taken after a reinterpretation of Argyris' proposed effects of hierarchy and an overview of credibility correlates, i.e., authoritarianism, etc. And finally, information dependence is said to be related positively to interaction largely to coincide with Kelley's approach to information dependence.

But quite aside from questions surrounding the arguments for individual hypotheses, there are a set of larger questions which should be answered if the hypotheses are to be fully explicated. These questions are: What are the relationships among the independent variables? Do any of them mediate any of the others? And what are the reasons that these variables should be studied as network predictors? As will be seen, to answer the first two questions is to suggest an answer to the third.

A Proposed Path of Effects

The interrelationships among the independent variables and the manner in which they affect network form will be approached by hypothesizing a four-stage process. The process is given in Figure 1-1. Since the data for the study were not collected at different periods of time, the model is suggested as heuristic.

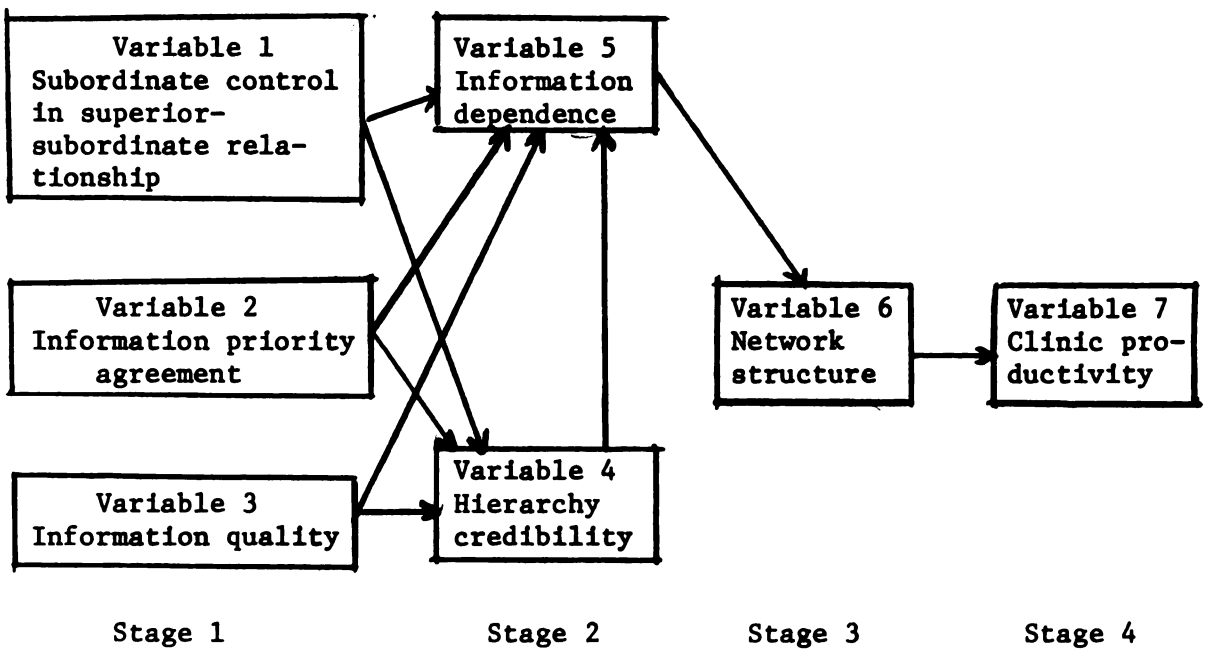


Figure 1-1. Hypothesized four stage process of effects of independent variables.

Arguments for the Hypothesized Path

Arguments for the hypothesized path will be treated stage by stage, beginning with the last stage and working toward the front.

For the last stage, given below in Figure 1-2,

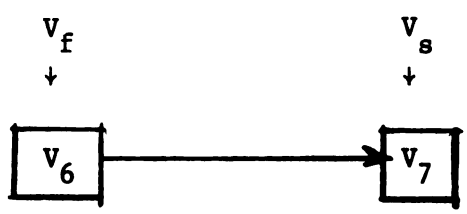


Figure 1-2. Hypothesized relationship between network structure and clinic productivity.

there can be little doubt of the correctness of the causal arrow. The whole of the body of research on the effect of controlled or manipulated

networks suggests that network morphology affects production. Hypotheses 6 and 7 are directly related to findings in this area.

Hypothesis 6: The higher the degree of network interaction, the more productive is the group in task performance (clinic productivity).

Hypothesis 7: The higher the degree to which the group is dominated, in terms of communication, the less productive the group in task performance (clinic productivity).

But what about the rest of the relationships in the model? No concrete body of literature suggests that any one of variables one through five can necessarily be conceived as prior to variable six. And all of these variables were processed simultaneously; hence, innumerable other models that fit the data might be specified.

This issue can be approached through two avenues. Heise (1969) suggests that where feedback cycles could be reasonably appended to the model, and thus the system becomes non-recursive, then that part of the path model which is recursive may still be valid. But with regard to the process outlined for the system, it is incomplete. Under this proposition, it would be admitted, a priori, that network morphology, V_6, affects variables precedent to it in the model, but that it does so at some later date, a date which could be isolated if the periodicity of the feedback cycle were known. But of course it is not known, so the validity of the recursive path model can be only hypothesized and, sadly, not subjected to a test.

A second approach to the specification problem is to gird a path model with assumptions which are intuitively acceptable and do not

conflict with any previous assumptions. To this end, two assumptions are offered.

1) It is assumed that individuals interact with others about their job in order to satisfy their uncertainty about jobs.

2) It is assumed that uncertainty is the result of culturally determined communication rules and the availability of information in the organizational communication system.

With these assumptions, we can cover the problem of specifying causal relationships in the model.

Under the first assumption a causal link between job-information dependence and interaction can be postulated. Given the first assumption, when an individual is in a state of high uncertainty about his job, he will interact more often with his fellow employees. Hence job-information dependence determines the degree of network interaction.

But what determines uncertainty? Under assumption two, uncertainty is determined by communication rules, such as those that govern the relationship between supervisor and subordinate, and by previous availability of information, the quality of the information, and its believability. Assumption two suggests that information dependence is determined by variables one through four of the hypothesized model (i.e., agreement on information priority, subordinate perceived control in the supervisor-subordinate relationship, information quality, and hierarchy credibility).

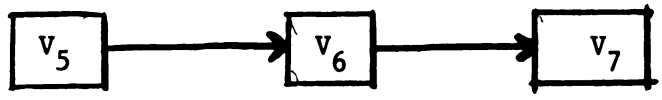
The two approaches to the specification of stages in the process are, of course, not antithetical to one another. They both deal with essentially the same problem and, even under the assumptions given above, there is no guarantee that feedback loops which affect the

model are not present. In fact, it is highly reasonable to suggest that they are indeed there, for most organizations are unabashedly, self-acclaimedly, even self-righteously, feedback-oriented. This requires us to adopt Heise's paradigm. There are a number of implications to this--one negative and the other positive.

On the negative side, it must be admitted that any organization worth studying (any with feedback loops) is not likely to have important information systems that can be *fully* described by path analytic procedures. Non-recursive systems must be resorted to.

On the positive side, it should be possible, since at least some of the feedback loops are formally specified, to fill in causal feedback loops into any causal model. Hence, non-recursive models become easier to construct. But there is an additional positive effect that accrues when feedback loops are inferred. This advantage is best shown by an example.

Suppose that the last three variables of the hypothesized path are taken. It is reasonable to assume that:



The management of the agencies being studied, and indeed of any organization, uses some measure of production (V_7) to feedback into the production information system ($V_{1\ldots6}$). Hence we can draw another diagram.

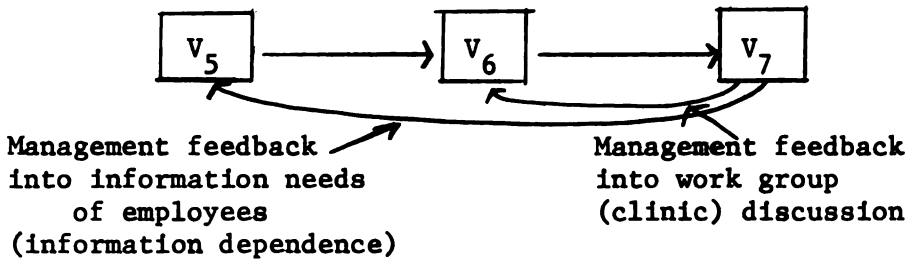
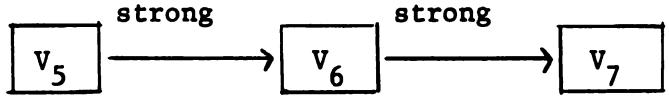


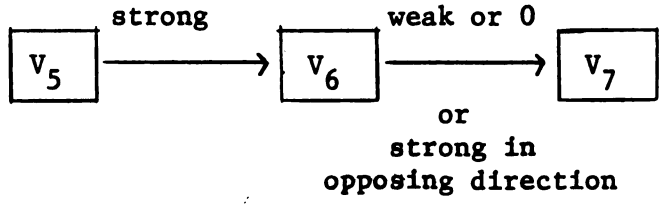
Figure 1-3. Feedback links between Variables 5, 6 and 7.

Now let it be supposed that, a priori, the path model is accepted *without a test.* Acceptance, from the point of view of the management, would require that the assumptions for the staging of the model, and the interconnections between variables in the model, be accepted as *a* (not *the*) correct way to prescribe organizational conduct. When these a priori suppositions are made, path analysis may be used as a diagnostic tool to correct management flaws.

For instance, if it is postulated that V_5 is highly correlated to V_6, and V_6 is highly correlated to V_7, we can write:



But if the empirical correlations give rise to path estimates that differ, say like



then we must surrender our assumptions. In this case, it may not be assumed that (in the organization under study) the degree of interaction in work groups leads to improved production. Interaction in work groups fulfills some other function. The dysfunctional (in terms of production) pattern of interaction may be attributed to lack of control or

direction from above, for it is the management which must enact the feedback loop from V_7 to V_6. Hence, by noting discrepancies from an accepted path, we may locate very specifically the problems within a process and infer weak management practices in specific areas.

Hypothesis-testing techniques may also be developed to determine optimal operation of feedback loops. For instance, if r_{57} is significantly different from (P_{65}) x (P_{76}) (the multiplicand of path estimates), then feedback loop $(V_7 \rightarrow V_6)$ may be dropped in favor of feedback loop $(V_7 \rightarrow V_5)$ for the latter suggests a direct effect.

In short, if we are willing to hypothesize feedback loops, we can use path analysis indirectly to infer the strength or weakness of these loops and can thus comment on management performance.

And there is anecdotal evidence during data gathering that suggests that management of the two agencies does initiate a feedback loop to the clinics. During late summer of 1973, IMCH clinics began to receive computer printouts ranking their previous months' performance against that of all other clinics in the agency. These were treated with great seriousness by clinic physicians.

Empirically, some measure of the feedback loop from management is available. Respondents in the study were asked to describe frequency of interaction with organizational employees other than clinic staff. These were invariably management personnel, so an estimation of feedback loop strength based on frequency of interaction is available. In this context, Hypothesis 8 is espoused.

Hypothesis 8: The higher the embeddedness of the group in the organization, the higher the productivity of the group.

Embeddedness will be defined as the degree of interaction between clinic family planning workers and agency management personnel.

It seems logical to suggest that performance of a work group is to some extent based on management. It also seems logical to test the relationship between network form and production. These are traditional relationships for researchers in organizational communication. But are there compelling reasons for selecting variables one through six as important variables? The question of "why these variables and not others?" must be answered.

As was implied earlier, the method of path analysis implies, or constrains, an answer. A quick look at any path diagram reveals that as the number of variables in the system rises, the number of hypothesized relationships rises geometrically. It behooves one who uses the technique to espouse as parsimonious a theoretical *weltanschaung* as can be found, for if one's vision of organizational realities is only moderately complex, a set of paths describing relationships is likely to be unmanageable. For this reason the variables in the study are fairly traditional ones in the study of organizational communication or in communication studies in general.

Summary and Overview

The purpose of this study is to define the relationship between communication relationship variables and network structure variables and productivity. The communication relationship variables are subordinate perceived control of the supervisor-subordinate communication relationship, agreement on information priority, information

quality, hierarchy credibility, and information dependence. The network structure variables are group connectedness and group dominance.

The study was conducted in the Philippines with two family planning agencies, one governmental and the other private. All subjects in the study were clinic personnel with the agencies. The study is an approach to the problem of how communication input influences clinic productivity in a Southeast Asian setting.

Five variables, subordinate perceived control of supervisor-subordinate communication, agreement on information priority, information quality, information dependence, and hierarchy credibility, are hypothesized to be related to frequency of interaction about family planning in two family planning agencies in the Philippines. The geography and a short organizational overview of the agencies was supplied, and then each hypothesis was supported with empirical findings and/or theoretical background. The argument for the positive relationship between subordinate control in the supervisor-subordinate relationship and interaction was couched in a critique of available explanations of why leaders or central figures attract communication from subordinates. The argument for agreement on priority information's positive effect on interaction is presented in the context of ABX systems. The argument for information quality's negative effect on interaction is made from empirical findings interpreted under a satisficing assumption. Hierarchy credibility is said to negatively correlate with clinic interaction. This position is taken after a reinterpretation of Argyris' proposed effects

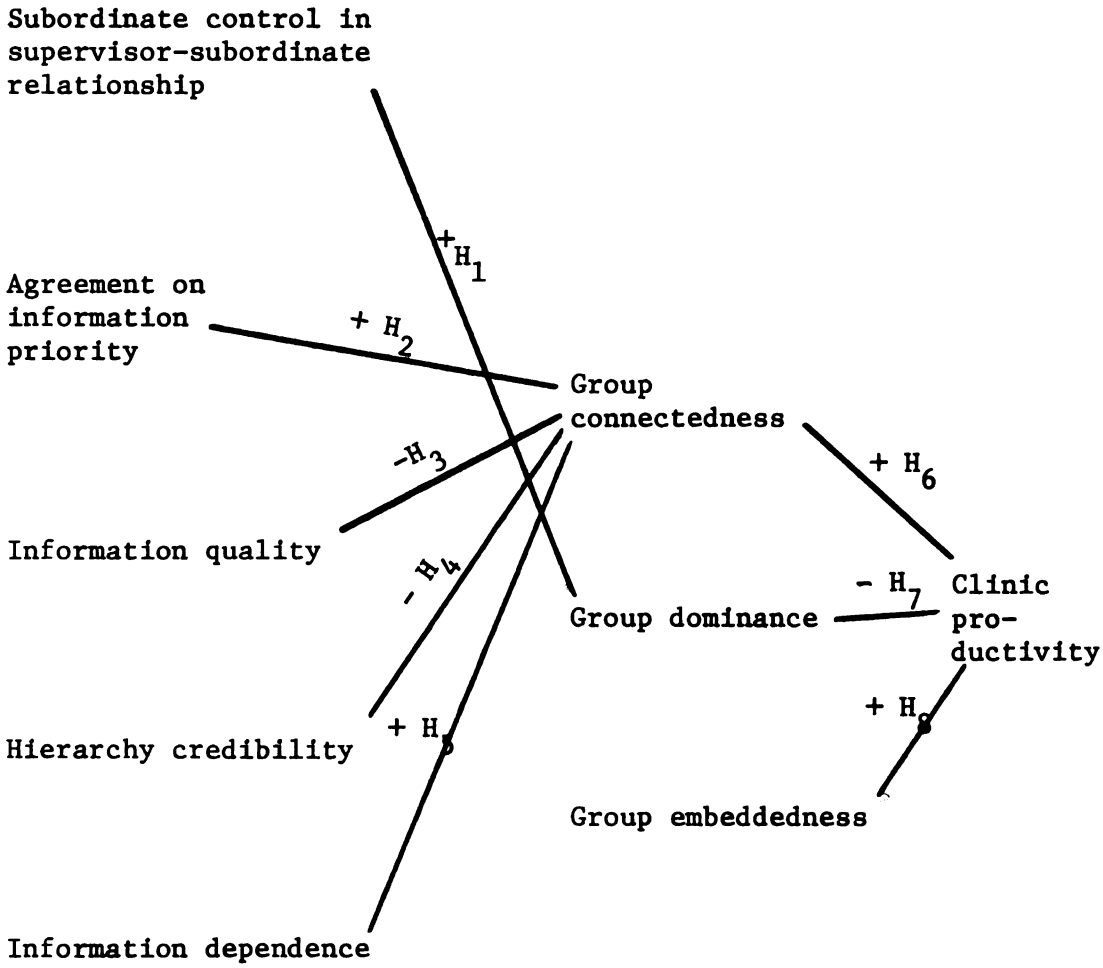
of hierarchy and an overview of credibility correlates, i.e., authoritarianism, etc. And finally, information dependence is said to be related positively to interaction largely to coincide with Kelley's approach to information dependence.

After arguments for the specific relationships designated in the first five hypotheses, a path model of interrelationships is proposed (Hypotheses 6, 7 and 8 are offered along with the model). These hypotheses relate network structure variables to the productivity of a network: group connectedness is hypothesized as positively correlated with production, group dominance negatively correlated, and group embeddedness positively correlated. The proposed model is bolstered by empirical evidence and two basic assumptions. It is then shown how a path model can act as a diagnostic tool for the development of better management communication. The hypotheses and the path (with overall effects of the control variables) are summarized in Figure 1-4.

In Chapter II, the operationalization, measurement, and scaling of the variables for the study are set forth. After a brief note on funding and entry into the two organizations, the selection of the sample clinics and rationale based on their distance from Manila is outlined. The development and use of a pre-research interview protocol is briefly discussed and is followed by the description of and data pertaining to the pretest questionnaire.

After these considerations the final operationalization of the variables, the manipulation of the data to achieve interval scaling for all variables, and the decisions to delete items from the

Hypotheses 1-8



The Hypothesized Path Model (Residual Terms Deleted)

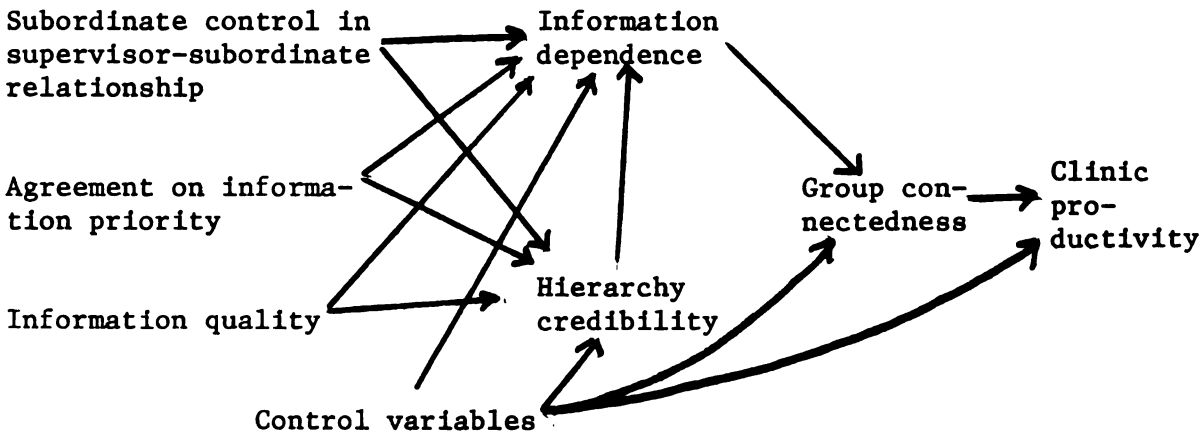


Figure 1-4. Overall diagram of relationships in the present study.

measurement of certain variables are treated. This section is followed by a brief consideration of the use of control variables in the study design and by the scaling of sociometric responses.

The findings of the study are set forth in Chapter III. Each hypothesis is repeated, the descriptive statistics pertinent to the variables laid out, and a brief comment on significance or lack of significance made. Due to the small sample size, an alpha of .10 is adopted. The treatment of each hypothesis is followed by an analysis of relationships in the path model. This begins with a consideration of the control variables and how they affect the model. After the control variables are included as exogenous variables, their effect on each stage of the model is analyzed. This is followed by a comparison of the hypothesized relationships in the path with the empirically derived sets of relationships in the path.

After a brief comparison it is suggested that different subsets (doctors, nurses, and midwives) of the sample reacted to the study questionnaire in systematically different ways. This is checked by comparing the zero order correlations for the hypotheses for each of the subsets of the sample and then outlining differences in the empirically derived path for each of the subsets. This comparison is followed by a section showing the relative stability of the correlations of the study variables with clinic productivity over a seven-month period.

In Chapter IV the findings are discussed. The chapter starts with a summary of the study. Then the hypotheses which are disconfirmed are examined and reasons for their disconfirmation are

suggested. This section is followed by some policy suggestions and the suggestion that future research place emphasis on a functional definition of networks rather than on one based solely on frequency of interaction.

CHAPTER II

PROCEDURE

In this chapter the procedure for conducting the study and the manipulation of data are set forth. The chapter starts with a section on preliminaries, which treats entry and funding problems as well as construction of a protocol for open-ended interviews. This is followed by a section on the sample of clinics for the study, which is followed by a treatment of the development of measurement for the variables in the study. This last section covers the construction of a pre-test questionnaire, pertinent data from the pre-test, the development of a final questionnaire, and the employment of validation and scaling routines in building interval scales for all the variables.

Preliminaries

This study was funded by a joint grant from the East-West Center in Honolulu, the University of the Philippines, and the Office of International Programs, Michigan State University. Funding was given when a proposal to do the study was submitted to the East-West Center. The University of the Philippines Institute of Mass Communication agreed to lend substantial material support and to give the researcher

a junior faculty research position. Michigan State University agreed to give the researcher support for his dependents.

The study was conducted from April of 1973 to September of 1973. The data were collected during August of 1973. The period previous to August was spent in obtaining permission to do research from the Population Commission, Office of the President, Republic of the Philippines, and from the two agencies in the study. This period was also used to acclimate to the culture, study, make on-site visits to clinics, interview management level personnel of both agencies, and develop and test a questionnaire.

He who wishes to study an organization must expect to spend time and energy on entry. For the present study entry into the organizations took one month.

During this period, formal organizational descriptions, written work routines, annual reports, and other pertinent documents were thoroughly studied. From these and from discussions with the chiefs of the two organizations, a rough open-ended questionnaire was devised. The questionnaire intended to serve as the basis for information collecting which would allow the researcher to answer several pertinent questions.

These questions were: Do the employees of these agencies perceive differences in the quality of messages? If so, what are the dimensions along which quality is assigned? Can we ask for measures of credibility in the highly paternalistic Filipino hierarchy? Is trust a pertinent variable? Can employees distinguish types of information from one another and, if so, what kinds? What are the

parameters for the construction of a personal contact checklist in these agencies? What are the dimensions of supervisor-subordinate relationships that are important in the Filipino hierarchy? What are some characteristics of information flow in the agencies?

It was realized that only when these questions were answered could an adequate survey instrument be devised. A protocol designed to obtain responses in these areas was devised and submitted to colleagues at the UP/IMC for comment. As was noted in the acknowledgements, their contributions were numerous and helpful.

During this same period, preliminary visits to outlying family planning clinics were undertaken. These visits suggested changes in the protocol and resulted in direct experience with communication problems the questionnaire was designed to tap. Clinics of both agencies were visited. Areas where the visits were made were the Provinces of Bataan and Bulacan. Care was taken to insure that no clinic in the study sample was visited during this pre-investigation stage.

These clinics could be avoided because tentative decisions on which clinics were to be in the study were made prior to the visits and during consultation with the agencies. One area was chosen close to Manila, and another somewhat more distant. The Province of Bulacan, only 30 kilometers from Manila, was chosen as the close-in area, and the Provinces of Pangasinan and La Union, about 250 kilometers from Manila, were chosen as the somewhat more remote area. Within Pangasinan and La Union the more remote clinics were chosen. This was done in answer to the suggestion by the head of

one of the agencies that communication in some of the more "difficult" areas be studied.

Later an additional area was selected. Funding from the East-West Center had been late in arriving in Manila. When full funding was finally received, it was decided that clinics from the Visayan region should be included. This decision was made in July of 1973. Although most of these clinics are fairly near cities, they are not on Luzon, hence travel to Manila from the area is relatively more expensive and time consuming than from the other sampled areas.

During the same period, a series of case studies of clinics produced by staff members of the Institute of Mass Communication was thoroughly examined (IMC-UNESCO, 1972). Each of these yielded valuable information on coordination of staff; preceding these visits, were conferences with both the regional and provincial offices of the agencies.

In summary, familiarity with both the formal and informal practice of both organizations was obtained during the period when the open-ended protocol was being devised.

Once the protocol was designed, interviewing was begun. Interviewers, the researcher and a faculty member from UP/IMC, covered three clinics from each agency in two of the three sample areas--the close in and the relatively remote. From two to five personnel from each of these clinics were interviewed. In addition, interviews were taken from provincial and regional health officials in the DOH and from field representatives and headquarters in IMCH. These latter interviews enabled an examination of upward communication from clinics to the units to which they report.

To this point, only the preliminaries to the study have been treated. With the conclusion of the brief treatment given above to entry, preliminary protocols, and selection of areas to be studied, a more comprehensive treatment of sampling procedure, operationalization of variables and scaling computations is in order.

Selecting the Sample

First, decisions on sampling will be considered.

Given the constraints of geography, politics, and finance, nothing approaching a random sample of clinics or clinic personnel was possible for this study. It was decided that since distance was such a controlling influence in administration of the family planning programs under study, it was necessary to systematically allocate clinics to the study in terms of their remoteness from or nearness to Manila. Accordingly, three distance conditions were chosen. These conditions, the provinces within them, and the number of clinics from each agency within each are given by Table 2-1.

Within each of the distance treatments, decisions on which clinics to include were made on several criteria. First, for IMCH clinics, the five in Bulacan and La Union represented the total for those provinces. For those chosen from Cebu, it was decided that clinics from around the Cebu City area were to be included. This decision was made in order not to confound the third distance condition with the second. It is eight hours from La Union to Manila by bus. It is one hour by plane from Cebu City to Manila. If it were eight hours from an IMCH clinic on Cebu to the Cebu City airport, to what would we attribute absence of personal communication with

Table 2-1. Allocation of clinics to the study sample

	IMCH	DOH
Near Manila	Province of Bulacan 5 IMCH clinics (total for province)	Province of Bulacan 10 RHU clinics
Relatively remote	Province of La Union 5 IMCH clinics (total for province)	Province of Pangasinan 10 RHU clinics
Most remote	Province of Cebu 5 IMCH clinics (within 20 kms of Cebu City)	Province of Northern Leyte 10 RHU clinics

Manila--the length of the drive to the airport, or the price of the flight?

Virtually the same argument was made in choosing RHU clinics in Northern Leyte. Clinics in and around Tacloban, the provincial capital, were chosen so that the controlling factor in communication with Manila was the flight from Tacloban to Manila and not ground transport from a clinic to Tacloban.

The ten RHU clinics in Pangasinan were chosen for their remoteness from Manila. The ten RHU clinics in Bulacan were chosen for their closeness to Malolos and thus their access to Manila, which is connected to Malolos by a superhighway. Operationally, the three conditions are defined by a) close--15 to 45 minutes by car to Manila, b) more remote, eight to five hours by bus to Manila, and c) one to one and one-half hours by plane or two to three days by boat to Manila.

There was no sampling of personnel within the clinics in the sample. As is demanded for network construction, a census of personnel within each clinic was taken. All individuals involved directly in family planning work--physicians, nurses, and midwives--were included in the census. Although clinics have other personnel--dentists, sanitary inspectors, etc.--these are not included in the family planning program and hence are excluded from the sample.

During actual data collection, several clinics and their personnel had to be dropped from the sample. In two clinics, one in Cebu and one in Pangasinan, the staff was absent on vacation during data collection. One clinic in Pangasinan was only one week old when data collection was performed, hence there were no performance records for the staff, nor would respondents' reaction to the questionnaire have amounted to more than guesswork. In La Union two clinics in the sample were presided over by the same doctor. The two clinics were treated in the analysis as one. Hence the total number of clinics in the study is 41. The total number of personnel in the sample is 138.

Lists of the clinics in the sample are to be found in the Appendix. With each clinic listed is the number of individuals from the clinic included in the study.

Development of Measurement for Variables

In the preceding section on preliminaries the development of an open-ended interview protocol to be given to clinic personnel was discussed. In this section, the contribution of interview responses to the formation of a pre-test questionnaire and a final questionnaire

are discussed. And of course, with discussion of the final questionnaire, there is concomitant operational definition for the variables in the study. A copy of the final questionnaire is included in the Appendix.

The open-ended interviews made a number of signal contributions to the development of a structured questionnaire. First, the interviews defined, however vaguely, the parameters of frequency of communication about family planning between clinic and administrative personnel. The definition of these parameters allowed the researcher to structure responses to sociometric choice questions. The result was a set of responses varying from "more than once a day" to "two or three times a year", with six other frequencies between these two. Responses to sociometric frequency questions enabled the construction of a valued matrix representing the network and channel strengths.

With the parameter for frequency of communication about family planning, there developed some ideas on the formality of supervisor-subordinate relationships. These were contributed to also by conversations with clinic staff and observation of interaction between doctors, nurses, and midwives. From these sources seven multiple choice questions on the important dimensions of conversational control were developed.

Several questions in the protocol asked for responses on the quality of memos, circulars, and other directives that the clinic staff receive. Generally, there was agreement on the high quality of information received in these messages, but some suggestions for improvements were made. Specifically, there were calls for higher

specificity, higher degree of relevance to the clinic (not just middle management levels), and the need for more directives. These suggestions and others led to the construction of 17 Likert type scales designed to tap the quality of directives received by the clinics. As is the case with most studies done in the Philippines, alternatives in agreement with Likert stimuli are not "strongly agree, agree..." but "agree, agree somewhat,...". Generally the use of the former results in less variance (Ables, 1973; Mercado, 1973).

Also contained in the interview protocol were several questions designed to obtain responses on the definition by clinic personnel of their job. Essentially, these responses were intended to contribute toward the construction of questionnaire items measuring job difficulty, complexity, routine, and load. And these in turn define the degree to which the clinic worker is dependent on others for help.

From this information 23 Likert type questions were developed for the measurement of on-the-job information dependence.

Moreover, this kind of information allows the construction of a set of stimuli which tap the basic orientation of individual to his task. For instance, when clinic personnel are asked to describe their job and rank its components in terms of importance, as in the first question of the protocol, it is of interest to note whether they describe activities which are supervisory or not, or activities which require teamwork or are relatively autonomous, or activities with clients or with other staff. The last two questions in the protocol paralleled the first in intent, for again they ask their respondents

to give advice on what kind of information is important on the job or to rank from stimuli the kind of information which is most important on the job. It is this last question which served as a basis for constructing a similar question on the structured questionnaire.

From the data reviewed above and from interaction with clinic staff, a structured questionnaire was developed. As indicated above, the questionnaire was as follows:

1) Sociometric choice section with entries of name and title of choice and structured responses for frequency of interaction.

2) Supervisor-subordinate relationship section with seven multiple choice questions.

3) Twenty-three Likert type scales designed to tape on-the-job information dependence.

4) Seventeen Likert type scales designed to tap the quality of written messages received by the clinic staff.

5) One ranking question designed to tap information needs on the job.

6) Two ranking questions designed to tap the credibility of supervisors and hierarchy.

Each of these sections will now be treated separately. In each section, statistics relevant to choice of items for the final questionnaire, and thus the final operational of the variables, will be presented.

The questionnaire described above was pretested using clinic personnel from RHU clinics in the Province of Pampanga. Pampanga lies halfway between Manila and Pangasinan and thus constitutes a

"compromise" province in accessability. Two days of pretesting resulted in fifteen finished questionnaires. Statistics cited below were computed from the pretest questionnaires.

Sociometric Measurements

The first section of the pretest was the sociometric choice section. Here there were two major concerns: 1) Was the set of structured frequency alternatives sufficiently comprehensive? and 2) Was there sufficient distinction within each questionnaire of different frequencies of interaction with different employees? Deficiency with respect to either of these issues would reduce the size of correlations, the first through limitation of range and the second through limitation on precise expression of within-clinic variance. Data pertinent to these issues are presented in Tables 2-2 and 2-3.

Table 2-2 suggests that there is full use of the range of frequency ratings and furthermore that the distribution is skewed toward the side of high frequency. There was, however, little indication from open-ended responses that more than two or three times a day would have been a valid addition to the frequency ratings, hence the range of eight possible frequency ratings was retained rather than extended to nine, the ninth being something more frequent than more than once a day.

On the second issue, most respondents made use of at least several frequency ratings. Furthermore, the two respondents who used only one frequency rating each cited only two contacts with other personnel.

Table 2-2. Range of choices on eight frequency of contact responses by 15 subjects

Alternative	Number of Citations
1) More than once a day	12
2) About once a day	22
3) About two or three times a week	23
4) About once a week	7
5) About two or three times a month	6
6) About once a month	14
7) About once every two months	4
8) Two or three times a year	1
Total	89

Table 2-3. Range of frequency of contact responses used by each individual

		Number of people in pretest sample
number of	1	2
different	2	4
frequency	3	4
ratings	4	3
employed	5	2
	Total	15

The results of these tabulations are that the sociometric questions and frequency ratings used in the pretest questionnaire are of sufficient quality to retain and, furthermore, their ability to make distinctions is sufficient to make mathematical manipulation of frequency ratings a valid measurement of interpersonal and clinic interaction.

Group connectedness, therefore, is defined as the average frequency of interaction for the relationship that composes the groups. *Group domination* is defined as the variance of frequency of interaction scores for all within-group relationships. *Group embeddedness* is defined as the average channel usage value of all relationships from family planning workers at the clinic level to non-family planning workers at the clinic level and/or to family planning workers at other hierarchical levels.

The three variables underlined constitute the variables for which measurements were derived from sociometric choices. As indicated, there is another dependent variable included in the study, *clinic productivity*. Before going on to the independent variables for the study, a brief treatment of clinic productivity is in order.

Mathematically, clinic productivity was calculated by the average number of family planning acceptors for the months of January through August, 1973, obtained by the clinic.

Control Variables

It can well be argued that clinic productivity will depend on a host of other variables. This is no doubt the case, and one who wishes to understand the effect of network differences on clinic

performance must control on a number of non-communication variables. For this study, 16 control variables were isolated and information was obtained for each. On a special *Control Variables* questionnaire administered to clinic physicians only, questions tapped responses on:

1) Public accessibility to clinic*
2) Availability of electricity and water*
3) Availability of equipment*
4) Availability of family planning literature*
5) Clinic motivation performance*
6) Physical state of building housing clinic*
7) Observation of regular hours for family planning consultation*
8) Presence of support from other governmental agencies*
9) Presence of moral or religious objections to family planning among staff*
10) Presence of private room for internal examination
11) Lateness of pay*
12) Presence and number of other family planning clinics in the municipality
13) Whether or not two clinics are housed in the same building
14) Number of staff

The main questionnaire yielded information on the sex of the physician and the average age of the staff, the remaining structural variables. The scaling of these variables and their treatment in the design are clarified later in this chapter. At this point, it

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*Likert scales.

suffices to say that those control variables which appear to be important in predicting clinic success are included in the analysis in multiple regression equations with productivity as the dependent variable. That part of the variance explained due to the control variables can thereby be represented in the analysis.

With this treatment of control variables and variables based on sociometric choices, it is now proper to examine the final operationalization and measurement of each of the independent variables in the study. This will be done in a manner consistent with the proposed path for variable effects. That is information priority agreement, subordinate-perceived control in the supervisor-subordinate communication relationship and information quality will be treated first. Hierarchy credibility will be treated next, and then information dependence will be treated last.

The measurement of information priorities was obtained from a single ranking question. In this question the respondent was asked which kinds of knowledge about family planning work was most important to have. These kinds of knowledge correspond to critical systems functions (Miller, 1967) cited in the first chapter. Respondents were then asked to rank eight kinds of knowledge about family planning work. The ranking stimuli and corresponding systems function are given in Table 2-4.

Pretest questionnaires reveal that, given an example of how a ranking question is answered, respondents had little trouble ranking stimuli in this question. Therefore, the question was retained in the final questionnaire.

Table 2-4. Ranking stimuli and corresponding systems function*

Stimulus to be ranked	Function
Knowledge about the feelings and thoughts and personalities of my co-workers	INTERNAL TRANSDUCER
Knowledge about family planning program objectives and policies	REPRODUCER
Knowledge about how to fill out family planning records and family planning forms	DECIDER
Knowledge about other family planning workers' experiences, problems and suggestions	MEMORY
Knowledge about new contraceptives, or new issues or research in family planning techniques	ASSOCIATOR
Knowledge about whom to go to with family planning problems--knowledge of who is an expert in family planning	CHANNEL AND NET
Knowledge about the people in the barrios and poblacions--what they think and feel about family planning	EXTERNAL TRANSDUCER
Knowledge about who knows whom and who is friendly with whom in the organization	BOUNDARY

*Respondents were asked to rank, in terms of their importance for the respondent's job, the eight stimuli on kinds of knowledge.

This was not the case for questions designed to tap the *subordinate-perceived degree of control in supervisor-subordinate interaction* questionnaire. The respondent was asked to answer seven multiple choice questions on the items listed in Table 2-5. Since the number of choices for each question varied, answers were coded then transformed before part-whole correlations for item analysis were computed. The

zero-order correlation coefficients for item analysis appear in Table 2-5.

Table 2-5. Subordinate-perceived control of supervisor-subordinate relationship items with item analysis correlations

Item	r's of each item/ total score
Accessibility of supervisor	-.06
On who brings up family planning problems for discussion	.44
Interruptions in relationship	.64
Expression of agreement	.43
Topic choice	.60
On who talks most in F discussions	.30
Amount of questions in discussion	.78

Of the seven items from this section of the pretest questionnaire, six were retained in the final questionnaire. Only the second to last question, on who dominates discussion in terms of time, with an r of .30, was deleted. The first question was retained for purposes not related to this study.

There are a number of criticisms against usage of such data for scale construction. First, one may argue that the data from such questions are not linear, nor is the requirement of homoscedasticity met. Second, part-whole correlations from such a few items undoubtedly are biased for the variable under question contributes

heavily to the whole score. Thirdly, as some have pointed out (Guilford, 1954), this second objection leads to a situation where even with totally orthogonal items a part-whole correlation of $1/N$ (N = no. of variables) can be expected. For this set of data $1/N = 1/7 = 1/2.64 = .38$. Certainly items two and four with respective r's of .43 and .44 do not markedly differ from .38. Hence, their validity is in question.

These criticisms deserve attention because they may be applied, although with somewhat less vigor, to the information quality and information dependence variables as well as to the measurement of supervisor-subordinate relationship measurement. The criticisms are themselves open to a number of objections.

First, the criticisms tend to cancel one another out. It is agreed that part-whole correlations with seven items will result in high r's due to individual item contribution to whole scores but the failure to meet linearity and homoscedesticity requirements will reduce the r's. With regard to the lower loading items, two and four, and their closeness to r = .38, one may answer the criticism by noting that it is based on the assumption that *all* items are orthogonal.

And of course they are not. A part-whole correlation of .43 on seven items, three of which have part-whole r's over .60, is far different from a part-whole r of .43 on seven items all of which are orthogonal. The latter is suspect, while the former will lend some weight to predictive validity.

This counter to the criticism of item weakness raises the issue of predictive validity, which in turn raises the issue of theoretical rather than methodological counters to criticisms of item weakness. There are two of these.

First, all of the variables defined by item analysis techniques for this study are, as an examination of the first chapter reveals, multifaceted constructs. When the theoretical definition of a variable admits to a certain latitude, then the operationalization and measurement of the variable should correspond. One should err on the side of predictive validity rather than construct validity, if one has to err.

Second, failures in application of theory to the field in the Orient are numerous. This is all the more unfortunate, for often field studies with adequate predictive outcomes are often desperately needed. One's responsibility to the client agency intrudes at this point. They have expectations that should be met.

The remaining variable in the first stage is *information quality*. Information quality was measured by a series of Likert scales sifted from a group of 23 scales used in the pretest. Part-whole item correlations were computed from pretest data and then scales for the first questionnaire were chosen. The part-whole correlation for each of the nine scales is presented in Table 2-6.

The variables of the second stage in the path model were measured by similar techniques. *Hierarchy credibility* was measured by a pair of ranking questions. In each, respondents were posed a problem, one medical and one administrative, and then asked to rank personnel

Table 2-6. Part-whole correlations for nine Likert-type scales on information quality

	r's of each item/ total score
Sometimes the memos and circulars we receive about family planning arrive late.	.47
Most circulars give us only broad policy statements.	.47
Usually we staff members have to discuss instructions we receive about family planning in the clinics.	.21
We very rarely get memos or circulars about family planning.	.42
Circulars from family planning headquarters are not detailed enough.	.55
There is room for improvement in the memos on family planning that we get.	.60
Sometimes the information we learn about family planning from memos is contradicted by other information we learn about.	.65
Occasionally a family planning circular or directive asks us to do the impossible.	.67
Often the family planning memos and circulars we get contain information important to the provincial and regional offices, but not so important for us at the RHU's.	.51

at different levels of the hierarchy in terms of their perceived capacity to solve the problem or offer advice on a solution to the problem.

Of course, because there are two different organizations, the two hierarchies are not similar, so individuals serving roughly the same functions within each agency were located (see Table 2-7). Questionnaires reflecting these differences were developed and distributed. Pretesting revealed that a number of regional level personnel were seldom if ever ranked higher than the lowest rank. Therefore in the final questionnaire some regional offices were deleted from the range of possible rankings. In the second question on this variable, that dealing with an administrative problem, respondents were asked to rank only their top four choices. This was done because of complaints during the pretesting that a number of individuals to be ranked were unknown or barely known by the pretest respondents. A summary of the questions for this variable is found in Table 2-7.

The remaining independent variable is *information dependence*. This construct, like the above, is tapped by nine Likert scales. These nine were chosen from a set of 16 used in the pretest questionnaire. The part-whole item correlations for each of these is given in Table 2-8.

These scales are intended to tap the degree to which agency employees are dependent upon colleagues for advice or direction. Items on the perceived difficulty of the job were included under the suspicion that a relationship between job difficulty and information dependence existed. The resulting scale is too much a composite and problems in reducing it to a cleaner measure of the construct are treated in the next section.

Table 2-7. Stimuli ranked in hierarchy credibility measurement

RHU personnel	IMCH personnel
The Medical Problem	
The Provincial Health Officer	Field Representative
The Regional Medical Coordinator	Clinic Physician
The Regional Nursing Supervisor	IMCH Seminar Leader
The Municipal Health Officer	Dr. del Mundo
Myself	Myself
Other, if any (specify)_____	Other, if any (specify)_____
The Administrative Problem	
Municipal Health Officer	Field Representative
Provincial Nursing Supervisor	Clinic Physician
Provincial Administrative Officer	IMCH Seminar Leader
The Family Planning Project Director	Dr. del Mundo
The Regional Director	Mrs. Sanchez
Myself	Myself
Other, if any (specify)_____	Other, if any (specify)_____

Scaling and Index Construction

The above section treats the operational definition of each of the study variables by outlining the items that contribute to measuring that variable. In the present section, the manipulation and analysis of responses to each item is considered, with the final outcome being the development of an index for each variable. All indices are built from items reduced to interval measurement. The result is interval measurement for each variable as required for testing routines involving multiple or zero-order correlations. As in the preceding section, each variable will be treated in order of its appearance in the hypothesized path.

Table 2-8. Part-whole correlations for nine Likert-type scales on information dependence

	r's of each item/ total scores
The family planning part of my job is difficult.	.54
I find it a good idea to get help from others when dealing with family planning problems.	.21
Family planning work is fairly routine.	.50
Family planning work consumes more time than the other things I do.	.66
When a problem related to family planning arises, I usually try to handle it myself.	.33
Most of the people in the barrios we serve share the same thoughts and feelings about family planning.	.27
I feel confident in doing the family planning part of my job.	.47
Without the advice of others, I would fail in doing family planning work.	.33
It seems like there are less problems in the family planning part of my job than in the other parts of my job.	.35

Subordinate-perceived control in the supervisor-subordinate relationship was measured by a set of multiple choice questions. The variable is defined as the degree of control of the conversational agenda perceived by the subordinate, that is, the degree to which the subordinate perceives himself to define the content (subject under discussion) and pragmatic (questioning, disagreeing) aspects of his relationship with his superior. The choices for the respondent

were analyzed in ascending or descending order on the dimension of conversational freedom with one's supervisor. An example is given below:

Question (4) Place an x on the line next to the sentence that best describes amount of disagreement with your boss.

_____ If I feel he is wrong, I will openly and frankly disagree with him.

_____ If I disagree with him usually I will say so but our disagreement should be private and confidential rather than public.

_____ I will very rarely openly disagree with what the boss says under any circumstances. We must be loyal to our supervisor.

_____ I would never disagree privately or publicly with my boss. He knows best.

Each of the six items tapping this variable were then submitted to scaling by the method of successive categories in which the actual category rather than the category limit is scaled (Guilford, 1954, p. 237). There each response to each item was transformed from nominal to linear values using values obtained from the scaling procedure.

Once this transformation was finished the comparison of one item against another by use of a correlation matrix and factor analysis was made possible. The data were submitted to a routine which develops an intercorrelation matrix and a principal axis solution for defining a main factor. The results are given below in Tables 2-9, 2-10, and 2-11. In the final analysis, the score for the variable was obtained by weighting the items by the squared factor loadings in Table 2-11 and summing the weighted items.

Table 2-9. Intercorrelation matrix for six supervisor-subordinate relationship items

		Var. 1	Var. 2	Var. 3	Var. 4	Var. 5	Var. 6
Var. 1	Accessibility of supervisor		.06	.09	.16	.04	.09
Var. 2	On who brings Fp problems up for discussion			-.01	.06	.17	-.15
Var. 3	On how often subordinate interrupts boss				.43	-.22	.15
Var. 4	On how openly subordinate disagrees with boss					-.35	.15
Var. 5	On who chooses topics						-.20
Var. 6	On who asks questions						-

Table 2-10. Principal factor from six supervisor-subordinate relationship items

		Principal factor
Var. 1	Accessibility of supervisor	.15
Var. 2	On who brings Fp problems up for discussion	-.17
Var. 3	On how often subordinate interrupts supervisor	.65
Var. 4	On how openly subordinate disagrees with boss	.79
Var. 5	On who chooses topics for discussion	-.66
Var. 6	On who asks questions	.56

Table 2-11. Revised principal factor solution for four supervisor-subordinate relationship items

		Principal factor
Var. 3	On how often subordinate interrupts	.69
Var. 4	On how openly subordinate disagrees with boss	.80
Var. 5	On who chooses topics for discussion	-.65
Var. 6	On who asks questions	.54

The scaling for *agreement on information priority*, since it was measured by a ranking procedure, involved a different set of manipulations. Agreement on information priority is defined as the similarity among respondents in ranking the importance of information about different aspects of their job (e.g., client relationships and attitudes, policy and objectives, etc.). First a matrix of the ranks by items was constructed. From this, in a routine which estimates the proportions of comparative judgments, each item against the others, a matrix of proportions was developed. The proportions matrix was used to scale each item under Case V of Thurstone's Law of Comparative Judgment.

As is proper under Case V, a test of internal consistency was made. Though Guilford suggests that one is not appropriate when estimations of proportions are made from ranking data, there is always the possibility that the estimated proportion matrix contains figures based on items whose dispersions are widely different or

abnormal, or figures based on judgments utilizing different dimensions. To test for such a possibility, the Mosteller X^2 was employed. The application of this routine resulted in an X^2 = 9.618, df = 21, sig. at .98. Thus, the null is saved, and the scaling of the ranking data by this routine appears to be usable.

Having determined scale values, the comparison of individual ranking was developed in the following manner. One person's first choice was compared with another's and the difference between the two computed. The differences across all eight ranks were then added to form an index of the degree similarity of ranking of information importance. Using this method, a difference score characterizing each relationship in the sample was developed. The individual score was computed as an average of his difference scores in each of his relationships.

The treatment of *hierarchy credibility* was very similar to the treatment outlined above for information priority. Hierarchy credibility is defined as the degree to which organization members perceive the hierarchy above them as manifesting either expertise or trustworthiness and thus to be competent sources of advice or agents of problem solving. Two questions asking respondents to rank positions in the hierarchy by their capacity to give advice or solve problems were used to measure the variable. A matrix of ranks by hierarchical positions was developed for both questions measuring the variable. These matrices were treated just as outlined above. A proportions matrix was developed and from that scaling under the assumptions of Case V took place. Just as above, the Mosteller X^2 test for internal

onsistency was employed just as in ranking data for information riority.

But the scaling routine for hierarchy credibility departed from he routine outlined for information priority in one crucial way. ndividual scores for each respondent were obtained by subtracting ndividual responses from a standard rather than from one another. he standards are given in Table 2-12 and Table 2-13.

Each respondent's ranking for each question was treated by subracting his ranking of stimuli from the standard in Table 2-12 or able 2-13. For example, when a respondent from DOH ranks the physiian first, the nursing supervisor second, the provincial administraive officer third, and the regional director fourth, then the ollowing calculations are made (Table 2-14).

The respondent's score totals 0. It conforms perfectly to the chain of command." In other words, his belief in the hierarchy redisposes him not to bypass. But if the respondent lacks faith n the physician, then he will choose someone else first, thus ontributing to his total. The higher the score becomes, then the ess belief in this advising or problem solving capacity of the mmediate hierarchy indicated by the respondent. This method of omputation was used in both questions measuring the variable and hen the two scores were summed to yield the respondent's score.

Two of the variables in the study, *information quality* and *jobnformation dependence*, were measured by Likert scales. Information ependence will be treated first. Job information dependence is the egree to which an employee is dependent upon his supervisor or

Table 2-12. Standard for computation of individual hierarchy credibility scores--medical problem

DOH	IMCH	Standard
Municipal Health Officer	Clinic Physician	1.4944
Provincial Health Officer	Field Representative	.8536
Reg. Nursing Supervisor	Dr. del Mundo (Director)	.5853
Reg. Medical Coordinator	IMCH Seminar Leader	.5275
Myself	Myself	.6360
Other	Other	.0000

Table 2-13. Standard for computation of individual hierarchy credibility scores--administrative problem

DOH	IMCH	Standard
Muncipal Health Officer	Clinic Physician	1.8657
Provincial Nursing Supervisor	Field Representative	1.7358
Provincial Administrative Officer	Mrs. Sanchez (Ad. Off.)	1.3171
Regional Director	Dr. del Mundo (Director)	.9087
FP Project Director	IMCH Seminar Leader	1.5749
Myself	Myself	.3490
Other	Other	.0000

Table 2-14. Computation of an individual hierarchy credibility score

From the standard	From resp. ranking	Abs. value of difference
1.8657	--- 1.8657	= 0
1.7358	--- 1.7358	= 0
1.3171	--- 1.3171	= 0
.9087	--- .9087	= 0
		0 Total

other employees for interpretations of job activity related cues: specifically, it occurs when an employee seeks advice on the importance of a cue event, the understanding of the cue, and the behavior required by the cue. Earlier, it was stated that the scale for this variable was composed under the assumption that the respondent's perception of the difficulty of the job would interact highly with information dependence. It makes sense, prima facie, to assert that one who thinks his job is difficult is dependent on advice from others and vice versa. If this is true, then items tapping one dimension should correlate highly with items tapping the other. The intercorrelations between Likert scales, with the corresponding stimuli, are given in Table 2-15. The evidence suggests that the correlation assumed above is not true. In fact, the intercorrelation matrix is filled with startlingly low r's.

This problem was handled by submitting the data to a principal axis factor analysis routine. The results were a principal factor

Table 2-15. Intercorrelations of information dependence items

Item	1	2	3	4	5	6	7	8	9
1) The family planning part of my job is difficult.	---	.08	.04	.13	-.07	.14	-.07	.10	.19
2) I find it a good idea to get help from others when dealing with family planning problems.		---	.03	-.10	-.23	.10	.02	.03	-.15
3) Family planning work is fairly routine.			---	-.02	-.05	.19	.10	.11	.18
4) Family planning work is very time consuming.				---	.11	.01	-.19	-.05	-.12
5) When a problem related to family planning arises, I usually try to handle it myself.					---	.22	.06	-.05	.27
6) Most of the people in the barrios we serve share the same thoughts and feelings about family planning.						---	-.12	.15	.30
7) I feel confident in doing the family planning part of my job.							---	-.01	.16
8) Without the advice of others I would fail in doing family planning work.								---	.16
9) It seems like there are less problems in the family planning part of my job, like pre- or post-natal work.									---

and a secondary factor illustrated in Table 2-16. The highest loading item in the first factor was an item on the nature of the job rather than the need for advice or obtaining help from others. But the secondary factor is not of the same structure. The two highest loading variables are on trying to get help from others and trying to solve problems alone. Furthermore, the difference in the proportion of variance explained by the principal factor as against the secondary factor is negligible.

Table 2-16. Principal and secondary factors for principal axis solution of information dependence items

	Principal factor	Secondary factor
Var. 1	-.39	.09
Var. 2	-.24	.03
Var. 3	.35	.47
Var. 4	-.13	.46
Var. 5	.54	-.54
Var. 6	.62	.14
Var. 7	.23	.28
Var. 8	.23	.33
Var. 9	.79	.04
	prop of variance explained .19	prop of variance explained .15

With these data, a new factor solution was sought. Variables 3, 6 and 9 were deleted from the solution and a principal axis of the structure outlined in Table 2-17. This factor weights heavily Variables 2 and 4, thus weighing heavily the variables which, on the face of it, define the construct.

Table 2-17. Revised principal axis solution for information dependence items

	Principal factor
Var. 1	.22
Var. 2	.73
Var. 4	-.39
Var. 5	-.73
Var. 7	.08
Var. 8	.21
prop of variance explained	.22

Scores were obtained by squaring the factor loadings of each variable, and using the square to weight the response on the Likert scales. The weighted responses were then added to one another to produce a single score. Items 4 and 7 were reversed for the procedure.

The Likert scales for the *information quality* scale were treated in much the same fashion as those for information dependence. The quality of work-related information is defined as the judgment by an

employee of the suitability of formal messages to meet the job related information needs he has, where suitability may be interpreted along dimensions important to the employee, i.e., specificity, clarity, timeliness, etc. The intercorrelations for the items measuring the variable are found in Table 2-18. With the exception of Variable 3, these are high enough to trust that there is a degree of homogeneity to the items. An examination of item 3 reveals that it is characterized by almost no variation in responses, thus it may be discarded. The remaining items were treated as in the foregoing procedure. The factor loadings for each item were squared and used as weights for each Likert scale, then the weighted responses were added to give the respondent's score on the variable. The principal axis solution appears in Table 2-19.

Control Variables

The remaining variables pertinent to the study, the control variables exogenous to the proposed path, were treated in the following fashion. All measurements of these variables were gathered into a multiple correlation equation predicting clinic performance. The partial correlation coefficients for each variable were examined (Table 2-20), and the highest of these were chosen. Though none of these was significant ($\alpha = .10$), it was decided to control on at least some variables, since the multiple r for the equation was .78. Care in selecting the variables to control on is necessitated by the stipulation that variables accounting for residual variance in path models are required to be uncorrelated with endogenous variables. The selection of variables upon which to control implies their

Table 2-18. Intercorrelations of information quality items

Variable	1	2	3	4	5	6	7	8	9
1) Sometimes the memos and circulars we receive about family planning arrive late.	---	.25	-.01	.12	.39	.38	.30	.21	.21
2) Most circulars give us only broad policy statements.		---	-.01	.05	.37	.21	.28	.29	.19
3) Usually we staff members have to discuss instructions we receive about family planning in the clinics.			---	-.15	.06	.02	.13	.05	.01
4) We very rarely get memos or circulars about family planning.				---	.27	.02	.24	.15	.19
5) Circulars from family planning headquarters are not detailed enough.					---	.25	.30	.17	.39
6) There is room for improvement in the memos on family planning that we get.						---	.20	.00	.02
7) Sometimes the information we learn about family planning from memos is contradicted by other information we learn about.							---	.32	.25
8) Occasionally a family planning circular or directive asks us to do the impossible.								---	.35
9) Often the family planning memos and circulars we get contain information important to Headquarters or the Field Representatives, but no so important for us at the clinics.									---

Table 2-19. Principal axis solution for information quality items

	Principal factor
Var. 1	.66
Var. 2	.62
Var. 3	.05
Var. 4	.39
Var. 5	.71
Var. 6	.40
Var. 7	.64
Var. 8	.54
Var. 9	.56

utility in accounting for residual variance, and thus variables chosen for control should exhibit nonsignificant correlations.

This problem was overcome by defining the correlation coefficient necessary to significantly differ from r = .00 and consulting the correlation matrix of structural variables to delete one variable from paris of highly correlating variables. A correlation of r = .39 at d = .99 two ways is required (by methods outlined in McNemar (1969) for dealing with small samples, p. 157) for such a comparison. The Partial correlation coefficients for the more valuable structural variables against clinic performance are given in Table 2-20.

However, Variable 1 was eliminated from the design for it correlated with Variable 3 at .54. Variable 2 was correlated with

Table 2-20. Partial correlations for control variables against clinic productivity

		Partial r (all other variables held constant)
Var. 1	Sex of physician	.24
Var. 2	Public access to clinic (reverse)	-.30
Var. 3	Clinic fully equipped (reverse)	-.30
Var. 4	Clinic regularly receives FP literature (reverse)	-.17
Var. 5	Motivators could perform better (reverse)	.36
Var. 6	Clinics hold regular hours	.17
Var. 7	Clinic receives support from authorities	.16
Var. 8	Clinic shares building with other clinic	-.38
Var. 9	Number of competing clinics in same area	.18
Var. 10	Population of area clinic serves	.25

Variable 5 at .43 and Variable 9 with Variable 3 at .45, so they were likewise discarded.

The scaling of sociometric responses entailed a different procedure than scaling of Likert-type responses. Sociometric responses on the frequency of interaction were obtained. The frequency of interaction was coded in one of eight frequency categories. At first it seems apparent that ratio scaling can be easily constructed. Obviously, "2 times a day" is more than "once a day" by a multiple of 2.

But a number of objections intrude. First, the clock is a mechanical contraption, and not necessarily a psychological one. Second, the Filipino culture is not nearly as concerned with time or the passage of time as is the American. Thirdly, a scaling of choice frequencies based on time would be badly skewed. And fourthly, the frequency stimuli which the respondents were asked to react to were themselves characterized by latitude, e.g., "More than once a day" or "two or three times a week." Hence, an exact accounting of days and weeks is not really available.

Under these conditions it was assumed that the distribution sociometric nominations for any respondent was normal and that the nominations could be scaled by the method of successive categories. This was done using the distribution of responses given in Table 2-21.

Table 2-21. Scale values for sociometric response categories

More than once a day	3.65
About once a day	3.00
About two or three times a week	2.52
About once a week	2.13
About two or three times a month	1.91
About once a month	1.54
About once every two months	.79
Two or three times a year	.00

The frequency of responses is, as one can see, only roughly normal.

The departures from normality can be attributed to a number of effects. Obviously, the upper end (high frequency) of the scale is skewed. But efforts in the pretest to have people estimate how often "more than once a day" actually was simply failed. The fourth and fifth frequencies received a lower number of nominations as an artifact of geography and administration. Clinic staff speak to one another about family planning more often than once a week, but rarely speak to provincial or regional staff more than about once a month; thus the bimodal nature of the dispersion.

The effect of assuming normality and scaling in that basis is to reduce the distance between 3 and 4, 4 and 5, and 5 and 6. But since frequencies 4 and 5 appear less frequently than others, negative effects are somewhat palliated.

Summary

This chapter has outlined the procedure followed in the study. It began with obtaining funding from the East-West Center, the University of the Philippines Institute of Mass Communication, and Michigan State University and the entry of the researcher into the two organizations studied. During this period the researcher made preliminar on-site visits, read organizational material and conferred with management.

In conference with the management and with fellow researchers, it was decided to draw a sample based on the distance from Manila. Three distance conditions--accessible (mid Luzon), somewhat

inaccessible (northern Luzon), and distant (Visayas)--were drawn up and clinics located in provinces meeting these conditions were drawn for the sample. An interview protocol for the study was designed and clinic personnel were interviewed from all three areas in the sample.

From responses to the interviews, a pretest questionnaire was devised and responses obtained from 15 clinic staff employees in the Province of Pampanga. These responses were analyzed to reduce the number of questions in the final questionnaire to those which appeared valid. To accomplish this a number of changes were made in the pretest questionnaire. One multiple choice question was deleted in the measurement of subordinate perceived control. Several ranking stimuli were removed from the two ranking questions measuring hierarchy credibility. The number of Likert scales used to measure information quality and information dependence was reduced to nine in each case. These items revealed item/whole score correlations ranging from .67 to .21.

The data obtained from the revised questionnaire were scaled in a number of ways. Rank data (agreement on information priority and hierarchy credibility) were scaled by an approximation with the pair comparison technique. The approximate was then applied to the Thurstone method under Case V and the resulting scales were tested using the Mosteller X^2 test. Likert scale data (information quality and information dependence) were accepted as coded from questionnaires. Multiple choice questions (subordinate-perceived control) were scaled by the method of successive categories, and then added to yield an index.

The number of control variables in this study was reduced by constructing a large multiple regression equation including all possible variables which might predict the dependent, clinic performance, and then deleting those which failed to exhibit substantial b's or those which correlated highly with control variables exhibiting substantial b's. Lastly, sociometric responses were scaled by the method of successive categories, the most frequent response receiving a scale value of 3.65 and the least frequent 0.0.

CHAPTER III

FINDINGS

In this chapter the findings of the statistical tests of the hypotheses given in Chapter I are set forth. The chapter is organized under the following format. First the hypotheses relating communication variables to network structure variables and network structure variables to productivity are considered. Each of these is presented in a standard format, replete with high and low values for the variable, the variable mean and variance and a short explication.

Second, the set of statistical relationships that is relevant to the hypothesized path is considered. A full presentation of all possible relationships within the path is preceded by a consideration of control variables and their integration into the path of proposed effects. The integration of control variables is achieved by examining each stage of the model and mapping the effects of the control variables onto the specific stage. The rationale for this procedure is given before the procedure is employed. The treatment of control variables is useful for elimination of weak or spurious relationships in the path model.

Third, it is suggested that the members of the study sample reacted to the questionnaire in systematically different ways. To test this suggestion, the sample is divided into subsamples based on

professional qualification--doctors, nurses, and midwives. The hypotheses and the path are retested for each of the subsamples.

Finally, the chapter concludes with an attempt to deal with a common problem in survey research, the problem of predicting "yesterday's" effect with today's data.

Relationships with Communication Connectedness and Dominance

The connectedness variable expresses the frequency with which clinic personnel communicate with one another, whereas the dominance variable expresses the degree to which communication in a clinic is dominated, in terms of frequency, by one or more individuals. Responses to questions on the frequency of interaction among clinic personnel from which connectedness and dominance are computed were scaled using the values given in Chapter II. Since these values are the assigned values for the dependent variable in four of the next five hypotheses under discussion (2, 3, 4 and 5), the descriptive statistics for the variable are given herewith.

Variable	Minimum Value	Maximum Value	Mean	Standard Dev.
Connectedness (based on frequency of interaction)	.711	3.646	2.954	.605

The individual connectedness score, which expresses the frequency of interaction by an individual with his fellow clinic employees, was computed by averaging the values of a respondent's cited contacts with other members of the sample. It is based on the frequency of

interaction cited by each individual in the sociometric questions on the first several pages of the questionnaire.

But for every hypothesis put forward in the earlier part of this study, there was a corollary. All of these corollaries state relationships between the connectedness or dominance of a particular clinic (not an individual score, but an average of all individual scores for the clinic) and the average score for clinic personnel on some other variable. In each of these corollaries clinic connectedness or clinic dominance is the dependent variable. Just as above, the descriptive statistics for these two variables are now given.

Variable	Minimum Value	Maximum Value	Mean	Standard Dev.
Clinic connectedness	1.590	3.646	2.962	.520
Clinic dominance	.000	.865	.256	.239

The correlations of independent variables with the dependent variables were computed by a double precision correlation routine. Since the use of the double precision option had a marked effect on the size of the correlations computed, a few remarks on this option are in order. Essentially, the option deletes from any set of data all of the responses of any respondent if just one of the responses of the given respondent is either unknown or ambiguous. The option assumes that if any one of a given respondent's responses is unknown or amgibuous, then there is reason to believe that the other responses made by the same person are either wrongly coded or contain a high degree of error. The effect of using a double precision set of data is to reduce the N of the sample. For this study, the use of the

double precision option reduced the N for persons from 138 to 77, and the N for clinics from 42 to 41.

The deletion of almost half of one's sample, 61 respondents in fact, from a study seems folly. But since the effect of this deletion will be analyzed later in this chapter, it suffices to say that in any study involving a culture other than the author's, there is a high chance that error will contribute heavily toward responses and that under these conditions it is wise to use a double precision option in computations. The alternative is to employ a single precision routine which deletes from the data only those individual data points which are in error. This procedure was followed *after* the use of the double precision routine and a verbal comparison of the differences between the statistics obtained using both methods occurs later in the chapter.

In order to relieve the study of the burden of testing hypotheses under conditions that are too severe, it seems sensible to offset the effect of diminished sample size by setting less severe alpha criteria for rejecting the null. Accordingly, the alpha level for hypotheses and for estimates of effects in the path model will be set at $\alpha = .10$. Since the N's for the tests of hypotheses are small, the significance of the correlations will be tested by the t-test for the difference between correlations taken from small samples. The formula for this test is:

$$t = r\sqrt{\frac{N-2}{1-r^2}}$$

In all tests the null shall be rejected only if it is shown that the empirically obtained correlation is significantly different from zero. Since the sample sizes from which the correlations are computed are known and do not change from one test to another, the degrees of freedom for each test are known and the required t for each of the hypotheses and its corollaries can be computed. These are:

For significance level = .10, df = 75, t = 1.662 (for hypotheses)

For significance level = .10, df = 39, t = 1.685 (for corollaries and clinic level hypotheses)

Subordinate-Perceived Control in the Supervisor-Subordinate Communication Relationship

The first set of hypotheses in the study have to do with the relationship between a subordinate's perception of his ability to control the flow of conversation with his superior and the amount of interaction between the two. *Subordinate-perceived control* in the supervisor-subordinate relationship is defined as the degree of control of the conversational agenda perceived by the subordinate, that is, the degree to which the subordinate perceives himself to define the content (subject under discussion) and the pragmatics (questioning, disagreeing, etc.) aspects of his relationship with his supervisor.

Hypothesis 1: The higher the degree of subordinate-perceived control in the supervisor-subordinate relationship, the higher the frequency of interaction in the supervisor-subordinate relationship.

The corollary to Hypothesis 1 is:

Hypothesis 1a: The higher the degree of subordinate-perceived control in the supervisor-subordinate relationship, the higher the degree to which the group is dominated.

Descriptive statistics for the variable subordinate-perceived control are given below:

Variable	Maximum Value	Minimum Value	Mean	Standard Dev.
Subordinate perceived control in the supervisor-subordinate communication relationship	4.781	.722	3.407	.737
Clinic average	4.570	1.850	3.395	.546

The dependent variable in Hypothesis 1 is the frequency of interaction in the supervisor-subordinate relationship. The descriptive statistics for this variable are:

Variable	Maximum Value	Minimum Value	Mean	Standard Dev.
Frequency of interaction in the supervisor-subordinate relationship	3.650	0.0	2.688	.891

The zero order correlation coefficients for H_1 and H_{1a} are as follows:

H_1 $r = .109$ $t = .9495$

H_{1a} $r = .008$ $t = .0499$

Since the t's for these correlations failed to meet the previously specified alpha level, the null hypothesis may be rejected in neither case. H_1 and H_{1a} are not confirmed.

Agreement on Information Priority

The second set of hypotheses proposes a relationship between agreement among persons about what kinds of information are important and the amount of interaction between people. *Agreement on information priority* is defined as the similarity among respondents in ranking the importance of information about different aspects of their job (e.g., client relationships and attitudes, policy and objectives, etc.).

Hypothesis 2: The higher the degree of agreement on information priority in a relationship, the higher the frequency of interaction.

The corollary to Hypothesis 2 is:

Hypothesis 2a: The higher the degree of agreement on information priority within a group, the higher the group connectedness.

Descriptive statistics for the variable agreement on information priority are given below.

Variable	Maximum Value	Minimum Value	Mean	Standard Dev.
Agreement on information priority	5.906	.245	2.736	1.099
Clinic average	4.744	1.893	2.898	1.052

The zero order correlation coefficients for H_2 and H_{2a} are:

H_2 $r = .016$ $t = .1385$

H_{2a} $r = .014$ $t = .0874$

As is the case with the first hypothesis, the t statistics fail to reach the required value at $\alpha = .10$ and the null may be rejected in neither case. H_2 and H_{2a} are not confirmed.

Quality of Information

The third hypothesis and its corollary suggest a relationship between the quality of the information an individual receives from the formal organizational message system and the rate of interaction he exhibits with other workers. The *quality of information* is defined as the judgment of an employee of the suitability of formal messages to the job related information needs he has, where suitability may be interpreted along dimensions important to the employee (i.e., specificity, clarity, timeliness, etc.).

Hypothesis 3: The higher the quality of information transmitted in the formal message system, the lower the frequency of work related interaction with other group members.

The corollary to Hypothesis 3 is:

Hypothesis 3a: The higher the quality of information transmitted in the formal message system, the lower the group connectedness.

Descriptive statistics for the variable quality of information are given below:

Variable	Maximum Value	Minimum Value	Mean	Standard Dev.
Quality of information	3.870	13.390	9.004	2.553
Clinic average	5.000	12.700	8.814	1.953

The zero order correlation coefficients for H_3 and H_{3a} are:

H_3 $r = -.231$ $t = 2.056$

H_{3a} $r = -.107$ $t = .665$

In this case, since the t statistic for H_3 is above the required value, at $\alpha = .10$, the null hypothesis for H_3 may be rejected. Hypothesis H_3 is confirmed. However, the t for H_{3a} fails to reach the required level of significance and H_{3a} is not confirmed.

Perceived Hierarchy Credibility

In Hypothesis 4 and its corollary, it is proposed that the credibility of the hierarchy, or chain of command, will influence the amount of interaction. *Hierarchy credibility* is defined as the degree to which organization members deem the hierarchy above them as manifesting either expertise or trustworthiness and thus to be competent sources of advice or agents of problem solving.

Hypothesis 4: The higher the degree of perceived hierarchy credibility, the lower the rate of interaction among group personnel.

The corollary is:

Hypothesis 4a: The higher the degree of group members' perceived hierarchy credibility, the lower the degree or group connectedness.

The descriptive statistics for the variable hierarchy credibility are given below.

Variable	Maximum Value	Minimum Value	Mean	Standard Dev.
Hierarchy credibility	4.091	0.000	1.514	.935
Clinic average	3.610	.325	1.760	.801

The zero order correlation coefficients for H_4 and H_{4a} are:

H_4 $r = -.055$ $t = .477$

H_{4a} $r = -.049$ $t = .306$

Since the t statistic for both correlations does not reach the predetermined level for significance, at $\alpha = .10$, neither of the hypotheses, H_4 or H_{4a}, is confirmed.

Perceived Information Dependence

The fifth set of hypotheses proposes a relationship between the degree to which an individual sees himself as dependent upon others for work related information and the amount of interaction the individual takes part in. *Information dependence* is defined as the degree to which an employee is dependent upon his supervisor or other employees for interpretations of job activity related cues: more specifically, it occurs when an employee seeks advice on the importance of a cue event, the understanding of a cue, and the behavior required by the cue.

Hypothesis 5: The higher the degree of perceived information dependence, the higher the degree of work related interaction.

The corollary to Hypothesis 5 is:

Hypothesis 5a: The higher the degree of perceived information dependence, the higher the degree of group connectedness.

Descriptive statistics for the variable degree of information dependence are as follows:

Variable	Maximum Value	Minimum Value	Mean	Standard Dev.
Perceived information dependence	4.657	1.315	2.751	.970
Clinic average	4.060	1.640	2.914	.707

The zero order correlation coefficients for H_5 and H_{5a} are:

H_5 $r = .201$ $t = 1.777$

H_{5a} $r = .178$ $t = 1.1295$

As is the case with H_3, the main hypothesis is supported but the corollary is not. For H_5, t is above the required value for statistical significance, at $\alpha = .10$, but for H_{5a} t is below the value.

Relationships with Clinic Productivity

Hypotheses 6 through 8 are qualitatively different than the preceding five. All of them hypothesize relationships between the kinds of patterns found in the clinic network and the productivity of the clinic. Clinic productivity, the dependent variable in

Hypotheses 6 through 8, is measured in terms of the average number of family planning acceptors per month obtained by the clinic staff over a period of eight months. The descriptive statistics for the variable are:

Variable	Maximum Value	Minimum Value	Mean	Standard Dev.
Clinic productivity	79.6	15.6	32.9	14.2

The same value for the t statistic as that required for confirmation of the corollaries of the previous hypotheses will be required for rejection of the null in Hypotheses 6 through 8. The required value is t = 1.685.

Clinic Connectedness and Clinic Productivity

Hypothesis 6 predicts a positive relationship between the amount of interaction in a clinic and the productivity of the clinic. To wit:

Hypothesis 6: The higher the degree of connectedness in the group, the more productive the group in task performance (clinic productivity)

The descriptive statistics for clinic or group connectedness are those given in the earlier part of the chapter when connectedness was treated as a dependent variable.

Variable	Maximum Value	Minimum Value	Mean	Standard Dev.
Clinic connectedness	3.646	1.590	2.962	.520

The zero order correlation coefficient for H_6 is:

H_6 $r = .178$ $t = 1.130$

The value of the t statistic fails to meet the level required for statistical significance, at $\alpha = .10$, hence the null cannot be rejected. Hypothesis 6 is not confirmed.

Communication Dominance and Productivity

Hypothesis 7 suggests that there is a relationship between the degree to which clinic staff are dominated in terms of communication choices by one or a few central figures and the output of the clinic.

Hypothesis 7: The higher the degree to which the group is dominated, in terms of communication, the less productive the group in task performance (clinic productivity).

Descriptive statistics for the variable dominance are given below:

Variable	Maximum Value	Minimum Value	Mean	Standard Dev.
Dominance	.865	.000	.255	.239

The zero order correlation for H_7 is:

H_7 $r = .051$ $t = .3189$

The size of the correlation and its corresponding t statistic are too small to reach the appropriate value for statistical significance at $\alpha = .10$. Hypothesis 7 is not confirmed.

Communication Embeddedness and Productivity

Hypothesis 8 posits a relationship between the amount of outside-the-group contacts for any group and the productivity of the group.

Hypothesis 8: The higher the embeddedness of the group in the organization, the higher the productivity of the group.

The embeddedness for any clinic was computed by simply adding the number of outside-the-clinic contacts within the organization for each member of the clinic until there was a clinic sum. The descriptive statistics for the embeddedness variable are:

Variable	Maximum Value	Minimum Value	Mean	Standard Dev.
Embeddedness	29	0	10.29	8.16

The zero order correlation coefficient for H_8 is:

H_8 $r = .203$ $t = 1.2946$

Since the t statistic fails again to reach the required level of significance, the null hypothesis cannot be rejected and H_8 fails to be accepted.

Summarizing to this point, two hypotheses have been confirmed and six have been rejected. Hypotheses 3 and 5, linking information quality negatively and information dependence positively to frequency of interaction, have been confirmed. Attempts to link subordinate perceived control in the supervisor-subordinate relationship, agreement on information priority and hierarchy credibility with rates of interaction in Hypotheses 1, 2 and 4 were not successful. The

The corollary hypotheses to the above five hypotheses failed likewise. In addition, attempts to relate group network characteristics to productivity, Hypotheses 6, 7 and 8, failed to yield statistically significant findings.

Analysis of Relationships in the Path Model

Since the path model for this study involves a cumbersome number of variables, the analysis of the relationships detected in the model is divided into two sections. First the impact of the control variables on each stage of the model will be examined. Then the entire model will be examined for patterns matching or violating those of the hypothesized path model.

Control variables, as such, are not normally a part of path analysis. Path analysis usually defines measured variables as either exogenous (having no causally prior variable within the model) or endogenous (caused by one or more of the exogenous variables). Unmeasured variance is attributed to a residual. But it is clear that there are two types of measured variables in this study. Some are related to communication within the agencies being studied and the others, the control variables, are largely geographical or socio-structural or demographic in nature. The question, then, is how should these latter variables be included in the model of path effects?

Perhaps the easiest way to account for the variability in clinic productivity due to the control variables is to simply include them in the model as exogenous variables. This has the effect of removing the variability in clinic productivity due to these variables by

simply accounting for it in the beta weights of the multiple regression equations which furnish path estimates. Moreover, since we know from demographic studies that the control variables explain clinic productivity, they give us something of criteria against which the size of the beta weights for estimates of the effects of communication variable effects can be compared.

However, there is a cost to adding the control variables to the path model. With the addition of seven more variables to the path, the model becomes overly complicated. The complication is to some extent relieved by a strategy described in the second chapter. The strategy was to treat the control variables, not as exogenous variables, but as residual variables and thus to require that they be uncorrelated with one another. This having been done, it is possible to interpret the effect of any of the control variables on the variables at any stage of the model as entirely a direct effect. Thus the virtually innumerable possible indirect effects of one control variable on one of the variables of the model through any number of other control variables is avoided. This allows a stage-by-stage analysis of the effects of all the variables in the model on one another. It also allows a detection of spurious relationships among communication variables which may have one or more control variables acting as underlying or preceding variables. It should be pointed out that correlations between exogenous variables, while they have a statistical effect on the estimation of path coefficients, are not considered to be of theoretical interest. It follows that we may need to know the correlations between exogenous variables not

as objects of analysis themselves but in order to interpret the model correctly.

The model, as hypothesized, appears in Figure 3-1.

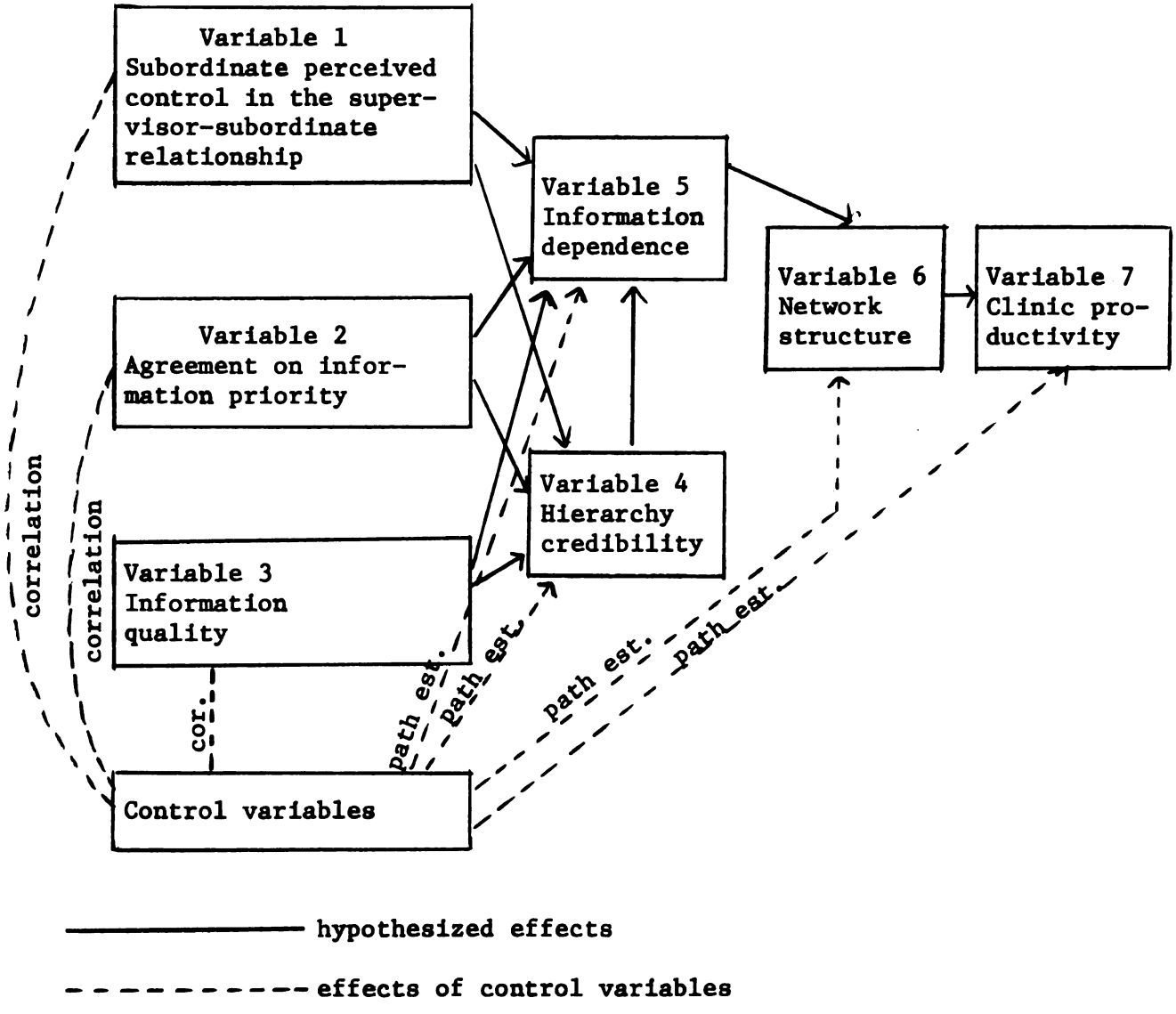


Figure 3-1. The hypothesized path model with the effect of control variables.

From the foregoing discussion of control variables, it appears that before an analysis of the full path model is attempted, it is helpful to set forth, in as organized a manner as possible, the effects of the control variables on the endogenous variables of the proposed path. This is a multiple task. First, if the model is to be interpreted correctly, it is necessary to know the correlations between all exogenous variables (especially including control variables) in the model. Second, it is necessary to set forth the effects of the control variables upon each of the endogenous variables. The variables involved in these problems are presented in visual form in Table 3-1.

In terms of Table 3-1, the problem is to (1) set forth the correlations between variables in block 1: this is required for any path model; (2) set forth the correlations between variables in block 2 and block 1: it is not necessary to examine intercorrelations among variables in block 2 for these variables have been chosen in such a way that they are not highly correlated; and (3) set forth the empirically derived beta coefficients for paths from variables in block 2 to variables in block 3. These are the direct effects of the control variables on the path model.

These steps are undertaken in the following tables (Tables 3-2 through 3-4). Each table contains correlations from two data bases. The first data base is that taken from individual responses of the respondents. The second is that taken from the clinic average of each clinic in the sample. Correlations from the first data base (the individual responses) are not enclosed in parentheses, while

Table 3-1. Exogenous and endogenous variables in the hypothesized path

Exogenous Variables		Endogenous Variables	
Study variables (block 1)	Subordinate-perceived control in supervisor-subordinate relationship		
	Agreement on information priority		
	Information quality		
		Study variables (block 3)	Hierarchy credibility
			Information dependence
			Group connectedness
			Clinic productivity
Control variables (block 2)	Clinic fully equipped		
	Clinic regularly receives FP literature		
	Motivators could perform better		
	Clinic holds regular hours		
	Clinic receives support from authorities		
	Clinic shares building with other clinic		
	Population of area clinic serves		

Table 3-2. Zero order correlations between exogenous study variables

	Subordinate perceived control	Agreement on information priority	Information quality
Subordinate perceived control	---	.04 (.16)	.12 (.32)
Agreement on information priority		---	.08 (.08)
Information quality			---

r's not in parentheses: individual data N = 77
r's in parentheses: clinic data N = 41

those from the second data base (clinic averages) are parenthesized. Table 3-2 sets forth the correlations between exogenous study variables. Table 3-3 sets forth the correlations between the exogenous study variables and the control variables. Table 3-4 sets forth the beta weights for path estimates from the control variables to the endogenous study variables.

The intercorrelations between exogenous variables and the direct effect of control variables having been set forth, it is useful before proceeding to examine their utility. Essentially, they enable the researcher to test empirically derived path estimates to see whether the relationships they suggest are spurious or not, for where there is a sizable path estimate from an exogenous variable to an endogenous variable, but at the same time the exogenous variable is correlated to a control variable, which in turn has a sizable path estimate to the same endogenous variable, then there is reason to suspect a

Table 3-3. Zero order correlations between control variables and exogenous study variables

	Subordinate perceived control	Agreement on information priority	Information quality
Clinic fully equipped	-.20(-.06)	.35(.34)	.27(.12)
Clinic regularly receives FP literature	-.14(-.15)	-.22(-.12)	.00(-.02)
Motivators could perform better	-.03(-.08)	-.23(-.11)	.07(-.11)
Clinic holds regular hours	-.01(.01)	-.08(-.18)	-.11(-.14)
Clinic receives support from authorities	-.14(-.17)	.12(.29)	.10(.05)
Clinic shares building with other clinic	.03(.28)	-.19(-.34)	-.01(.36)
Population of area clinic serves	-.10(-.08)	.32(.40)	.07(.08)

r's not in parentheses: individual data N =77
r's in parentheses: clinic data N = 41

spurious relationship. This, then, is the utility of the figures in Tables 3-2 through 3-4. They allow one to test the validity of hypothesized path estimates.

Now that the relationships of the control variables to the endogenous variables in the proposed path have been set forth, it is possible to look at the pattern of path effects empirically derived from the data. These are given in Tables 3-11 and 3-12. The path estimates in the table were derived from sets of multiple regression equations of the following form. A specific endogenous

Table 3-4. Beta coefficients for effects of control variables on endogenous variables

	Hierarchy credibility	Information dependence	Group connectedness	Clinic productivity
Clinic fully equipped	.06(-.16)	-.21(.05)	.41*(.42)*	-.16(-.15)
Clinic regularly receives FP literature	.09(.15)	.08(-.04)	.19(.13)	-.14(.09)
Motivators could perform better	.00(-.21)	-.08(.21)	.08(.18)	.30*(.16)
Clinic holds regular hours	.34*(.24)	-.40*(-.35)*	-.04(-.09)	.06(.07)
Clinic receives support from authorities	.13(.20)	.00(.31)	.07(.13)	.30*(.08)
Clinic shares building with another clinic	-.18(-.43)*	.15(.21)	.17(.23)	-.24*(-.58)*
Population of area clinic serves	.11(.04)	.01(-.09)	-.22(.02)	.60*(.54)*

r's not in parentheses: individual data N = 77
r's in parentheses: clinic data N = 41

*Significant at $\alpha = .10$.

variable acted as the dependent variable and all previous variables in the model, i.e., the control variables, the exogenous variables, and preceding endogenous variables, are independent variables. For example, in predicting Variable 5, information dependence, all control variables, Variables 1, 2 and 3 (the exogenous variables), and Variable 4 (a preceding endogenous variable) were entered into the regression equation as independent variables.

Where betas for individual paths reach the .10 level of significance, an asterisk (*) is put behind them. Table 3-4 presents the estimates for path effects taken from individual data. Table 3-5 presents the estimates for path effects taken from clinic level data. In other words, Table 3-4 reflects the relationships revealed in the same data that were used to test the hypotheses, while Table 3-5 reflects the relationships revealed by the data used to test the corollaries in the previous sections.

A cursory glance at Tables 3-5 and 3-6 make it clear that there should be no problem trimming away path estimates in the fully estimated model to a more parsimonious model. Indeed, very few of the path estimates are significant at the .10 level. If all estimates which fail to meet these criteria are cleared away from Tables 3-5 and 3-6, then the paths which remain are those found in Tables 3-7 and 3-8, respectively. Residual and control variable effects are deleted from the tables for the sake of clarity.

It would appear, from Tables 3-7 and 3-8, that the hypothesized path of effects does not hold. Of the seven significant estimates in the two tables, only three are predicted by the model. Furthermore, six of the proposed paths are substantiated in neither of the tables. But if the path is not confirmed, there remains the question of the validity of the empirically supported paths. Can they be defended as representing valid as opposed to spurious relationships?

This question can be answered by examining each of the empirically valid relationships and by searching for relationships between one of the control variables and both of the variables in the relationship.

Table 3-5. Complete estimates of beta coefficients for communication variables in the model of path effects (personnel data: N = 77)

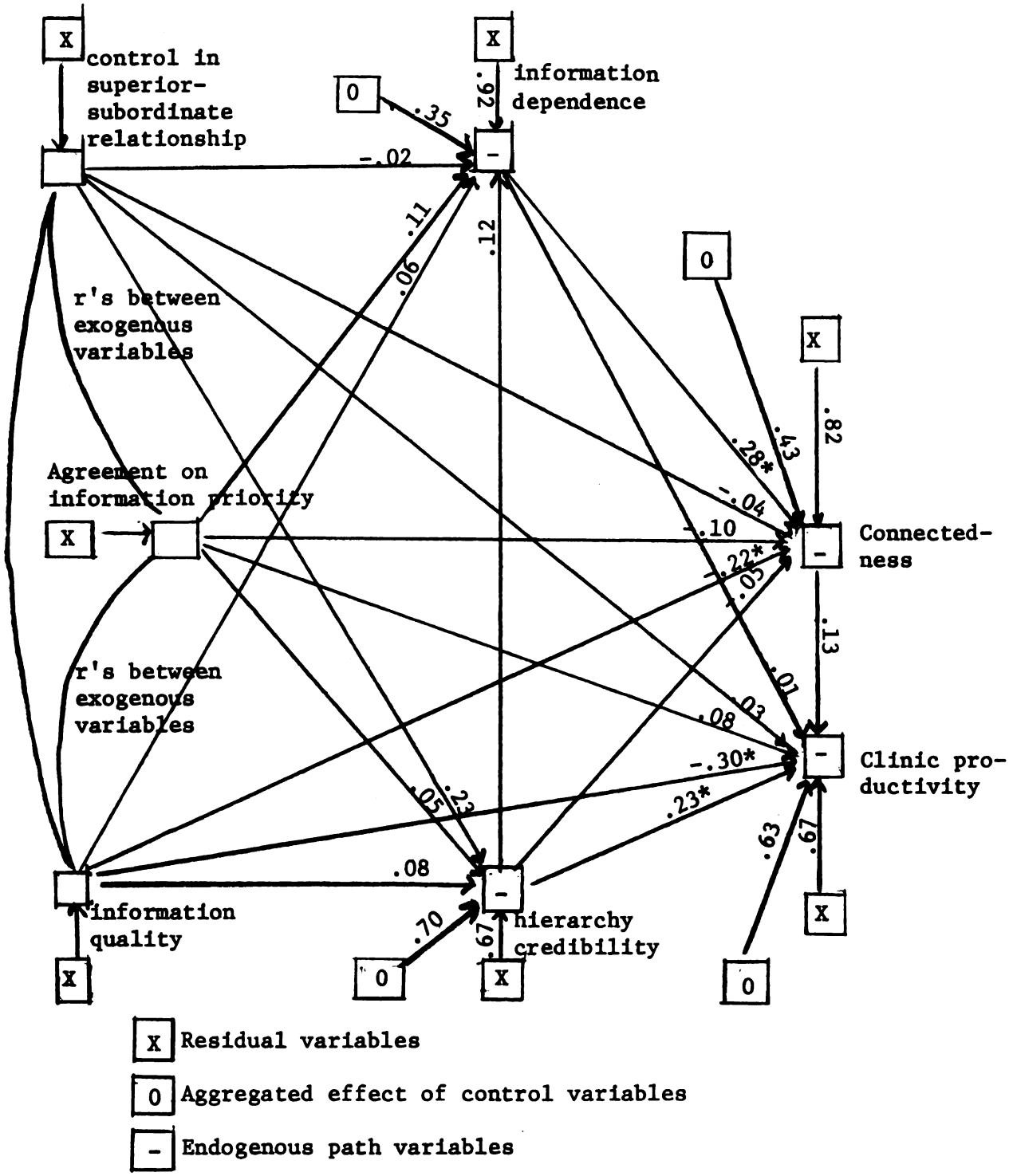


Table 3-6. Complete estimates of beta coefficients for communication variables in the model of path effects (clinic data: N = 41)

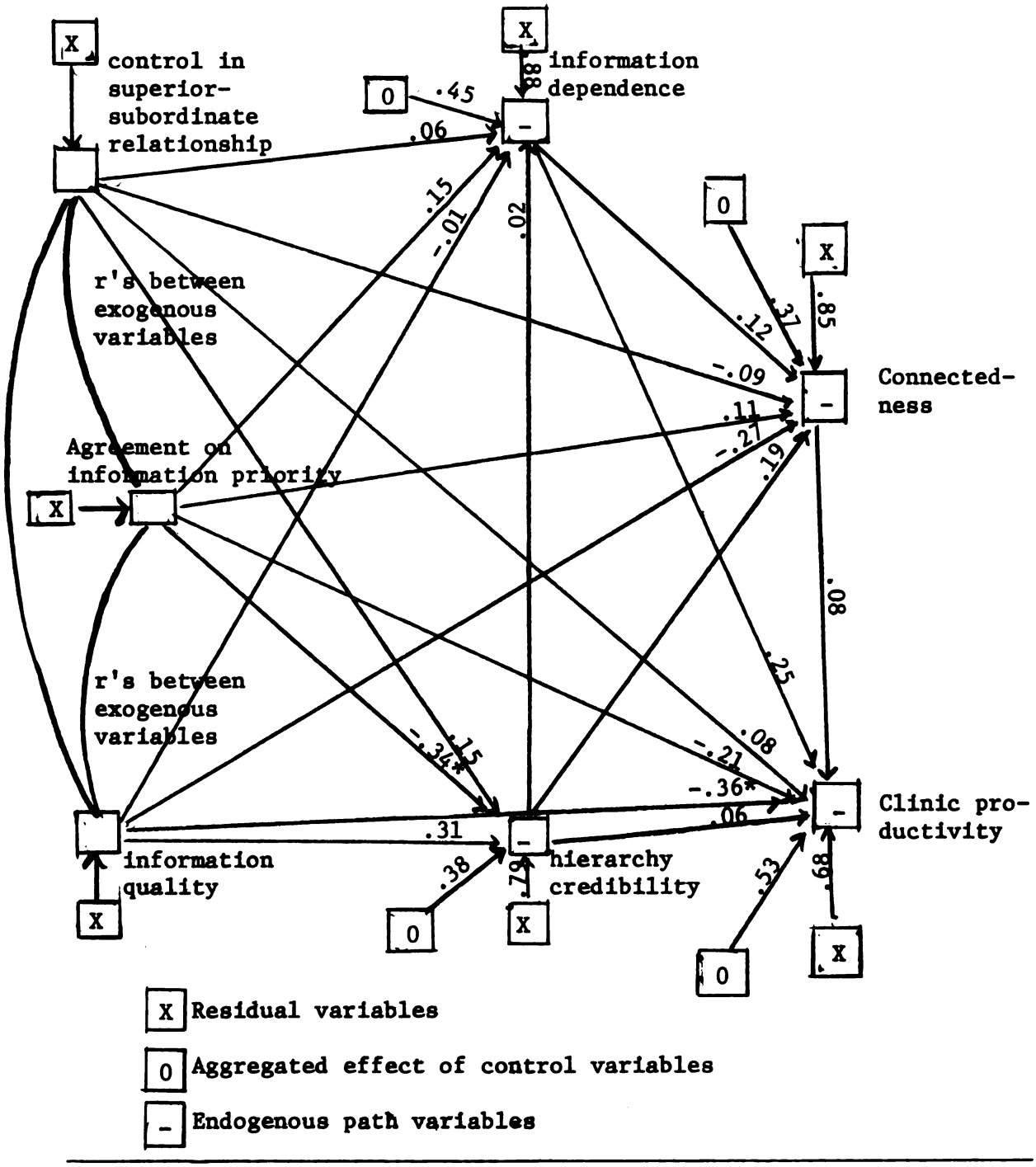


Table 3-7. Path estimates from Table 3-4 (individual data) which are significant at the .10 level

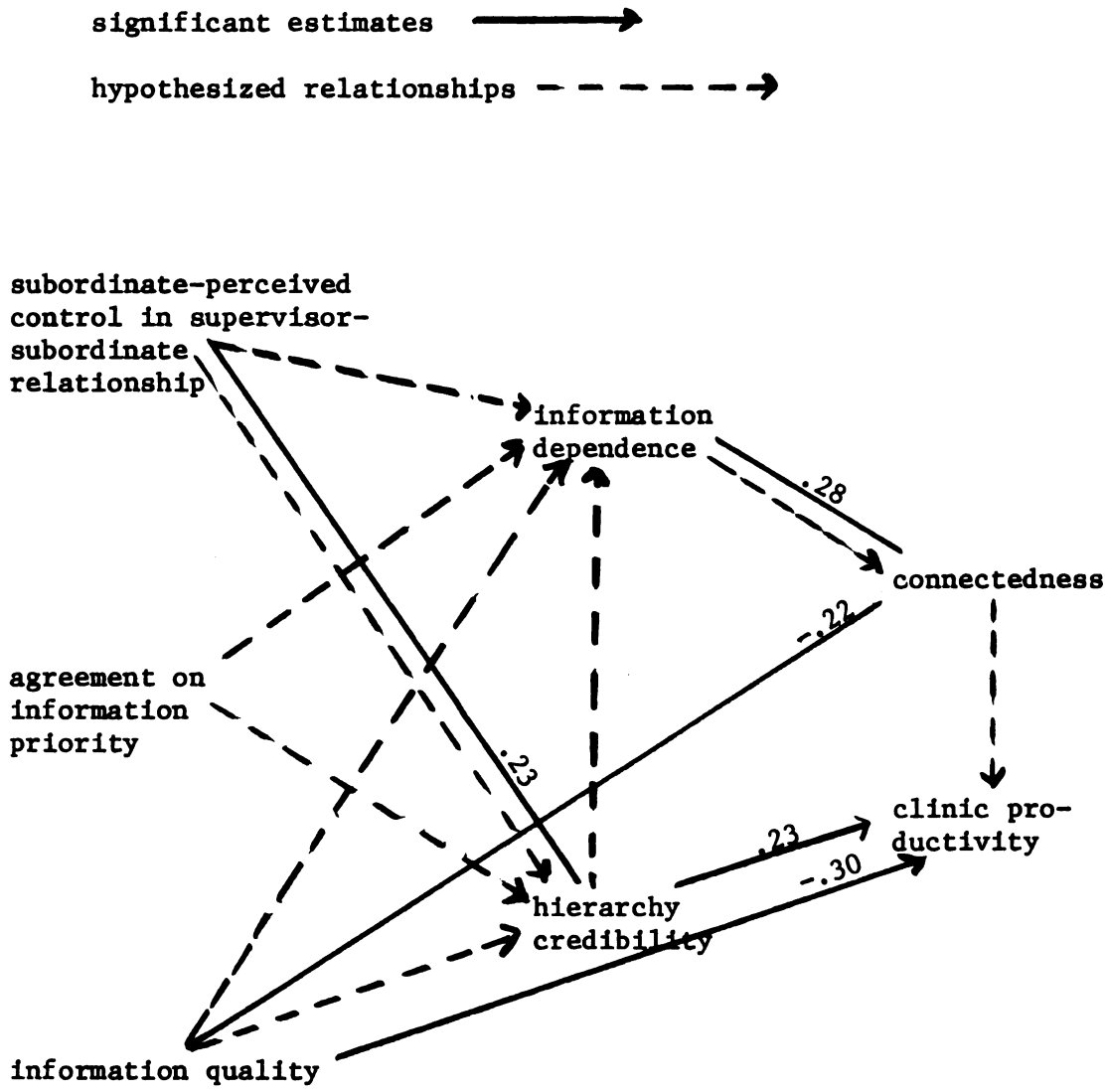
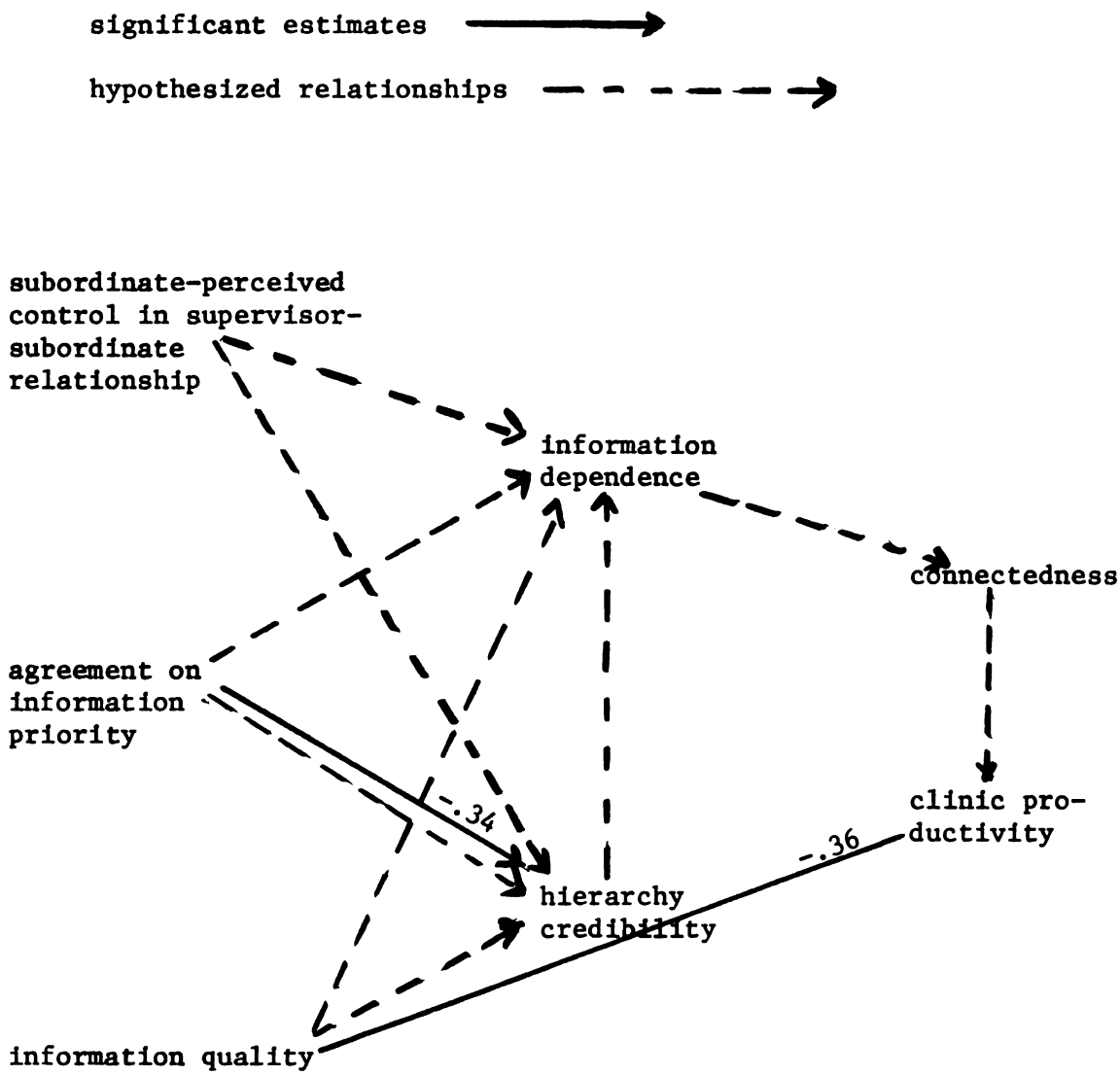


Table 3-8. Path estimates from Table 3-5 (clinic data) which are significant at the .10 level



For the relationship between subordinate-perceived control and hierarchy credibility (path estimate of .23 in Table 3-7), a straightforward interpretation seems possible. In that set of data (Table 3-7), the individual data, hierarchy credibility is affected by the control variable "clinic holds regular hours", but this variable is only weakly correlated (.01) with subordinate perceived control.

The relationship between agreement on information priority and hierarchy credibility (-.34 in Table 3-8) appears, however, to be a more subtle issue. The variable "clinic shares building with other clinic" affects hierarchy credibility negatively and is negatively correlated with agreement on information priority. Given these two effects, the path from agreement on information priority to hierarchy credibility should be positive; but it is negative and statistically significant. It may be concluded that the control variable "clinic shares..." acts as a suppressant to a strong negative relationship between the other two variables.

From Tables 3-7 and 3-8, information quality is negatively related to connectedness and clinic productivity. The negative path estimate from information quality to connectedness (-.22 in Table 3-7) appears, as in the discussion in the preceding paragraph, to have been affected by a suppressant variable. The control variable "clinic fully equipped" is positively correlated to information quality (.27) and has a positive path estimate (.41) to connectedness.

The negative relationship between information quality and clinic productivity (-.30 in Table 3-7 and -.36 in Table 3-8) appears to be a straightforward one. One of the control variables has a significant

path estimate to connectedness, but it is not correlated with information quality.

The positive path estimate from hierarchy credibility to clinic productivity (.23 in Table 3-7) seems likewise defensible. There is no control variable which has significant direct effects on both of these variables, and the relationship does not appear to be the result of indirect effects of exogenous variables. This defense also holds true for the positive path estimate from information dependence to connectedness (.28 in Table 3-7).

To sum up the treatment of the hypothesized path, it would appear that a majority of the hypothesized effects were not confirmed. Only three of the total of nine hypothesized paths were shown to have significant path coefficients in manipulation with either data base. The paths that are empirically verifiable, whether hypothesized or not, appear to be, for the most part, direct effects. Therefore, none of the mediated effects of the hypothesized path can be accepted. Those empirical paths that were detected appear to be valid.

It should be noted that the sample size used for deriving path estimates in both data bases is extremely small. Indeed, one may attribute the general failure of the data to yield significant results to the relatively small N for the data for the study. This again raises the issue of a double precision versus single precision data base, for a single precision data base will be a great deal larger. Accordingly, if there is no change in the path estimates but a larger N from which they are derived, more significant betas will be found and the drastic trimming of relationships found in Tables 3-7 and 3-8 will be avoided.

In order to test this approach, the variables on which the largest number of respondents had equivocal or unkown responses (frequency of interaction with supervisor, and connectedness with clinic staff not in the sample) were deleted from the study. The result was that the double precision routine rejected the data of only two respondents, and the data pool from which path estimates were derived jumped from an N of 77 to 136.

However, the corresponding rise in the number of significant path estimates *did not occur*. In fact, most of the path estimates decreased in value.

This finding can be interpreted in one of two ways. First, it is possible that the respondents' data originally deleted by the double precision option were, in fact, clouded with error, and therefore the addition of these data to the sample resulted in betas which were depressed by the effect of error variance. On the other hand, perhaps the data added to the sample of 77 which served as the data base for the statistics in the foregoing parts of this chapter differed in some systematic way from the sample of N = 77. Perhaps the betas in the sample of 136 were reduced because different segments of that sample differ systematically in the way they responded to the study questionnaire. But this explanation cannot be accepted unless there is fairly strong evidence that the use of the double precision option systematically deleted certain types of individuals from the study sample. This appears to have been the case.

It was found that of the 39 doctors in the sample, 38 were deleted by the double precision routine. In short, the data basis

for the study was composed almost entirely of paramedical employees (nurses and midwives).

Now it is certainly conceivable, perhaps even probable, that the employees in the sample at different levels of professional training might react to the study questionnaire in systematically different ways. This is particularly true with regard to the assumption, mentioned in the first chapter, that the employees' behavior was geared toward satisfying external criteria rather than maximizing performance to meet internally generated criteria. Since the satisficing assumption undergirds a number of the hypotheses in the present study, the possibility that members of the study sample are behaving under a different assumption could be expected to account for lack of statistically significant findings.

To test whether this may be the case, the members of the sample were divided according to their professional training and a set of correlations and regressions was run for each professional level--doctors, nurses, and midwives. The correlations for each of the hypotheses (1-5) based on personnel data for each of the professional levels and the significant beta's in the path model for each of the professional levels are given in Tables 3-9 and 3-10. Since the dependent variable in Hypothesis 1 was deleted from the study, the dependent variable in Hypothesis 1 for each of the following tables is the same as the dependent variable in H_2 through H_5: connectedness.

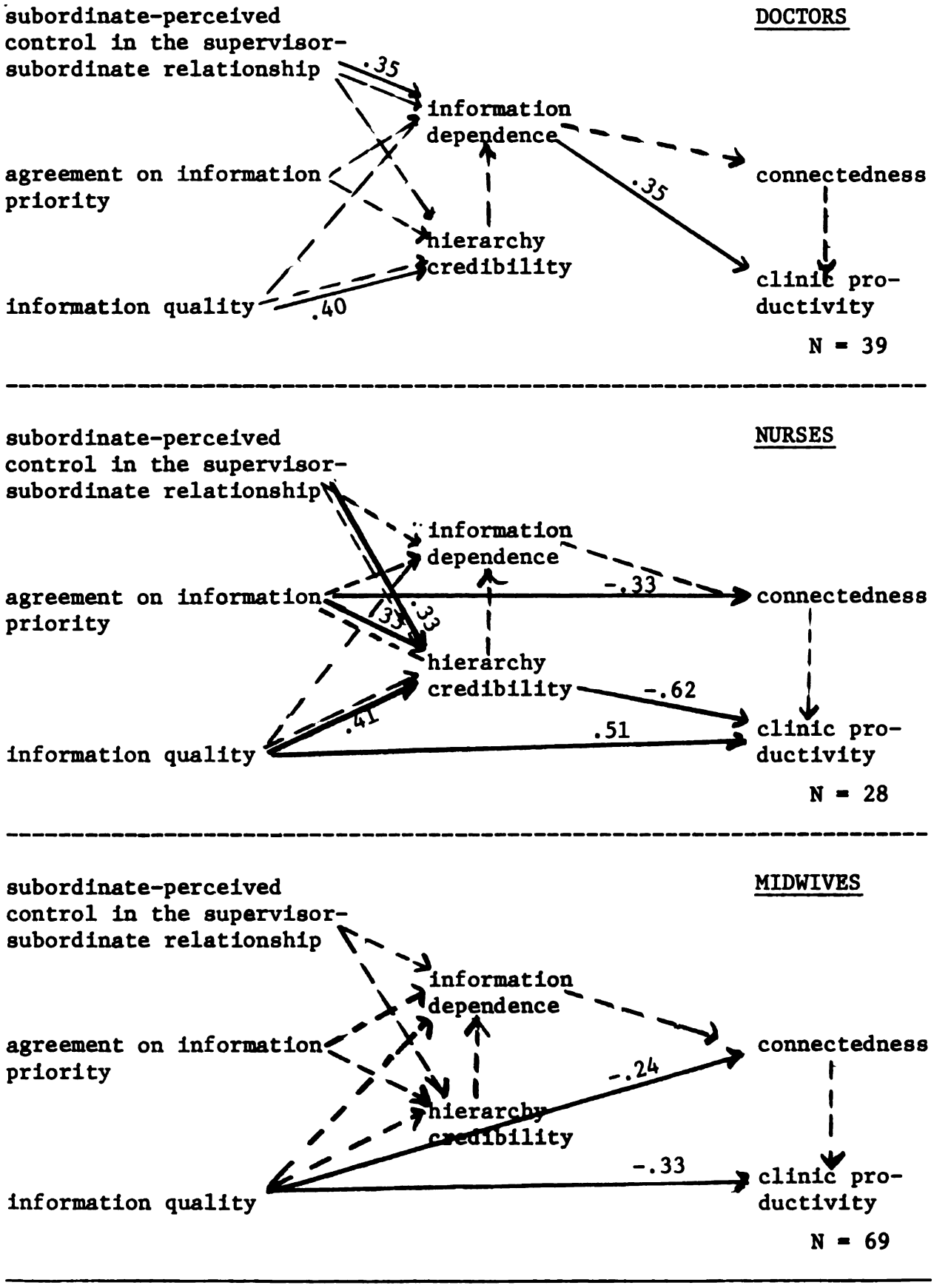
Though a full analysis of the tables must await the next chapter, it should be fairly obvious that different segments of the sample reacted differently to the study questionnaire. This can be seen by

Table 3-9. Zero order correlations for Hypotheses 1 through 5 for the subsamples of doctors, nurses and midwives

Hypothesis	Doctors	Nurses	Midwives
1 - Subordinate-perceived control in the supervisor-subordinate relationship x connectedness: negative	-.04	.22	-.16
2 - Agreement on information priority x connectedness: positive	.01	-.29	.17
3 - Information quality x connectedness: negative	.11	-.31	-.15
4 - Hierarchy credibility x connectedness: negative	.03	-.11	.00
5 - Information dependence x connectedness: positive	.12	.11	.01

Doctors - N = 39
Nurses - N = 28
Midwives - N = 69

Table 3-10. Statistically significant path estimates for the subsamples of doctors, nurses, and midwives



perusing the direction of the zero order correlation coefficients in Table 3-9. Though few of the r's are significant, they are in many instances in different directions from one another. The different directions of the correlations help to explain the absence of significant findings for the sample as a whole. They also help to explain the absence of significance in the testing of hypotheses with clinic level data, for these data were aggregates of the responses of clinic personnel--doctors, nurses, and midwives--and therefore the averaging of responses in a clinic would lead to the canceling out of one respondent's answers by another's. The implications and ramifications of these findings are treated in the following chapter.

But before the full-scale discussion of the findings is attempted, there is one other issue which must be raised. In any survey study in which data are collected at only one period of time, there is always the danger that the dependent variable in the study is in fact one of the determinants of one of the other variables in the study. The problem is sometimes referred to as the problem of "yesterday's dependent variable." Where time-order is not available to suggest causality, it is left to theory to do so.* This raises another issue: On what grounds does one reject theoretically hypothesized causes? One answer to this question lies in the manipulation of the dependent variable when the dependent variable itself was collected over a period of time.

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*Generally, three conditions are considered adequate for establishing causality. These are: (1) covariance or concomitant variance, (2) time order, and (3) the ruling out of other possible causes (Selltiz *et al.*, 1959).

To put it another way, one would have grounds to reject a causal relationship if the correlation between the dependent and independent variable, based on measures taken at the same time, was lower than the correlation between the same variables when the dependent variable was measured earlier than the independent variable. But is this likely to occur?

For this study all the variables in the study, except one, were measured in late August of 1973. The remaining variable, clinic productivity, was based on clinic records covering the first eight months of 1973. It was assumed that the responses to the questionnaire were indicative of attitudes that the respondents had built up over a number of years, and that these attitudes preceded the performance of the clinics (in 1973) in time. But perhaps clinic performance preceded the attitudes.

The possibility that clinic performance preceded attitudes can be tested by constructing from the figures for clinic performance a moving average based on four consecutive months. This yields five separate figures (including those from July alone) for the performance of each clinic. It is argued that where a multiple regression equation predicting clinic performance explains more variance for the earlier of these moving averages, e.g., for the one composed of the months of January, February, March and April, then the theoretical justification of causes in the path model should be rejected.

The proportion of variance explained by the remaining variables of the study against each of the moving averages is given in Table 3-11.

Table 3-11. Multiple r^2 for predicting clinic performance; dependent variable is moving average of clinic productivity; independent variables are all remaining variables in the study

Moving average of productivity for months	Multiple r^2
January, February, March, April	.55
February, March, April, May	.56
March, April, May, June	.56
April, May, June, July	.53
July *only*	.49

It can be readily seen that there is little if any difference between the multiple r's for the different arithmetic definitions of clinic productivity. The assumption that measures of clinic productivity were obtained co-extensively with measures of the other variables in the study can be retained.

Summary

This chapter was developed in four sections. First the main hypotheses of the study were tested. Second, the hypothesized path was tested after the effect of the control variables on the path was analysed. Third, the suggestion that different subsamples in the study responded to the study differently was tested. Finally, a test of the concomitance of variation between attitude measure in the study and clinic productivity was made.

In the test of the eight main hypotheses, two were found to exhibit correlations high enough to reach significance for the t statistic, $t = r\frac{\sqrt{N-2}}{\sqrt{1-r^2}}$, at $\alpha = .10$. These were the hypotheses that information quality was negatively related to frequency of interaction, H_3 ($r = -.231$), and the hypothesis that information dependence was positively related to frequency of interaction, H_5 ($r = .203$). The hypotheses relating subordinate perceived control in the supervisor-subordinate relationship, agreement on information priority, and hierarchy credibility to rates of interaction failed to be confirmed. The hypotheses that group connectedness, group dominance, and group embeddedness affect clinic productivity, H_6, H_7 and H_8, were likewise not confirmed. The corollaries to Hypotheses 1 through 5 also failed to be confirmed.

The relationships suggested in the hypothesized path are tested by developing empirical path estimates between the variables as they are specified in the hypothetical path. The results are that only three of the nine hypothesized paths appear to be valid. Furthermore, there appear to be three valid direct effects not predicted by the hypothesized path. Of the empirically detected paths, all seem to be valid relationships when tested for spuriousness by examining their relationships with control variables. In general, the mediating effects of endogenous variables in the hypothesized path do not appear to be valid. It is probable that the variables in the model need to be respecified.

Due to the relative failure of the hypothesized path, it was suggested that different subsamples of respondents reacted in

systematically different ways to the study questionnaire. To test the suggestion, the sample was divided by professional status and the statistical routines for the study were rerun. The result was that the correlation for Hypotheses 1 through 5 were different in size and direction for different subsamples. The empirical path estimates for the subsamples were also distinctly different.

Finally, it was suggested that covariance between the attitude measures and the measures of clinic productivity are necessary if causality was to be assured. This contention was tested by constructing a moving average of the clinic productivity scores predicting each average by a multiple regression equation which includes all the variables in the study. If the multiple r for the earlier of the moving averages were higher than those for the later, then causality must be assumed to have worked in a direction opposite to the direction assumed in the study. Since the multiple r's vary between .49 and .56, it was thought the assumption of causality assumed in the study was a tenable one.

CHAPTER IV

DISCUSSION

This study was conducted to show the effect of several communication variables on the patterns of interaction found in intact work groups stationed at family planning clinics in the Republic of the Philippines. It was suggested that the patterns of communication found among clinic staff might be predicted by tapping the perceptions of clinic staff of the adequacy of their contacts outside the clinic and the utility of their contacts within the clinic. It was further suggested that the pattern found in clinic staff interaction will affect the productivity of the clinic in acquiring converts to family planning methods. The underlying assumption was that successfully advocating the adoption of family planning is a difficult and many-faceted problem and that the higher the interaction among members of the clinic staff, the more successful their endeavors. The general assumption underlying the study is that many traditional variables in organizational research are determined by communication behavior and that a contribution in this area can be based on an analysis of the effects of communication variables.

In this chapter the findings of the study are summarized, reasons for the findings discussed, several policy implications suggested, and directions for future research proposed.

Summary

The objectives of the study were to outline the connection between a set of variables which described communication behavior or attitudes and another set of variables describing communication network structure. The network structure variables were then used to try and predict group productivity. The variables for the study were those outlined in Chapter I. These are again given below in Figure 4-1. Although the network variables are the dependent

Independent Variables Communication/relationship variables	Dependent Variables Network variables	Dependent Variables Organizational variables
1) Subordinate-perceived control in the superior-subordinate communication relationship	1) Group connectedness	1) Group productivity
2) Agreement on information priority	2) Group dominance	
3) Information quality	3) Group embeddedness	
4) Hierarchy credibility		
5) Information dependence		

Figure 4-1. Schema of variables used in the present study.

variables in the first five hypotheses, they are the independent variables in Hypotheses 6, 7, and 8. They therefore are considered mediating variables and a path model of effects for the variables is constructed to reflect their position as mediators.

This study was done under the auspices of the East-West Center in Honolulu, Hawaii, and the Institute of Mass Communication, University

of the Philippines, and Michigan State University. These institutions lent aid to the researcher in the form of funds, advice, and staff support. The Philippines was chosen as a site for the study because both public and private family planning agencies are active in the country and because the staffs of the clinics could be counted upon to know a common language--English.

The two family planning agencies studied in this study are (1) the Family Planning Project office of the Department of Health, a branch of the federal government, and (2) the Family Planning Project of the Institute of Maternal and Child Health, the largest and most active private family planning agency in the country. The DOH (Department of Health) delivers its family planning service through a set of clinics established in each municipality (the equivalent of a county in the U.S.) in the country. These clinics provide, in addition to family planning service, most of the medical services in the country. IMCH centers its efforts on family planning and maternal and child health. There are 325 IMCH clinics in the Philippines in areas ranging from urban to extremely remote. Unlike DOH clinics, the physician at IMCH is half-time and the staff is somewhat smaller than the staff at DOH clinics.

Both of the agencies face severe manpower problems, chiefly because they are not sufficiently funded to hold talented staff in key positions. The result is that, in the effort to fully staff their clinics, they must often accept staff members who are less than enthusiastic about family planning. Moreover, as in the case of

research on many organizations, there were instances where the staff were defensive or evasive.

Both of these problems contribute to the difficulty of conducting the present study, for the data collection is incomplete where respondents are either defensive or have an approach to the English language, which is based solely on formal classroom learning or idiosyncratic local usage.

But such an investigation is desirable because there is increasing determination among those who study problems in family planning to locate the determinants of clinic success. Specifically, there is a growing effort to see if communication styles of administration affect the performance of clinic staff.

The main variables for the present study were taken from three data bases. First, all respondents in the study were given a questionnaire that obtained their responses to sociometric questions and questions designed to measure the communication variables in the study. Second, the physician at each clinic in the study was given a questionnaire designed to measure the control variables (non-communication variables that were expected to affect clinic performance). Third, figures on clinic performance and municipal populations were obtained from each clinic or its respective provincial office.

There were 41 clinics in the sample and 138 respondents. The clinics were chosen so that some were easily accessible, others less accessible, and some quite remote.

A data base for testing clinic level hypotheses was constructed by taking the score of each of the members of each clinic on the communication variables and obtaining an average for the clinic.

The main variables for the study are listed below.

Subordinate-perceived control in the supervisor-subordinate communication relationship. Subordinate-perceived control was defined as the degree to which a subordinate controls the conversational agenda when he communicates with his superior. The variable was measured by four multiple choice questions. Each of these was scaled by the method of successive categories, and weights for each question were determined by the principal factor loading of the item in a principal factor solution.

Agreement on information priority. Information priority was defined as the agreement between members of a dyad on which sorts of information are useful for the accomplishment of their formally defined tasks. The variable was measured by a single ranking question. The responses were used to approximate a set of paired comparisons and from this a scale value was assigned to each stimulus in the ranking question. The responses of each sample member were then compared with the responses of others with whom he communicated, and a total difference in the ranking for the members of the dyad was achieved. For each member of the sample, the average of these differences acted as his score on this variable.

Quality of information. The quality of information variable was defined as the perception of an employee of the suitability of formal messages to the job-related information needs he has, where suitability may be interpreted along dimensions important to the employee (i.e., specificity, clarity, timeliness, etc.). This variable was measured by eight Likert scales, each weighted by its principal factor loading in a principal axis solution, and then added.

Information dependence. Information dependence was defined as the degree to which an employee is dependent upon his supervisor or other employees for interpretations of job activity related cues: more specifically, it occurs when an employee seeks advice on the importance of a cue event, the understanding of the cue, and the behavior required by the cue. The variable was measured by six Likert scales. These were weighted by principal factor solution and added for each respondent's score.

Hierarchy credibility. This concept was defined as the degree to which organization members deem the hierarchy above them as manifesting either expertise or trustworthiness and thus to be competent sources of advice or agents of problem-solving. The variable was measured by two ranking questions. These were manipulated to approximate paired comparisons and then values were assigned to each stimulus on each question. The stimuli were hierarchical positions. Their rank indicated their relative capacity to give advice and solve problems. With a value assigned to each of the stimuli, it became possible to compare individual responses to each question with the formally designated chain of command. The difference between these two were computed for each question. When added together, these differences became the score for each individual.

Connectedness. Connectedness is the overall degree of interaction between members of a group. Connectedness was measured by obtaining sociometric responses on frequency of communication with group members, scaling them by the method of successive categories, and finding an average rate of interaction for each member of the sample.

Dominance. Dominance is a group characteristic. It is the degree to which a group is dominated, in terms of communication contacts, by one or a number of sociometric stars. Dominance was measured by obtaining the standard deviation of the individual connectedness scores of each member of a given group.

Clinic productivity. The productivity of a clinic was defined as the ability of the clinic to convince clients to adopt family planning methods. Each clinic keeps a monthly record of the number of new adopters it has claimed. These records were averaged over a seven month period and used to measure clinic productivity.

Control variables. Variables expected to determine clinic productivity, but not related to communication within clinic staff, were gathered as control variables. Most of them were obtained from a series of Likert scales responded to by the physician in each clinic. Others, like the municipal population, number of staff, age of staff, were obtained from clinic records.

These variables were combined in eight hypotheses, five corollaries, and a path model. Of the five hypotheses linking communication variables to network variables, two were accepted. The corollaries to these hypotheses were not accepted. The three hypotheses linking group network variables to clinic productivity were likewise not accepted. Table 4-1 sets forth Hypotheses 1 through 8. Path estimates for the hypothesized path did not match the proposed effects. Indeed, there is evidence that each professional level of employee generates a separate and quite distinct set of path estimates. The two accepted hypotheses will be treated in this section. The

Table 4-1. The main hypotheses

Hypothesis		Status
1	The higher the degree of subordinate-perceived control in the supervisor-subordinate relationship, the higher the degree of frequency of interaction in the supervisor-subordinate relationship.	rejected
2	The higher the degree of agreement on information priority in a relationship, the higher the frequency of interaction.	rejected
3	The higher the quality of information transmitted in the formal message system, the lower the frequency of work related interaction with peers.	accepted
4	The higher the degree of perceived hierarchy credibility, the lower the rate of interaction in non-hierarchical dyads.	rejected
5	The higher the degree of perceived information dependence, the higher the frequency of interaction.	accepted
6	The higher the degree of connectedness in the group, the more productive the group in task performance.	rejected
7	The higher the degree ot which the group is dominated, in terms of communication, the less productive the group.	rejected
8	The higher the embeddedness of the group in the organization, the higher the productivity of the group.	rejected

remaining hypotheses and the path will be treated in the discussion section.

Hypothesis 3 proposed that the higher the quality of information transmitted in the formal message system, the lower the frequency of

work related interaction with other group members. The hypothesis was offered under the assumption that clinic staff were essentially motivated by external criteria imposed upon them by their agency. They communicated enough with one another to meet these criteria, but where formally transmitted information was satisfactory in enabling them to meet the criteria, the need to interact was reduced. This hypothesis was supported.

Hypothesis 5 proposed that the higher the degree of perceived information dependence, the higher the degree of interaction. It was argued that where a member of the clinic staff does not have the information processing rules to deal with cues related to his work behavior, then he becomes dependent upon other work group members for direction and advice, hence he is more prone to seek interaction. Hypothesis 5 was supported by the findings of the study.

Discussion

This section discusses the limitations of the study and the hypotheses which were not accepted.

Findings from the present study must be applied with great care to other situations. The Philippines is unique geographically, in that it is an archipelago, and unique culturally in that it is an overlay of American upon Spanish upon Malay influences. Moreover, a nationwide effort to encourage family planning in the country is relatively new. From a historical perspective, the two agencies in the study have really just begun in their efforts to diffuse family planning. Application of the findings herein to agencies having a longer history in family planning programs may be altogether

inappropriate. Generalization to other kinds of organizational units would be even more inappropriate.

Generalization to other areas of the Philippines is inhibited by the selection of the sample. Since it was not possible to select a random sample of clinics, an effort was made to select as representative a sample as possible. But the Philippines is an amazingly diverse country and the researcher can make no guarantee that all cultural elements within the country are represented in the sample.

The environment of the study contributed to lack of confidence in the validity of responses to the questionnaire in another way. Use of the English language is a matter of great pride for many Filipinos. It is the mark of formal education. In any circumstance where English might be used, to use one of the native languages is an insult. It is an implication that the individual addressed is uneducated. As a result it was impossible to construct questionnaires in the native languages of the members of the sample. To do so would have been to risk non-compliance with requests to fill out the questionnaire.

The problem of language had other effects. In some instances all personnel of some clinics were administered the questionnaire in a group. The temptation to read questions out loud, and thus prove facility with the language, became too strong on one occasion, despite continued pleas to "accomplish" the form without aid from anyone. It is not known whether this procedure affected responses or not. The request by the researcher that responses be the personal opinion of the respondents was made to every member of the sample. When the researcher was accompanied by an official of the agency being sampled,

the official frequently reemphasized that the questionnaires were to be completed without the aid of other staff. However, in the case of two clinics, there is a suspicious homogeneity in the responses of the personnel.

In the remainder of this section, the disconfirmation of a number of the hypotheses will be examined. First, the unaccepted hypotheses (1, 2 and 4) will be treated, then there will follow a consideration of the corollaries and the path.

Hypothesis 1 suggests that the higher the degree of subordinate-perceived control in the supervisor-subordinate relationship, the higher the frequency of interaction in the supervisor-subordinate relationship. The correlation for the hypothesis is positive but not strong enough to reject the null hypothesis. It would appear from examining Chapter III that the nurses in the sample acted in a manner counter to the hypothesis and that the weakness of the correlation is chiefly due to their propensity to communicate less often with a doctor who allows them to guide the conversation. A number of possible explanations emerge. Perhaps freedom in setting the conversational agenda allows for longer, more meaningful, but less frequent interactions. This might particularly be expected where the members of the dyad approach one another in education and skill. Their understanding of the complexity of problems might prompt longer, more profitable discussions.

Yet another possibility emerges. Perhaps subordinates disrespect superiors who are not authoritarian. The correlation between hierarchy credibility and perceived control is negative for the subsample of

trained midwives in the present study. It may be that subordinates deem a laissez-faire or democratic supervisor as lacking in expertise or trustworthiness. Thus they shun interaction with him.

Hypothesis 2 states that the higher the degree of agreement on information priority in a relationship, the higher the frequency of interaction. Again, different levels of personnel reacted quite differently. For the subset of doctors, the correlation was zero, for nurses negative, and for midwives positive (see Tables 3-9 and 3-10). The hypothesis seems to apply if at all to only the less educated and probably less motivated members of the sample. With regard to the nurses and their relationships with others agreeing with them on information priority, perhaps there is such confidence in the degree of agreement or such a high degree of coordination that there is no need to validate social reality, as the ABX model argues. Perhaps communication is not necessary where there is complete agreement. It is only likely to occur where there is enough disagreement that issues and misunderstandings crop up from time to time.

It should not be too difficult to make a theoretical argument for this position. Miller (1965) suggests that any system must handle a number of specific functions. Where there is a group which tries to handle them all, there is likely to be some internal tension over which function has priority. It is reasonable to suggest that this tension might result in communication over the issue, negotiation, barganining, etc. Thus what would predict a high level of interaction in any group would be a fortunate mix in responses to the ranking of functions, not agreement in ranking.

The disconfirmation of Hypothesis 4 is somewhat more difficult to explain. Hypothesis 4 states that the higher the degree of perceived hierarchy credibility, the lower the rate of interaction among group personnel. In this instance, there is little or no difference in the reaction of different level personnel to the hypothesis. Perhaps disconfirmation can be explained by suggesting that fatigue interfered with responses to questions designed to measure this variable. The questions measuring the variable were placed at the end of the questionnaire, and it may have been that fatigue introduced error into the responses. Anecdotal evidence suggested that many of the respondents were tired by the time they reached the end of the questionnaire.

The disconfirmation of the corollary hypotheses to each of Hypotheses 1 through 5 is implicit in the discussion above. Data for the corollaries were obtained by computing average scores for a clinic. Since each clinic included doctors, nurses and trained midwives, and employees in each of these categories appear to have responded differently to the questionnaire, the averaging procedure leads to canceling out of one response by another. The failure of the corollaires is attributed to this effect.

But Hypotheses 6, 7 and 8 should be immune from this effect. The lack of confirmation here is all the more puzzling for these hypotheses seem to have adequate theoretical underpinning. Hypothesis 6 states that the higher the degree of connectedness in the group, the more productive the group in task performance. The research on small group networks in laboratories suggests very strongly that, when

groups face complex problems, their success is positively correlated with the amount of communication they generate. The correlation for Hypothesis 6 is in the predicted positive direction, but it is not accepted. It may be the case that some clinics which are very well managed are so well coordinated that they do not need to communicate to handle every-day problems in family planning. If this is the case, a positive correlation for Hypothesis 6 would be weakened.

Hypothesis 7 states that the higher the degree to which a group is dominated, the less productive the group. It was found, to the researcher's surprise, that dominance and connectedness had a positive correlation. The implication is that, where a group has a strong and communicative leadership, there is more interaction throughout the group as a whole than would be the case when leadership is weaker. Under these conditions, the disconfirmation of Hypothesis 7 is consistent with the positive correlation for Hypothesis 6.

Hypothesis 8 was included in the study to test the oft-heard promise of agency administrators that clinics doing poorly received the most help from above. The hypothesis states that the higher the embeddedness of the group in the organization, the higher the productivity. The correlation for the hypothesis was positive, as predicted, but the hypothesis was not accepted. There is in the positive correlation the suggestion that the better a clinic performs, the more support it receives from above. But such a conclusion is not yet a valid inference. Another test of Hypothesis 8 is needed.

In general it would appear that hypotheses about clinics were disconfirmed. This can be attributed to an artificial restriction on

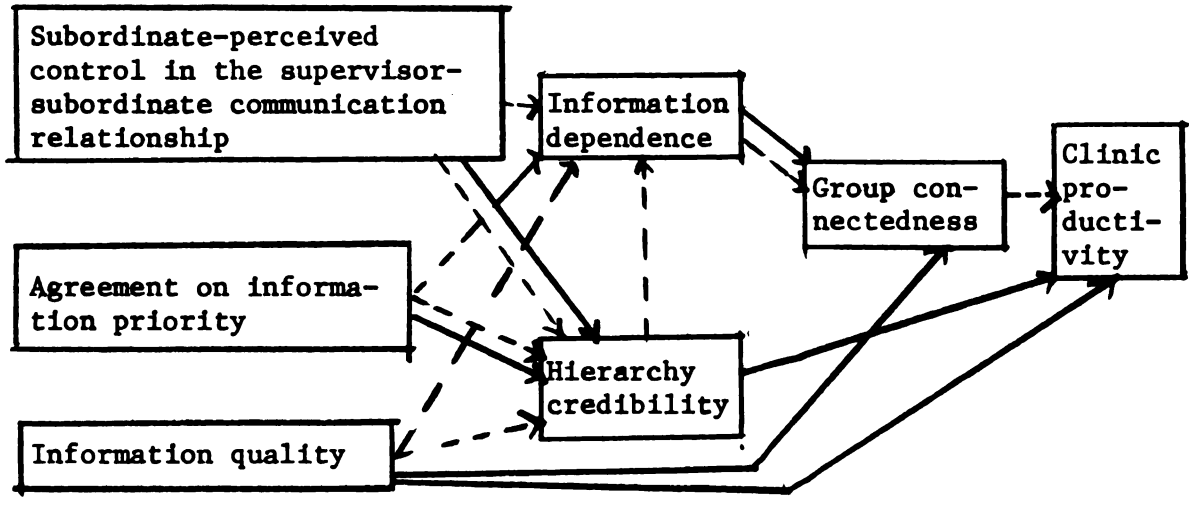
the range of variability in production (and probably other variables). The national average for clinic productivity is 25.6. For the clinics in the study it is 32.9. The sample of clinics in the study has an average noticeably higher. Therefore, the clinics in the study tended to be more successful than on the average.

Since the hypothesized path for the present study was proposed as a heuristic, a blow-by-blow explanation of its failures is probably not warranted. But that is not to say that the path is without theoretical interest. Several implications emerge from the sets of path effects set forth in Chapter III. These are repeated in Table 4-2. On the negative side, it does not appear that connectedness or

Table 4-2. The hypothesized path and empirical path effects from Chapter III

hypothesized path

empirical path*



* Significant at α=.10.

information dependence mediate the effect of the first stage variables and hierarchy credibility on clinic productivity. This is an interesting deficiency for those interested in network studies and will be commented on later.

The position of hierarchy credibility as a possible mediator of effects is less weak. It appears linked to the first stage variables in several instances and it influences productivity in two of the models in Chapter III. But not all of these relationships are cleanly decipherable. The relationship between information quality, hierarchy credibility, and productivity in the path for the subsample of nurses is outlined in Figure 4-2. The implication is that it is quite possible to trim away nonsignificant betas from a path and obtain a model with respectably large estimates that is also completely unintelligible. The path estimates in Figure 4-2 are not interpretable without the other variables in the model, and even then probably not interpretable within the assumptions of path models.

Given this problem, it seems best to conclude that the model offers no convenient mediating variable. Even if one were willing to change the basic assumptions of the model and rewrite it such that information quality becomes a mediating variable, then one would be left with the very unusual negative beta weight between information quality and productivity. Under these circumstances, it seems most appropriate to see if the model can generate policy suggestions rather than theoretical relationships.

A general summary of the discussion section is best presented visually. This is done in Table 4-3.

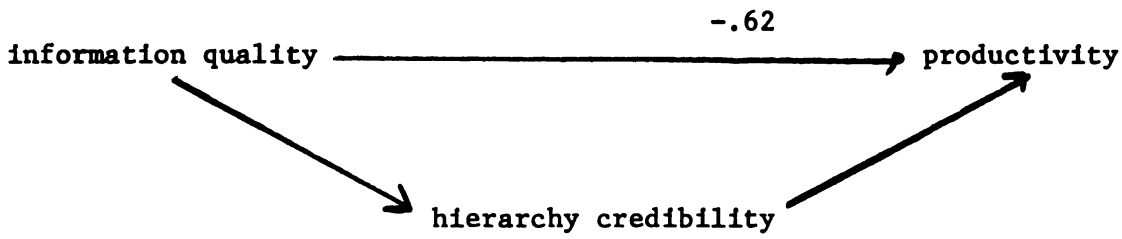


Figure 4-2. Significant betas for relationships between information quality, hierarchy credibility, and productivity in the subsample of nurses (N = 28).

Generally the schema is disconfirmed. Many of the hypothesized relationships do not have empirical counterparts and vice versa. Most importantly, it does not appear that network structure variables can be used either to mediate the effects of the other variables in the study, nor are they effective independent variables. Such a conclusion requires a reconceptualization of networks and their components. Some suggestions on how this might be done are made later in the chapter.

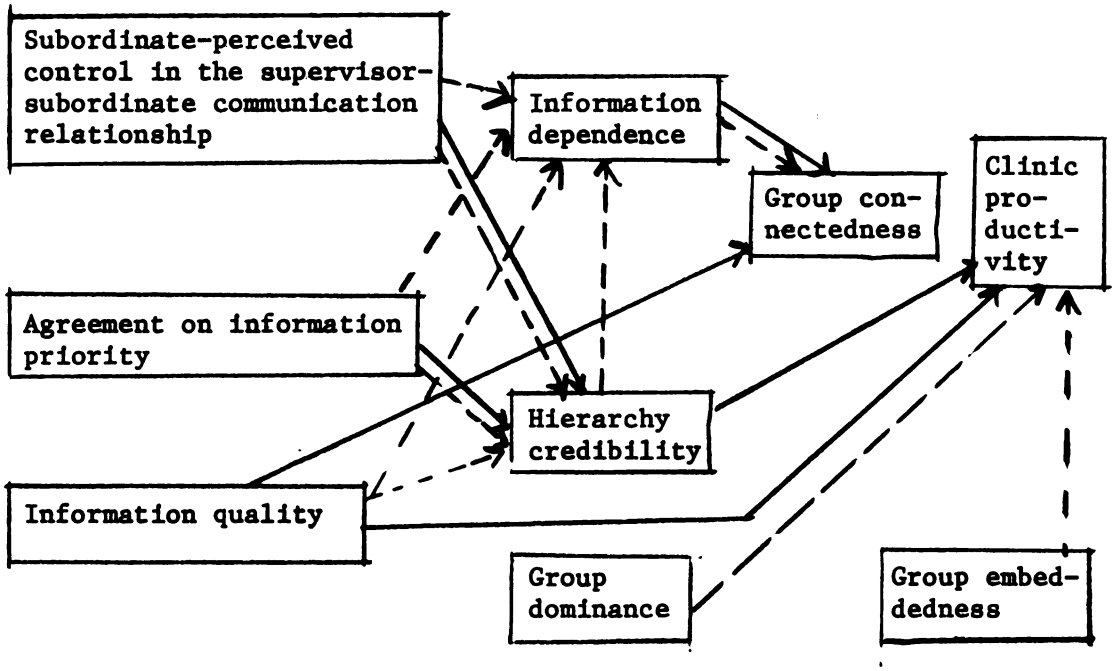
Policy Suggestions

The negative relationship between information quality and productivity poses a problem to the policy-maker in family planning agencies. It is not intuitively acceptable that poor quality information, on the dimensions on which this variable were measured, would lead to productivity. Perhaps those who have succeeded in the field in diffusing family planning understand the full complexity of the task and therefore view the information transmitted to them through the formal organizational channels as deficient because it lacks awareness of the complexity of the problems of a field worker. The

Table 4-3. General schema for relationships between independent, mediating and dependent variables in the present study

hypothesized relationships

empirically confirmed relationships*



*Empirical relationships are taken from both individual and clinic data bases.

implication is that the personnel in the lower producing clinics are content with the quality of information they receive from above for they are not motivated to improve and are therefore less demanding of their superiors. On the positive side, if middle management staff can be trained to meet the needs of clinic staff in their formal messages, there is a strong likelihood that the more highly motivated clinics would respond very favorably.

Yet another issue is raised by the absence of any relationship between clinic connectedness and productivity. The absence of any relationship has two implications for the agencies in the study.

First, one of the problems that the agencies face is whether family planning programs can be integrated into the other programs that the agencies must run. Many officials in middle management positions say that clinic staff are overworked. But the absence of a relationship between connectedness and clinic productivity indicates that, in terms of the energy spent in communicating, family planning need not necessarily place a burden on clinic staff. In the interview protocol designed for the present study, questions asking the percentage of time spent by personnel on family planning matters were asked. Responses varied from 90% to 10%. Since there appears to be no positive correlation between amount of time spent on communicating about family planning and clinic productivity, it would seem possible to routinize family planning work. Integration appears possible where the clinic physician is a good administrator.

Second, on the other side of this issue, there appear to be a number of clinics where there is an above-average amount of communication about the family planning aspect of the staff's jobs but below-average performance. Much energy goes into the discussion of the job but little of a constructive nature comes out of it. Perhaps training sessions and refresher courses could emphasize to clinic physicians that governing this kind of communication and seeing that it is not squelched but channeled into constructive problem solving sharing of ideas might raise clinic productivity.

The clinic physician will not be successful in overseeing constructive problem solving communication unless more power is delegated to him and to his immediate supervisor. In previous discussion it was suggested that, as the physician becomes more open in his communication with his staff, he loses credibility. He need not lose credibility if the openness does not result in the raising of issues or problems that the physician cannot solve or cannot get immediate advice on. The physician must have the power to act upon the needs of his subordinates. If he does not have this power, then communication openness will do no good. Communication takes time and energy. Something more than a lucid explication of a perfectly insoluble problem should be obtained from it.

The granting of more power to clinic physicians and their immediate supervisors in the DOH is consistent with the data for the study. In measuring hierarchy credibility, it was found that clinic personnel rank themselves as the least credible sources of advice on solutions to problems. They rank their immediate supervisors as the most credible. This sets the stage for "buck passing" and unless clinic physicians and their superiors have power, the "buck" does not stop until it reaches headquarters in Manila. Many complaints do go to Manila without a decision in the provinces, and the result is chronic overload at headquarters.

Absence of power at the lower levels may have a more subtle but equally grave effect on the kind of information that flows in channels of the organization. Since the channels are filled with

communication on administrative problems, very little information of a medical nature is transmitted.

For instance, it would appear that the flow of technical information on family planning methods and innovation in contraception is very limited. In one province the researcher, although not a medical man, found himself in the unusual position of having to explain to three recently trained family planning nurses that vasectomy is not castration and that physically it does not affect sexual performance. It is likely that paramedical and even medical personnel serving in remote areas rarely hear or read of innovations in contraceptive practice or innovation in information or persuasion campaigns.

There is an immediate need in both agencies to relay technical information to clinic personnel. This must be done in language that is clear and precise. Whether this is done by a newsletter or a circular, it should include information about family planning communication as well as medical information.

Data for the study also indicated that many clinic personnel had no idea why some problems persisted. For instance, lack of condoms was attributed to poor supply channels within the organization rather than to the scarcity of condoms in the world market. Upper echelons of the agencies lose credibility when they are blamed for a problem which is not of their making. Clinic personnel need to be informed of the source of problems other than by word of mouth.

In summary, power needs to be dispersed to provincial or clinic level employees in DOH, and a technical bulletin is needed for both agencies in the study.

Further Research

In the introduction to this study, it was suggested that communication variables are potentially powerful because they may mediate or cause the effects of underlying attitudinal variables like motivation and satisfaction. The findings of the present study indicate that this may not be the case. In fact, it appears that responses to items measuring interaction and perceptions of communication within the agencies may be governed by education, level of professional attainment and, perhaps, by motivation.

The present findings have serious implications for anyone attempting to explain the forms found in networks by using the kinds of communication input variables used in the present study. It is already known that propinquity influences the rate of interaction within networks. It now appears that the effect of information inputs is mediated by a number of other variables. If one agrees that the communication network is an important way to represent an organization and if one reflects that it is most difficult to predict to the form of a network, and predict from the form of a network to productivity, then one is forced to admit that a theory of organizational communication based on networks will be most difficult to achieve.

But perhaps some progress might be made by changing the tactics used in the present study. In this study most of the hypotheses were bolstered by assumptions governing the motivations of the sample members. It was assumed that they were trying to satisfy external criteria rather than to maximize client care. The satisficing

assumption may be quite accurate for a midwife, but a physician, due to his training and socialization, may be governed by the need to maximize client care.

It follows that an alternative to the approach taken by this study is to measure motivational level of the sample members. Kelman's (1958) taxonomy of compliance, identification, and internalization might be useful in such an approach. Whiteman (1971) has already used this taxonomy to test the linkages between communication behavior and the relationship of military officers with the goals of the military. Herzberg's (1966) two-factor theory of satisfaction offers another framework on which measures might be profitably taken. If measures of this sort were taken, one then would not have to assume a theory of motivation in order to write a theory of communication.

These conjectures raise the larger issue of the utility of networks based on measures of frequency of interaction. It is entirely possible that the relationship between the amount of communication taking place in the network and the productivity of the group the network represents is not a linear relationship. It was suggested earlier in the Discussion section of this chapter that some groups may be so well organized that very little communication is required to attain a high level of productivity. Perhaps in some groups a high degree of interaction contributes to confusion and, therefore, a loss of productivity.

But even if one agrees that some low interacting groups might perform very well because of their superior organization, one is bound

to ask how they achieved their high degree of coordination. Perhaps at some past time the group underwent an intense period of interaction to coordinate themselves. Such conjectures raise questions about the reliability of frequency of interaction data which has been gathered from intact groups with a long history. Might it not vary greatly given changes in the organizational environment? These questions will remain quandaries as long as networks are constructed solely from frequency of interaction data.

One way around the dilemma is to recognize that communication linkages in networks may be viewed as necessary but not sufficient for performance. Mulder (1960) hints at this by noting that constraints in laboratory networks constrain performance but do not account for it. The dynamic aspects of the interactants in the network must be counted on to explain performance. The work of Burgess (1968, 1968b) on the effects of numerous trials on the supposed differential efficiency of variously constrained laboratory networks points in the same direction.

Given this position, one may ask, "What is sufficient to explain network performance?" The present researcher suggests that the function of interactions which are traced in networks may be more important than the frequency of the interactions. Such a suggestion raises a number of issues.

First, most of the measures of network structure are based upon the mathematical manipulation of frequencies of interaction. There is often implicit in such an approach the assumption that the distribution of fruitful communication relationships throughout a network

is entirely stochastic. To put it another way, if A talks with B ten times a week and with C once a week, then the relationship between A and B is the stronger because of the higher likelihood one of the ten encounters will provide fruitful interaction. But this need not be the approach one takes. One can, in trying to offer a teleological explanation, suggest that the relationship between A and C is stronger in its capacity to predict behavior if that one interaction is more functional than the ten between A and B. If this approach is taken, communication networks must be based on measures of structure which are a multiplicative function of the frequency of interaction in a relationship and the functional utility of the relationship.

This raises the issue of whether various functions have individual networks. This approach was taken in much of the research done on large scale networks at Michigan State University.* Of course, with a taxonomy of functions which is fairly comprehensive, one cannot afford to generate a single network for each function. Analysis would become too laborious, and exegesis would defy parsimony.

An alternative is to attempt to measure the functional utility of each dyad in the network constructed from frequency of interaction data along all dimensions of function and use such a measure as the basis from which to construct a new network.

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*The definition of networks in terms of frequency of interaction was used in four studies of large networks. Three of these are dissertations (Schwartz, 1968; McDonald, 1970; Amend, 1971). The fourth is a study of the network structure of a department in a large bank (Berlo *et al.*, 1972b).

This approach is entirely consistent with the type of systems theory known as structural functionalism. Under such an approach one could characterize the linkages available to groups or individuals as traits, or options in behavior, available for reaching or maintaining goals or objectives. Such an approach has already been taken in an attempt to analyze the effect of different communication nets on children (Fontes, 1973). The application to large scale organizational networks is by no means straightforward, but the approach is available and should be fruitful.

To conclude, the author hopes that further work in the analysis of networks will move from attention to frequency of interaction to the analysis of functional utility in the dyads that make up a network. The immediate need is for a conceptual approach that utilizes structural functionalism in conjunction with the methodology for the analysis of large scale communication networks. For such an approach to be successfully applied, a thorough operationalization of any one of a number of functional taxonomies must be successfully developed. When these two desiderata are achieved, network analysis may well lead to a theory of organizations based on communication structure and communication flow.

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APPENDICES

APPENDIX A

PATH ANALYSIS

For the analysis of interrelationships among variables, this study uses the method of path analysis. Path analysis was used first by biometricians (Wright, 1921) and has been lately adopted by social scientists, chiefly in sociology (Land, 1969).

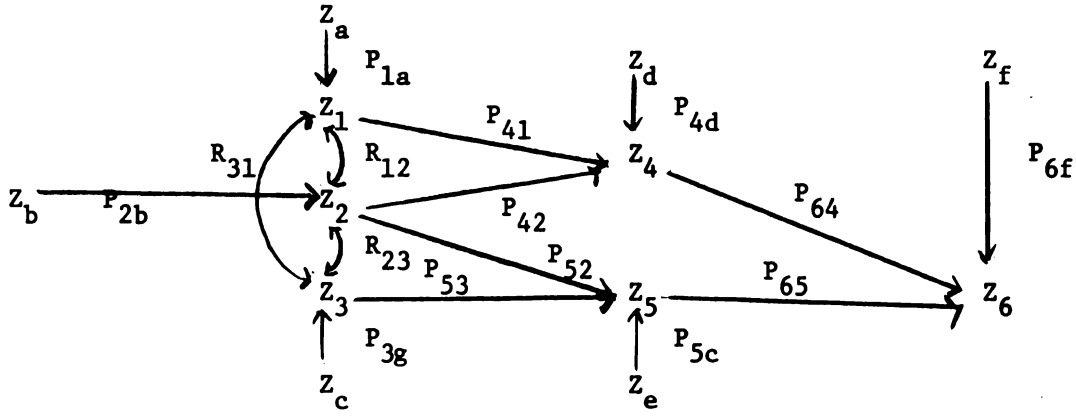
In brief, it works in the following way. A process of effects is hypothesized and from this process a set of equations is developed. These equations connect each of the variables in the model with other variables previous to it in the model. For instance, V_4, hierarchy credibility, needs to be connected by an equation to the variables preceding it. Hence

$$V_4 = AV_1 + BV_2 + CV_3$$

In other words, V_4 is determined by the values of the variable preceding it, each variable weighted appropriately. The set of equations like the one above, that is derived, is the set corresponding to the model itself. Then, empirical correlations between the variables are derived and plugged into simultaneous equation solutions for regression coefficients corresponding to the hypothesized effects of the model (Land, 1969). The regression coefficients may then be used to test the proposed path effects, the assumptions of the model, or to define

the total indirect effects of one variable on another through other variables.

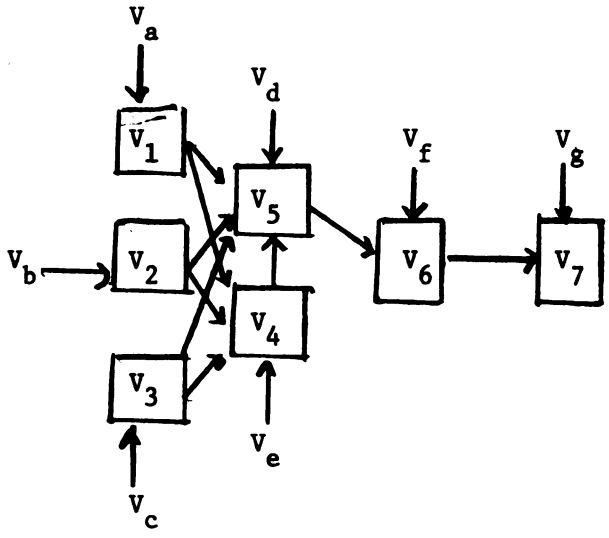
The mapping of path models follows a procedure outlined in Figure A-1.



1) Unidirectional arrows represent causal relations.
2) Two-headed arrows represent unanalyzed relationships between exogenous variables.
3) Residual variables affect system variables through unidirectional arrow to system variables. Literal subscripts are used for all residual variables.
4) P_{ij} denotes the standardized path coefficient
   j = independent var., i = dependent var.
   (from Land, 1969, p. 8).

Figure A-1. Mapping path models.

Using exactly the same typology, a map of the path model for this study is proposed in Figure A-2. The figure is accompanied by a table of the variable names and their corresponding numbers. Beneath the table is a set of equations, each defining the effect of variables upon one another.



V_1 = Supervisor-subordinate communication relationship, perceived subordinate control
V_2 = Agreement on information priority
V_3 = Information quality
V_4 = Hierarchy credibility
V_5 = Information dependence
V_6 = Network morphology (interaction on job topics)
V_7 = Clinic performance
$V_{a...g}$ = Residual variables

Structural Equations

$$Z_1 = P_{1a}Z_a$$

$$Z_2 = P_{2b}Z_b$$

$$Z_3 = P_{3c}A_z$$

$$Z_4 = P_{41}Z_1 + P_{42}Z_2 + P_{43}Z_3 + P_{4c}Z_c$$

$$Z_5 = P_{51}Z_1 + P_{52}Z_2 + P_{53}Z_3 + P_{54}Z_4 + P_{5d}Z_d$$

$$Z_6 = P_{65}Z_5 + P_{6f}Z_f$$

$$Z_7 = P_{76}Z_6 + P_{76}Z_6$$

Figure A-2. The hypothesized path of effects.

The set of structural equations is, in a sense, a hypothesis, for it suggests that some relationships between the variables exist but that others do not. For instance, it suggests that the effect of V_1 on V_6 is not a direct effect, but that the effect is mediated by V_5. But how can such an assertion be tested? Both Land (1969) and Blalock (1964) suggest ways. Their methods are based on overidentification, or the "extra information" present in the model. What is this "extra information"?

Observe the relationship between V_1 and V_6. It is mediated by V_5. The theoretical path suggests that the relationship between V_1 and V_6 is, then, $(P_{51})(P_{65})$, and from these symbols an estimate can be made of the effect of V_1 on V_6. But we may also compute r_{61} from data at hand. This is the extra information. In short, we have two values for the relationship between V_1 and V_6. It follows that, if they are significantly different from one another, the hypothesized path is incorrect, and must be discarded.

This same routine can be used to analyze any mediated relationship in the model. A paradigm to develop tests for these relationships is available from Heise (1969).

But it should be clear that the model can be tested for disproof only. A set of empirical correlations coincident with those derived from path estimation manipulation merely means that the model cannot be discarded. It does not prove the model. The proof of the model is dependent upon the theoretical evidence suggesting the relationships defined in each stage. Thus, support for the hypothesized model depends upon showing that the preceding variable of each stage is the cause of change in the subsequent variable.

APPENDIX B

QUESTIONNAIRES

The two questionnaires used in the present study are provided in this appendix. The first questionnaire, entitled "Organizational Communication Case Study Questionnaire", was distributed to all 138 members of the sample. The questionnaire contains directions, three pages for sociometric entries, six multiple choice questions for subordinate-perceived control of the supervisor-subordinate communication relationships, nine Likert scales each for information dependence and information quality, and three ranking questions, the first one for agreement on information priority and the other two for hierarchy credibility.

The second questionnaire is entitled "Structural Variables." For the most part it is a set of Likert scales designed to measure the control variables in the study. There are several other questions designed to obtain yes-no responses or to have respondents name individuals or agencies with whom they have contact.

Organizational Communication

Case Study

Questionnaire

The researchers promise that only they will see the questionnaires. Whatever you say will be kept confidential.

This study is being made to obtain information that could explain why family planning organizations in the Philippines are more effective than those in other developing nations. Specifically, we would like to find out how family planning personnel coordinate their work within the organization.

The researchers will use information gained in this questionnaire to write a case study for the East-West Center in Honolulu and the University of the Philippines Institute of Mass Communication.

Province_____

Clinic_____

Name_____

Position_____

Length of time in present position_____

Highest educational grade_____

Age_____

Have you had family planning training? ( ) Yes ( ) No

When did you receive family planning training?_____

PLEASE READ THE INSTRUCTIONS

On the following pages we would like you to tell us who you talk with about family planning related matters. By family planning related matters we mean not just contraception and the medical side of family planning, but also about approaching and motivating clients, or keeping records or scheduling family planning activities, or anything related to the family planning program. Specifically, we would like you to write down in the space provided the *names* of your co-workers in IMCH (clinic personnel and others) who you speak to about family planning matters. Then give us their title and indicate how often you speak with each person about family planning matters. Please print.

Whom do you speak to about family planning matters?	Their title	How often do you speak with them about family planning matters?			
		( ) more than once a day	( ) about 2 or 3 times a week	( ) about 2 or 3 times a month	( ) about once every 2 months
		( ) about once a day	( ) about once a week	( ) about once a month	( ) 2 or 3 times a year
		( ) more than once a day	( ) about 2 or 3 times a week	( ) about 2 or 3 times a month	( ) about once every 2 months
		( ) about once a day	( ) about once a week	( ) about once a month	( ) 2 or 3 times a year
		( ) more than once a day	( ) about 2 or 3 times a week	( ) about 2 or 3 times a month	( ) about once every 2 months
		( ) about once a day	( ) about once a week	( ) about once a month	( ) 2 or 3 times a year
		( ) more than once a day	( ) about 2 or 3 times a week	( ) about 2 or 3 times a month	( ) about once every 2 months
		( ) about once a day	( ) about once a week	( ) about once a month	( ) 2 or 3 times a year
		( ) more than once a day	( ) about 2 or 3 times a week	( ) about 2 or 3 times a month	( ) about once every 2 months
		( ) about once a day	( ) about once a week	( ) about once a month	( ) 2 or 3 times a year

Whom do you speak to about family planning matters?	Their title	How often do you speak with them about family planning matters?			
		( ) more than once a day	( ) about 2 or 3 times a week	( ) about 2 or 3 times a month	( ) about once every 2 months
		( ) about once a day	( ) about once a week	( ) about once a month	( ) 2 or 3 times a year
		( ) more than once a day	( ) about 2 or 3 times a week	( ) about 2 or 3 times a month	( ) about once every 2 months
		( ) about once a day	( ) about once a week	( ) about once a month	( ) 2 or 3 times a year
		( ) more than once a day	( ) about 2 or 3 times a week	( ) about 2 or 3 times a month	( ) about once every 2 months
		( ) about once a day	( ) about once a week	( ) about once a month	( ) 2 or 3 times a year
		( ) more than once a day	( ) about 2 or 3 times a week	( ) about 2 or 3 times a month	( ) about once every 2 months
		( ) about once a day	( ) about once a week	( ) about once a month	( ) 2 or 3 times a year
		( ) more than once a day	( ) about 2 or 3 times a week	( ) about 2 or 3 times a month	( ) about once every 2 months
		( ) about once a day	( ) about once a week	( ) about once a month	( ) 2 or 3 times a year

P L E A S E R E A D T H I S

Before going on, please think if there might be anyone else at your clinic (perhaps a motivator) with whom you talk about family planning. Perhaps you even speak to staff from other IMCH clinics or from IMCH Headquarters. If so, include these people. If not, please continue the questionnaire.

Here are some questions about communication between you and your boss.

First please write the name of your immediate supervisor, your boss, in the space below.

_____

Question (1) Place an x on the line next to the sentence which best describes how you and your boss get together to talk about family planning problems.

_____ If I have a problem, my boss will drop whatever he is doing and see me immediately.

_____ If I have a problem, generally my boss will see me right away, but sometimes he is busy or away meeting with other officials and I have to wait.

_____ He is very busy, so if I have a problem I must often wait a day or two to see him.

_____ My boss expects me to solve most family planning problems without coming to him, so if I have a problem I'll usually talk about it with others or solve it myself without going to him.

Question (2) Place an x on the line next to the sentence that best describes who seeks out whom to discuss family planning problems.

_____ If there is a family planning problem, I usually bring it up for discussion with my boss.

_____ If there is a family planning problem, my boss usually brings it up for discussion with me.

_____ On family planning matters, we bring them up for discussion about equally between us.

_____ We don't talk about family planning matters.

Question (3) Place an x on the line next to the sentence that best describes the interruptions that occur in your communication with your boss.

_____ My boss and I communicate very informally and so we both interrupt one another when we talk.

_____ Occasionally I interrupt him but only if I feel very strongly about a point we are discussing.

_____ It is not polite to interrupt anyone, and certainly not one's boss, so I avoid it.

Question (4) Place an x on the line next to the sentence that best describes amount of disagreement with your boss.

_____ If I feel he is wrong, I will openly and frankly disagree with him.

_____ If I disagree with him usually I will say so but our disagreement should be private and confidential rather than public.

_____ I will very rarely openly disagree with what the boss says under any circumstances. We must be loyal to our supervisor.

_____ I would never disagree privately or publicly with my boss. He knows best.

Question (5) Place an x on the line next to the sentence that best describes who chooses what topics are to be discussed with your boss.

_____ When my boss and I communicate, he is always the one who chooses the topic we will talk about.

_____ When my boss and I communicate he is, in a majority of cases, the one who decides what topic we will talk about.

_____ When my boss and I communicate, we both decide about equally what is to be talked about.

_____ When my boss and I communicate, I, in a majority of cases, am the one who decides what topic we will talk about.

_____ When my boss and I communicate, I am always the one who says what topic we will talk about.

Question (6) Place an x on the line which best describes the amount of questioning when you and your boss talk.

_____ When we talk, we both ask lots of questions.

_____ When we talk, I ask lots of questions, but he usually asks less than me.

_____ When we talk, he will usually ask more questions than I will.

_____ We both ask very few questions if we have a discussion.

Answer the following questions by placing an x on the line that expresses your opinion.

Question (7) The family planning part of my job is difficult.

_____ agree

_____ agree somewhat

_____ neither agree nor disagree

_____ disagree somewhat

_____ disagree

Question (8) I find it a good idea to get help from others when dealing with family planning problems.

_____	_____	_____	_____	_____
Agree	Agree somewhat	Neither agree nor disagree	Disagree somewhat	Disagree

---

Question (9) Family planning work is fairly routine.

_____	_____	_____	_____	_____
Agree	Agree somewhat	Neither agree nor disagree	Disagree somewhat	Disagree

---

Question (10) Family planning work is very time consuming.

Agree	Agree somewhat	Neither agree nor disagree	Disagree somewhat	Disagree

---

Question (11) When a problem related to family planning arises, I usually try to handle it myself.

Agree	Agree somewhat	Neither agree nor disagree	Disagree somewhat	Disagree

---

Question (12) Most of the people in the barrios we serve share the same thoughts and feelings about family planning.

Agree	Agree somewhat	Neither agree nor disagree	Disagree somewhat	Disagree

---

Question (13) I feel confident in doing the family planning part of my job.

Agree	Agree somewhat	Neither agree nor disagree	Disagree somewhat	Disagree

---

Question (14) Without the advice of others I would fail in doing family planning work.

Agree	Agree somewhat	Neither agree nor disagree	Disagree somewhat	Disagree

---

Question (15) It seems like there are less problems in the family planning part of my job than in the other parts of my job, like pre- or post-natal work.

Agree	Agree somewhat	Neither agree nor disagree	Disagree somewhat	Disagree

---

Here are some more questions which ask you to agree or disagree with a statement.

Question (16) Sometimes the memos and circulars we receive about family planning arrive late.

Agree	Agree somewhat	Neither agree nor disagree	Disagree somewhat	Disagree

---

Question (17) Most circulars give us only broad policy statements.

Agree	Agree somewhat	Neither agree nor disagree	Disagree somewhat	Disagree

---

Question (18) Usually we staff members have to discuss instructions we receive about family planning in the clinics.

Agree	Agree somewhat	Neither agree nor disagree	Disagree somewhat	Disagree

---

Question (19) We very rarely get memos or circulars about family planning.

Agree	Agree somewhat	Neither agree nor disagree	Disagree somewhat	Disagree

---

Question (20) Circulars from family planning headquarters are not detailed enough.

Agree	Agree somewhat	Neither agree nor disagree	Disagree somewhat	Disagree

---

Question (21) There is room for improvement in the memos on family planning that we get.

Agree	Agree somewhat	Neither agree nor disagree	Disagree somewhat	Disagree

---

Question (22) Sometimes the information we learn about family planning from memos is contradicted by other information we learn about.

Agree	Agree somewhat	Neither agree nor disagree	Disagree somewhat	Disagree

---

Question (23) Occasionally a family planning circular or directive asks us to do the impossible.

Agree	Agree somewhat	Neither agree nor disagree	Disagree somewhat	Disagree

---

Question (24) Often the family planning memos and circulars we get contain information important to Headquarters or the Field Representatives, but not so important for us at the clinics.

Agree	Agree somewhat	Neither agree nor disagree	Disagree somewhat	Disagree

---

This next question is a ranking question. Number the choice you like best as number one, second best as two, and so on. Below is an *example.*

EXAMPLE Rank the following drinks according to which ones you like best:

4 tea	1 coke	2 water
3 coffee	5 milk	
6 beer	7 whiskey	

QUESTION

This answer indicates that the person answering the question likes coke the best, water second best, coffee the third best, tea fourth, milk fifth, beer sixth, and whiskey least.

Now, we would like you to answer the following ranking questions.

Question (25) Below are eight different kinds of things to know about the family planning part of your job. Rank them according to which ones you think are the most important for *you* to know. Use the numbers 1 through 8. The number 1 means that you think that kind of knowledge in the most important for you in the family planning part of your job. All these types of knowledge may seem important. So take your time.

_____ Knowledge about the feelings and thoughts and personalities of my co-workers

_____ Knowledge about family planning program objectives and policies

_____ Knowledge about how to fill out family planning records and family planning forms

_____ Knowledge about other family planning workers' experiences, problems and suggestions

_____ Knowledge about new contraceptives, or new issues or research in family planning techniques

_____ Knowledge about whom to go to with family planning problems - knowledge of who is an expert in family planning

_____ Knowledge about the people in the barrios and poblacions - what they think and feel about family planning

_____ Knowledge about who knows whom and who is friendly with whom in the organization

---

Here are two more questions where you rank alternative choices:

Question (26) Suppose an IUD acceptor came to you and complained of severe abdominal pain and continuous bleeding. Which of the following people could give you the best, most expert advice on the problem? Rank the following persons on their ability to give expert advice on this matter, regardless of their *availability*.

_____Field Representative
_____Clinic Physician
_____IMCH Seminar Leader
_____Dr. del Mundo
_____Myself
_____Other, if any (specify)_____

Question (27) Suppose a family planning motivator had not received her pay for 3 months. Which four individuals would be most effective in solving her problem (i.e., getting her pay)? Rank four persons below according to who you think would be most effective in solving this problem.

_____Field Representative
_____Clinic Physician
_____IMCH Seminar Leader
_____Dr. del Mundo
_____Mrs. Sanchez
_____Myself
_____Other, if any (specify)_____

THANK YOU VERY MUCH!

STRUCTURAL VARIABLES

MHO'S ONLY

Name of Clinic_____

1. Our clinic is very accessible to the public.

Agree	Agree somewhat	Neither agree nor disagree	Disagree somewhat	Disagree

---

2. We have no problems getting electricity or water.

Agree	Agree somewhat	Neither agree nor disagree	Disagree somewhat	Disagree

---

3. We do not have all the necessary equipment to do family planning work in our clinic.

Agree	Agree somewhat	Neither agree nor disagree	Disagree somewhat	Disagree

---

4. We regularly receive family planning literature for distribution.

Agree	Agree somewhat	Neither agree nor disagree	Disagree somewhat	Disagree

---

5. Has your RHU been given or have you ever received any family planning leaflets, pamphlets, or comic books for distribution to clients?

( ) Yes ( ) No

If answer above is "Yes", please list the individual person or persons who gave you this material for distribution, and indicate when it was given to you.

Person	About what month and year	From which agency

6. Our motivators and clinic staff could do a much better job of motivating the public to accept family planning.

Agree	Agree somewhat	Neither agree nor disagree	Disagree somewhat	Disagree

7. Our facility (building) is in excellent shape.

Agree	Agree somewhat	Neither agree nor disagree	Disagree somewhat	Disagree

8. Our RHU observes regular hours for family planning consultation.

Agree	Agree somewhat	Neither agree nor disagree	Disagree somewhat	Disagree

9. We receive little support from other agencies in our municipality.

Agree	Agree somewhat	Neither agree nor disagree	Disagree somewhat	Disagree

Which agencies, if any, give you support? What kind of support?

10. Some of my staff have moral or religious objections to family planning.

Agree	Agree somewhat	Neither agree nor disagree	Disagree somewhat	Disagree

11. The room where we do internal examination for family planning work is not private enough.

Agree	Agree somewhat	Neither agree nor disagree	Disagree somewhat	Disagree

12. We receive our family planning incentive pay very late.

Agree	Agree somewhat	Neither agree nor disagree	Disagree somewhat	Disagree

13. Is there another family planning clinic in the Municipality?

( ) Yes ( ) No If so, what is its name?_____

_____

14. Do you share your building with another RHU or other family planning clinic?

( ) Yes ( ) No

15. Write down the number of staff in your RHU for each of the following positions:

_____Doctor(s) _____Motivator(s) _____Other(s)

_____Nurse(s) _____PH Dentist

_____Midwive(s) _____Sanitary Inspector(s)

APPENDIX C

SAMPLE CLINICS

Clinics close to Manila Province: Bulacan

DOH Clinics	No. of personnel	IMCH Clinics	No. of personnel
Baliwag	4	Baliwag	3
Pulilan	3	Plaridel	3
Malolos I	4	Bocaue	3
Malolos II	5	Marilao	2
Hagonoy II	4	Valenzuela	3
Sta. Maria	4		
Guiguinto	4		
Bulacan	4		
Meycauayan I	5		
Meycauayan II	4		

Clinics somewhat distant from Manila Province: Pangasinan (DOH) and La Union (IMCH)

DOH Clinics	No. of personnel	IMCH Clinics	No. of personnel
Bolinao	4	Bacnotan	2
Anda	3	San Fernando (Lorma)	3
Bani*	2		
Agno	4	San Fernando	3
Alaminos	3	Aringay†	2
Mabini	3	Agoo†	2
Burgos	2		
Dasol	2		
Infanta**	?		
Labrador	4		

Clinics most distant
from Manila Province:
Leyte (DOH) and
Cebu (IMCH)

DOH Clinics	No. of personnel	IMCH Clinics	No. of personnel
Alangalang	3	Liloan	3
Santa Fe	3	Mandaue I	3
Palo	4	Mandaue II	3
Tanuan	4	Cebu City	?
Tolosa	3	Talisay	3
Dagami	3		
Burauen	5		
Julita	3		
Dulag	4		
Mayorga	2		

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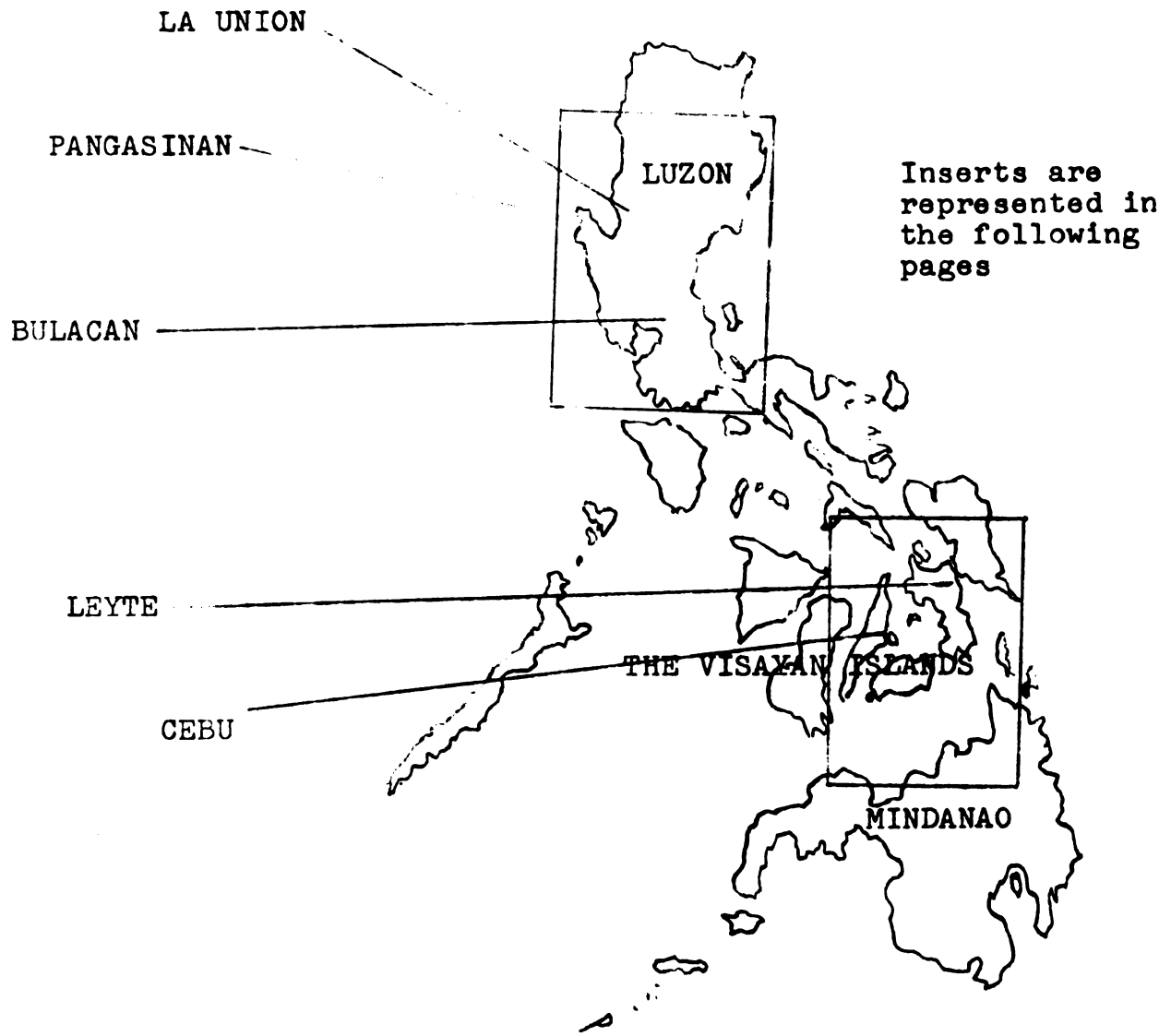
*Had just begun operation.

**Staff on vacation during data collection.

†Counted together as one clinic.

OUTLINE MAP OF
THE PHILIPPINE ARCHIPELAGO



SUR
ISABELA
MOUNTAIN PROVINCE
LA UNION
SAN FERNANDO
BENGUET
IFUGAO
BAGUIO CITY
BAYOMBONG
NUEVA VIZCAYA
Lingayen Gulf
HUNDRED ISLANDS
DAGUPAN CITY
PANGASINAN
SAN CARLOS CITY
CABANATUAN CITY
TARLAC
BALER
LUZON
Rural Health Units (DOH)
Institute of Maternal and Child Health (IMCH)
PAMPANGA
BULACAN
POLILLO I
Subic Bay
BALANGA
MALOLOS
RIZAL
QUEZON CITY
CALOOCAN CITY
MANILA
PASAY CITY
CAVITE CITY
TREC MARTIRES
CAVITE
TAGAYTAY CITY
S PABLO CITY
LIPA CITY
BATANGAS
LAMON B
ALABAT I
LUBANG ISLANDS


Rural Health Units (DOH)
Institute of Maternal and Child Health (IMCH)
CALBAYOG CITY
WESTERN SAMAR
EASTERN SAMAR
TACLOBAN CITY
LEYTE GULO
SOUTHERN LEYTE
DANAO CITY
TOLEDO CITY
CEBU CITY
CAMOTES SEA
CAMOTES ISLANDS
BANTAYAN ISLAND
CANIGAO CHANNEL
SURIGAO STRAIT
CAMIGUIN PROVINCE
CAMIGUIN I
MISAMIS OR.
CAGAYAN DE ORO CITY
DEL NORTE
SURIGAO DEL NORTE
DINAGAT I
SIQUIJOR I
NEGROS
PANAY
MINDANAO
SEA