

AGENCY FOR INTERNATIONAL DEVELOPMENT WASHINGTON, D. C. 20523 BIBLIOGRAPHIC INPUT SHEET	FOR AID USE ONLY <i>Batch #26</i>
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1. SUBJECT CLASSIFICATION	A. PRIMARY Agriculture	AE50-0000-G635
	B. SECONDARY Rural sociology--India	

2. TITLE AND SUBTITLE
Communication structure and innovation diffusion in two Indian villages

3. AUTHOR(S)
Yadav, D.P.

4. DOCUMENT DATE 1967	5. NUMBER OF PAGES 228p.	6. ARC NUMBER ARC IN301.24.Y12
--------------------------	-----------------------------	-----------------------------------

7. REFERENCE ORGANIZATION NAME AND ADDRESS
Mich. State

8. SUPPLEMENTARY NOTES (*Sponsoring Organization, Publishers, Availability*)
(In Technical rpt., 2)

9. ABSTRACT

10. CONTROL NUMBER PN-RAB-455	11. PRICE OF DOCUMENT
12. DESCRIPTORS Communication theory India Interpersonal relations Technological change Villages	13. PROJECT NUMBER
	14. CONTRACT NUMBER CSD-735 Res.
	15. TYPE OF DOCUMENT

csd-735

COMMUNICATION STRUCTURE AND INNOVATION DIFFUSION
IN TWO INDIAN VILLAGES

By

Dharam P. Yadav

Technical Report 2

Project on the Diffusion of Innovations
in Rural Societies

A Research Project Funded by the
United States Agency for International Development

Department of Communication
Michigan State University
East Lansing, Michigan

November, 1967

Foreword

The present report is second* in a series of technical reports by the staff of a research project, Diffusion of Innovations in Rural Societies, sponsored by the U. S. Agency for International Development and conducted by the Department of Communication at Michigan State University. These technical reports are mainly aimed at readers in the scientific community, and hence are reproduced in only a very few copies.

Dr. Yadav's analysis deals with a central, but little-studied aspect of the diffusion of ideas in peasant villages, which deals with the structure of interpersonal communication. He tests three kinds of hypotheses: (1) those in which the individual is the unit of analysis, (2) those in which the two-person dyad is the unit of analysis, and (3) those in which cliques or subgroups within the village are studied via structural analysis methods. In my opinion his results argue for the importance of using the dyad or the network as the appropriate unit of analysis in field investigations of

*The first such study is Gordon C. Whiting, Empathy, Mass Media, and Modernization in Rural Brazil, East Lansing, Michigan, Department of Communication, Diffusion of Innovation Technical Report 1, 1967.

communication, rather than the individual. Perhaps many readers will be as interested in the author's methodology, especially that dealing with the structural analysis of within-village interpersonal communication, as in his findings. His measures of liaison roles, concentration, and homophily can be utilized with advantage in the study of communication in many other types of systems.

While I served as advisor of the author's Ph.D. dissertation, a work upon which the present report is almost completely based, I wish to disclaim much credit for this study. Dharam Yadav worked with a minimum of direction from me, and I feel the following report is largely a credit to his ingenuity and effort.

Everett M. Rogers
Professor of Communication
and Project Director

PREFACE

The present thesis is an attempt to explore some of the underlying mechanisms of the process of communication and technological change in the context of peasant communities. The accomplishment of this thesis in the present form is indeed due to invaluable assistance and helpful suggestions received from numerous sources which, I can only acknowledge.

I owe my greatest debt to my advisor, Dr. Everett M. Rogers, who has been instrumental in guiding the present study from the beginning to the very end. I wish to acknowledge the intellectual stimulation and professional guidance that Professor Rogers has offered with great warmth throughout the period of my studies in the Department of Communication, Michigan State University.

I extend my great appreciation to Dr. Hideya Kumata, Dr. Erwin P. Bettinghaus, and Dr. Eugene Jacobson, who served as members on my doctoral guidance committee and who offered valuable suggestions and comments in regard to the present thesis. I wish to thank Professor Jacobson for the significant theoretical and methodological suggestions especially dealing with the analysis of interpersonal communication structures.

To Robert F. Keith and Duane Pettersen, my colleagues in the department, I extend my appreciation for the helpful suggestions they contributed toward the improvement of the present thesis.

Finally, I wish to take this opportunity to thank Dr. David K. Berlo and the faculty of the Department of Communication for the indefinable help and encouragement that I received throughout the period of my doctoral studies in communication.

Dharam P. Yadav

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CHAPTER I

INTRODUCTION AND THEORETICAL BACKGROUND

Importance of Interpersonal Communication

The peasant villages in India have been undergoing a process of change and modernization--a process initiated by governmental change agencies since the first Five Year Plan was put into action in 1951. Plans for increasing agricultural production were given priority via an attempt to accelerate the adoption and diffusion of improved agricultural practices. Development planners recognized since the very beginning of these programs of change that illiterate peasants must be motivated and induced to accept innovations. Large-scale community development and agricultural extension programs were launched to help peasants in all phases of better farming and better living. These attempts by change agencies focused on villages as grass roots social organizations for the implementation of social and technological change. Indeed, the diffusion of innovations has been one of the major mechanisms of bringing about agricultural development in these settings.

To what extent have peasants responded to innovations over time? What are some of the underlying social processes influencing the rate of technological diffusion in peasant villages? How do new ideas and innovations become integrated into the life style of villagers? These are a few of the many important questions that one might raise in order to explore the process of technological diffusion in peasant villages. We shall be primarily concerned in this thesis with some of the elements of the communication process, especially those dealing with interpersonal communication, in innovation diffusion in Indian villages.

The diffusion of innovations involves at least four crucial elements: (1) the innovation, (2) its communication from one individual to the other, (3) in a social system, (4) over time. Thus, the major task of accelerating innovation diffusion in peasant villages depends upon the effectiveness of the flow of messages from mass media and change agencies to opinion leaders, and through interpersonal communication channels from opinion leaders to other villagers. Studies in the United States reveal the effect of interpersonal communication and influence on individuals' attitudes and behaviors in diverse areas such as voting behavior (Lazarsfeld and others, 1948, p. 151), marketing and public

affairs (Katz and Lazarsfeld, 1955, p. 25), and adoption of farm practices (Rogers, 1962, p. 25). In all such studies, even in a media-saturated society like the United States, interpersonal communication was found to be more important than mass media channels.

At a more general level, Pye (1963, p. 27) emphasized the relative importance of interpersonal communication in development in these words: "It is only necessary at this point to make it clear that the process of development is less dependent upon increased investment in the modernized, urbanized mass media system than it is upon the adjusting of the informal, rural systems to each other and to the mass media system." Seemingly, Pye is suggesting that new arrangements in the social structure of peasant villages are a prerequisite to the effective adoption of innovation messages and their integration into the life style of rural communities.

Indeed, Eisenstadt (1962) reported from a study conducted in modern, traditional, and transitional informal social systems in Israel that the extent to which a given item of information would diffuse through the interpersonal communication network was partly determined by (1) the characteristics of opinion leaders, (2) the nature of interpersonal

networks, and (3) the manner in which the community responded to certain kinds of messages and influences. Speaking of the role of mass media and interpersonal communication in modernization, Pool (1963, p. 248) stated that mass media channels seldom lead to adoption directly, they rather created an awareness of the existence of new practices, and provided guidance to innovating leaders. Pool further pointed out that the adoption of an innovation advocated in the mass media was mainly dependent on its interpersonal dimension. Thus it is widely acknowledged that the effectiveness of communication attempts to induce change in individual attitudes and behavior is in large part dependent upon the nature of interpersonal networks of communication.

New ideas mainly reach peasant communities as a result of programs of planned change which heavily depend upon local leaders for the dissemination of ideas via word-of-mouth channels. Considering the limited availability of the mass media and the high rates of illiteracy among peasants (preventing them from using printed materials), much reliance has been placed on interpersonal communication in the diffusion of innovations to peasants. Furthermore, peasant communities are to a considerable extent rigidly structured, highly stratified and an individual's decision to adopt technological

innovations is expected to be subordinated and conditioned by dominant role prescriptions and group norms. Thus, keeping in view the limited mass media availability, mass illiteracy, coupled with the situation in which an individual's decision is considerably conditioned by the social structure, the probability that individuals will adopt technological innovations depends in part upon (1) whether knowledge or information regarding innovations is available in the interpersonal communication network, and (2) whether norms and group standards are such that they provide the necessary social support for adoption of decisions. It is indeed in these micro systems of informal face-to-face diffusion networks that encoding and decoding of innovation messages takes place. Interpersonal communication structure thus assumes a relatively much more important function in technological diffusion and adoption in these settings. However, our knowledge is too limited and scanty to specify exactly what particular elements of the interpersonal communication structure make what kind of differences in technological diffusion. Perhaps one of the main factors responsible for lack of scientific body of knowledge dealing with interpersonal communication is that past diffusion research, which was conducted mostly in the U.S. and other developed countries, was based on

survey research designs in which individual rather than interpersonal relationship was the unit of analysis.

Objectives

The main objectives of the present thesis are twofold:

1. To develop a conceptual and analytical framework designed to study the relationship of the elements of communication structure and technological diffusion in comparative social systems.

2. To utilize this framework in an empirical investigation of the attributes of communication structure which differentially affect technological diffusion in two social systems, which are peasant communities in India.

Our goal is to understand what variations in communication structure differentially condition technological diffusion in comparative social systems. First, we intend to define rate of technological diffusion, then present an overview of the state of research bearing on the relationship of interpersonal communication and technological diffusion, and consequently suggest some of the inadequacies in diffusion research. Following this discussion we shall seek to state the central problem of this thesis, and then spell out in

brief our conceptual framework, incorporating the key elements of communication structure.

Rate of Technological Diffusion

Rate of technological diffusion* is defined as the extent to which members in a social system have adopted innovations over time. It is described in terms of the cumulative percentage of a social-system's members who have adopted an innovation.

Some researchers have studied rate of diffusion as the logistic fitted to the logarithmic transformation of diffusion curve data (Griliches, 1957). Coleman, and others (1966, p. 97) considered rate of technological diffusion as a function of the "snowball process" in which those members who had adopted an innovation in one time period exerted influence on other members to adopt it during subsequent periods. Under these circumstances the proportion of potential adopters who would accept the innovation in each time period would

*Rate of technological diffusion is an important criterion variable in order to predict innovation acceptance at the social system level. However in past diffusion research, only a few investigations utilised this particular variable primarily because a study of rate of technological diffusion requires a social system as the unit of analysis.

increase in proportion to the number of those who had already adopted, and the resulting curve would be a logistic curve. Considering individuals as adopting units, rate of technological diffusion was interpreted by Rogers (1958) in the form of an S-shaped distribution based on the normal distribution. Rogers assumed the S-shaped distribution was an indicant of the effect of interpersonal influences on the adoptive decisions of individuals in a social system.

Thus, the rate of technological diffusion in a social system is directly related to and affected by processes of interpersonal influence in which innovating leaders and early adopters influence those who have not adopted. Over a certain period of time innovation is expected to be adopted by a majority of social system members.

State of Research on Interpersonal Communication and Technological Diffusion

It is appropriate at this point to review what we know from diffusion research about the nature of interpersonal communication variables which have been investigated in relation to their effect on technological diffusion.

Research findings from studies conducted in the United States supported the notion that the rate of technological

diffusion is considerably influenced when early adopters of innovations influence later adopters (Haven and Rogers, 1961; Ryan and Gross, 1943; Rogers and Beal, 1958; Coleman and others, 1957). These findings are presumably based on the interpretation that once innovations are adopted by a few members in a given social system, then innovation diffusion flows through the social structure over time by means of interpersonal communication channels or what has been generally called the "interaction effect."

Further support regarding the effect of interpersonal communication channel use on technological diffusion is evident from quite a large number of studies in which the research focus was to investigate what specific channels were important at various stages in the process of acceptance of innovations by farmers (Copp and others, 1958; Wilkening 1956; Rogers and Beal, 1958). These studies indicate that interpersonal channels such as peers, neighbors, and progressive farmers are important influences in innovation decisions, especially at the persuasion stage when favorable attitudes toward adoption of innovation are formed. Similar results were reported in studies conducted in peasant societies where farmers were found to have had little or no exposure to mass media channels, and interpersonal channels were most important in

innovation decisions (Deutschmann and Fals Borda, 1962, Myren, 1962, Rahim, 1961; and Rogers and Meynen, 1965).

These studies have their main focus on the use of interpersonal channels in innovation decisions. How the structural attributes of interpersonal communication networks might condition innovation diffusion was not the prime objective in these studies.*

In view of the focus of the present research on interpersonal communication in technological diffusion in comparative social systems, a further attempt was made to pool empirical findings bearing on these variables, from all possible diffusion studies. Table 1 indicates the nature and extent to which certain dimensions of communication variables have been studied in determining their relationship to innovativeness.** From Table 1, it is evident that out of a total

*Exception is the study by Coleman, Katz and Menzel (1957) who considered innovation diffusion from the point of view of friendship networks, discussion networks, and consultation networks formed by communication links among doctors.

**The variable of innovativeness is one indicator of rate of technological diffusion and is defined as the degree to which an individual is relatively earlier in adopting innovations than other members of the social system. The major difference between innovativeness and rate of technical diffusion stems from the fact that innovativeness is measured by utilising individual as the unit of analysis whereas rate of technological diffusion is studied by utilising social system as the unit of analysis.

TABLE 1.--Relationships of interpersonal variables to innovativeness.*

Variables Related to Innovativeness	Type of Relationship Found				Total Number of Publications
	Pos.	None	Neg.	Cond**	
1. Opinion Leadership	9	3	1	1	14
2. Interpersonal Communication Exposure	28	6	6	0	40

of about 900 diffusion studies content-analyzed in the Diffusion Documents Center at Michigan State University, slightly more than one per cent investigated the relationship of opinion leadership to innovativeness, and around four per cent inquired into the relationship of interpersonal interaction with innovativeness. In most of the studies opinion leadership was defined as the degree to which an individual is sought by others for information and advice. Interpersonal

*Data reported in Table 1 were obtained from the Diffusion Documents Center at Michigan State University. The Center contains more than 1,200 articles pertaining to the communication of new ideas among members of a social system over time. Each empirical study catalogued in the Center has been content-analyzed, and information pertaining to both the independent and dependent variables and the relationship between them has been placed on IBM cards.

**Conditional--A relationship that may be positive or negative depending upon other variables.

communication measured in terms of information-seeking from peers, neighbors, etc. In about two-thirds of these studies the relationship of such dimensions as opinion leadership and interpersonal interaction to innovativeness is reported to be positive. This review from all diffusion studies reflects the extent to which interpersonal communication variables remain unexplored in diffusion research. Even the related concept of opinion leadership has not been much studied in diffusion research.

Comparative Social System Analysis

A further review of diffusion studies shows that only five studies deal with the relationship of interpersonal communication variables to technological diffusion in comparative social systems.* Two of these studies dealt with diffusion of educational innovations in school systems in the United States (Eibler, 1965; and Davis, 1965) and three other studies were conducted in U.S. farming communities to study rate of

*There are a few other diffusion research studies based on comparative social system analysis, but the research focus in such studies was not on interpersonal communication (Van Den Ban, 1960; Marsh and Coleman, 1954 and 1956; Bose and Basu, 1963). Van Den Ban studied locality differences in innovation acceptance in Wisconsin counties in terms of religious and cultural values; Marsh and Coleman analysed the effect of neighborhood norms on individual's adoption behavior in Kentucky, and Bose and Basu investigated the effect of reference group norms on farm practice adoption in Indian villages in West Bengal.

technological diffusion (Coughenour, 1964 and 1966; Lionberger, 1963). In the latter case, the researchers found that rate of technological diffusion varied from one locality to the other with the extent to which information and influence flowed from those individuals who were relatively more innovative and more exposed to mass media to others who were relatively less so. Only one study was conducted in a developing society by Rogers and van Es (1964); they studied the communication behavior of opinion leaders in modern and traditional peasant communities in Colombia.

These studies were not designed to investigate in depth the differential characteristics of the structure of interpersonal communication system itself, the focus was rather on one or a few selected interpersonal variables. It is therefore very clear that our understanding of the variations in patterns of interpersonal communication and their differential effect in innovation diffusion in comparative social systems, especially peasant villages, is very much limited. Indeed, lack of research in this area which is so evident from the previous review, was very categorically pointed out by a team of U.S. social scientists in India who stated:

"None of the village studies conducted so far in India provided a description of the channels of communication which

might be utilized by change agents to diffuse innovations" (Taylor, Ensminger, and others, 1965, p. 539).

From this discussion, we move to brief the major inadequacies in diffusion research dealing with the effect of interpersonal communication in technological diffusion.

Inadequacies in Diffusion Research

In summary, the previous review brings to focus the central hypothesis that the nature of interpersonal communication affects innovation diffusion in a social system. At the same time this discussion is also indicative of the fact that in spite of theoretical importance of interpersonal communication in technological diffusion, this specific area of research has not been much explored. Some of the inadequacies in past diffusion research are:

1. The major emphasis in most diffusion studies has been limited to investigation of what functions interpersonal channels such as peers and neighbors serve in the innovation decision-making process, rather than on studying the structural characteristics of interpersonal communication networks as they condition innovation diffusion in a social system. There has been

very little or no attempt to focus on analysis of interpersonal relationships. Interpersonal channels are embedded in a specific social structure and should be studied in that context.

2. Another limitation of diffusion research, pointed out by Katz (1963), is the lack of studies designed to analyze the extent to which differential characteristics of communication structure influence the diffusion of innovation within one social system as compared to the other. That is, there is a need to use the comparative method.

In view of these research inadequacies and the fact that such limited research has been done thus far in the area of interpersonal communication and technological diffusion, our research problem assumes greater importance. With this background, our next step is to state and define the central problem of this thesis.

The Problem

This thesis is a comparative study to analyze elements of communication structure related to the diffusion of innovations in informal social systems in peasant communities.

Once innovations penetrate these social systems, it takes a certain period of time before innovations are widely accepted by the system's members. For example, it was found that 14 years were required for hybrid seed corn to reach complete adoption in Iowa (Ryan and Gross, 1943) and it took almost 50 years for the widespread adoption of a new educational practice by school systems in the United States (Ross, 1953). It is evident that the process of innovation diffusion spreads over a period of time.

A synthesis by Rogers (1962) of research findings drawn from more than 500 diffusion studies bearing on the factors which condition adoption in social systems indicated that the more important of the factors were (1) characteristics of adopting units, (2) characteristics of innovations as perceived by the adopting units, (3) availability of information sources, and (4) the nature and extent of interpersonal communication and influence.

Now a very fundamental question from a theoretical and practical viewpoint can be raised as to why some social systems have a higher rate of technological adoption than other social systems. Perhaps such variation in rate of technological adoption from one social system to another is a function of variations in the four factors just mentioned.

But which specific factors are more important in affecting technological adoption, and to what extent, is an empirical question that would require comparative social system analysis.

Given (1) that social systems are comparable on relatively important characteristics of adopting units, (2) that the innovations are equally applicable to the adopting units in these social systems, (3) that innovations are introduced by one and the same change agency at similar time periods, and (4) that physical conditions and facilities for availability of innovations are just about equally similar, then the stage is set for raising the fundamental problem of this thesis: Are there differences between social systems with regard to their communication structure which differentially affects innovation diffusion and technological adoption.

The concern of the present thesis is to dwell upon such questions as: Are there differences between social systems with regard to their opinion leadership roles which tend to influence greater acceptance of innovations in one social system than the other? Are there differences between social systems with respect to characteristics of the structure of dyadic communication involving the flow of innovation and influence in the person to person diffusion network which

contributes to their differential rate of technological adoption? Are there differences between social systems in terms of patterns of communication integration which condition differentially their rate of acceptance of innovation? In brief, then, the problem is to understand the differential rate of innovation acceptance in two social systems in terms of variations in their patterns of communication structure.

It would be appropriate to mention here that since the research investigation of this thesis is restricted to only two social systems, there are certain limitations in statistical analyses. We assume that the two social systems widely differ with regard to their rate of technological diffusion and mean adoption index* (both are considered as dependent variables) on account of differences in their communication structure. Therefore, on the premise of extreme differences between the two social systems with respect to their rate of technological diffusion and mean adoption index, we seek to conceptualize each one of them on a continuum of traditional-modern social system types, and then proceed with the problem of determining what differences in fact exist between the two social systems with regard to their communication

*Adoption index is defined as the tendency of an individual to be early in adopting innovation.

structure. A conceptualization of the two social systems as traditional and modern is derived empirically from observations of reality; as Rogers (1962, p. 60) pointed out, the purpose of constructing ideal types is primarily methodological as they provide tools for analysis and understanding of some dimension.

Our goal in this thesis is not prediction. We seek to understand and describe the differential characteristics of communication structure which affect technological diffusion in informal social systems, peasant villages.

Understanding the diffusion of innovations and their adoption by members of a social system is contingent upon adequate and scientific knowledge of the networks of interpersonal communication, especially in the context of peasant villages. Rogers (1962, p. 219) observed that the importance of interpersonal influence convinced most students of diffusion that it was impossible to ignore social relations in studying the spread of innovations. Once innovation messages penetrate into the boundaries of a social system, then the diffusion process occurs mainly via interpersonal communication; hence a study of communication structure and innovation diffusion has a considerable theoretic import. However, the basic question of analyzing the interpersonal communication

seems to have received little or no attention in diffusion research.

It seems that the lack of research in this area stems partly because there is no single coherent theory of interpersonal communication, and partly because the analysis of interpersonal communication structure has some methodological drawbacks, especially limitations in constructing quantitative measures of structural characteristics. Furthermore, lack of research in the area of interpersonal communication can also be attributed to the greater reliance upon survey research designs in which the unit of analysis is the individual.

Therefore, we see two issues which must be resolved as a prerequisite to studying the differential effect of communication structure in innovation diffusion. First, there is need to develop a conceptual framework descriptive of communication structure. Secondly, the conceptual scheme should be so organized that it can be fitted as soundly as possible into an analytical framework useful to study the variables of communication structure in comparative social systems.

Hence, in order to see the problem of this thesis in clear perspective, we shall outline and define in brief the conceptual framework of communication structure now.

Communication Structure:
Δ Conceptual Framework

Our concern in this section is to conceptualize communication structure in such a way that (1) it takes into account the linkage of interpersonal networks, and the characteristics of those who provide this linkage, to the flow of information and influence from outside sources to the system, especially via the mass media and change agencies; (2) it provides meaningful interpersonal dimensions which have a bearing on innovation diffusion, and (3) it serves as a descriptive model which can potentially be utilized to compare empirically one social system with another in interpersonal dimensions which affect innovation diffusion in these systems.

At various points in our attempt to conceptualize communication structure descriptive of informal social systems, we found especially useful the work of Jacobson and Seashore (1951) and Weiss and Jacobson (1955), who suggested a conceptual and analytical scheme for the study of communication structure in complex organizations.

We intend to discuss first the social psychological basis of communication structure, and then to define communication structure, its key concepts, and variables.

Social-Psychological Basis
of Communication Structure

How the structure of interpersonal communication evolves can be more clearly illustrated from Figure 1. In general, innovation messages emanating from the mass media or the change agencies first reach a few persons like B_1-B_n in Figure 1. It is from them that other social system members like A_1-A_n * acquire information. In addition, the very act of adoption of innovations by innovators produces information, alternatives, and evaluative results for the benefit of other members in the social system. Indeed, these adoption acts might activate channels of interpersonal communication if the social system is characterized by relatively change-inducing norms. The interpersonal communication exchange through which members in a social system obtain information tend to be structured rather than occurring randomly.

The manner in which members in a social system enter into distinctive interpersonal communication behavior in the

*There can be situations in which individuals like A_1-A_n also have direct contact with mass media sources and change agents. In such situations the communicative relationship between A_1-A_n and B_1-B_n implies one in which individuals like A_1-A_n seek interpretation, clarification, and evaluation of information dealing with innovations.

S O C I A L S Y S T E M

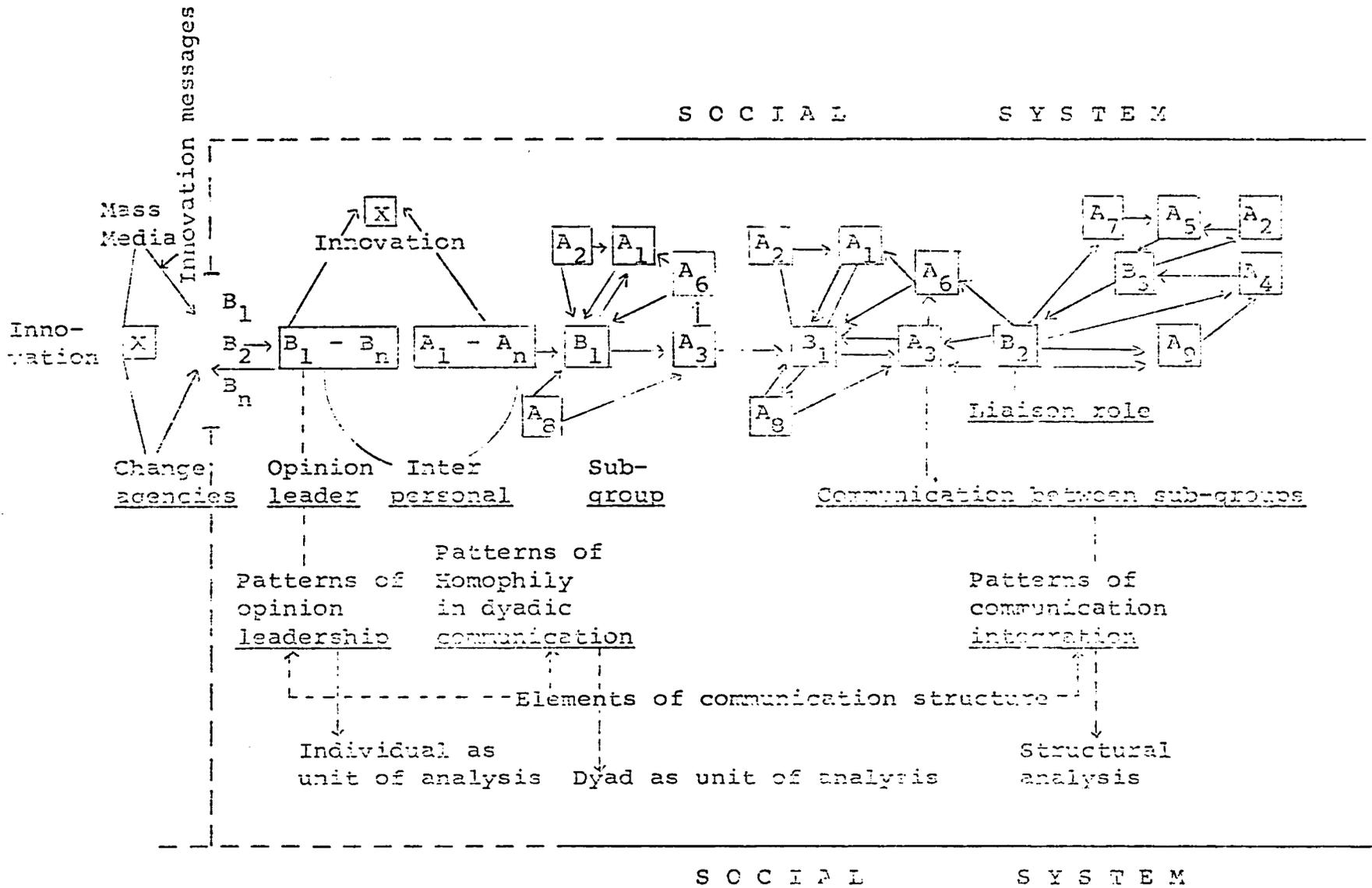


Figure 1.--Conceptual and Analytical Paradigm of Communication Structure in Innovation Diffusion

process of innovation decisions can be understood from the A-P-T model of interpersonal behavior (Newcomb, 1953 and 1954). The communication relationship between A_j and B_j (where B_j is an opinion leader on innovation X) about innovation X can be explained in terms of what Newcomb calls the individual system and the collective system stability. Basic to this theory is the notion that individual A_j will tend to maintain minimal discrepancy between his own attitudes toward the innovation X and those of B_j 's attitudes, depending upon A_j 's attraction toward the opinion leader B_j , and the valence or importance that is jointly attributed to innovation X by the two individuals. Newcomb stated the role of interpersonal communication in maintaining minimal discrepancy between interacting individuals oriented toward common objects in their environment. In other words interpersonal communication involving information seeking about innovations is one of the basic mechanisms through which individuals like A_1 - A_n will maintain minimal discrepancy between their attitudes toward innovations and those of opinion leaders B_1 - B_n . If innovations are evaluated positively by opinion leaders B_1 - B_n , it is expected that channels of interpersonal communication will generate innovative processes in a given social system.

Similarly Festinger (1950) stated that individuals (like A_1) engage in interpersonal communication with others (like B_1) because of certain need states which induce them to equilibrate their view of "social reality," to learn what others believe and to modify their own opinions. According to this formulation the extent to which interpersonal communication of a message would lead to attitudinal and behavioral change will greatly depend upon the degree to which others with whom one is in communication are believed to adopt the same attitudes or behaviors.

Similar to Newcomb's notion of strain toward symmetry in individual and collective systems and Festinger's need-generating function inducing individuals to gain "social reality," Lewin (1966, p. 237) postulated that if the individual should try to diverge "too much from group standards, he would find himself in increasing difficulties" Most individuals, therefore, stay pretty close to the standards of the group they belong to or which they wish to belong. In other words, the group level itself acquires value. According to Lewin, the group becomes a positive valence corresponding to a central force field with the forces keeping the individual in line with the standards of the group. Thus the nature and extent of interpersonal communication in

innovation diffusion will be influenced by group standards or norms relating to technological adoption. That is, the extent to which innovations become salient and significant objects for goal-attainment in a social system, to that extent innovation messages will activate channels of interpersonal communication among the members in a social system.

In light of the previous discussion (and Figure 1), opinion leadership is a relationship between an individual exerting influence and those who are influenced through interpersonal communication. As part of this process, informational status is accorded to persons called opinion leaders whose decisional preferences are taken into account and sought by other members of the social system. If innovations are evaluated positively by opinion leaders, other members involved in interpersonal communication would acquire needed information about innovations in their decision-making process. In this way, interpersonal influence is expected to facilitate legitimization of innovation acceptance and internalization of new behavior patterns.

The recurring communicative exchange of the A-B-X type which occur between members at the dyadic level*

*A dyad refers to a pair of individuals engaged in communication. The communicative relationship can be either symmetric ($A \rightleftarrows B$) or asymmetric ($A \rightarrow B$).

generate a communication structure. In terms of the problem of this thesis, we shall now discuss specifically what we mean by communication structure, its key concepts, and variables.

Definitions of Key Concepts and Variables

What is Communication Structure?

Before we begin outlining the key elements of the communication structure, we must define social system and communication structure. Social system* is defined as a set of primary group interaction processes among members who share a common boundary and are engaged in similar problem-solving activities. By communication structure we mean the networks of interpersonal relationships through which information, innovation, and influence flow among the members of a social system. Thus the communication structure describes not only the patterns of communication contacts among

*An Indian village community is a social system as it contains within its boundary informal social groups which are characterised by networks of intimate face-to-face communication. Members of these groups are engaged in similar problem solving activities.

members in the social system but also the pattern of communication contacts that occur between subgroups of members. However, the communication structure of a social system is basically derived from the most fundamental interpersonal communication relationships that exist at the dyadic level.

Communicative relationships can be differentiated in terms of "instrumental" and "social." A relationship instrumental when the purpose of communication is to be utilized in some future goal-oriented behavior. Instrumental communication is to be studied in terms of information-seeking contacts established between social system members for obtaining advice about innovations. The set of instrumental communication contacts is called the "information-seeking network."

A communicative relationship is purely social or for a consummatory purpose when the relationship is oriented toward informal affective association, such as with friends. The set of social interactions of this type are called "friendship network." Thus, the communication structure can be studied in terms of the nature of the interpersonal relationships established between members in information-seeking network and friendship network. As Festinger and others (1950, p. 127) pointed out, the development of friendship networks was indicative of active channels of communication

of information and opinions among members involved in friendships. They further stated that the nature of communication content depended upon the interest of members in certain matters and its relevance to their friendship.

Implicit in our definition of communication structure is the notion that certain roles are positioned and distributed as part of the communication structure. It is through these communication roles that innovations diffuse via the interpersonal networks. These role behaviors can be viewed as recurring actions of an individual or a set of individuals interrelated with the repetitive and recurring activities of other members in the interpersonal communication network. These recurring events of interpersonal communication are indeed the basis of communication structure.

The communication structure is a complex set of variables. In line with the criteria stated earlier in this section for the conceptualization of communication structure, some ordering and organization of these variables is a prerequisite to meaningful analysis of communication structure in innovation diffusion. Thus the communication structure can be mainly conceptualized in terms of three major concepts: (1) pattern of opinion leadership; (2) patterns of homophily in dyadic communication; and (3) patterns of communication integration.

We shall now discuss in brief each of these concepts and the variables that have been grouped under each. Detailed discussion of these concepts and the hypotheses concerning them are given in the next chapter.

1. Patterns of Opinion Leadership. Opinion leadership is one of the most important concepts of the interpersonal communication structure, and has a direct bearing on the rate of technological adoption in a given social system. We define Opinion leadership as interpersonal influence exercised in a situation through communication process toward the attainment of certain attitudes and/or behavior. Opinion leaders serve as interpersonal communication channel roles within the interpersonal networks, and therefore it is logical to expect that the rate of technological diffusion will be differentially conditioned by the extent to which these communication channel roles are characterized by higher degree of knowlegeability, innovativeness, cosmopolitaness, and formal participation in one social system as compared to the other.

Two variables of opinion leadership are included in our conceptual framework of communication structure: opinion leadership concentration and polymorphism of opinion leadership. Opinion leadership concentration is the degree to which one or more units in a social system are perceived to

have relatively greater degree of interpersonal influence on a given scope or criteria than other units in that social system. Concentration in brief might be considered a statement of the power structure of a social system with reference to a given communication situation. Thus, opinion leadership in a social system can be either widely distributed over the entire communication structure or concentrated in the hands of a few individuals.

Polymorphism of opinion leadership is the tendency of an individual to be in the same relative influence position in a social system across a given number of issues. Thus, according to this definition the communication structure can either be characterized by opinion leadership roles which vary in specialization as the scope is varied, or it can be characterized by opinion leadership roles having a generalized influence (same position) as the scope or criteria is varied.

2. Patterns of Homophily in Dyadic Communication. The communication structure and its effect on innovation diffusion in given social systems can be differentiated in terms of the nature of communication relationship at the dyadic level. We consider opinion leadership as a property of the interpersonal relationship which occur between an opinion

leader and others who seek information from him. Thus, patterns of communication contacts can be conceptualized in terms of "who interacts with whom of what attributes and for what purpose." To organize these person-to-person diffusion contacts conceptually with respect to attributes of the interacting members as well as the purpose of the communicative exchange, we intend to use the concept of homophily, originally used by Lazarsfeld and Merton (1954, p. 23) in studying patterns of interpersonal contacts in two U.S. communities. Homophily is defined as the degree to which individuals with a certain designated attribute have interpersonal communication contacts with others of similar attributes. The concept of homophily is to be utilized in studying both information-seeking contacts and the friendship contacts. Furthermore, communication structure in given social systems can be differentiated and its effect on rate of technological diffusion studied in terms of the frequency with which communication contacts occur between members of dyadic pairs especially for the purpose of information seekings on innovations.

3. Patterns of Communication Integration. The communication structure of given social systems can be conceptualized and analyzed in terms of what we call "pattern of communication integration." Communication integration is

defined as the degree to which social system members and subgroups are interconnected in interpersonal communication relationships. It is evident from this definition that the concept of communication integration includes not only the interpersonal relationships between individuals at the dyadic level but also between individuals and subgroups and between subgroups themselves which constitute the entire communication structure of a social system. In other words, the intent is to look at the interpersonal relationships from the point of view of the communication structure as a whole at the social system level.

Studying communication structures at this level has some inherent limitations, especially when it comes to measurement. The degree of communication integration in a social system can be studied in terms of integration of social system members into the friendship network, and the information seeking network.

Furthermore, following the work of Jacobson and Seashore (1951) and Weiss and Jacobson (1955), the degree of communication integration of given social systems can be differentiated in terms of (1) subgroups which constitute a given communication structure, (2) the pattern of communication contacts between subgroups, and (3) key communication

positions especially those of liaison persons. Such are defined as individuals whose interpersonal contacts diffuse through two or more subgroups thereby serving as communication linkages between subgroups. The more such liaison roles are located in the interpersonal structure of a social system, the greater is the degree of communication integration and hence higher degree of technological diffusion.

It is within this conceptual framework that we seek to outline statements of hypotheses in the next chapter by utilizing three different units of analysis, corresponding to the three levels of concepts and variables of the communication structure. By so doing the conceptual and analytical framework of this thesis is designed as follows:

1. Patterns of opinion leadership dealt within the framework of the individual as the unit of analysis.
2. Patterns of homophily in dyadic communication are studied by utilizing the dyad as the unit of analysis.
3. Patterns of communication integration are described by utilizing structural analysis.

To summarize, communication structure involves a complex of variables. We have attempted to present the above conceptual framework in order to derive a meaningful picture

out of this complexity. The next important step is to organize the hypotheses dealing with the above concepts and variables within the framework of three different units of analysis in such a way that there is a correspondence between our three clusters of concepts and the proposed analytical scheme.

CHAPTER II

CONCEPTS AND STATEMENTS OF HYPOTHESES

In line with the conceptual and analytical framework discussed in Chapter I, we intend to outline statements of hypotheses which are described under three different levels of analyses corresponding to the three levels of variables of the communication structure.

The Individual as the Unit of Analysis

This analysis deals exclusively with individuals, especially with regard to their roles. No consideration is given to the dyad or to the subgroups to which the individual belongs. According to Berlo (1960, p. 53), this approach to analysis is called "monadic" in that the focus is on the individual rather than on relationships among individuals. The concepts and variables for which the individual is the unit of analysis include patterns of opinion leadership.

Patterns of Opinion Leadership

Our concern in the present section will be on the phenomenon of opinion leadership, conceptualized in terms of

interpersonal influence. Merton (1957, p. 415) defines interpersonal influence as the direct interaction of persons in so far as this affects the behavior or attitudes of participants. In the two-step model* of communication, the opinion leader, through transmission and interpretation of messages to group members, is influential in the decisions of his peers.

In small group research literature, the current leaning is toward a focus upon interaction between individuals and its relation to influence assertion and acceptance (Hollander, 1963, p. 470).

We define opinion leadership as interpersonal influence exercised in a situation through communication process toward the attainment of certain attitudes and/or behavior. We consider opinion leadership as an act of influence on some matter relevant to the interest of group members, and as such it is a continuous variable which describes each group member in terms of his degree of interpersonal influence with regard to one or more issues. Viewed in this way,

*The two-step model of communication is based on the "two-step flow" hypothesis of communication originally postulated by Lazarsfeld and others (1948, p. 151). According to this hypothesis "ideas often flow from radio and print to opinion leaders and from these to the less active sections of the population."

leadership may be distributed among many members or it may be concentrated in a few individuals, and it may vary from one situation to the other.

Communication and Innovative
Behavior of Opinion Leaders

Basic to the definition of opinion leadership is the fact that opinion leaders serve communication roles by providing social system members with information, advice, and evaluation pertaining to innovations and ideas flowing from outside of the social system. As such, opinion leadership is a communication role positioned in the communication structure of a social system. It is expected that the degree of technological diffusion varies from one social system to the other depending upon the extent to which opinion leaders (1) are exposed to mass media sources, (2) have change agent contact, (3) use cosmopolite interpersonal communication channels in the process of innovation decisions, (4) participate in formal organizations, and (5) are innovative in adopting technological innovations. Following Homans (1961, p. 314) these behavioral attributes of opinion leaders are rare and salient resources which are valued and exchanged by other system members in the process of innovation diffusion.

Katz (1957) pointed out that opinion leaders generally expose themselves to the media appropriate to the area of their influence. The greater exposure of opinion leaders to the mass media serves to relate the groups to relevant messages emanating from the mass media. Results from diffusion studies conducted in the U.S. indicate that technological diffusion among localities varies by the extent to which the communication structure is such that farmers are influenced by opinion leaders regarded by them as highly technologically competent and as having greater mass media exposure (Young and Coleman, 1959; Coughenour, 1964 and 1966). Emery and Oeser (1962, p. 49) reported that in Australian farm communities, the opinion leader adopted innovations and had closer contacts with change agents. Eisenstadt (1962) studied the communication structure in the context of three communities and found that opinion leaders in the modern community were more exposed to specialized information and were more differentiated in specific activities than in the case of traditional and transitional communities. Rogers (1964, p. 26, 32) also found that opinion leaders in modern communities were somewhat more exposed to mass media and were more innovative than in traditional communities.

Theoretically, it is anticipated that as the technology comes in from sources outside of a social system, opinion leaders are the key points of contact in a modern community marked by a relatively higher rate of technological diffusion. On the other hand, opinion leaders in a traditional social system are expected to lack external contacts seemingly because the role of an opinion leader in such settings is to communicate messages which tend to support the existing norms and the maintenance of status quo rather than the adoption of technological change.

Thus we state the following hypotheses.

- H₁ Opinion leadership is more highly related to mass media in a modern social system than in a traditional social system.
- H₂ Opinion leadership is more highly related to change agent contact in a modern social system than in a traditional social system.
- H₃ Opinion leadership is more highly related to the use of cosmopolite interpersonal communication sources in the process of innovation decisions in a modern social system than in a traditional social system.

H₄ Opinion leadership is more highly related to the degree of participation in formal organizations in modern social systems than in traditional social systems.

H₅ Opinion leadership is more highly related to innovativeness in a modern social system than in a traditional social system.

Polymorphism of Opinion Leadership

Leadership is not a general trait. It is responsive to changing situations and an individual who is a leader in one situation may not retain his position as the group moves on to another situation (Gibb, 1954, p. 902). The distinctiveness of leaders does not rest on their attributes as such but on the relationship between their attributes and those of the rest of the group. The concept situation has many dimensions but one specific dimension with which we are concerned is its "content"--that is the particular activity in which the members of the group are engaged and seek advice and consultation from those who are competent. Such opinion leaders guide opinion and opinion changes rather than lead directly into action.

Some opinion leaders exert their influence primarily in one specific area such as public affairs or agriculture or health. Merton (1957, p. 414) termed this leadership "monomorphic." Polymorphic opinion leadership is defined by Merton as the degree to which a single leader is sought for information and advice about a variety of topics such as agriculture, health, and public affairs.

We define polymorphism of opinion leadership as the tendency of an individual to be in the same relative influence position in a social system for numerous topics or issues. Since we consider opinion leadership as a communication role, it is expected that in peasant communities a certain role structure functions to help solve certain problems and achieve certain goals in which social system members are involved. Following Bales' (1950, pp. 15-16) theoretic notions of role differentiation it can be assumed that the communication structure of groups can be understood as a system of solutions to the functional problems of interaction which become institutionalized in order to reduce the tensions growing out of uncertainty and unpredictability in certain courses of action. But our knowledge is too limited to state what kind of a communication role structure operates in the process of innovation diffusion in traditional and modern

social systems, and how it differs from one social system to the other.

Research findings completed in the context of more developed societies indicated that there is generally little overlap among the different types of opinion leaders (Emery and Oeser, 1958, p. 51). Blankenship (1964) reported that influentials were distributed with respect to their specialized areas in a highly industrialized community, whereas, influentials in a less industrialized community were not as specialized and only a few had leadership roles in several areas. Katz and Lazarsfeld (1955, p. 334) studied opinion leadership in several areas such as marketing and public affairs, and found little support for the notion of a generalized leader. On the other hand Marcus and Bauer (1964) reanalyzed the data of Katz and Lazarsfeld's study, and reported that there was a tendency toward some generalized opinion leadership.

In the context of developing societies hardly any research appears to have been conducted dealing with polymorphism of leadership. Rogers and van Es (1964, p. 60) found that leadership in three modern Colombian peasant communities was no more monomorphic than opinion leadership in two traditional communities. However, Esienstadt (1962, p. 341)

reported that in the Israeli modern community, the informal differentiation between the various opinion leaders generally corresponded to the main institutional spheres in which they were most prominent. There was also greater differentiation between the bearers of various types of information. In the case of traditional communities the structure of interpersonal communication was primarily served by a few elites.

According to our conceptualization a low degree of polymorphism means greater degree of role differentiation with respect to the areas over which opinion leadership influence is distributed. It is assumed that degree of communication role specialization in the interpersonal networks of a social system considerably affects the rate of technological diffusion in that system. We can therefore expect that in modern social systems, characterized by a higher rate of technological diffusion, roles are based on functional specificity and competence whereas in a traditional social system opinion leadership roles are probably based on status hierarchy rather than expertness in a given activity.

H₆ Opinion leadership in modern social systems is less polymorphic than in traditional social systems.

Opinion Leadership Concentration

Considering that opinion leadership is a continuous variable* rather than a dichotomy of leaders and followers, it is expected that opinion leadership is fairly widespread, even though it may be especially concentrated in a few individuals.

Opinion leadership concentration is the degree to which one or more units in a given social system have relatively greater degree of interpersonal influence with respect to a given scope or criterion than other units of that social system. In essence, concentration is a statement of the power structure of a social system. From a communication point of view, concentration means that the availability of interpersonal communication channels is restricted in a social system. In other words, there are relatively limited opinion leadership roles positioned in the communication structure of a social system.

*An individual's degree of opinion leadership is measured in terms of sociometric choices received by him on a given criteria. As such, sociometric choices can either be concentrated in a few individuals, thus indicating greater degree of leadership concentration, or sociometric choices can be distributed among many individuals indicating less concentration of leadership.

From a search of the small group literature as well as the diffusion research, it seems that the concept of leadership concentration has not been given adequate attention. In small group research, marked differences of opinion have been expressed as to the consequences for group functioning of various distributions of leadership. Since our focus is to study how concentration of information channels can affect diffusion and acceptance of new ideas and innovations in a social system, it is perhaps advantageous to refer to the communication network studies by Bavelas (1950) and Leavitt (1951), who studied the effects of differential patterns of network "designs" (such as the wheel, the chain, and circle) on information sharing and decision making by group members. The attempt in these experiments was to create extremes of communicability in that a subject could communicate to and receive messages from all of the other subjects or a subject could communicate to no one and receive information from only one person. It was found that if there was a wide open communication pattern, there was somewhat less chance for a group to fall into gross error and much better chance to exchange correct information, than, when communication was centralized. Reicken and Homans (1954, p. 808) stated that the pattern of interaction channels available to a group had an

influence on its effectiveness as measured in a number of ways, and that a highly centralized pattern might not give the overall effectiveness.

Although the above results were based on laboratory experiments yet they pointed out that groups in which members had relatively more access to interpersonal communication channels had much better chances to exchange correct information than groups with restricted access in the communication network. These results have some bearing on opinion leadership concentration relative to informal social systems in the sense that restriction of availability of communication channels in the interpersonal networks caused by concentration might not be conducive to effective diffusion of new ideas in a social system. However, as Cartwright and Zander (1953, p. 544) suggested, different degrees of concentration are required for the accomplishment of different purposes under different conditions. But these conditions remain unspecified as yet. We intend to outline hypotheses by stating the conditions or situations which probably require varying degrees of opinion leadership concentration.

1. If opinion leadership is considered as a means toward the achievement of some specific social system goals, or in collective innovation decisions, then we expect

the following hypothesis:

H₇ There is greater degree of opinion leadership concentration in a modern social system than in a traditional social system.

In other words, the hypothesis states that in the case of innovations which require group decisions, it is expected that there will be greater degree of technological diffusion when opinion leadership is concentrated in a social system than when it is too much distributed in a social system.

1. If opinion leadership is considered as a functional means toward the achievement of individual goals (such as seeking information and evaluation on innovations for making individual decisions) then we suggest the following hypothesis:

H₈ There is less opinion leadership concentration in a modern social system than in a traditional social system.

According to this hypothesis it is expected that there should be less opinion leadership concentration in a social system when the acceptance of innovations is a result of individual decision-making. When there is fairly widespread distribution of opinion leadership roles facilitating a free give and take of information among members, it is

conceivable that there would be a greater degree of technological diffusion. Thus, we expect less opinion leadership concentration in a modern social system characterized by a relatively higher rate of technological diffusion. On the other hand if opinion leadership roles are concentrated in a few individuals either because of social status factors, or due to lack of specialized information sources available within the communication structure, then the rate of innovation diffusion would be less which is likely to be so in a traditional social system.

No specific investigations have been conducted utilizing the concept of opinion leadership concentration in innovation diffusion, but there are some indications from a few diffusion studies which support the last hypothesis. Emery and Oeser (1958, p. 48) stated that a fairly widespread consultative link among Australian farmers was found to be operating not on the basis of neighborhood or kinship but on the level of competence of the opinion leaders, and that channels of influence functioned all the way from the top influentials, forming a sort of communication hierarchy, the basis of which was competence. Rogers and van Es (1964) found that respondents in more traditional communities were prone to name fewer opinion leaders than in modern communities. Eisenstadt (1962)

reported that in traditional and transitional communities in Israel, messages could be transmitted via interpersonal communication only through a selected few elites.

To sum up our previous discussion dealing with patterns of opinion leadership, it is appropriate to mention that our main focus is on opinion leadership as a communication role, positioned and integrated in the communication structure of a social system. Hypotheses were stated with respect to variations in communication behavior of opinion leaders, polymorphism of opinion leadership and concentration of opinion leadership. These are assumed to affect differentially the degree of technological diffusion in informal social systems. Our consideration of opinion leadership in the previous hypotheses was limited only to the individual level of analysis. However, considering opinion leadership as a property of interpersonal relationship, we intend to focus on this aspect in the next section where we shall dwell upon patterns of homophily in dyadic communication by utilizing the "dyad" as the conceptual and analytical unit.

The Dyad as the Unit of Analysis

The following focus of analysis is on the dyad or the interpersonal relationship with reference to a communication

situation. No consideration is given to the sub-groups to which the dyad or the members in the dyad belong. The importance of dyadic analysis was pointed out by Berlo (1960, p. 53-54) who stated that many of the key determinants of communication involve the relationship between source and receiver characteristics and that a large portion of communication theory should be dyadic in nature.

Patterns of Homophily in Dyadic Communication

Since the essence of innovation diffusion in a social system is the flow of information and influence from person to person, it becomes essential to investigate the nature and characteristics of dyadic communication in order to understand how such communication structures condition the diffusion of innovations within one social system as contrasted with another social system.

As an attempt to investigate patterns of interpersonal communication, Lazarsfeld and Merton (1954, p. 23) pointed out that the tendency of "likes" to interact with "likes" was not a simple statement, but was rather a complex problem of determining the degree to which selectivity in interpersonal interaction varied for different kinds of social attributes and

how it varied within different kinds of social structures. To study bases of selectivity in interpersonal relationships, they suggested the concept of "homophily" defined as the tendency for friendships to form between those who are alike in some designated respect. The concept of "heterophily" was defined as the tendency for friendships to form between those who differ in some designated respect. Homophily and heterophily are descriptive concepts rather than interpretative. The word "tendency" does not refer to some propensity assumed to be rooted in the individual, but is in fact an observed correlation positive in one instance and negative in the other between designated attributes of friends (Lazarsfeld and Merton, 1954, p. 23). Lazarsfeld and Merton sought to study homophily in intimate social relationships in two communities with differing socio-cultural context and found that for the same social attributes, the degree of homophily differed widely between the two communities. Coleman (1959) suggested the use of this concept in studying the basis of communication contacts between members in social organizations.

Since our focus is on the diffusion of innovations in peasant communities, we shall extend this concept not only to interpersonal communication in informal friendship associations but also to relatively more goal oriented communication

relationships involving acquisition of information and the flow of influence in innovation decisions. In doing so we define homophily as the degree to which individuals with a certain attribute have interpersonal communication with other individuals with a similar attribute. We conceive homophily as a relational concept. In this thesis interpersonal communication relationships are to be studied in terms of sociometric choices that individuals make of other individuals for friendship, family visiting, or for seeking expert information. Thus, we seek to conceptualize communication relationships within the theoretical framework suggested by Blau (1962), who classified sociometric choices along two general dimensions: (1) interaction vs. evaluation, and (2) instrumental vs. social. Following Blau's scheme, four dimensions of interpersonal choices can be conceptualized. However, in view of the focus of this thesis on innovation diffusion, our primary concern is only on interaction choices, namely, "instrumental interaction" and "social interaction," defined as follows:

1. "Instrumental-interaction" refers to choices of persons selected specifically for the purpose of seeking information, advice or evaluations in innovative decisions. In this thesis the set of interpersonal communication contacts

of this type is termed an information-seeking network.

2. "Social interaction" refers to choices of persons selected primarily for intimate and informal friendly association. This set of interpersonal contacts is to be referred to as a friendship network. Festinger and others (1950, p. 125) found that friendship networks were active channels of communication of information relevant to the interest of group members. We consider such networks of considerable importance especially in innovation diffusion in peasant villages.

Conceptually, these two types of communication networks are considered mutually exclusive. They are based on the purpose of interpersonal communication relationship and are similar to "instrumental purpose" and "consummatory purpose" of communications suggested by Festinger (1950) and Berlo (1960, p. 17). The concept of homophily will be studied within the realm of these two types of interpersonal communication networks specifically with regard to those attributes (of members in dyadic relationship) which we believe have relatively important bearing on innovation diffusion. To the extent that dyadic communication contacts in either of the two types of networks in a social system, have low homophily with respect to these designated attributes,

then to that extent the diffusion potential is increased and hence we expect greater degree of technological diffusion in that system. From Figure 2, it is evident that in the interpersonal communication situation in which seekers tend to over-choose or under-choose persons with a specified attribute, quite independently of the way the attribute relates to the seeker, we expect a low degree of homophily which consequently affects a relatively greater degree of technological diffusion. In this thesis the social system, having relatively higher rate of technological diffusion, is conceptualized as modern. On the other hand if the degree of homophily is positively high, indicating communication between members of dyads having similar attributes, then diffusion potential within the social system is relatively lower. In this thesis the social system having a relatively lower rate of technological diffusion is conceptualized as traditional.

In general the levels of homophily with respect to both types of interpersonal communication networks (instrumental interaction and social interaction) in modern and traditional social systems can be described as follows:

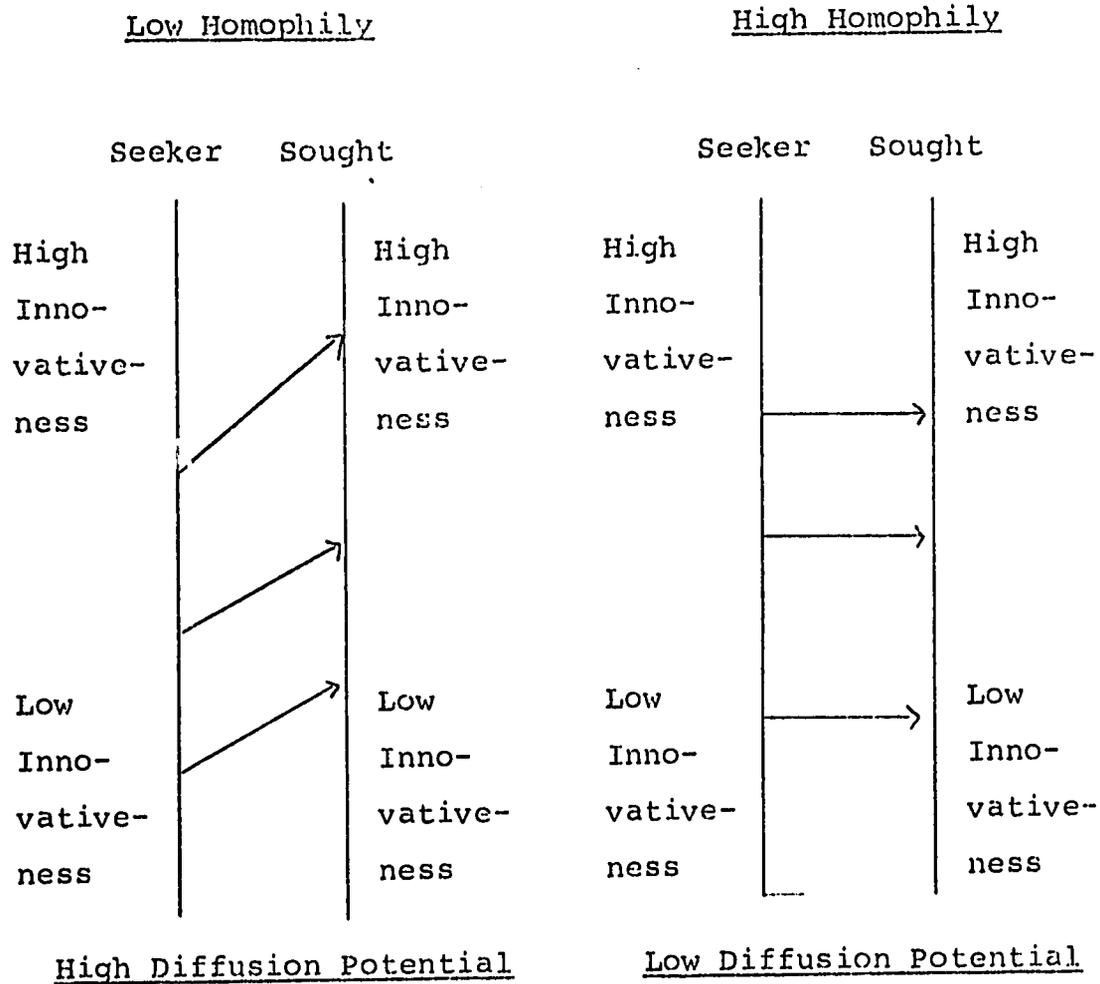


Figure 2.--The Relationship of Homophily and Techological Diffusion Potential.

	<u>Homophily in</u>	
	Modern Social System (high diffusion)	Traditional Social System (low diffusion)
	rate	rate
Instrumental interaction (information seeking network)	Low	< High
Social Interaction (friendship network)	Low	< High

In view of the previous description it should be noted that in modern social systems "low" homophily in both instrumental interaction and social interaction does not imply exactly the same degree of homophily. Same is the case with "high" homophily in the traditional social system. This is merely to indicate how in dyadic communication contacts variations in the homophily index can affect technological diffusion in given social systems. As a matter of fact, the index of homophily can vary from -1 to +1. In this thesis the statistical norm for low homophily implies a correlation ranging from 0 to -1 as compared with high homophily which implies a correlation ranging from low positive value to +1. To simplify our discussion, we intend to use the words such as "lower" and "higher" homomphily in our statements of hypothesis which indicate relative values of homophily in

comparative systems. However, it should be made clear now that variation in the index of homophily from one social system to the other is relative to (1) the type of social structure under investigation; (2) the type of communication relationship such as "instrumental interaction" and "social interaction"; and (3) the specific attributes of the interacting members in dyadic communication contacts.

There is hardly any diffusion study completed thus far utilizing seeker-sought dyadic analysis in comparative social systems. Thus, our hypotheses can not be substantiated by much past empirical evidence. However, research findings from various studies having relevance to the present discussion are included.

Innovativeness

Figure 2 shows that if less innovative farmers are involved in instrumental interaction with more innovative farmers in a social system then the rate of technological diffusion would be relatively greater. This is what we expect in the modern social system. In the traditional social system there may be barriers for less innovative farmers to seek information from more innovative farmers. Also the interpersonal communication behavior of peasants in a traditional

social system may not be such as to make innovation salient and significant objects of orientation in instrumental interaction.

Past diffusion studies conducted in the U.S., the Netherlands and Colombia indicated two general tendencies: seekers obtained information from individuals who are (1) generally similar in relevant characteristics or (2) more expert and innovative than the seekers in relevant knowledge and other characteristics (Lionberger, 1957, 1959; van den Ban, 1963; Rogers and van Es, 1964). However, Emery and Oeser (1959, p. 49) found that "influencers" were more innovative than the "influencees" in Australian farm communities.

With respect to communication barriers in innovation diffusion in a social system, Rogers (1964) found in Colombia, that communication flow was impeded by seeker-sought differences in innovativeness to a greater degree in more traditional communities than in more modern villages. However, van den Ban (1963) concluded that differences in innovativeness between individuals were a more important barrier in modern than in traditional social systems in the Netherlands. Coleman and others (1966, p. 117) found that advisor network and discussion networks of pairs of doctors showed most pair-simultaneity (or pair homophily) in drug adoption at the

beginning and then progressively declined. These researchers concluded that doctor's contacts with one another seem to be strongly related to the time of adoption of the drug. Thus, there seems to be no one consistent finding as to how innovativeness is related to interpersonal communication exchange between members in a social system. However, we state the following hypothesis:

H_g In the information seeking network instrumental interaction contacts have higher homophily with respect to innovativeness in a traditional social system than in a modern social system.

There are other studies which, though not directly related to the previous hypothesis, have some bearing on our present discussion. Duncan and Kreitlow (1954) found that heterogeneous neighborhoods, i.e., neighborhoods with low "homophily" in religious values and ethnic background had more favorable attitudes toward school practices and had much higher adoption scores as compared with homogeneous neighborhoods (high homophily). Coughenour (1966) also found that the rate of technological diffusion varied from locality to locality with the extent to which least competent farmers sought information and advice from most competent farmers.

In the case of "social interaction" choices, we expect greater homophily with respect to innovativeness in the traditional community than in the modern community. The assumption is that informal friendly association with others may be a relatively more important source of social gratification in a traditional community whereas in a modern community social interaction may be based on mutual exchange of ideas and solutions to problems encountered by interacting members in the attainment of specific goals.

Chou (1966, pp. 48-49) examined the concept of homophily in the context of Colombian communities and found a significant relationship with respect to innovativeness in informal friendship interaction.

We may expect differences in the degree of homophily in social interaction between modern and traditional communities.

H₁₀ In the friendship network, "social interaction" contacts have a higher degree of homophily with respect to innovativeness in a traditional social system than in a modern social system.

Mass Media Exposure

Mass media exposure as an attribute of interacting individuals is an important factor in innovation diffusion

in a social system. The question with which we are concerned is whether innovation and influence tend to flow from those more exposed to mass media, to others less exposed. The greater the extent to which the two-step or multi-step flow of influence involves persons of higher and lower degree of mass media exposure, respectively, as sought and seekers, the more conducive is the communication structure to rapid innovation diffusion. But the extent to which this relay of information and influence from one person to another takes place may vary from one social system to the other. We expect the following hypothesis:

H₁₁ In the information-seeking network, instrumental interaction contacts have a greater degree of homophily with respect to mass media exposure in a traditional social system than in a modern social system.

Research findings from the U.S. and from developing societies indicate that opinion leaders are more exposed to farm magazines, professional journals and other mass media (Katz, 1957; Menzel and Katz; 1955; Rahim, 1961, p. 58). However, the above findings were not obtained in comparative social systems with varying degrees of modernism or tradi-

systems in the U.S. indicated that the rate of technological diffusion varied from one social system to the other with the extent to which farmers with few media contacts had informal contacts with other farmers having many media contacts (Coughenour, 1964).

We also expect that in modern social systems friendship associations involve persons with a high and low degree of mass media exposure, whereas in traditional social systems, such friendship associations are between those having a relatively similar exposure to the mass media. There is some support in this direction from a study conducted in five Colombian communities. Results of this study showed that in traditional communities social interaction choices had homophily with respect to mass media communication contact (Chou, 1966, p. 49).

H₁₂ In the friendship network, social interaction contacts have greater degree of homophily with respect to mass media exposure in a traditional social system than in a modern social system.

Change Agent Contact

Change agent contact is the degree to which an individual communicates with a change agent over a specific

period of time. In view of our earlier discussion, we might expect that there will be a greater tendency for information seeking to occur between persons having a high degree of change agent contact and those having low change agent contact, in modern than in traditional social systems. A similar tendency, although perhaps less marked, may occur in friendship associations.

H₁₃ In the information seeking network, instrumental interaction contacts have greater homophily with respect to change agent contact in a traditional social system than in a modern social system.

H₁₄ In the friendship network, social interaction contacts have greater homophily with respect to change agent contact in a traditional social system than in a modern social system.

There is no direct evidence to support these two hypotheses, but findings from studies conducted in Australia and the U.S. reported that instrumental interaction involved opinion leaders who were more likely to have had a greater degree of change agent contact than other system members (Emery and Oeser, 1956, p. 50; Rogers and Burdge, 1962).

Agricultural Knowledgeability

Agricultural knowledgeability is the degree to which an individual is relatively earlier in acquiring information about innovations than other members of the social system. A low degree of homophily is expected with respect to agricultural knowledgeability for information-seeking and informal friendly association in a modern social system because of more specialized information needed by members in making innovation decisions.

H₁₅ In the information seeking network, instrumental interaction contacts have greater homophily with respect to agricultural knowledgeability in a traditional social system than in a modern social system.

H₁₆ In the friendship network, social interaction contacts have greater homophily with respect to agricultural knowledgeability in a traditional social system than in a modern social system.

Social Status

Research findings dealing with status as an attribute influencing the interpersonal communication relationship between the seekers and the soughts are not very consistent,

probably the inconsistency in findings might be due to differences in the type of communities (modern vs. traditional) studied. However, one generalization can be drawn from available research findings that opinion leaders have higher social status than their followers (Rogers, 1962, p. 241). But the interpersonal relationship may be differentially conditioned by social status factors from one social system to another. In a traditional social system, higher status individuals may not serve as comparable "role models" for low status members (Rogers, 1962, p. 241). Also, extreme differences in social status between seekers and soughts might serve as barriers to the flow of communication on account of the relatively more hierarchically structured character of social relationships in a traditional social system as compared to a modern social system.

To the extent that status tends to inhibit the use of certain interpersonal communication channels, the less would be the rate of technological diffusion in a social system. We hypothesize that:

H₁₇ In the information seeking network, instrumental interaction contacts have greater homophily with respect to social status in a traditional social

H₁₈ In the friendship network, social interaction contacts have greater degree of homophily with respect to social status in a traditional social system than in a modern social system.

There is some indication for support of the previous hypotheses from a comparative study in five Colombian communities conducted by Rogers and others (1964, p. 47). They suggested that social status served as a more important barrier in the flow of innovation and influence between the seeker and the sought in the traditional communities than the modern. Logically, social status would serve as a more important barrier in traditional communities with respect to "social interaction" on an informal and personal basis, thereby restricting interpersonal communication between those having similar social status. Rao (1963, p. 153) conducted a study in two Indian villages and reported that social status barriers were quite pronounced in interpersonal communication especially with the elites in the traditional community. However in the modern community, interpersonal communication was considerably widespread, resulting in higher levels of information than in the traditional community.

However, we might find an artifact in interpersonal relationships in traditional social systems especially if there is a tendency on the part of members to identify with the more powerful members, having high social status, and a tendency toward separation from the less powerful having low status.

Frequency of Instrumental Interaction

How often members in a social system have dyadic communication contacts with relatively more innovative farmers for the purpose of obtaining information and advice on innovations, is an important factor which is expected to affect the diffusion of new ideas. Frequency of instrumental interaction is defined as the rate at which members in a social system initiate dyadic communication specifically oriented to seeking information and advice in the innovation decision making process. The greater frequency of dyadic communication contacts among members reflects a greater degree of goal oriented communication behavior in the innovation decision making process, and hence is expected to affect rate of technological diffusion in a social system. Findings from small group research indicated that the more frequent the interaction among a group of individuals, the

more they like each other and the more similar attitudes and uniform behavior they tend to have (Homans, 1950; Newcomb 1953, 1956; Festinger, Schachter and Back, 1950, p. 130). It seems, therefore, that a greater degree of interaction between the less innovative and more innovative members of a social system would tend to induce the acceptance of innovations on the part of less innovative members. We expect therefore the following hypothesis:

H₁₉ In the information seeking network, there is greater frequency of instrumental interaction in the modern social system than in the traditional social system.

We now close our discussion relating to patterns of homophily in dyadic communication. Our focus was to outline hypotheses designed to study variations in homophily from one social system to the other with respect to designated attributes of interacting members in two types of dyadic communication contacts (information seeking contacts and friendship contacts) and the possible effect of such variations in innovation diffusion in these systems. Both conceptually and analytically, our focus was primarily on the dyad with no consideration given to the relationship of

the dyads to other dyads or subgroups of the communication structure.

We shall continue with statements of hypothesis in the next section where we intend to deal with the entire communication structure of a social system as the conceptual and analytical unit. We intend to deal with "communication integration" within the framework of structural analysis.

Structural Analysis

In structural analysis our focus is on the entire communication structure of a social system with a major emphasis on the interrelationships between individuals and subgroups, between subgroups, and the differential roles which interrelate these subgroups to form what we call "patterns of communication integration." We shall now define more specifically some of these patterns of communication integration and outline possible hypotheses.

Patterns of Communication Integration

Communication integration is the degree to which social system members and the subgroups formed by interpersonal contacts among members in a social system are interconnected.

It is expected that the greater the extent to which individuals and subgroups are interrelated in their communication behavior, the greater will be the rate of technological diffusion in that system. In this thesis, the analysis of the patterns of communication integration in given social systems is based on two approaches:

1. We intend to deal with those variables which are descriptive of the degree of communication integration in a social system, and which can provide some quantitative information for comparative social system analysis. The concern is merely to study the extent to which members in a social system are integrated into the networks of interpersonal communication with no consideration given to the position or location of members within the communication structure. The variables to be considered for this particular analysis are:
 - (1) integration into the information seeking network, and
 - (2) range of social interaction.

Integration into the Information Seeking Network

Integration into the information seeking network is the degree to which members in a social system initiate instrumental communication contacts with relatively more innovative members in order to seek information and advice in

innovation decisions. This purposive interpersonal communication behavior on the part of social system members should be expected to influence the rate of technological adoption. Coughenour (1966) found that locality rates of technological adoption varied with the extent to which members sought information from more competent farmers. Coleman and others (1957) reported that the influence of social networks on drug adoption operated most among the doctors who were integrated into the community of their colleagues through ties of a professional nature as advisors or discussion partners. These researchers pointed out that a doctor's integration into the medical community of his colleagues was a cause of his early use of a new drug (Coleman, Katz and Menzel, 1966, p. 104).

It can be assumed that the greater the extent of social system members' into the information seeking relationships, the greater will be the rate of technological diffusion in that system. A greater number of members should be engaged in information seeking contacts with others perceived as relatively more expert, only when social system norms on innovativeness are favorable. Support for this notion can be drawn from the study by Festinger and others (1950, p. 123), who noted that when content was favorable to the member's organization, the communication process was much more active than

in the case where the content was considered as unfavorable.

H₂₀ There is greater degree of integration into the information seeking network in a modern social system than in a traditional social system.

Range of Social Interaction

Range of social interaction is defined as the extent to which an individual in a social system can initiate directly and indirectly, interpersonal contacts with other members for the purpose of friendship. The sociometric range of social interaction is based on the number of friends that an individual chooses plus the friends of these friends. Mathematically, it is the degree to which an individual is interconnected with other members through direct and two step chains of interpersonal contacts of the type $A \rightarrow B \rightarrow C$.

The extent to which members in a social system are interconnected through these two step interpersonal chains is one index of the communication integration of a social system, because it is through these direct and indirect connections that information, innovation, and influence diffuse through a communication structure. The very existence of these direct and indirect interpersonal contacts among

members suggests that there will be sharing of information and opinions among the interconnected members on those matters which are salient to the needs and interests of interacting members. Festinger and others (1950, p. 123) studied rumor transmission in two housing communities and found that the diffusion of information was considerably affected by the direct and indirect communication links existing among the members and the attitude of these members toward the planted information. This experiment led these investigators to suggest that the character and behavior of the group depended in part upon the direct and indirect interpersonal connections among members.

Thus it can be expected that the greater connectedness among members through direct and indirect interpersonal contacts leads to higher potential for the diffusion of innovation through such channels, if innovations are perceived as salient and significant objects of goal attainment by members in a social system. Thus we state the following hypothesis.

H₂₁ The range of social interaction is greater in a modern social system than in a traditional social system.

2. Structural Analysis. We shall analyze patterns of actual communication contacts which occur among individuals in a social system and in terms of the patterns of communication contacts which might occur among the subgroups that are formed by interpersonal contacts among members. The analysis is based primarily on the relative positions of individuals and subgroups which constitute the communication structure of a social system.

In doing so it is believed that the process of innovation diffusion in informal social systems can be differentiated with regard to the internal communication structure that operates in these systems, especially the subgroups constituting the structure and the differential roles which provide intercommunicative linkages between and among the subgroups. Our focus here is to identify the subgroups or cliques which constitute the communication structure, and the "liaison" roles which interrelate the various subgroups or cliques.

It is realized that the notion of opinion leadership thus far studied in public opinion research and diffusion is too narrow to uncover relatively communication roles which interrelate the various subgroups of communication structure

and provide the mechanisms of an interlocking and integrated communication system. There appears to be no one research study in which these aspects of communication structure were studied in rural communities. A few studies were conducted with the purpose of determining the patterns of friendship contacts and family visiting among peasants (Loomis, 1960, p. 480; Proctor, 1960, p. 483). But structural analysis dealing with interconnectedness between subgroups and the identification of "liaison" persons within a communication structure has not been conducted thus far in diffusion research.

To trace these aspects of the communication structure, it is necessary that our data should be based on those interpersonal contacts which occur most frequently in a regular pattern. Hence we intend to analyze subgroup and liaison roles from informal friendship contacts which exist among members in a social system. It is through such face-to-face informal social groupings that many of the attitudes and norms which affect the behavior of group members are transmitted. Once the internal communication structure of a social system has been differentiated with regard to the subgroups and the liaison roles which interconnect these subgroups in informal

interpersonal contacts, then the logical questions that we can raise are:

1. How does the communication structure of one social system differ from the other with respect to the communication contacts between subgroups, especially the location of liaison roles which provide interconnections between and among subgroups?
2. Is the differential placement of liaison individuals and subgroups within a social system related to their differential normative structure? In other words is there a pattern of interrelationship between social psychological subgroups and their normative structure such as innovativeness?
3. Are there variations from one social system to the other with regard to the interrelationship of subgroups and liaison roles with patterns of normative structure?
4. Is the differential placement of an individual in a liaison role in the interpersonal network related to characteristics such as social status, innovativeness, mass media exposure and opinion leadership

influence? If so, how does it vary from one social system to the other?

This thesis is an attempt to examine some of these questions with the use of structural analysis of interpersonal networks in two social systems.

Subgroups

A subgroup can be defined as a set of group members who interact more frequently with members of the set than they do with social system members outside the set. It is on this principle that the communication structure of a social system can be differentiated into separate subgroups. However, to isolate subgroups and to identify their core membership, some specific criterion as to subgroup membership is a prerequisite. The bases of identifying subgroup membership and liaison roles are discussed in the next chapter. Subgroups generally referred to as "social cliques" are vital constituents in the network of interpersonal communication in peasant villages. Almost every peasant is a member of such a subgroup. In traditional communities, an individual's position is determined by the group to which he belongs. Such subgroups have a great influence on interpersonal communication in social, political and day-to-day

life of the members of a community (Nicholas and Mukhopadhyaya, 1962; Loomis and Davidson, 1939). They may help accelerate the process of diffusion or serve as barriers to the acceptance of innovations in a social system (Lewis, 1958, p. 20). Subgroups may even set up mechanism to prevent exposure to new ideas and may set up norms restricting interpersonal communication with others outside of the subgroup. In dealing with case studies of social change, Niehoff (1966, p. 226) pointed out that factionalism of course constituted cooperation among the members of one particular group but this kind of cooperation often brought about divisiveness in the larger social unit--the village.

From the point of view of innovation diffusion in a social system, if the structure can be separated into subgroups within which there is high association but between which there is little or none, then diffusion is restricted to the confines of those subgroups. Now these considerations make it apparent that for a study of the consequences of a given structure in which a process of diffusion was in operation, crucial measure is that of the "connectedness" of the structure, identifying the degree to which such isolated cliques exist (Coleman, 1964, p. 433). In informal rural

systems of peasant societies we expect that the greater the degree to which communication contacts exist between subgroups in a social system, the greater is the integration of the communication structure which has consequences of higher rate of innovation diffusion in that system. The social system with a higher rate of technological diffusion was characterized as a modern system and the other having a low rate of technological diffusion was defined as a traditional system. Thus, we are led to the following hypothesis.

H₂₂ In a modern social system there is a greater degree of communication contacts between subgroups than in a traditional social system.

There is some evidence (based on observations rather than structural analysis) from a study conducted in India by Rao (1963, p. 137), who stated that communication in a modern village was highly dynamic, traveling through a maze of interpersonal relationships which made up the total community. Rao (1963, p. 158) also reported that communication in the traditional village was characterized by peer groups, and was largely limited within these groups.

Communication contacts between subgroups can be determined in terms of the interconnections provided by liaison persons and bridges. In terms of graph theory

(Harary, 1959), a "bridge" denotes the communication contact from a member of one subgroup to a member of a second subgroup. If there is one such interconnection between two subgroups, the bridge is single whereas if there are two such connections which interlink two subgroups, then the linkage is called a double bridge. The inter connections among subgroups provided by liaison persons are more important from the point of view of innovation diffusion in a social system.

Liaison Roles

A liaison person is an individual who interconnects two or more subgroups in such a way that his removal from the communication structure would separate the two subgroups, and that the removal of his communication contacts from one subgroup would still keep him in communication contact with the other subgroup(s). Individuals who serve this type of a communication role are called liaison roles. The interpersonal contacts of liaison individuals permeate through two or more subgroups in a communication structure, although a majority of the contacts of a liaison person are in one subgroup. It is therefore apparent that such liaison roles are important in the diffusion of information and influence in a given social system.

Jacobson and Seashore (1951) pointed out the importance of liaison roles in the communication structure of organizations. These researchers stated that liaison individuals were in a position to influence significantly or to control the communications to and from certain groups. The more such roles are positioned within the communication structure of a social system, the higher is the communication integration of the structure and consequently the higher would be the rate of technological diffusion in that system. Hence, we expect the following hypothesis.

H₂₃ In a modern social system there is a greater number of liaison roles than in a traditional system.

Furthermore, Jacobson and Seashore (1951) also reported that through liaison individuals, it was possible to trace differential influences throughout the organization as they were reflected in differences in attitudes among the several subgroups. In the diffusion of innovations, we should expect that the degree to which liaison roles are characterized by innovative behavior, has a considerable effect on subgroup and social system norms on innovativeness. It should also be expected that a greater degree of mass media exposure on the part of liaison persons would considerably

affect diffusion of new ideas in the social system. In view of our discussion, we expect the following hypothesis:

H₂₄ In a modern social system, liaison individuals are relatively more innovative than the subgroups of members but in a traditional social system liaison individuals are relatively similar in innovativeness to the subgroups of members.

H₂₅ In a modern social system liaison individuals have relatively a higher degree of mass media exposure than the subgroups of members but in a traditional social system liaison individuals have a relatively similar degree of mass media exposure as the subgroups of members.

We have stated two categories of hypotheses. In the first type, hypotheses based on such variables as "integration into the information seeking network" and "range of social interaction" were discussed with the purpose that they can provide some quantitative dimensions for comparative analysis of the degree of communication integration in innovation diffusion in informal social systems.

The second category of hypotheses, relatively much more important from the point of view of studying the degree

of integration of communication structures, are based on structural characteristics such as interconnectedness between subgroups and the position of roles within a given structure. These aspects of the communication structure can at best be studied by structural analysis which has to be based on specific theoretical criteria regarding subgroups and subgroup membership. Not much research work has been done in studying interconnectedness between individuals and subgroups within communication structure. To date, the conceptual and analytical framework suggested by Jacobson and Seashore (1951) and Weiss and Jacobson (1955) still remains one of the very few attempts which dealt specifically with the analysis of patterns of contacts between individuals and subgroup and of the differential placement of individuals in "liaison" roles by the use of sociometric techniques.

CHAPTER III

METHODOLOGY AND TECHNIQUES OF MEASUREMENT

This thesis is an ex post facto scientific field study conducted in two peasant communities in India. The present chapter describes the criteria of selection of the two communities and their locale; methods of data collection; operationalization of concepts and techniques of sociometric measurement; the reliability of sociometric measurement; and the methodological assumptions made; and equivalence of the two communities.

Selection of Communities and their Locale

Locale

The locale of the present study included two farming communities,* "Bsant Pur" and "Arjan Pur," which are situated

*Instead of the original names of the two communities, each is symbolized by the real name of its most influential opinion leader. "Bsant," himself an innovator and a major source of innovation and change in the life of "Basant Pur," is relatively more innovative than other community members, and so village Bsant Pur is changing relatively faster than many other peasant communities. "Arjan," the singlemost source of influence, is no more innovative than his fellow community members, and so the village of "Arjan Pur" is similar to many other rural communities in accepting innovation and

in the District of Ludhiana, Punjab State, India. Bsant Pur is a village community of 54 farm families. It is located at a distance of about 25 miles from the district headquarters of Ludhiana and six miles from a local marketing center. Arjan Pur constitutes 30 farming families and is located at a distance of about 13 miles from Ludhiana. Arjan Pur is located at a distance of about two miles from a local marketing town.

Criterion of Selection

The two farm communities reported previously were purposively selected from several communities on the basic assumption that each of the two communities was characterized by a different pattern of communication structure (independent variable of the study) which affected a higher rate of technological diffusion (dependent variable) in one community as compared with the other. On the basis of ratings made by local change agents, the community of Bsant Pur was expected to be marked by a relatively higher rate of technological diffusion than Arjan Pur.

change rather slowly. The names of the two communities are indeed symbolic of the basic underlying character of communication, innovation, and change in each of them.

The assumption that the two communities represented two types of interpersonal communication systems was pure speculation. It was based on the premise that Bsant Pur was a relatively new settlement inhabited by farming families who had migrated to the present place from West Pakistan at the time of partition of the State of Punjab in 1947, whereas the village of Arjan Pur was an old settlement in which the present farm families had been living for centuries. However, it should be pointed out here that the farming families now settled in Bsant Pur originally hailed from villages located within a radius of about five miles surrounding the present settlement where they still owned their farms. It was about four decades ago that these families had moved to another area within the State of Punjab (now West Pakistan) in order to do farming on lands distributed and sold by the government at that time.

In brief, the two communities were selected on the assumption that they manifested different types of social structures producing different patterns of interpersonal communication which concomitantly affected differential rates of technological adoption in the two settings. However, to pursue this problem empirically and scientifically, other criteria were to be met in the selection of the two communities.

These criteria in essence dealt with controlling the effect of extraneous independent variables which in past diffusion research were found to be related to technological adoption. The purpose of control was to select two communities which were comparatively homogeneous and similar with regard to such extraneous independent variables as discussed below.

1. The two communities under investigation should be comparable with regard to respondent's age, educational levels, literacy, family literacy index, family size, experience in farming, experience in government service, religious, and cultural background.
2. The two communities should be located within the jurisdiction of one district administration and be served by one and the same change agency responsible for the introduction of innovations.
3. The innovations included in the study were equally applicable to the farming conditions in the two communities and were introduced at similar time periods by the change agency.
4. Soil and climatic conditions, irrigational facilities, and supply facilities for innovations were equally

similar in the two communities.

5. Both communities should be comparable in terms of their institutional development. That is, each community had a village panchayat (an elected body of members responsible for village development), a cooperative credit society, and a primary school for children.

It is believed that by controlling the previous extraneous variables through equalization, their differential influence on technological adoption in the two communities is considerably minimized.

Method of Data Collection

It is appropriate to state here that the initial impetus and intellectual stimulation for conducting this study came from Dr. Everett M. Rogers, who in January 1964, began working in India as a consultant to the India-UNESCO communication research project. At that time the author had been working with a Ford Foundation-sponsored research project designed to study communication and adoption of agricultural innovations in the District of Ludhiana where the "Intensive

Agricultural Districts Program" was being implemented. Some of the steps that were followed in the collection of data are summarized next.

Development of Interview Schedule and Pretesting

In view of the focus of this study on comparative analysis of interpersonal communication in innovation diffusion, the author developed an interview schedule which incorporated sociometric design. In June, 1964, the schedule along with a brief outline of the overall research design was sent to Professor Rogers at Michigan State University and to other research investigators in India for suggestions to improve the research instrument. The suggestions of these researchers helped in the further improvement of the research design of this study.

The interview schedule was pretested in two communities, one relatively more innovative than the other. The two communities where pretesting was conducted were under the jurisdiction of the same change agency, but were located in a development block different from the ones where the actual research investigation was to be conducted later on.

The pretesting of the interview schedule was conducted by me and three trained research investigators who had been

working with me on the Ford Foundation research project in India. Some of the results which accrued from pretesting are worth mentioning here.

1. It was observed that some of the respondents were reluctant to respond to sociometric questions, especially naming of friends. Some of the typical responses in such cases were as follows:

"Everybody is my friend in this community. I maintain good relations with everyone here."

"I don't go to anybody here in this village. It is better to stay away from others. If I go to some one like Mr. X, then people in this community begin to think that I belong to the group led by Mr. X."

"Why do you need such information as who our friends are or who we go to for seeking information? How this kind of information is going to help us in obtaining more credit and cheap fertilizers?"

Such responses as reported were perhaps indicative of one of the relatively more important characteristics of peasant community life in India. That is, they reflected how much group rivalries and factions were involved in peasant villages. The pretest responses to sociometric questions

also indicated the lack of mutual trust on the part of the peasant in the sense that a respondent seemed to be afraid of telling to an outside research investigator as to who his friends were. Perhaps the type of responses reported above could be considered as mechanisms of self defence on the part of the respondent or as a tendency to maintain, under the stress of interviewing situation, psychological balance and feeling of security by withholding information. Whatever the explanation, the peasant respondent reacted to sociometric questions in such a style that he tended to project either his dissociation from the rest of the community or his association with everybody in the community in order to "prove" to the investigator that he had no close association with a subgroup.

Responses of this kind were helpful in our later investigation as they pointed out the importance of establishing a good rapport with the respondents in order to obtain relatively more reliable information regarding sociometric questions.

2. It was observed that when a respondent was interviewed in the presence of other farmers, he was very likely to name them as friends or as advisors.

To remove this possibility of bias in sociometric responses, we interviewed each peasant respondent alone either on his farm or at his residence.

3. While going through the pretested schedules, it was found that in these communities many of the persons named as friends or as advisors had similar names which later on we found it difficult to identify and locate such individuals.

Thus it helped us to improve the interview schedule so that sociometric relationships could now be noted in terms of the name of the person chosen and his father's name.

Following pretesting, necessary improvements were made in the interview schedule. The interview schedule in its final form consisted of 38 pages and five main parts. The first part included full sheet information and some "warm up type" questions. Sociometric questions intended to tap interpersonal communication contacts, were then followed in the second part. The third part consisted of questions regarding respondent's mass media exposure which was followed by the fourth part incorporating innovativeness scale and the innovation decision making process through which individuals pass. Personal information regarding the respondent such as income, level of living, credit availed,

etc., and social psychological variables such as attitude toward change, educational aspirations, occupational aspirations, achievement motivation and empathy were included in the fifth part of the interview schedule. Our concern in this thesis is primarily with the first four parts of the interview schedule.

Sample Size and Data Gathering

Since our major objective was to analyze sociometrically the nature of interpersonal communication structure and its possible effects on innovation diffusion in the two communities, it was necessary to interview all the heads of farm families so that every respondent could be located within the network of interpersonal communication contacts. That is, the sociometric design of this study required "saturation sampling." Therefore, we interviewed all the 54 heads of farm families in the village Bsant Pur, and all of the 30 family heads in village Arjan Pur. Interviews were conducted simultaneously in both communities with two research investigators working in each. The author personally interviewed respondents in both communities along with three other trained research investigators who had been working as interviewers for about a year in the district of Ludhiana

itself. The availability of trained investigators who had experience in the context of farming communities in the district of Ludhiana was indeed of immense help in the conduct of this study.

Since the questions in the interview schedule were in English it was desirable that the investigators know the regional language "Punjabi" in order to translate and interpret the questions meaningfully in the language of the respondents. There was no problem of translation or language in interviewing farmers as the mother-tongue of all the investigators who helped in the conduct of this study was "Punjabi."

The average time to complete one interview was about an hour and a half. Data were gathered from all the respondents in the two communities during the month of August-September, 1964. In all 54 respondents were interviewed in village Bsant Pur and 30 respondents were interviewed in Arjan Pur.

Operationalization of Concepts and Techniques of Sociometric Measurement

In this section we intend to deal first with the operationalization of the two dependent variables and then

continue our discussion with the concepts and variables of the communication structure in the same order in which hypotheses were outlined within the conceptual and analytical framework. The discussion includes illustrations of the operational measures used to study these variables, the techniques utilized in construction of various indices, and, the approach followed in the structural analysis of liaison persons and communication contacts between subgroups.

1. Rate of Technological Diffusion: The extent to which members in a social system have adopted innovations over time. Operationally it is the cumulative percentage of social system members who have adopted innovations over a period of time. The eleven innovations* which were investigated in this study included: ammonium sulphate fertilizer, calcium ammonium fertilizer, superphosphate fertilizer, endrine insecticide, hybrid maize, improved plough, wheat c-273, 2-4-D weed spray, American cotton, desi cotton, and compost pit.

2. Adoption index: The tendency of an individual to be early in adopting innovations. Operationally, it is the sum

*The Intensive Agricultural District Program popularly known as "Package" program was being implemented in the two communities where the present study was conducted. The innovations constituted the core of the Package of improved farm practices. The approach to the diffusion of Package of farm

of scores an individual gets for all the eleven innovations on a six-point scale incorporating the degree to which an individual has progressed from first hearing of the innovation to its final adoption, e.g., an individual's adoption score with regard to adoption of ammonium sulphate was obtained from the following:

0. not heard
1. heard but not interested
2. interested but not tried
3. tried but rejected
4. tried and moving toward adoption
5. adopted but discontinued
6. adopted and continuing

3. Opinion Leadership: The degree to which an individual has interpersonal influence exercised in a situation through communication process for the attainment of knowledge, attitudes, or behavior. Opinion leadership was operationalized in two different ways.

In the first case an individual's opinion leadership score is based on direct sociometric choices received from

practices among farmers was based on the principle that innovations should be adopted in combination as a Package in order to maximize agricultural production (Expert Committee on Assessment and Evaluation, 1963, p. 2).

other group members in regard to a specific criterion. As for example when group members overtly express sociometric choices for other individuals from whom they seek information and advice on agricultural innovations. This is called sociometric opinion leadership.

In the second case an individual's opinion leadership score is the number of sociometric relationships that the individual has with other group members whom he reported to have provided information and advice on agricultural innovations. This technique is known as self-perceived opinion leadership.

- (1) Has any cultivator(s) in your village come to you for information related to improved agricultural practices? Yes___No___

Name 1_____2_____3_____

- (2) How many cultivators you think come to you to seek advice on improved practices? Number_____

4. Polymorphic Opinion Leadership: The tendency of an individual to be in the same relative influence position in a social system across a given number of criteria. Operationally, it is the sum of scores assigned to the relative degrees of weighted sociometric opinion leadership that

an individual has across each of the four criteria, plus the number of criteria in which the individual exerts opinion leadership influence. In this thesis the criteria of opinion leadership deal with agricultural innovations, health and medical treatment; children education and family matters; and nomination on an agricultural development committee.

The weighted sociometric opinion leadership of an individual on a given criterion is computed as the total number of sociometric choices received by the individual divided by the total number of choices received by all respondents in the social system, multiplied by 100. Once weighted sociometric opinion leadership is computed for each individual on each criterion, scores are then assigned to each individual in terms of the relative degree of weighted sociometric opinion leadership the individual has across each criteria. The scoring is done as follows:

0. no weighted opinion leadership
 2. five per cent or less of weighted opinion leadership
 3. from 5.1 to 10 per cent of weighted opinion leadership
- etc.

To this score we add the number of criteria in which an individual exerts opinion leadership influence. That is, if an individual is an opinion leader in one area, a score of 1 is given, if in two areas, a score of 2 is given, and so on.

Some of the typical sociometric questions which deal with opinion leadership on a given criteria are like the one illustrated below:

If your child or relative became sick, with whom in your village would you consult in regard to making necessary arrangements for medical treatment?

Name _____

Social relationship _____

5. Opinion Leadership Concentration: The degree to which one or more units in a social system are perceived to have relatively greater degree of interpersonal influence with regard to a specific criterion than other units in that system. Opinion leadership concentration is operationalized in terms of sociometric choices received by an individual with regard to two separate communication situations. In the first case opinion leadership is based on sociometric choices made by

individuals on a criterion according to which individuals relate themselves to opinion leaders explicitly for meeting their own personal needs.

Amongst your informal contacts in the village, whose opinion do you seek most often about new farming practices?

Name _____

In the second situation opinion leadership is defined in respect of sociometric contacts received by individuals on a criterion primarily concerned with the attainment of changes, improvements or goals of the social system as a whole.

If you were one of the members on an agricultural development committee for the village what two other persons would you choose to work on the committee?

1. Name _____

2. Name _____

Opinion leadership concentration* is measured from the Lorenz curve by plotting the cumulative percentage distribution of sociometric choices on the ordinate against the cumulative percentage distribution of individuals on the

*Similar to the notion of opinion leadership concentration, Coleman (1964, pp. 434-440) developed a measure of hierarchy, in order to determine the degree to which sociometric choices are concentrated in a few individuals.

abscissa. The Lorenz curve is drawn by rank-ordering all individuals according to the percentage of sociometric choices that each individual has. Since both axes of the Lorenz curve are expressed in terms of cumulative percentage distribution ranging from 0 to 100, the straight line rising from the origin indicates the line of perfect equality of distribution of sociometric choices among all members (Figure 3). The area between the Lorenz curve and the line of perfect equality represents the degree of opinion leadership concentration in a social system. The ratio of the area between the Lorenz curve and the line of perfect equality, to, the total area of the triangle formed by the two axes and the line of perfect equality, is called the Gini ratio of concentration or Gini index of concentration.

In essence, the Gini index sums for each individual in the population, the difference between where he is on the Lorenz curve and where he would be expected to be in the case of equal distribution of sociometric choices among all the members. This sum is divided by its maximum possible value so that the Gini coefficient ranges between 0 and 1. The greater the Lorenz curve deviates from the line of equality, the greater is the concentration. To make this discussion clear, the following illustration of Lorenz curve and Gini

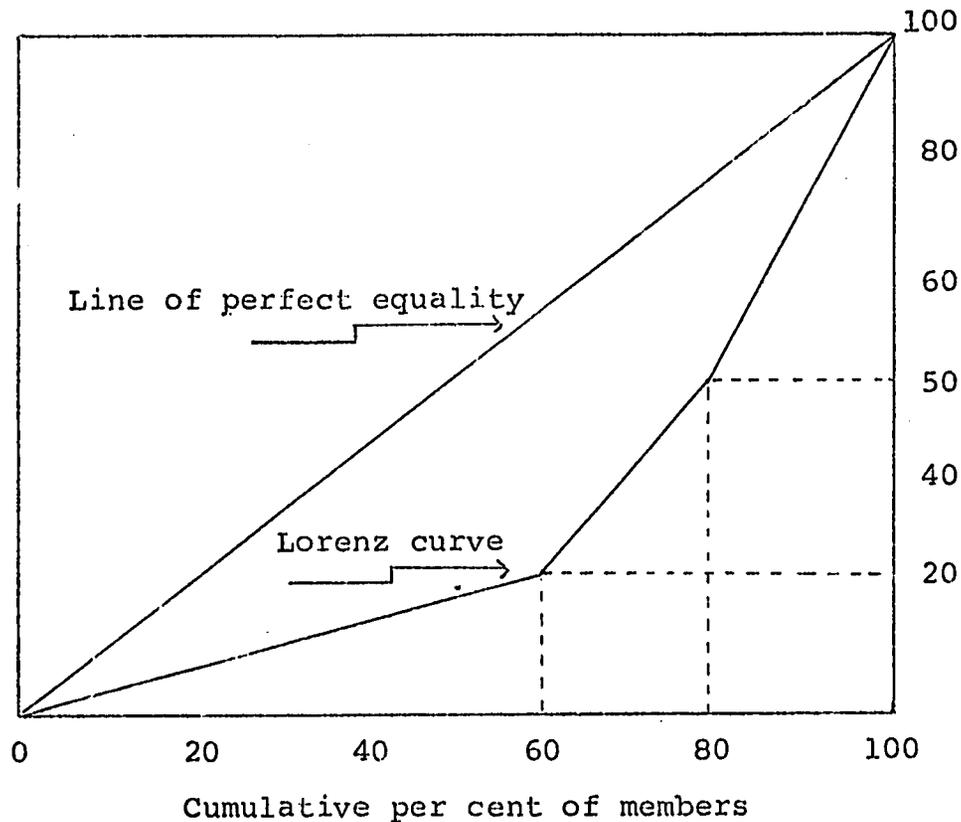


Figure 3.--An illustration of Lorenz Curve indicating concentration of sociometric contacts.

ratio is presented in Figure 3. From the illustration in Figure 3 it is seen that sixty per cent of the members receive only twenty per cent of the total sociometric contacts whereas fifty per cent of the total contacts are concentrated among twenty per cent of the members. The Gini ratio of opinion leadership concentration is

$$= \frac{\text{Area between the curve and the line of perfect quality}}{\text{Total area of the triangle formed by the two axes}}$$

6. Mass Media Exposure: The degree to which an individual is exposed to mass media of communication. Operationally it is the average of the sum of standard scores an individual obtains from (1) the number of hours that he listens to radio per week, (2) the number of newspapers he reads per week, (3) the number of magazines he reads per month and (4) the number of films he sees per year.

7. Change Agent Contact: The degree to which an individual has contacts with change agents. Operationally it is the sum of the number of contacts that an individual has with various change agents during the period of one year.

8. Cosmopolite Interpersonal Channel Use in Innovation Decisions: The degree to which an individual has external orientation to the use of interpersonal sources of information in his innovation decision making process. Operationally it is the simple sum of the number of interpersonal sources including change agents, salesmen, and innovators in other villages, which the individual mentions as having used from first hearing of an innovation to its final adoption.

9. Formal Participation: The degree to which an individual takes part in formal organizations. Operationally it is the average of two standard scores that an individual

obtains from (1) the number of years he has been a member in various organizations within his community and (2) the number of organizations outside of the community where he is a member.

10. Innovativeness: The degree to which an individual is relatively earlier in adopting an innovation than other members of the social system. Operationally it is the average value of eleven standard scores, that an individual obtains from "the number of months ago" that he adopted each of the eleven innovations reported earlier. It should be noted here that the standard scores are computed for each of the eleven innovations separately and then the average value is obtained for each individual. In this way the average standard score that an individual obtains indicates his general tendency to adopt innovations relatively early or late.

11. Agricultural Knowledgeability: The degree to which a person is relatively earlier in acquiring information about innovations than other members of the social system. Operationally it is the average value of eleven standard scores, each standard score computed separately from the "number of months ago" an individual got first knowledge of the innovations under investigation.

12. Social Status: The amount of material attributes that a person has. Operationally it is the average value of standard scores that an individual obtains from (1) his level of living measured in terms of number of items such as radio, furniture, and other household possessions, (2) his size of land holding, (3) his income, and (4) the quality of housing accommodation. That is, standard scores are computed first for each of the four indicators of social status as noted above and then the average value is computed in order to obtain a relative and general social status index for each individual.

13. Homophily: A relational concept which describes the degree to which individuals with a certain designated attribute have communication contacts with others of similar attributes. Operationally, it is an observed correlation between the designated attributes of individuals who have dyadic communication contacts. The correlations can vary from +1 through 0 to -1. With the dyad as the unit of analysis, homophily* is operationalized with respect to such attributes as innovativeness, mass media exposure, etc., which are considered

*Coleman (1959) suggested a method of computing a homophily index for dichotomous variables, but all our variables are continuous.

as continuous variables. The two types of communication contacts in which homophily is operationalized are discussed next.

14. Social Interaction: Interpersonal communication contact between individuals primarily oriented to informal and affective association. Operationally it refers to the sociometric choices that a person gives to other individuals on a criterion explicitly concerned with informal friendship. The number of sociometric choices allowed an individual is six.

"Do you have any friendly association with other cultivators in your community?" Yes____No____

"If yes, who are they"

Name: 1_____2_____3_____

15. Instrumental Interaction: Direct interpersonal communication contact between members established specifically to the attainment of goal seeking behavior. Operationally it refers to the sociometric choices that a person makes for another individual explicitly on a criterion which deals with seeking information and knowledge on innovations.

16. Frequency of Instrumental Interaction: The rate at which an individual initiates dyadic communication contacts specifically oriented to seeking information and advice in

the innovation decision making process. Operationally it is the number of times an individual seeks information and advice on innovations from other members perceived by the individual as relatively more innovative.

How often do you seek information on new farm practices from progressive farmers in this community?

0. Never
1. Once in a cropping season
2. Twice in a cropping season
3. Thrice in a cropping season

17. Integration into the Information Seeking Network:

The extent to which individuals in a social system initiate instrumental contacts with relatively more innovative members in order to seek information and advice in innovation decisions. Operationally it is the proportion of social system members who express sociometric choices for the explicit purpose of seeking information on innovations from relatively more progressive farmers.

18. Range of Social Interaction: The extent to which an individual in a social system can initiate directly and indirectly, interpersonal contacts with other members for the purpose of friendship. Operationally it is the sum of direct

and two-step indirect communication contacts a person has with other group members.

The direct communication contacts of a person are obtained from the row sums of the original "who to whom" sociometric choice matrix, C , with elements c_{ij} where $c_{ij} = 1$ if i chooses j and $c_{ij} = 0$ if i does not choose j . The two-step indirect communication contacts are obtained by manipulation of the sociometric choice matrix to the power of two. Festinger (1949) and Luce and Perry (1949) pointed out that for matrices whose elements are 0 or 1, powers of choice matrix C , have as elements the numbers of chains of corresponding length going from i through intermediating links to j . In other words if we raise the original choice matrix to the power of two, then $C^2 = (c_{ij}^{(2)})$ where $c_{ij}^{(2)} = \sum_k c_{ik} c_{kj}$. Each component, c_{ik} , of $c_{ij}^{(2)}$ is equal to one if and only if i chooses k and k chooses j , i.e., there is an indirect communication contact or a length of chain two from i to j . In essence the entries $c_{ij}^{(2)}$ of the squared choice matrix, C^2 , show the number of two-step indirect communication contacts from each i to each j . The sum of such contacts in each row gives the number of two-step indirect contacts that each person has with other group members.

The sum of direct contacts that a person has in the original choice matrix, and the two-step indirect contacts obtained from the squared matrix, is the amount of connectedness or range of social interaction of the individual with the rest of group members. However, from this sum obtained for each individual, we need to subtract the number of his overlapping contacts. The overlapping contacts for each person are obtained from entries along the principal diagonal of the squared matrix which in fact indicate the number of individual's mutual choices with other persons. We subtract these overlapping contacts because they are already included in the total number of direct contacts a person has from the original choice matrix.

19. Subgroups: A set of group members who interact more frequently with members of the set than they do with social system members outside the set. Operationally, it is the set of individuals who express more sociometric contacts for informal friendship association with each other than with members outside the set. The basic aim of operationalizing subgroups is to analyze the entire communication structure of the social system especially in terms of interrelationships among the subgroups. As such, the definition of subgroup in this thesis implies not only the internal contacts

within the subgroup but more importantly the interrelatedness among subgroups of individuals so that we can analyze the separateness or relatedness of the subgroups with each other.

20. Liaison Role. A liaison person is one who interconnects two or more subgroups in such a way that his removal from the communication structure would separate the two subgroups and that the removal of his communication contacts from one subgroup would still keep him in communication contact with the other subgroup(s). Liaison individuals who serve this type of a communication role are called liaison roles. Operationally he is the person who has frequent and important sociometric contacts in two or more subgroups.

To state clearly the operationalization of subgroups, it is appropriate to discuss here the analytical technique utilized to identify subgroups, the communication contacts among subgroups especially in terms of liaison persons, and, the criteria on which this analysis is based.

Before we discuss the specifics of the technique followed in this thesis, it should be mentioned that there have been several methodological contributions to the sociometric analysis of group structures with a major focus on the identification of subgroups or cliques. Notable among these contributions included such techniques as the simple

reordering of the choice matrix (Forsyth and Katz, 1946); matrix manipulation with the use of algebraic methods (Festinger, 1949; Luce and Perry, 1949); input-output approach to clique analysis based on manipulation of the matrix in which the entries were weighted (Hubble, 1965); factor analytic method to identify social cliques (Coleman and MacRae, 1960; MacRae, 1960); application of graph theory to the analysis of group structures (Harary, 1959); and a communication approach to structural analysis* of subgroups and contact between subgroups in a complex organization with the use of sociometric methods (Weiss and Jacobson, 1955).

The distinctive feature of the approach reported by Weiss and Jacobson is the relatively greater emphasis on theoretical framework incorporating key structural concepts such as communication contact between subgroups and liaison persons which provide a basis for the sociometric analysis of communication structure. The analysis of communication structure by Weiss and Jacobson (1955) was based on symmetrical sociometric contacts whereas in the present thesis we have sought to utilize their technique to the choice matrix which is largely asymmetrical. That is, the analysis of

*A detailed discussion of the method of structural analysis is separately reported by Weiss (1956, pp. 88-108).

communication structure of the two peasant communities is based on sociometric relationships, majority of which are unreciprocated. The technique followed in operationalizing subgroups, contact between subgroups, and liaison roles is briefly outlined next.

1. The first step dealt with the preparation of the matrix of sociometric relationships derived from informal friendship choices that a person gives to other individuals in the community. In the sociometric question on friendship, a person could choose a maximum of six individuals.
2. The matrix was reordered by arranging the order of rows and columns in such a way that individuals who chose each other frequently cluster along the diagonal of the matrix. At this stage a tentative identification of liaison persons was made in terms of their greater number of outside contacts.
3. The matrix was then partitioned arbitrarily into separate segments so that individuals choosing each other more frequently were included in each segment. Each segment so separated had to be a square.

4. Persons who had majority of their contacts within the segment, and also had relatively greater number of contacts outside the segment were identified as liaison persons. The operational criteria for identifying a liaison person were:
 - a. Majority of the sociometric choices of the liaison person should be within a specific subgroup. The operating rule, in this thesis, was that the liaison person should at least have a total of three or more sociometric choices within a specified subgroup. The condition of three choices included the choices that he gave to other members within the subgroup plus the choices that he received from subgroup members. However, out of these three choices there should at least be one choice that he gave to a member within that subgroup.
 - b. In addition to the above, the liaison person was required to have at least two or more choices going from him to a subgroup other than the one in which the liaison person had the majority of his choices.

5. Following the identification of liaison persons, they were taken out of the matrix and the matrix was re-ordered so as to bring persons, who reported contacts with each other, into adjacent positions in order to finally separate subgroups. While isolating subgroups, the following criteria were set forth for subgroup membership.
 - a. Majority of the choices that a person gave to others should go to the subgroup in which the individual was located, and majority of the choices the person received from others should also be located within the same subgroup.
 - b. A less stringent condition was that the person should make at least one sociometric choice within a specific subgroup. Those who did not make any choice for others but received sociometric choices from members in a specific subgroup were considered members within that subgroup.
6. Persons who had no sociometric choices given to or received from members in various subgroups, but expressed choices only for liaison persons were considered as members of "liaison set." According to Weiss

and Jacobson (1955) a "liaison set" is a group of liaison persons closely associated with one another. The liaison set also includes some individuals who, while not functioning as liaison persons, are more closely associated with the liaison persons than with any of the separate subgroups.

7. Once separate subgroups were differentiated, then contact between subgroups were operationalized in terms of sociometric contacts going from members of one subgroup to different members in another subgroup. In addition to these contacts between separate subgroups, liaison individuals also provided the mechanism of interconnections between subgroups.
8. Finally a sociogram was drawn on the basis of above structural analysis in order to obtain a microscopic view of the entire communication structure in terms of the separate subgroups which constituted the communication structure, contact patterns between subgroups and the position of liaison persons who inter-related two or more subgroups.

Thus, the communication structure of both communities was analysed in terms of subgroups, in terms of contacts

between subgroups, and in terms of liaison persons. Following structural analysis, liaison persons were studied in terms of such characteristics as social status, degree of innovativeness and degree of mass media exposure. To understand the normative pattern of subgroups, mean index of social status, mean degree of innovativeness and mean degree of mass media exposure were computed for each of the subgroups which constituted the communication structure in both communities.

Reliability of Sociometric Measurement

Since many of the variables in the present thesis were operationalized in terms of sociometric measures, it is essential to determine whether sociometric responses constituted a satisfactory reliable basis for measuring individual differences. Consistency of sociometric choices, especially dealing with the different criteria of opinion leadership was evaluated in terms of choices received by individuals from social system members. The degree of consistency of choice status would also provide a basis of examining whether the criteria of sociometric choices utilized in the present thesis were relevant. Two methods were followed to determine consistency of choice status.

Single Stage Reliability

The question of reliability of sociometric measures is concerned with determining the extent to which an individual's choice status remains at the same position in the choice status continuum. The method of determining reliability as followed in this thesis is the single-stage reliability technique which consists of splitting the choosers on an odd-even-basis and then computing two measures of choice status for each individual in the community, one from each of the two odd-even groups. The product moment correlation between the two measures is then treated by Spearman-Brown formula to yield a corrected reliability coefficient. Results are shown in Table 2. All the correlations between the two-choice status measures based on odd and even group responses are significantly different from zero at the five per cent level of significance. On the whole, the results of Table 2 demonstrate a significant degree of reliability of sociometric measures.

Intercorrelation among Techniques

The reliability of sociometric measures was also obtained by employing two different techniques of measuring the same dimension and then correlating the measures derived

Table 2. Single-stage Reliability Coefficients of Sociometric Measures

Sociometric criteria	Technique of choosing	Reliability coefficient	
		Arjan Pur (N = 30)	Bsant Pur (N = 54)
Information seeking agriculture	1 sociometric choice	.87	.96
Information seeking health and medical treatment	1 sociometric choice	.89	.57
Information seeking children education and family matters	2 sociometric choices	.88	.44
Nomination on agricultural development committee	2 sociometric choices	.90	.90

from each. In this case an individual's opinion leadership status on agriculture was measured in terms of sociometric choices received by the individual from members of the community and in terms of the extent to which an individual perceived himself as an opinion leader on agriculture. The correlations in both communities are significantly different from zero at the five per cent level of significance. Thus the following results indicate consistency between the two measures of opinion leadership.

<u>Village</u>	<u>N</u>	<u>Correlation between opinion leadership based on sociometric choices received and self perceived opinion leadership</u>
Arjan Pur	30	.423
Bsant Pur	54	.705

Methodological Assumptions

1. Sociometric measurement is based on the use of direct choice techniques. These procedures require members of a specified community to give overt expressions concerning their reactions to one another in terms of an explicit criterion which is uniform and standard for all the respondents. When members in a community are asked to name or evaluate one another in terms of some criterion of choice, it can be assumed that sociometric choices they make are appropriate measures for differentiating individuals, the patterns of communication contacts between pairs of individuals and the patterns of contacts between "sets" of individuals in the context of informal social systems.

2. It is further assumed that interpersonal contacts derived from sociometric measures tend to occur repeatedly and produce distinctive patterns as to the structure and function of interpersonal communication in given social systems.

3. This is a comparative study based on a virtual census (saturation sampling) of two purposively selected communities, one of which is assumed to represent relatively modern and the other a traditional social system. On the basis of sampling theory, respondents in the two communities cannot be claimed as a random sample of similar respondents in peasant communities in general. However, we seek to assume that the respondents and the interpersonal contacts among respondents in each of the two communities represent a "sample" of similar populations in peasant communities having characteristics similar to the "modern" and "traditional" community "type" of our study. It is only under this assumption that statistical tests are applied to the analysis of data obtained from the two communities. The tests of hypotheses are based on correlational analyses, analysis of variance, and "t" tests.

Equivalence of the Two Communities

Equivalence of the two communities was determined in terms of variables dealing with respondents' characteristics and background information. Data are presented in Table 3. It is evident that the two communities, Arjan Pur and Bsant

Table 3.--Equivalence of the Two Communities with Regard to Variables
Dealing with Characteristics and Background Information of
Respondents

Characteristics		Arjan Pur N = 30	Basant Pur N = 54	Chi Square Test of Significance
Age	26-35 yrs	26.7%	29.6%	.733, d.f. = 2 N-S*
	36-55 yrs	46.6	51.8	
	56 yrs and above	26.6	18.6	
		100.0%	100.0%	
Education	No formal education	73.3	59.3	1.738, d.f. = 2 N-S
	1-5 yrs schooling	6.7	11.1	
	6-10 yrs schooling	20.0	29.6	
		100.0%	100.0%	
Functional literacy	Illiterate	56.6	48.2	.685, d.f. = 2 N-S
	1-6 words correct	6.7	5.6	
	7-9 words correct	36.7	46.2	
		100.0%	100.0%	
Family size	1-5 members	20.0	16.7	1.599, d.f. = 3 N-S
	6-10 members	43.3	57.3	
	11-15 members	26.7	18.5	
	16-21 members	10.0	7.5	
		100.0%	100.0%	
Family literacy index	All family members illiterate	6.6	5.6	0.464, d.f. = 3 N-S
	1-33 per cent literate	20.0	20.4	
	34-66 per cent literate	26.7	33.3	
	67-100 per cent literate	46.7	40.7	
		100.0%	100.0%	
Farming experience	1-10 yrs	10.0	7.5	.929, d.f. = 2 N-S
	11-30 yrs	46.7	57.3	
	31-50 yrs	43.3	35.2	
		100.0%	100.0%	
Experience in government/military service	No experience	80.0	83.3	.007, d.f. = 1 N-S
	Some experience	20.0	16.7	
		100.0%	100.0%	

* N-S indicates that Chi Square is not significant at the five percent level of significance.

pur, are no more different than sampling error expectations with respect to such variables as the respondents' age, education, functional literacy, family literacy index, farming experience, experience in government service, and family size.

CHAPTER IV

RESEARCH FINDINGS

We have seen in chapter III that the two communities are comparatively similar and homogeneous with regard to respondents' age, education, functional literacy, family literacy index, farming experience, experience in government service, and family size. The present chapter summarizes research findings specifically dealing with (1) differences between the two communities with regard to the criterion variable, rate of technological diffusion and (2) tests of hypotheses based on variations between modern and traditional social system with respect to patterns of communication structure which differentially affect technological diffusion in the two social systems.

Criterion Variable

The criterion variable of the present study is technological diffusion, which was studied in terms of (1) rate of technological diffusion in a social system, and (2) adoption index of an individual. As earlier defined, rate of

technological diffusion in a social system is the proportion of individuals who have adopted an innovation during a certain time period. Hence rate of technological diffusion was computed for each innovation separately. On the other hand adoption index is the tendency of an individual to adopt innovations and as such an individual's adoption index is his total score based on the general tendency to adopt all the eleven innovations investigated in the present research. It was computed in terms of the extent to which an individual had progressed from first hearing of the innovations to their final adoption.

It should be noted that while stating the problem of this thesis, we assumed that the two social systems were marked by different degrees of technological diffusion. It was on the basis of this assumption that the two communities were conceptualized as modern and traditional social system types; the modern community of Bsant Pur was expected to have relatively greater degree of technological diffusion than the traditional community of Arjan Pur.

Validation of "Modern" and "Traditional" Social
System Types on the Criterion Variable

In view of the above discussion, it is apparent that empirical validation of modern and traditional social system types is dependent on the extent to which there are significant differences between the two communities with regard to the criterion variables, namely rate of technological diffusion and adoption index. Table 4 presents the comparative rate of technological diffusion of each of the eleven innovations in the two communities. As can be seen from Table 4, the rate of technological diffusion of all the innovations (except desi cotton) was greater in Bsant Pur than Arjan Pur. However, on the basis of chi square, results indicate that rate of technological diffusion of four innovations is greater in the modern community of Bsant Pur than in the traditional community of Arjan Pur.

Considering that the diffusion and adoption of each of the eleven innovations in a social system was an independent adoption event, the several chi squares, computed separately for each innovation were summed to a total chi square with degrees of freedom equal to the sum of the degree of freedom for the chi squares being summed. The purpose of summing the different chi squares was to

Table 4.--Comparative Rate of Technological Diffusion in the Two Communities

Innovation	Time Period of Adoption	Arjun Pur N = 30	Basant Pur N = 54	Chi Square Test of Significance
Ammonium sulphate fertilizer	1940-55	23.3%	42.6%	5.135, D.F. = 2
	1956-62	43.4	42.6	
	Not adopted	33.3	14.8	
		<u>100.0%</u>	<u>100.0%</u>	
C A N fertilizer	1958-60	16.6	53.7	* 18.320, d.f. = 2
	1961-64	56.7	44.4	
	Not adopted	26.7	1.9	
		<u>100.0%</u>	<u>100.0%</u>	
Phosphate fertilizer	1954-60	13.4	25.9	* 13.503, d.f. = 2
	1961-64	46.6	66.7	
	Not adopted	40.0	7.4	
		<u>100.0%</u>	<u>100.0%</u>	
Endrine insecticide	1958-60	16.7	14.8	* 10.060, d.f. = 2
	1961-64	10.0	42.6	
	Not adopted	73.3	42.6	
		<u>100.0%</u>	<u>100.0%</u>	
Hybrid maize	1959-64	3.3	16.7	2.121, d.f. = 1
	Not adopted	96.7	83.3	
		<u>100.0%</u>	<u>100.0%</u>	
Inverting plough	1945-60	46.7	59.3	5.095, d.f. = 2
	1961-64	6.6	16.7	
	Not adopted	46.6	24.0	
		<u>100.0%</u>	<u>100.0%</u>	
Wheat variety c273	1950-60	46.7	57.5	.893, d.f. = 1
	1961-64	53.3	42.5	
		<u>100.0%</u>	<u>100.0%</u>	
American cotton variety	1949-64	63.4	96.3	* 13.628, d.f. = 1
	Not adopted	36.6	3.7	
		<u>100.0%</u>	<u>100.0%</u>	
Desi cotton variety	1955-60	3.3	11.1	3.697, d.f. = 2
	1961-64	30.0	12.9	
	Not adopted	66.7	76.0	
		<u>100.0%</u>	<u>100.0%</u>	
Compost pit	Adoption up to '64	76.7	92.6	2.549, d.f. = 1
	Not adopted	23.3	7.4	
		<u>100.0%</u>	<u>100.0%</u>	
2-4D weed spray**	Adoption up to '64	0.0	14.8	
	Not adopted	100.0	85.2	
		<u>100.0%</u>	<u>100.0%</u>	

*Chi Square significant beyond the 5 percent level of significance

**Chi square is not computed because of a 0 entry in the contingency table.

determine the overall differences between the two communities with regard to the rate of technological diffusion. Thus, the total chi square = 75.001 with degrees of freedom = 16 is significant beyond the .001 level.

The results, therefore, indicate real differences between the two communities with regard to the rate of technological diffusion, which is relatively greater in Bsant Pur (the modern community) than in Arjan Pur (the traditional community).

The difference between the two communities with regard to adoption index was tested by means of analysis of variance. The mean adoption index in Bsant Pur is 55.16, compared with a mean adoption index of 43.63 in Arjan Pur. Results of analysis of variance* indicate that the mean adoption index in Bsant Pur (the modern community) is significantly greater than that in Arjan Pur (traditional community).

Thus, it can be concluded that Bsant Pur has a relatively higher rate of technological diffusion and higher mean adoption index than Arjan Pur. On the whole the previous results supported the notion that there are significant

*The value of $F = 29.7$ is significant beyond the one percent level of significance.

differences between the two communities with regard to the criterion variable, namely the degree of technological diffusion. Furthermore, in light of these differences the conceptualization of Bsant Pur as a modern community, and of Arjan Pur as a traditional community is validated empirically.

Tests of Hypotheses

Research findings dealing with tests of hypotheses are discussed under the three key pattern variables of communication structure namely; patterns of opinion leadership, patterns of homophily in dyadic communication and patterns of communication integration.

Patterns of Opinion Leadership

Communication and Innovative Behavior of Opinion Leaders

Five hypotheses were stated in order to determine the variation between the traditional and modern social system with regard to the relationship of opinion leadership to indicators of communication and innovative behavior such as mass media exposure, change agent contact, use of cosmopolite interpersonal sources in innovation decisions,

participation in formal organizations and degree of innovativeness.

The general approach in testing these hypotheses is to compute Pearsonian product-moment correlations between the individuals' degree of opinion leadership and other variables indicating the individuals' communication and innovative behavior for each social system. The two correlations are then transformed into Fisher z's in order to determine the significance of the difference between the two correlations. Table 6 presents the results for each of the five hypotheses.

H_1 Opinion leadership is more highly related to mass media exposure in a modern social system than in a traditional social system.

As can be seen from Table 5, the correlation between opinion leadership and mass media exposure is relatively higher in modern social system ($r = .431$) as compared with traditional social system ($r = .117$). However, the z statistic based on difference between the two correlations is not significant at the 5 percent level of significance ($z = 1.185$). Thus, the hypothesis is not supported.

TABLE 5.--z-Statistic for Correlation Differences between Modern and Traditional Social System with Regard to the Relationship between Opinion Leadership and Indicators of Communication and Innovative Behavior

Indicators	Correlations between opinion leadership and indicators of communication and innovative behavior in:		z-statistic for correlational differences
	Traditional social system with low technological diffusion (N = 30)	Modern social system with high technological diffusion (N = 54)	
Mass Media Exposure	.117	.431*	1.185
Change Agent Contact	.158	.225	.714
Use of Cosmopolite Interpersonal Channels	.111	.450*	1.640*
Participation in Formal Organizations	.485*	.799*	2.400*
Innovations	.162	.421*	1.205

*Significant at the five per cent level.

TABLE 6.--z-Statistic for Correlational Differences Between Modern and Traditional Social System with Regard to the Relationship Between Opinion Leadership and Indicators of Mass Media Exposure

Indicators	Correlations between opinion leadership and indicators of mass media exposure in:		z-statistic for correlational differences
	Traditional social system with low technological diffusion (N = 30)	Modern social system with high technological diffusion (N = 54)	
Radio Exposure	-.201	.401*	2.638*
Newspaper Reading	.188	.008	.785
Magazine Reading	.274	.689*	2.369*

*Significant beyond the five per cent level.

However, when the relationship between opinion leadership and each of the separate items in the total index of mass media exposure such as radio exposure, newspaper reading and magazine reading were analyzed, results presented in Table 6 indicate that the correlation between opinion leadership and radio exposure is relatively higher in modern social system ($r = .401$) than in traditional social system ($r = .201$). The difference between the two correlations is also significant beyond the 5 percent level of significance ($z = 2.638$). Similarly the correlation between opinion leadership and magazine reading is higher in modern social system ($r = .689$) as compared with traditional social system ($r = .274$). Again, the z statistic based on difference between the two correlations is significant beyond the 5 percent level of significance ($z = 2.369$)

Thus it appears that opinion leadership is more highly related to radio exposure and magazine reading in modern social system than in traditional social system. The previous results indicate partial support for Hypothesis 1, when it is tested in the form of three sub-hypotheses.

H_2 Opinion leadership is more highly related to change agent contact in a modern social system than in a traditional social system.

Correlation between opinion leadership and change agent contact is slightly higher in modern social system ($r = .225$) than in traditional system ($r = .158$). From Table 5, it is evident that the difference between the two correlations is not significant ($z = .714$). The hypothesis is therefore not supported.

H₃ Opinion leadership is more highly related to the use of cosmopolite interpersonal sources in the process of innovation decisions in a modern social system than in a traditional social system.

Results from Table 5 indicate that the correlation between opinion leadership and use of cosmopolite interpersonal communication sources is stronger in the modern social system ($r = .450$) as compared with traditional social system ($r = .111$). The difference between the two correlations is significant at the five percent level ($z = 1.64$). Thus Hypothesis 3 is supported.

H₄ Opinion leadership is more highly related to the degree of participation in formal organization in a modern social system than in a traditional social system.

As can be seen from Table 5, the degree of relationship between opinion leadership and participation in formal organizations is comparatively stronger in modern social system ($r = .799$) than in traditional social system ($r = .485$). It should be pointed out here that participation in formal organizations was measured in terms of the number of years that an individual had been a participating member in specific organizations concerned with development and change in the community. Perhaps this provided a better measure than the simple count of the organizations in which an individual was a member.

The value of z-statistic based on difference between the two correlations is found significant beyond the five percent level of significance ($z = 2.40$). Thus Hypothesis 4 is supported.

H₅ Opinion leadership is more highly related to innovativeness in a modern social system than in a traditional social system.

Correlation between opinion leadership and innovativeness is relatively much higher in modern social system ($r = .421$) than in traditional system ($r = .162$). However, as is evident from Table 5, the difference between the two

correlations is not significant at the five percent level ($z = 1.205$). Thus Hypothesis 5 is not supported.

Polymorphism of Opinion Leadership

H₆ Opinion leadership in a modern social system is less polymorphic than in a traditional social system.

This hypothesis is tested by determining the significance of the difference between the two social system means (\bar{X}'_s) on the polymorphism scores (of individual members in both the traditional and modern social systems). Results are presented in Table 7.

It is evident from Table 7 that the mean polymorphism score in the traditional social system ($\bar{X} = 3.26$) is greater than in the modern social system ($\bar{X} = 2.07$). However, the difference between the two means is not significant at the 5 percent level ($t = 1.08$). Hypothesis 6 is not supported.

Opinion Leadership Concentration

It was expected that concentration of opinion leadership would vary from modern to traditional social system

TABLE 7.--Variations Between Modern and Traditional Social System with Regard to Polymorphism of Opinion Leadership and Opinion Leadership Concentration

Indices	Traditional social system with low technological diffusion	Modern social system with high technological diffusion	t
Mean Polymorphism of Opinion Leadership	3.26	2.07	1.08
N	30	54	
Gini Ratio** of Opinion Leadership Concentration (First criterion)	.732	.805	1.00
N (Total number of sociometric choices)	52	80	
Gini Ratio** of Opinion Leadership Concentration (Second criterion)	.904	.747	1.67*
N (Total number of sociometric choices)	15	43	

137

*Significant at the five per cent level of significance.

**Since the Gini ratio is the proportion of choices that are concentrated out of the total number of choices made by members in a social system, a t test was applied for determining significance of difference between two independent proportions, each proportion based on an N equal to the total number of choices made in the social system. The formula for computing t is:

$$t = \frac{p_1 - p_2}{S.E.(p_1 - p_2)} \text{ for which } S.E.(p_1 - p_2) = \sqrt{\frac{p_1 q_1}{N_1} + \frac{p_2 q_2}{N_2}}$$

depending on the nature of criterion utilized to measure leadership. Opinion leadership was therefore measured in terms of two different criteria. Two hypotheses, each dealing with a different criterion of leadership were postulated. In terms of the first criterion, the role of opinion leader was to take innovation decisions for the social system as a whole. According to the second criterion, opinion leadership role was considered as that of an interpersonal channel of information and advice sought by individual members to make individual farm decisions.

Dealing with the first criterion, the hypothesis was:

H₇ If opinion leadership is considered as a means toward the achievement of some specific social system goals or in collective innovation decisions, then there is greater degree of opinion leadership concentration in a modern social system than in a traditional social system.

To test the above hypothesis, concentration of opinion leadership was computed in terms of Gini ratio which in essence is the proportion of sociometric choices concentrated out of the total choices received by all members.

Thus, opinion leadership concentration is based on the distribution of sociometric choices among social system members with regard to a specific criterion.

Based on the first criterion, results of Hypothesis 7 are presented in Table 7. It can be seen from Table 7 that Gini ratio of opinion leadership concentration is relatively higher in modern social system (Gini ratio = .805) than in traditional social system (Gini ratio = .732). Results are in the expected direction indicating greater degree of concentration in modern social system than in the traditional social system. Thus, when the criterion of leadership nomination is such that it deals with issues, goals, purposes or decisions concerning the social system as a whole, there is relatively greater degree of concentration in modern social system than in traditional social system. However, the difference between the two Gini ratios is not significant at the five percent level of significance ($t = 1.00$). Thus hypothesis 7 is not supported.

Dealing with the second criterion, the hypothesis was:

H₈ If opinion leadership is considered as a functional means toward the achievement of individual goals, then, there is less opinion leadership

concentration in a modern social system than
in a traditional social system.

As can be seen from Table 7, results indicate that there is greater degree of opinion leadership concentration in traditional social system (Gini ratio = .904) than in modern social system (Gini ratio = .747). That is, traditional social system is marked by fewer opinion leaders from whom others seek information and advice in individual innovation decisions whereas modern social system has a relatively greater number of opinion leaders. The difference between the two Gini ratios is significant at the five percent level of significance ($t = 1.67$). Thus, hypothesis 8 is supported.

Patterns of Homophily in Dyadic
Communication

Patterns of homophily in dyadic communication were studied in two types of communication relationships; one involving instrumental interaction and the other involving social interaction or informal friendly association between members in a social system. The index of homophily in instrumental interaction and social interaction was obtained by computing product moment correlation between the

attributes of dyad members. Thus, index of homophily as computed from product moment correlation can vary from -1 through 0 to +1. A correlation of zero or negative magnitude indicates low homophily or lack of homophily whereas a high positive correlation indicates a relative high index of homophily. The variation in homophily index from traditional to modern social system was determined by first transforming product moment correlations (r's) into Fisher z's, and then computing the z statistic in order to test the significance of difference between correlations. Results dealing with variation of homophily, from traditional to modern social system, with respect to designated attributes of members in dyadic contacts based on instrumental interaction, are presented in Table 8. Table 9 presents variation in homophily index between traditional and modern social system with regard to dyadic communication contacts based on social interaction or informal friendly associations.

On the basis of results contained in Table 8 and Table 9, all the hypotheses dealing with variation in homophily between the two social systems are now briefly analyzed in terms of member's designated attributes namely innovative-ness, mass media exposure, change agent contact, agricultural

TABLE 8.--Variation in Homophily Index, Between Traditional and Modern Social System, with Respect to Designated Attributes of Members in Dyadic Communication Contacts Based on "Instrumental Interaction" in the Information Seeking Network

Designated attributes	Product moment correlation between attributes of dyad members in:		z-statistic for correlational differences
	Traditional social system with low technological diffusion (N = 14)	Modern social system with high technological diffusion (N = 42)	
Innovativeness	.103	-.293*	1.188
Mass Media Exposure	.165	.047	.350
Change Agent Contact	.408	.103	.970
Agricultural Knowledgeability	.151	-.302*	1.360
Social Status	.133	-.015	.436

*Significant at the five per cent level of significance.

TABLE 9.--Variation in Homophily Index, Between Traditional and Modern Social System with Respect to Designated Attributes of Members in Dyadic Communication Contacts Based on Social Interaction in the Informal Friendship Network

Designated attributes	Product moment correlation* between attributes of dyad members in:		z * statistic for correlational differences
	Traditional social system with low technological diffusion (N = 69)	Modern social system with high technological diffusion (N = 150)	
Innovativeness	.025	.078	-.359
Mass Media Exposure	.071	.132	-.410
Change Agent Contact	.130	.054	.517
Agricultural Knowledgeability	.005	.049	-.291
Social Status	.116	.036	.544

*Results are not significant at the five per cent level of significance.

knowledgeability and social status.

H₉ In the information seeking network, instrumental interaction contacts have higher homophily with respect to innovativeness in a traditional social system than in a modern social system.

It is evident from Table 8 that in the case of dyadic communication contacts based on instrumental interaction, the product moment correlation between innovativeness scores of the dyad members was comparatively higher in the traditional social system ($r = .103$) than in the modern social system ($r = -.293$). As discussed earlier, the index of homophily with respect to a designated attribute is mainly derived from the magnitude and direction of product moment correlation between the attributes of dyad members; the correlation clearly indicated a relatively higher index of homophily in instrumental interaction in a traditional social system than in a modern social system. However, the difference between the two correlations is not significant at the .05 level ($z = 1.188$). Thus, the hypothesis is not supported.

H₁₀ In the friendship network, social interaction contacts have higher degree of homophily with respect to mass media exposure in a traditional

social system than in a modern social system.

Results from Table 8 indicate relatively greater degree of homophily in instrumental interaction in traditional social system ($r = .165$) compared with modern social system ($r = .047$). However, the difference in homophily between the two social systems is not significant at the .05 level as determined from z statistic ($z = .350$). Thus hypothesis 11 is not supported.

H₁₂ In the friendship network, social interaction contacts have greater degree of homophily with respect to mass media exposure in a traditional social system than in a modern social system.

As can be seen from Table 9, the results are in the opposite direction than expected. The correlation between mass media exposure scores of members of friendship dyads is higher in modern social system ($r = .132$) than in traditional social system ($r = .071$). The difference between the two correlations is not significant ($z = -.410$). Hence hypothesis 12 is not supported.

H₁₃ In the information seeking network, instrumental interaction contacts have greater homophily with

respect to change agent contact in a traditional social system than in a modern social system.

In light of results presented in Table 8, it is clear that in the case of instrumental interaction, the correlation between change agent contact scores of dyad members is higher in traditional social system ($r = .408$) than in modern social system ($r = .103$). Thus, there was greater homophily in instrumental interaction in traditional social system compared with modern social system. However, the difference between the correlations is not significant at the five percent level of significance ($z = .970$).

Hypothesis 13 is not supported.

H₁₄ In a friendship network, social interaction contacts have greater homophily with respect to change agent contact in a traditional social system than in a modern social system.

It is noted from Table 9 that the degree of homophily with respect to change agent contact is higher in traditional social system ($r = .130$) than in modern social system ($r = .054$). The difference between the two correlations is not significant at the .05 level ($z = .517$). Thus hypothesis 14 is not supported.

H₁₅ In the information seeking network, instrumental interaction contacts have greater homophily with respect to agriculture knowledgeability in traditional social system than in a modern social system.

It is evident from Table 8, that in the case of instrumental interaction there is relatively greater homophily with respect to agricultural knowledgeability in traditional social system ($r = .151$) compared with modern social system in which the homophily index is marked by a negative correlation ($r = -.302$). However, the difference between the two correlations is not significant at the 5 percent level of significance ($z = 1.360$). Thus hypothesis 15 is not supported.

H₁₆ In the friendship network, social interaction contacts have greater homophily with respect to agricultural knowledgeability in a traditional social system than in a modern social system.

From Table 9, it is observed that there is no homophily between members of friendship dyads with respect to agricultural knowledgeability in both traditional and modern social

systems. That is, there is no correlation between agricultural knowledgeability scores of members of friendship dyads in traditional social system ($r = .005$) as well as in modern social system ($r = .049$). The difference between the two correlations cannot be attributed to more than sampling error. Hypothesis 16 is not supported.

H₁₇ In the information seeking network, instrumental interaction contacts have greater homophily with respect to social status in a traditional social system than in a modern social system.

It appears from Table 8, that in instrumental interaction, there is greater degree of homophily with respect to social status in traditional social system ($r = .133$) than in modern social system ($r = -.015$). Although the difference between the two correlations is in the right direction, it fails to reach the five percent level of significance ($z = .436$).

Thus hypothesis 17 is not supported.

H₁₈ In the friendship network, social interaction contacts have greater degree of homophily with respect to social status in traditional social system than in a modern social system.

Results given in Table 9 indicate that in social interaction, the correlation between social status scores of dyad members is relatively higher in traditional social system ($r = .116$) compared with modern social system ($r = .036$). That is, there is comparatively greater homophily with respect to social status in traditional social system than in modern system. The difference between the two correlations is not significant at the .05 level ($z = .544$). Hence hypothesis 18 is not supported.

Frequency of Instrumental Interaction

H_{19} In the information seeking network, there is greater frequency of instrumental interaction in a modern social system than in a traditional social system.

To test this hypothesis, a t test was computed to determine the difference between the mean frequency of instrumental interaction in traditional social system and the mean frequency of instrumental interaction in modern social system. Results are presented in Table 10.

As can be seen from Table 10, mean frequency of instrumental interaction is relatively larger in modern

TABLE 10.--Variation Between Traditional and Modern Social System with Respect to Frequency of Instrumental Interaction, Degree of Integration into Information Seeking Networks, and Range of Social Interaction

Indices	Traditional social system with low technological diffusion	Modern social system with high technological diffusion	t
Mean frequency of instrumental interaction	1.930	2.981	2.225*
Proportion of social system members initiating dyadic communication	.466	.777	2.906*
Mean range of social interaction	8.30	10.781	2.818*

*Significant beyond the five per cent level.

social system ($\bar{X} = 2.98$) than in traditional social system ($\bar{X} = 1.93$). Furthermore the difference between the two means is in the expected direction and is found significant beyond the 5 percent level of significance ($t = 2.22$). Hypothesis 19 is therefore supported.

Patterns of Communication Integration

Integration into the Information Seeking Network

H₂₀ There is greater degree of integration into information seeking network in a modern social system than in a traditional social system.

To test this hypothesis, the proportion of individuals, who initiated dyadic communication contacts for the purpose of seeking information from others perceived as relatively more innovative, was computed in each of the two social systems. Significance of difference between the two proportions was determined by the use of t test. Results are presented in Table 10.

From table 10, it is evident that the proportion of individuals who initiated dyadic communication contacts with more innovative farmers is larger in modern social

system ($p = .777$) compared with traditional social system ($p = .466$). The difference between the two proportions is significant beyond the 5 per cent level of significance ($t = 2.90$). Hypothesis 20 is supported.

Range of Social Interaction

H_{21} The range of social interaction is greater in a modern social system than in a traditional social system.

Range of social interaction was earlier defined as the sum of direct and indirect interpersonal communication contacts that a person has with other members in the social system. Thus, range of social interaction of an individual member was computed by (1) first manipulating the "who to whom" original matrix to the power of two, (2) then summing the row entries in the squared matrix in order to obtain the indirect two-step contacts of each individual, (3) adding the two-step contacts so obtained with the direct contacts that each individual had in the original matrix and finally (4) subtracting from an individual's sum total of direct and indirect contacts, the number of his mutual contacts if any, in order to avoid overlapping of interpersonal contacts.

From individual's range of social interaction, mean value of

the range of social interaction was obtained for each social system. To test the previous hypothesis, a t test was applied to determine the difference between the two means. The results are given in Table 10.

It can be seen from Table 10 that mean range of social interaction is larger in modern social system ($\bar{X} = 10.78$) than in traditional social systems ($\bar{X} = 8.30$). The difference between the two means is found significant beyond the five per cent level of significance ($t = 2.818$). Thus hypothesis 21 is supported.

Subgroups

H₂₂ In a modern social system there is a greater degree of communication contacts between subgroups than in a traditional social system.

It should be noted that the test of hypothesis 22 is based primarily on structural analysis rather than on tests of statistical significance. This is also true of the hypotheses that would follow next.

To test the previous hypothesis, sociometric choices dealing with informal interpersonal contacts were arranged in the form of a "who to whom" matrix which was manipulated in order to differentiate sub-groups, contacts between sub-

groups and position of individuals especially liaison persons in the interpersonal communication structure. Figure 4 and Figure 5 present an analysis of communication structure of the modern and traditional social system respectively.

A comparative analysis of Figure 4 and Figure 5 indicates clearly that communication structure of the modern social system is characterized by a relatively larger proportion of communication contacts between subgroups (.36)* than in the traditional social systems (.16)*. Five subgroups are identified in the modern social system and two subgroups are identified in the traditional social system.

From Figures 4 and 5 two types of communication contacts between subgroups can be observed. In the first type are the dotted lines which connect a member of one subgroup to a member in a different subgroup; as for example the contacts between group members 3 and 17, and between group members 7 and 53 shown in Figure 4. The second type of contacts between and among subgroups are shown in Figure 4 and Figure 5 by dotted lines as well, but these contacts occur through liaison persons such as numbers 38, 40, 19, and 47 in Figure 4, and number 18 in Figure 5.

*The proportion of communication contacts between subgroups

$$= \frac{\text{Number of contacts between subgroups.}}{\text{Total number of contacts in the community.}}$$

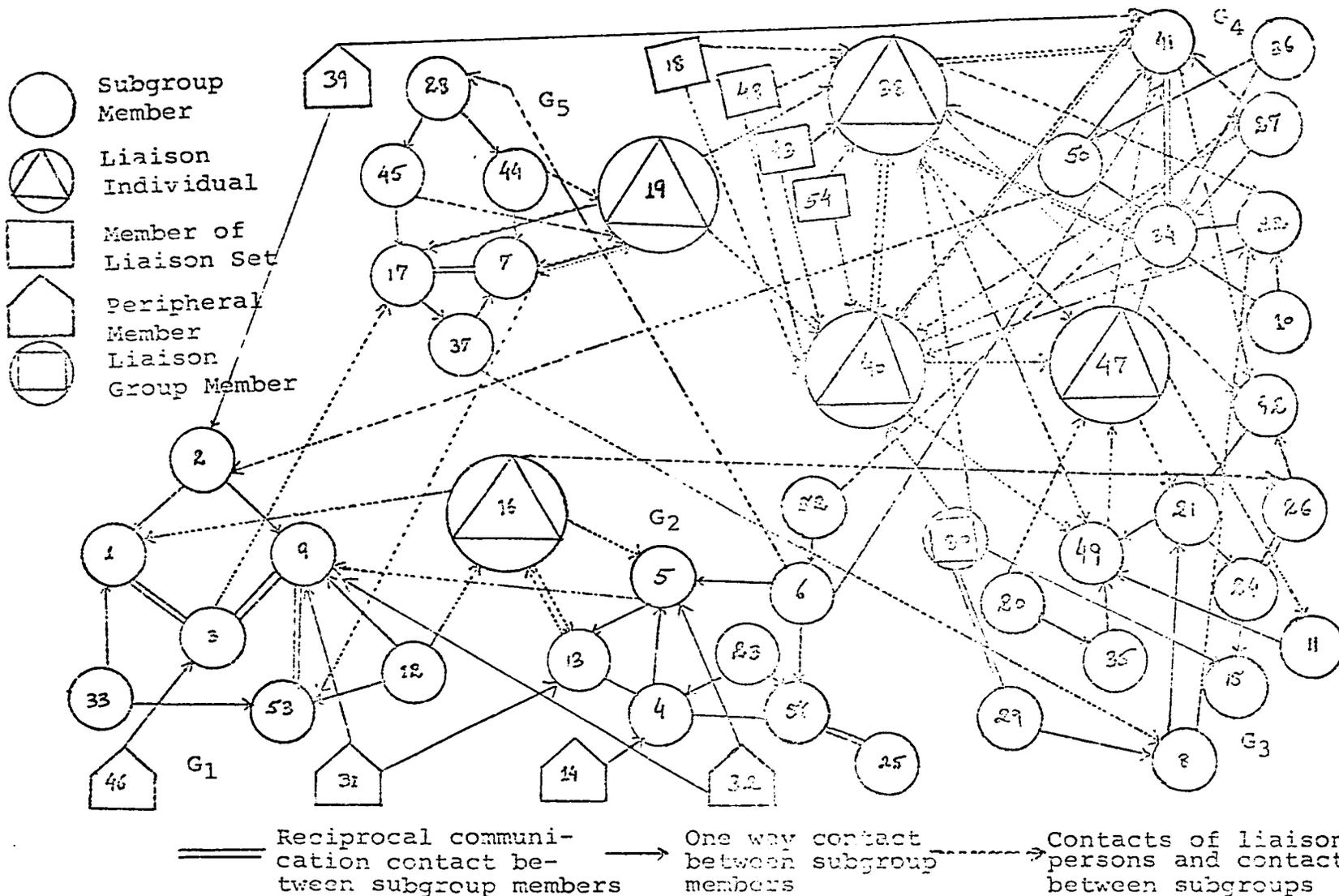


Figure 4.--Patterns of communication integration in the Bsant Pur modern community

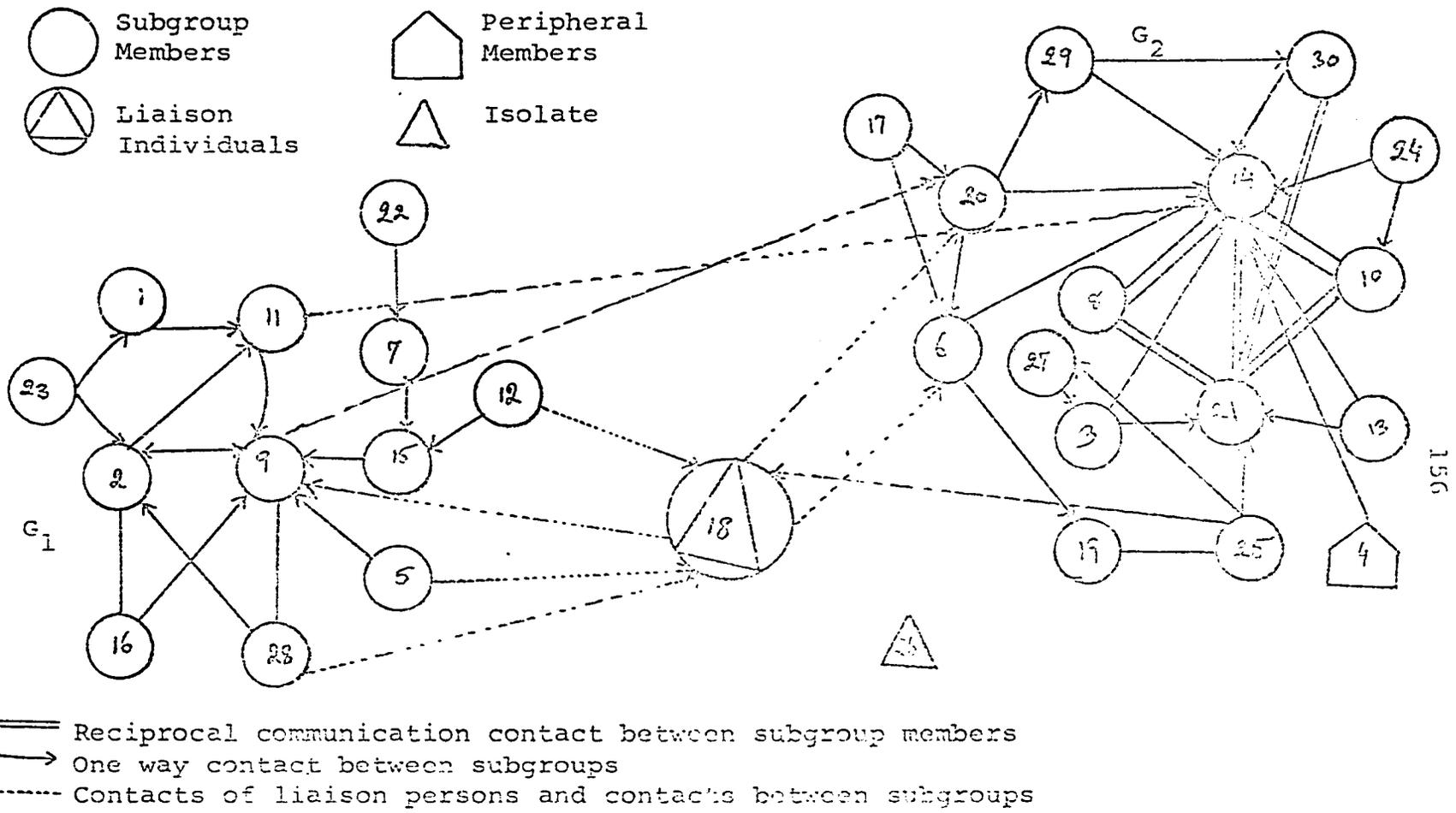


Figure 5.--Patterns of communication integration in the Arjan Pur traditional community

Thus, an examination of communication contacts between subgroups from Figure 4 and Figure 5 clearly supports the hypothesis that there are greater number of contacts between subgroups in the modern social system than in the traditional social system. The hypothesis is supported.

H₂₃ In a modern social system, there is a greater number of liaison roles in the communication structure than in a traditional social system.

From an analysis of the communication structure mapped in Figure 4 and Figure 5, it is seen that in the modern social system there are six liaison persons (numbers 19, 38, 40, 47, 16, 30) who interconnect five subgroups of fifty-four members as compared with only one liaison person who interlinks two subgroups of thirty members in the traditional social system. Further examination of the position of liaison persons in Figure 4 indicates that liaison person number 19 is instrumental in interrelating his subgroup to liaison persons 38 and 40 who are both interrelated to each other through reciprocal contacts. Furthermore liaison persons 38 and 40 not only provide interlinkage between two subgroups, but both are identified to be interrelated to another liaison person 47. Thus, the inter-linkage among the liaison persons

leads to a liaison set in the modern social system. In Figure 4, number 30 is a liaison group member who interrelates the subgroup to liaison persons 38 and 40. Finally, it is observed from Figure 4 that there are some individuals (numbers 18, 43, 48, 54) who have no contacts with any subgroup but are found to be interlinked to liaison persons 38 and 40. Such individuals are also considered as members of the liaison set.

In contrast, the communication structure of the traditional social system shown in Figure 5 is not only marked by lack of liaison persons but is relatively more centralized. As can be seen from Figure 5, interpersonal choices in each of the two subgroups are concentrated mostly in one of the subgroup members identified as numbers 9 and 14 respectively.

On the basis of structural analysis presented in Figures 4 and 5 it can be concluded that in comparison to the traditional social system, communication structure of the modern social system is characterized by relatively greater number of liaison persons, and by a higher degree of interrelatedness among the liaison persons and through them, among the subgroups of the communication structure. Thus, hypothesis 23 is supported.

H₂₄ In a modern social system, liaison individuals are relatively more innovative than the subgroups of members but in a traditional social system liaison individuals are relatively similar in innovativeness to the subgroups of members.

H₂₅ In a modern social system liaison individuals have relatively a higher degree of mass media exposure than the subgroups of members but in a traditional social system liaison persons have a relatively similar degree of mass media exposure as the subgroups of members.

Hypothesis 24 and Hypothesis 25 were tested on the basis of structural analysis presented in Figures 4 and 5. Mean scores with respect to social status, innovativeness, and mass media exposure were computed for each of the separate subgroups identified as part of the communication structure of the two social systems. Scores with respect to social status, innovativeness, and mass media exposure were also obtained for each of the liaison persons who interrelated two or more subgroups of the communication structure in each social system. Analysis with regard to the modern

social system is provided in Table 11 which presents the scores of liaison persons and the mean scores of subgroups in terms of such characteristics as social status, innovativeness and mass media exposure. Results with regard to the traditional social system are presented in Table 12 which describes the characteristics of liaison persons, the subgroups and also of the most highly chosen member in each of the two subgroups shown in Figure 5. It should be noted here that the scores dealing with social status, innovativeness, and mass media exposure are standard scores computed for each social system separately and hence are relative to the specified social system.

From Table 11 and Table 12 it is possible to examine three types of relationships: (1) the interrelationship between the characteristics of liaison person and those of the subgroups with which the liaison person is interconnected, (2) variation in the characteristics of liaison persons interrelated to each other as a liaison set and (3) variation among the subgroups with regard to their normative structure. In light of the hypothesis stated previously, focus of the present research is primarily on the first type of analysis. The second type of relationships are also analyzed in view of their importance in the diffusion of innovations.

TABLE 11.--Liaison Persons, Subgroups, and Their Characteristics in the Modern Social System

Liaison Persons and Subgroups	Social Status	Inno- vative- ness	Mass Media Exposure
Score of liaison person, no. 16	54.2	51.2	59.3
\bar{X} score of subgroup G_2 in which no. 16 is a member	53.2	49.1	47.9
\bar{X} score of subgroup G_1 intercon- nected by liaison person no. 16	48.5	46.9	47.2
Score of liaison person, no. 47	41.3	52.6	58.7
\bar{X} score of subgroup G_3 person no. 47	46.9	51.5	52.4
\bar{X} score of subgroup G_4 intercon- nected by liaison person no. 47	53.8	53.3	53.0
Score of liaison person, no. 38	83.9	64.0	64.9
\bar{X} score of subgroup G_4 in which no. 38 is a member	53.8	53.3	53.0
\bar{X} score of subgroup G_3 intercon- nected by liaison person no. 38	46.9	51.5	52.4
Score of liaison person, no. 40	65.9	57.4	59.5
\bar{X} score of subgroup G_4 in which no. 40 is a member	53.8	53.3	53.0
\bar{X} score of subgroup G_3 intercon- nected by liaison person no. 40	46.9	51.5	52.4
Score of liaison person, no. 19	63.9	53.4	49.2
\bar{X} score of subgroup G_5 in which no. 19 is a member	47.6	47.6	46.5
Score of the other liaison persons contacted by liaison person 19			
Liaison person 38	83.9	64.0	64.9
Liaison person 40	65.9	57.4	59.5

TABLE 12.--Liaison Persons, Subgroups, and Their Characteristics in the Traditional Social System

Liaison Persons and Subgroups	Social Status	Innovativeness	Mass Media Exposure
Score of "liaison" person, no. 18	66.5	50.4	46.3
\bar{X} score of the subgroup G_1 in which no. 18 is a member	48.7	47.7	50.4
\bar{X} score of the subgroup G_2 interconnected by liaison person no. 18	51.9	51.7	51.0
Score of the "most highly chosen" person of subgroup G_2 (person no. 14)	68.2	50.7	53.7
\bar{X} score of subgroup G_2 in which no. 14 is a member	51.9	51.7	51.0
Score of the "most highly chosen" person of subgroup G_1 (person no. 9)	57.0	49.4	42.0
\bar{X} score of the subgroup G_1 in which no. 9 is a member	48.7	47.7	50.4

*Since in the traditional social system the communication structure was marked by concentration of sociometric choices in specific individuals, it was considered pertinent to include the characteristics of the "most highly chosen" individual in each of the two subgroups. Such individuals, by virtue of their position in the communication structure, are highly influential in the diffusion of innovations.

It can be seen from Table 11 that liaison persons in the modern social system are relatively more innovative and have relatively higher degree of mass media exposure than the respective subgroups of members with which the liaison persons are interconnected. On the other hand this relationship is not so clearly observed in the case of traditional social system in which liaison person 18 is found to have relatively higher social status but less mass media exposure than the subgroup. From Table 12 it can also be seen that in the traditional social system the most highly chosen member of each of the two subgroups are no more innovative than the subgroups of members, are found to have rather relatively less mass media exposure than their respective subgroups but are characterized by relatively higher social status compared with the mean social status of the subgroup.

Furthermore, the important characteristic of the communication structure in the modern social system is the interrelatedness among the liaison persons. Although social status, innovativeness, and mass media exposure scores of liaison persons in the modern social system vary from relatively lower scores to the highest scores in the social system (liaison person 38 has the highest scores on all the

three characteristics), yet the liaison persons are imbedded in an intercommunicative linkage among themselves. Such interrelatedness is not found in the traditional social system.

CHAPTER V

SUMMARY AND CONCLUSIONS

Summary

The main objectives of the present thesis were two-fold: (1) to develop a conceptual and analytical framework designed to study the relationship of the elements of communication structure and technological diffusion in comparative social systems, and (2) to utilize this framework in an empirical investigation of the attributes of communication structure which differentially affect technological diffusion in two social systems, which are peasant communities in India.

The comparative study reported in the present thesis was designed to examine variations between two informal social systems, with regard to patterns of communication structure which were hypothesized to have differentially affected the rate of technological diffusion in these systems. The study was conducted in two peasant communities in the State of Punjab, India. The selection of the two communities was based on the criteria (1) that identical

programs of technological change were introduced in the two communities, which were comparatively similar in terms of respondents' age, education, functional literacy, family literacy, family size, farming experience, experience in government service, religious, ethnic and cultural background. (2) that the two communities manifested different types of social structures, each producing different patterns of interpersonal communication, and (3) that different patterns of communication structure affected the differential rate of technological diffusion in the two communities.

In view of the focus of the present study on the analysis of interpersonal communication structures, a sociometric design based on "saturation sampling" was employed so that every respondent could be located within the networks of interpersonal communication contacts. Thus, one head of a farm family was interviewed in both communities. In all, 54 respondents were interviewed in the village of Pur and 30 respondents were interviewed in Arja village.

The study was comparative but limited in its analysis of communication structure and its effect on technological diffusion in only two communities. It was considered essential to conceptualize the two communities as "modern" and "traditional". The assumption is that there was a

differences between the two communities with respect to the rate of technological diffusion, the dependent variable. This conceptualization of the two communities was a methodological device and had to be validated empirically. Results based on empirical evidence indicated that the Esant Pur village, conceptualized as a "modern" social system, had a relatively much higher rate of technological diffusion than the Arjan Pur village, which was conceptualized as a traditional social system. The differences between the two social systems with regard to rate of technological diffusion (and mean adoption index) were statistically significant.

The communication structure of a social system was conceptualized in terms of 3 main concepts: patterns of opinion leadership*, patterns of homophily** in dyadic communication, and patterns of communication integration***.

* Opinion leadership is defined as interpersonal influence exercised in a situation through communication process toward the attainment of certain knowledge, attitudes and/or behavior.

** Homophily is defined as the degree to which individuals with a certain designated attribute have interpersonal communication contacts with other individuals with a similar attribute.

*** Communication integration is defined as the degree to which social system members and sub-groups are interconnected in interpersonal communication relationships. Implicit in this definition is the notion that communication

It is within the framework of these three categories of concepts that hypotheses dealing with communication structure were outlined for comparative social system analysis. Furthermore, the hypotheses were tested by utilizing three different levels of analysis corresponding to the three levels of concepts. That is, hypothesis dealing with patterns of opinion leadership were tested by utilizing the individual as the unit of analysis; hypotheses pertaining to patterns of homophily in dyadic communication were studied by utilizing the dyad as the unit of analysis; and hypotheses concerning patterns of communication integration were tested using the group or system as the unit of analysis. Findings based on the variations in patterns of communication structure between the modern and traditional social system were as follows:

1. Patterns of Opinion Leadership

Eight hypotheses dealing with opinion leadership were postulated and tested. The first five hypotheses were concerned with variations between the modern and traditional

integration can be analyzed in terms of communication contacts among individuals, in terms of contacts between sub-groups and in terms of liaison persons who interconnect two or more sub-groups in a given social system.

social systems with regard to communication and innovative behavior of opinion leaders. The sixth hypothesis dealt with differences in the degree of polymorphism of opinion leadership* between the modern and traditional social system, and the remaining two hypotheses postulated variations in degree of opinion leadership concentration** between the two social systems.

Hypothesis 1 stated that opinion leadership is more highly related to mass media exposure in a modern social system than in a traditional social system. Analysis showed that the correlation between mass media exposure and opinion leadership was significantly different from zero in modern social system, but not in the traditional social system. However, the value of z statistic based on the difference between the two correlations was not significant at the

* Polymorphism of opinion leadership is defined as the tendency of an individual to be in the same relative influence position in a social system across a given number of issues.

** Opinion leadership concentration is the degree to which one or more units in a given social system have relatively greater degree of interpersonal influence with respect to a given criterion, than other units of that social system.

5 percent level of significance. Hence the hypothesis was not supported. Further analysis indicated partial support for the main hypothesis when tested in terms of three sub-hypotheses. It was found that opinion leadership was more highly related to radio exposure and, to magazine reading in modern social system than in traditional social system. On the basis of z test, the differences between the correlations were significant at the .05 level.

The expectation in Hypothesis 2 was that the relationship between opinion leadership and change agent contact is stronger in modern social system than in traditional social system. Results indicated that the difference between the two correlations was not significant at the 5 percent level of significance. Thus, hypothesis 2 was not supported.

Hypothesis 3 suggested that opinion leadership is more highly related to the use of cosmopolite interpersonal communication sources in the process of innovation decisions, in modern social system than in traditional social system. It was found that the correlation between the use of cosmopolite interpersonal communication sources and opinion leadership was significantly different from zero in the modern social system, but not in the traditional social system. The difference between the two correlations was found significant

at the 5 percent level. Hypothesis 3 was supported.

Also supported was Hypothesis 4, which stated that opinion leadership is more highly related to the degree of participation in formal organization in modern social system than in traditional social system. The correlations between participation in formal organization and opinion leadership were significantly different from zero in both the modern and traditional social systems. The difference between the two correlations was significant beyond the 5 percent level of significance.

Hypothesis 5 postulated that the relationship between opinion leadership and innovativeness is stronger in modern social system than in traditional social system. Analysis showed that the correlation between innovativeness and opinion leadership was significantly different from zero in the modern social system, but not in the traditional social system. The difference between the two correlations was in the expected direction, but z test indicated that the difference was not significant at the .05 level. Thus hypothesis 5 was not supported.

According to Hypothesis 6, it was expected that opinion leadership would be less polymorphic in modern

social system than in traditional social system. Analysis showed that mean polymorphism score was larger in traditional social system than in modern social system. But the difference between the two means was not significant at the .05 level. Thus, hypothesis 6 was not supported.

The concern in Hypothesis 7 and Hypothesis 8 was to test the variation between modern and traditional social system with regard to opinion leadership concentration. Hypothesis 7 postulated that if leadership is considered, as a means toward the achievement of specific social system goals, or, in collective innovative decisions, then there is greater degree of opinion leadership concentration in modern social system than in traditional social system. The results were in the expected direction, but the hypothesis was not confirmed.

Hypothesis 8 was that if leadership is considered as a process of interpersonal communication in which the main purpose is to help other members achieve individual goals (such as when members seek information and evaluation from opinion leaders for making personal decisions in the process of innovation adoption), there is less opinion leadership concentration in modern social system than in traditional social system. The hypothesis was supported.

In brief, of the eight hypotheses dealing with patterns of opinion leadership, three were confirmed. one was partially supported, and the remaining four, although in the expected direction, were not supported.

2. Patterns of Homophily in Dyadic Communication

Ten hypotheses were stated dealing with patterns of homophily in dyadic communication. The hypotheses dealt with variations in the degree of homophily between the modern and traditional social system, with respect to five designated attributes of members, and with respect to two types of dyadic communication, namely instrumental interaction* and social interaction**. In addition, one hypothesis dealing with frequency of instrumental interaction in dyadic communication contacts was also tested.

Hypothesis 9 postulated that in information seeking, instrumental interaction contacts have higher homophily

* Instrumental interaction is defined as direct interpersonal communication contact between members established specifically to the attainment of goal seeking behavior such as seeking information and knowledge about innovations.

**social interaction is defined as interpersonal communication contact between individuals primarily oriented to intimate friendship associations.

with respect to innovativeness in a traditional social system than in a modern social system. As expected, the correlation in the modern social system was significant and negative as compared with a positive but not significant correlation in traditional social system. Results were in the expected direction, but the difference between the two correlations was not significant at the 5 percent level. The hypothesis was not supported.

Hypothesis 10 stated that social interaction contacts in the friendship network have a higher degree of homophily with respect to innovativeness in a traditional social system than in a modern social system. The correlation in both the modern and traditional social systems was near zero, although it was expected that in friendship contacts, the correlation would be positive and high in traditional social system and low in the modern social system. Analysis showed that although the results were in the opposite direction than expected, the difference in homophily between the two social systems was not significant at the 5 percent level. The hypothesis was not supported.

The expectation in Hypothesis 11 was that instrumental interaction contacts in information-seeking have a greater degree of homophily with respect to mass media

exposure in a traditional social system than in a modern social system. Analysis showed that the correlation in the traditional social system was higher than in the modern social system. The difference between the two correlations was not significant at the 5 percent level. Results were in the expected direction, but the hypothesis was not supported.

According to Hypothesis 12, it was expected that social interaction contacts have a higher degree of homophily with respect to mass media exposure in a traditional social system than in a modern social system. The correlations in both the traditional and modern social systems were positive; however, contrary to expectation, the correlation was relatively higher in the modern social system than in the traditional social system. Neither of the correlations was significantly different from zero. Analysis showed that the difference between the two correlations was not significant at the 5 percent level. Thus, the hypothesis was not supported.

Hypothesis 13 postulated that instrumental interaction contacts in information-seeking have a higher degree of homophily with respect to change agent contact in a traditional social system than in a modern social system. As

expected, the correlation was positive and high in the traditional social system, and positive and low in the modern social system. The difference between the two correlations was not significant at the .05 level. The hypothesis was not supported, although the results were in the expected direction.

The expectation in Hypothesis 14 was that social interaction choices for friendship have a higher degree of homophily with respect to change agent contact in the traditional social system than in the modern social system. The results were in the expected direction as indicated by a relatively higher degree of correlation in the traditional social system as compared with the modern social system. The difference between the two correlations was not found significant at the 5 percent level of significance. The hypothesis was not supported.

According to Hypothesis 15, it was suggested that in information-seeking, instrumental interaction contacts have a higher degree of homophily with respect to agricultural knowledgeability in the traditional social system than in the modern social system. As expected the correlation in the modern social system was negative and high and significantly different from zero, whereas the correlation in the

traditional system was positive but not significantly different from zero. Analysis showed that the differences between the two systems were in the expected direction, but failed to reach the significant level of .05. The hypothesis was not supported.

Hypothesis 16 stated that social interaction contacts of friendship have greater homophily with respect to agricultural knowledgeability in the traditional social system than in the modern social system. Results indicated almost zero correlations in both traditional and modern social systems. The hypothesis was not supported.

The expectation in Hypothesis 17 was that instrumental interaction contacts in information-seeking have greater homophily with respect to social status in the traditional social system than in the modern social system. As expected, the correlation in the traditional social system was positive, whereas a negative correlation was obtained in the modern social system. Neither of the correlations was significantly different from zero. The difference between the two correlations was not significant at the .05 level. Thus the results were in the expected direction, but the data did not support the hypothesis.

Hypothesis 18 postulated that in social interaction contacts a greater degree of homophily with respect to social status will develop in the traditional social system than in the modern social system. Results showed that the correlation was higher in the traditional social system as compared with that in the modern social system, but neither of the correlations was significantly different from zero. The analysis indicated that although the difference in homophily between the two social systems was in the expected direction, the hypothesis was not supported at the 5 percent level of significance.

Finally, Hypothesis 19 stated that in information-seeking there is a greater frequency of instrumental interaction in the modern social system than in the traditional social system. The hypothesis was supported.

As a summary statement of the results of hypotheses postulated to determine variations in patterns of homophily between modern and traditional social system, it can be noted that out of ten hypotheses, seven were in the expected direction, three in the opposite direction than expected, and none of the hypotheses were confirmed. An eleventh hypothesis dealing with frequency of instrumental interaction in dyadic communication contacts was supported.

3. Patterns of Communication Integration

The research emphasis regarding communication integration was to compare the communication structure of the two peasant social systems in terms of subgroups, in terms of communication contacts between the subgroups, and in terms of the key communication positions of liaison persons. The tests of four hypotheses were primarily based on inspection of a structural analysis, rather than on statistical criteria. In addition, two hypotheses were postulated dealing with differences between the modern and traditional social system with regard to degree of integration into the information-seeking network, and the range of social interaction respectively. The latter two hypotheses were tested statistically. Thus, a total of six hypotheses dealing with communication integration were tested.

According to Hypothesis 20, it was expected that there is greater degree of social system members integrated into the information-seeking network in the modern social system than in the traditional social system. On the basis of a t test it was found that the proportion of social system members who initiated dyadic communication with relatively more innovative members, was larger in the modern social system than in the traditional social system.

hypothesis was supported.

Hypothesis 21 stated that the range of social interaction* is greater in the modern social system than in the traditional social system. The hypothesis was supported on the basis of a t test, which indicated that the mean range of social interaction was greater in the modern social system than in the traditional social system.

The expectation in Hypothesis 22 was that there would be a greater degree of communication contacts between subgroups in the modern social system than in the traditional social system. On the basis of a structural analysis (presented in Figures 4 and 5), the hypothesis was supported.

Hypothesis 23 postulated that there was a greater number of liaison roles in the modern social system than in the traditional social system. The hypothesis was supported on the basis of an analysis of the communication structure of the two social systems.

Hypothesis 24 postulated that in the modern social system, liaison persons are relatively more innovative than the subgroups of members, but in the traditional social system

*Range of social interaction is defined as the extent to which an individual can initiate, directly and indirectly, interpersonal contacts with other members for the purpose of informal friendship association.

liaison persons are relatively similar in innovativeness to the subgroups of members. The hypothesis was supported.

Finally, the expectation in Hypothesis 25 was that liaison persons in the modern social system have a relatively higher degree of mass media exposure than the subgroups of members, but in the traditional social system liaison persons have a relatively similar degree of mass media exposure to the subgroups of members. The hypothesis was supported.

In conclusion, it was found that out of six hypotheses dealing with patterns of communication integration, two of the hypotheses were confirmed statistically and the remaining four were supported on the basis of inspection of a structural analysis.

Discussion

Among the 25 hypotheses postulated, twenty-one were tested on the basis of statistical tests of significance and the remaining four were studied in terms of evidence primarily derived from inspection of a structural analysis. Results dealing with all the 25 hypotheses are summarized in Table 13. Of the twenty-one hypotheses tested statistically, eight were concerned with differences in patterns of opinion

TABLE 13.--Summary of Results of the 25 Hypotheses Tested in the Present Thesis

Concepts and Variables	Hypothesis Number	Type of Test	Result
<u>Patterns of Opinion Leadership:</u>			
Communication and innovative behavior of opinion leaders		z-test of difference between two r's	Not supported
Mass media exposure	H ₁	" " "	"
Change agent contacts	H ₂	" " "	"
Use of cosmopolite interpersonal sources	H ₃	" " "	Supported
Formal participation	H ₄	" " "	"
Innovativeness	H ₅	" " "	Not supported
Polymorphism of opinion leadership	H ₆	t-test of difference between two means	"
Opinion leadership concentration	H ₇	t-test of difference between two proportions	"
Opinion leadership concentration	H ₈	" " "	Supported
<u>Patterns of Homophily in Dyadic Communication:</u>			
Instrumental interaction (innovativeness)	H ₉	z-test of difference between two r's	Not supported
Social interaction (innovativeness)	H ₁₀	" " "	"
Instrumental interaction (mass media exposure)	H ₁₁	" " "	"
Social interaction (mass media exposure)	H ₁₂	" " "	"
Instrumental interaction (change agent contact)	H ₁₃	" " "	"
Social interaction (change agent contact)	H ₁₄	" " "	"
Instrumental interaction (agricultural knowledgeability)	H ₁₅	" " "	"
Social interaction (agricultural knowledgeability)	H ₁₆	" " "	"
Instrumental interaction (social status)	H ₁₇	" " "	"
Social interaction (social status)	H ₁₈	" " "	"
Frequency of instrumental interaction	H ₁₉	t-test of difference between two means	Supported
<u>Patterns of Communication Integration:</u>			
Integration in information seeking	H ₂₀	t-test of difference between two proportions	Supported
Range of social interaction	H ₂₁	t-test of difference between two means	"
Communication contacts between subgroups	H ₂₂	Structural analysis	"
Liaison person	H ₂₃	" " "	"
Characteristics of liaison persons and the subgroups	H ₂₄	Descriptive statistics	"
" " "	H ₂₅	" " "	"

leadership between the modern and traditional social system; eleven dealt with patterns of homophily in dyadic communication, and the remaining two dealt with patterns of communication integration. On the whole, six hypotheses were supported and one more was partially supported on the basis of statistical tests, four were supported on the basis of a structural analysis, and fourteen were not supported. Of these, eleven were in the expected direction and three were in the opposite direction to that postulated. The question therefore arises, why were some of the hypotheses supported and others not supported?

Methodological Factors

1. Sample Size. Perhaps one of the important possibilities responsible for a lack of significant differences where encountered, could be that the sample size was not adequate. The sample size in the case of the traditional community was 30, as compared with a sample size of 54 in the case of the modern community.

At least three of the hypotheses dealing with differences in patterns of opinion leadership between the two social systems (H_1 , H_5 , and H_6) approached significance with the present sample.

Similarly, in the case of the dyadic analyses dealing with differences in homophily between the modern and traditional social systems, with respect to designated attributes of members involved in instrumental communication contacts, the sample size in both communities was relatively small. There were 14 dyads in the case of the traditional community and 42 in the case of the modern community. Although the number of dyads was relatively small in both communities, all the five hypotheses dealing with differences in homophily between the two communities with respect to information-seeking were in the expected direction and two of the hypotheses (H_9 and H_{15}) approached significance.

2. Specificity of criteria in sociometric designs.

In the case of hypotheses dealing with differences in homophily with respect to social interaction or friendship contacts, inconsistent results were obtained in spite of a relatively larger number of dyads, which was 69 in the traditional community and 150 in the modern community. Results of this analysis indicated almost no correlation between such members' attributes as innovativeness, mass media exposure, change agent contact, agricultural knowledgeability and social status.

Three possibilities might explain the lack of hypothesized relationships. First, the criterion of friendship on which sociometric choices were obtained was perhaps too general rather than specific. In other words, specificity regarding the exact type of friendship contact might help in differentiating as to which attributes influence interpersonal contacts. A second possible explanation deals with the number of friendship choices which an individual was allowed to make. In the present study, an individual respondent was allowed to choose up to a maximum of six friends among the members in his community. Perhaps homophily is higher when the number of choices allowed is smaller. This is an empirical question that should be explored in future research. Third, members' attributes, such as innovativeness, change agent contact, mass media exposure, agricultural knowledgeability, and social status which were utilized in determining the degree of homophily were not important in differentiating informal friendship contacts although these very attributes were found to differentiate specific goal-oriented instrumental communication contacts to a relatively greater extent in both the communities.

Results dealing with polymorphism of opinion leadership and concentration of opinion leadership were in the

expected direction but the postulated hypotheses were not supported. One possible explanation could be that the sociometric criteria utilized to measure opinion leadership were relatively general rather than specific and salient to the situation of peasants. In future empirical research greater attention should be given to study of opinion leadership with respect to more specific and discriminatory sociometric criteria which can meaningfully differentiate the nature and extent of opinion leadership influence in peasant villages. It is believed that specificity and differences in sociometric criteria of leadership can provide a more valid basis of the existence or non-existence of polymorphic opinion leadership and leadership-concentration.

Theoretical Factors

In addition to methodological factors, lack of support for the hypotheses postulated about opinion leadership and homophily can be further examined in terms of theoretical considerations from small group literature.* To be specific, the main focus in our discussion that follows is on hypotheses dealing with polymorphism of opinion leadership, opinion

*No discussion is contemplated with respect to hypotheses postulated in the category of patterns of communication integration as they were all supported.

leadership concentration, and homophily in dyadic communication. It is appropriate to note that lack of empirical evidence utilizing these variables in the diffusion research context, was one limiting factor in the construction of the present analytical framework. The hypotheses dealing with polymorphism of opinion leadership, opinion leadership concentration, and homophily, had to be formulated primarily on the basis of parallel work from the existing literature. Furthermore, since the hypotheses in the present research deal with differences between modern and traditional social systems, they are to a great degree exploratory in character.

The hypothesis that there are differences between the modern and traditional social system with regard to the degree of polymorphism of opinion leadership was, although in the expected direction, not confirmed in the present thesis. Parallel results from small group research indicate no conclusive and definite evidence regarding the generality or specificity of leadership influence on the basis of results of a factor analytic study in which the same groups were observed at six different tasks. It was concluded that there were probably families of situations for which leadership was fairly general for any task falling in that family; but there would be other

families in which the leadership requirements might be fairly independent of those in the first family of situations (Carter, 1953, p. 26). Gibb (1954, p. 902) studied leadership in small groups which were observed in eight different tasks and concluded that leadership was not entirely specific to the situation; neither was it wholly a general factor. Added to these are the survey findings of opinion leadership studies conducted by Katz and Lazarsfeld (1955), who found a tendency toward monomorphic leadership, and by Rogers and van Es (1964), who found no difference between modern and traditional social systems with regard to polymorphism of opinion leadership. However, the findings of the present study indicate a tendency toward polymorphism of leadership in both types of communities, although this tendency was relatively greater in the traditional community than in the modern community. In view of the findings of the present research, perhaps it would be useful to study opinion leadership in terms of more specific and more numerous criteria, and then determine what variables (including group structure, situational and task demands, and behavioral and personal attributes of individuals) predict polymorphism of leadership in peasant communities.

Groups having a relatively higher degree of leadership concentration or a high degree of consensus on leadership were

found to have more effective communication and were more productive in the achievement of group goals than groups in which leadership was widely distributed because of a lack of consensus among group members regarding leadership status (Heinicke and Bales, 1953, Shelly, 1960). Directly related to this point is Hypothesis 7 of the present study which stated that, if leadership is concerned with social system goals or collective innovation decisions, then there is greater degree of opinion leadership concentration in the modern social system than in the traditional social system. Results were in the expected direction, but the hypothesis was not supported.

Homophily in friendship association was found to be related to similarities in attitudes and religious background on the part of interacting members (Lazarsfeld and Merton, 1954, p. 65); whereas homophily in professional (instrumental) contacts among medical doctors was related to drug adoption (Coleman and others, 1966). Blau (1962) found low homophily in instrumental interaction with respect to designated attributes of a group of professional employees in a voluntary organization.

The effect of certain status factors in the diffusion of innovations has also been studied (Larsen and Hill, 1958;

Katz and Lazarsfeld, 1955; Rogers and van Es, 1964). However, there is little consistency in the results of these studies. Lack of clear evidence on the basic question of "who interacts with whom, in what attributes" is apparent from the work of Homans (1950, pp. 182-184), who postulated tendencies both to interact vertically (that is, with those of higher and lower status) and to interact horizontally. However, Homans (1950) and Reicken and Homans (1954, p. 798) pointed out that the tendency to interact vertically and horizontally is influenced by the criterion or the particular situation in which interpersonal interaction occurs. These researchers postulated that individuals interact with high ranking people in task-oriented situations and with equals in social situations.

As partial support of Homans' statement, results in the present thesis indicated that in instrumental communication contacts, the degree of homophily with respect to designated attributes was indeed lower in the modern social system than in the traditional social system. Several of the hypotheses dealing with homophily differences between the modern and traditional social systems in instrumental communication contacts approach significance, but were not supported. However, results of the present research were not consistent

with regard to homophily in informal friendship contacts, perhaps due to a lack of specificity of the friendship criterion and problems of measurement.

In summary, it can be noted from the previous discussion that the variables of opinion leadership concentration, polymorphism of opinion leadership, and homophily in dyadic communication were relevant to the analyses of the effect of these variables on innovation diffusion in comparative social systems. However, the exact relevance of the latter two variables (polymorphism of opinion leadership and homophily in interpersonal interaction) is not clearly established from the present empirical evidence.

Conclusions

To conclude the present thesis, three logical questions can be raised:

1. Why is it that a meaningful understanding of communication structure as conceptualized in the present thesis is fundamental to explain the process of innovation diffusion in informal social systems like peasant villages? Can the conceptual framework of the present thesis be related logically and meaningfully to a relatively more general theory of social action and change?

2. What implications does the present research have for accelerating the diffusion of innovations in rural societies?
3. What are some of the research problems that the present investigation brings into focus?

Communication Structure and Innovation Diffusion

The theoretical importance of analyzing the effect of communication structure in innovation diffusion is evident from the basic tenet of diffusion theory which stipulates that the process of diffusion is primarily a process of interpersonal influence, i.e., the interactional mechanisms that occur among members in a social system (Rogers, 1962, p. 138). Hence, the conceptual and analytical framework of the present thesis was designed primarily from a communication point of view, to understand a specific phenomenon of social change, namely, the diffusion of innovations in Indian villages. However, it is believed that the communication approach of the present thesis can also be meaningfully related to the general theory of action formulated by Parsons (1962, p. 7), who conceptualized social action within three broad systems. Among the three systems of Parsons' theory, the first two are pertinent to the present thesis.

First, the orientation of action of anyone given actor and its attendant motivational processes becomes a differentiated and integrated system. This system will be called the personality and we will define it as the organized system of the orientation and motivation of action of one individual actor.

Secondly, the action of a plurality of actors in a common situation is a process of interaction . . . this interaction also becomes differentiated and integrated and as such form a social system.

In the present thesis the conceptualization of opinion leader as a communication role can be considered as somewhat parallel to what Parsons calls the differentiated and integrated system of individual actors, whereas the patterns of homophily in dyadic communication, and the patterns of communication integration can be compared to Parsons' second system (the process of interaction and the related patterns of differentiation and integration in the social system).

Opinion Leader--A Differentiated
Communication Role

Thus, opinion leadership in the present thesis was conceptualized as a type of interpersonal influence in which certain individuals play communication roles by providing other members with information and evaluations about innovations. Individuals who perform such roles are called opinion leaders. These opinion leaders are differentiated from other actors in their social system by virtue of the communication

role that they play in the innovation diffusion process. The extent to which opinion leaders can provide effective linkage of the interpersonal structure in a social system with the external information environment, and indeed with new meaning areas, depends upon their orientation to the use of mass media and other channels. Furthermore, the extent to which opinion leaders can be influential in the diffusion of innovations in a social system depends upon their orientation to the adoption of innovations. In other words, it is expected that the degree of differentiation of opinion leader roles in a social system will influence the rate of innovation diffusion in that system. Empirical findings from the present research indicated a relatively greater degree of differentiation of opinion leader roles in a modern social system than in a traditional social system.

Homophily in Dyadic Communication and Role Interaction

While in Parsons' (1962) conceptualization of social action, the second component dealing with process of social interaction refers to a general phenomenon at the social system level, the present thesis sought to analyze, specifically from a communication point of view, the effect of communication structure in innovation diffusion at the micro level of

dyadic interaction. The dyad is the most fundamental unit of conceptualizing and analyzing the nature of communicative exchange that occurs between two individuals. As Newcomb (1958) stated, it is at the dyadic level that the nature of communicative exchange between individuals oriented to common objects in the environment, can provide the microscopic reality of how individuals' attitudes are formed or changed with respect to objects of orientation.

In the present research, communicative contacts at the dyadic level were differentiated by utilizing the concept of homophily (defined as the degree to which actors with certain designated attributes interact with others of similar attitudes). In terms of this conceptualization, low homophily in communicative contacts indicated a greater degree of differentiation between interacting individuals, whereas high homophily indicated a low degree of differentiation. Communicative exchanges which occur among members in the innovation diffusion process, can perhaps be more appropriately considered as a role interaction between innovators and late adopters, between persons more exposed to specialized communication sources and others less exposed. Role interactions (such as between innovators and later adopters) are expected to result in role alterations involving behavioral changes on the part

of actors in a social system. Such behavioral changes refer to the acceptance of innovations by actors in a social system over time. However, the nature and extent of behavioral changes among members in part depends upon the degree of homophily in communicative interaction. The empirical results of the present study indeed suggest that in instrumental communication, the degree of homophily was comparatively lower in the modern social system than in the traditional social system.

Patterns of Communication Integration
and Functional Differentiation

In his general theory of action, Parsons (1962) stated that the process of interaction becomes differentiated and integrated, and as such forms a social system. Parsons (1961) also stated that the basic element in the process of social change is one involving qualitative and structural change, producing what he called structural differentiation and the concomitant development of patterns and mechanisms which integrate the differentiated parts. Rogers (1964, p. 7) considered social change as the process by which a social system undergoes alterations in the structure and function of one or more of its components which are functionally differentiated and integrated. The approach to the conceptualization

of social change, as stated by Parsons and Rogers, implies structural differentiation, as well as integration of the differentiated parts, as key elements in the process of change in general.

In the present thesis, the effect of patterns of communication integration in the diffusion of innovations in a social system can be considered as parallel to the general theoretic notions previously stated in terms of functional differentiation and integration. Following the work of Jacobson and Seashore (1951) and Weiss and Jacobson (1955), the present study sought to analyze patterns of communication integration in terms of communication contacts among individuals, in terms of communication contacts between subgroups, and in terms of liaison persons who interrelated two or more subgroups constituting the communication structure of a social system. Furthermore, the degree of functional differentiation of these components of the communication structure was analyzed in terms of the interrelationship between the normative structure of subgroups and the degree of role specialization of liaison persons interconnecting the subgroups.

Empirical results based on statistical and structural analyses* indicated that the communication structure in the modern social system was communicatively more integrated, and functionally more differentiated with respect to role specialization of liaison persons, than in the traditional social system. The communication structure in the modern social system was like a complex web of interwoven communicative contacts among individuals and among subgroups, but more importantly among the liaison persons. The liaison persons in the modern system were more innovative, had a greater degree of mass media exposure than the subgroups of members, and regardless of social status, there was a coordinative link among the liaison persons.

In contrast the communication structure in the traditional social system not only lacked communicative integration among individuals and subgroups, but was characterized by a centralized structure in which the majority of the communication contacts originating from group members were.

*The details about the patterns of communication integration in modern and traditional social system can be examined from Figures 4 and 5, respectively, whereas Table 11 and Table 12 describe the normative structure of subgroups of members and the degree of role specialization of liaison persons in regard to the modern and tradition social systems.

directed to the highest social status members. These individuals were no more innovative and had no greater exposure to mass media than the subgroups of members.

In essence, our comparative analysis of patterns of communication integration in the modern and the traditional social system indicated two important results:

1. The modern social system was characterized by a normative consensus on innovation and change, as compared with the traditional social system, which was marked by a normative consensus on status. Indeed, the status differential that existed between the most highly chosen subgroup leaders and the subgroup members in the traditional social system brings into focus a moot question as to whether such interpersonal contacts are really informal. Perhaps, interpersonal contacts in the traditional social system were oriented to the maintenance of social relations rather than toward purposeful communication of ideas.

2. The nature and extent of innovation diffusion in a social system depends upon an effective linkage of interpersonal communication structure with the information environment external to a social system. An effective linkage of interpersonal communication structure with the outside information environment is greatly influenced by a conjunctive

condition, implying functional differentiation of the parts of internal communication structure as well as communicative integration of the differentiated parts. Results of the present research indicated that the existence of such a conjunctive condition was perhaps a more important contributing factor to the development of innovative norms and to the concomitant technological diffusion in the modern social system than in the traditional social system. This conjunctive condition can be considered as an index of the variable capacity of a social system to generate and channelize processes of innovation diffusion.

From the previous discussions it is evident that the comparative analysis of communication integration was important both theoretically and empirically in terms of bringing into focus the effect of communication structure on innovation diffusions.

As a general evaluation, it is believed that the conceptual and analytical framework of the present thesis provides a meaningful perspective for looking at the effects of communication structure on the process of innovation diffusion. The present approach outlines a systematic schema to empirically investigate elements of communication structure in terms of three categories of concepts, each category

corresponding to a different unit of analysis. Though the conceptual scheme of the present thesis specifically deals with elements of communication structure related to the diffusion of innovations, it can be meaningfully related to some of the general theoretic notions of social action and change. It is also believed that the framework outlined in the present thesis can be used to organize research findings dealing with each of the three categories of concepts. The study reported in the present thesis was primarily exploratory, but the empirical results suggest the utility and fruitfulness of the present conceptual and analytical framework in future research in comparative social systems.

Implications for Action

Results of the present research suggest that communication structure within a social system does influence the diffusion of technological changes. Students of modernization also agree that changes in social structure are a prerequisite to the acceptance of innovations and change by members in a social system. Indeed, a historical perspective of the change process which occurred in the modern community of the present investigation perhaps suggests similarity

to the three change phases suggested by Lewin (1958): unfreezing an old pattern, changing to a new one, and refreezing of a new pattern. The unfreezing of the old pattern primarily deals with restructuring the existing social relationships. The unfreezing phase is followed by a process of change in which target individuals begin to identify themselves with one or more role models in the social environment. The process of change also occurs when the target individuals confront new situations, through self-experimentation and adopt favorable attitudes to change. The refreezing phase involves internalization of new behavioral patterns by the target individuals, and maintenance in the target system of an adequate number of role models who would serve as sources of social support and reinforcement in the process of change.

Thus, the process of change suggested by Lewin also requires some sort of restructuring of existing social relationships as a precondition to change, which is a difficult goal to bring into effect. However, in light of the present thesis, the comparative analysis of communication structure of a modern and traditional social system can hopefully provide information regarding the kind of structural rearrangements which might be conducive to the adoption of technologies. Furthermore, knowledge of structural arrangements

characterizing modern and traditional communities can also serve as a basis to develop communication strategies designed to accelerate the adoption of technologies in peasant communities in India.

What suggestions do the present findings offer to administrators of change agencies responsible for the planning and implementation of programs of technological change, and to change agents who want to introduce innovations in peasant communities? Results of the present study suggest the following considerations:

1. Management of information programs. It is essential to provide innovating leaders and liaison persons with relevant messages regarding both programs of change and technological innovations. It is expected that innovating leaders who are linked with the outside information environment serve as word-of-mouth channels for the social system. The objective should be the creation and sustenance of word-of-mouth communication channels who are receptive to change.

2. Management of organized media forums.* The success of organized media forums in villages depends on the group

*The importance of organized media forums in the diffusion of innovations is reported by Mathur and Neurath (1959) and by Neurath (1962) who studied the effects of rural radio forums on knowledge and attitudes of listeners in Indian villages.

norms relating to innovation, on the nature of interrelationships among the various subgroups, and among subgroup leaders in the community. Individuals who serve as liaison roles within a social system should be active leaders in media forums, so that communication can flow through them to the various subgroups with which they are connected. An objective in the organization of media forums should be to break the centralized communication structure typical of the traditional social system of the present study.

3. Training of change agents. The role of interpersonal communication structure in the diffusion of innovations should be emphasized as part of the training of change agents. The interrelationship among individuals, communication contacts among subgroups, and the position of liaison persons in a social system are important structural factors which affect not only the change agent-client relationship, but also the degree of innovation diffusion among members in the social system. Results of comparative analysis of the communicative structure (such as the present research) can provide useful case histories dealing with the role of interpersonal communicative processes in technological change, and how to maximize its role in planned change.

4. Manipulation of interpersonal communication contacts. The role of change agent is not merely to establish contacts with individuals, subgroups, and subgroup leaders. He should rather utilize his communication contacts as a means to manipulate the establishment of contacts between subgroups and among liaison type of persons. This procedure creates what Lippit and others (1958, p. 240) call a permanent "mechanism of changeability" in a social system. The mechanism of changeability refers to the ability of a system to build into its permanent structure a mechanism for performing the functions of the change agent after the change agent terminates his activities. Such a mechanism was evident in the communication structure of the modern social system in the present thesis.

In essence, comparative social system investigations such as the present research bring to focus certain assumptions about the mechanism in which a social system can or does not change.

Needed Research

From the experience of the present study it is evident that our knowledge is too scanty to specify what kinds

of structural arrangements are conducive to the diffusion of technologies in the context of developing societies. More importantly, there is limited empirical evidence available from past diffusion research with regard to the basic problem as to what variations in communication structure from one social system to the other condition the rate of technological diffusion in these systems. The present study was designed to analyze the effects of communication structure in technological diffusion in comparative social systems.

The following research areas are suggested for future investigations.

1. The analytical approach developed in the present thesis can be usefully employed to conduct further exploratory studies in comparative social systems with sociometric data. The utility of such exploratory investigations will be to gain a better understanding of communication structures in comparative social systems with varying degrees of modernism and traditionalism in their norms.

2. The phenomenon of opinion leadership needs to be studied not only in terms of personality and behavioral attributes of opinion leaders, but also in terms of attributes perceived by group members, and in the specific situation or activity in which an individual will or will not be a leader.

3. To increase our understanding of the flow of information and influence in dyadic communication contacts, it is necessary that the concept of homophily be studied with respect to a relatively greater number of attributes of members. There is hardly any empirical evidence dealing with homophily in interpersonal communication, and one aim of future research should be to assess the determinants of homophily in dyadic communication. Research is needed to determine how certain attributes of seekers influence homophily with respect to designated attributes of seeker-sought dyads. An example of such a research problem will be to analyze how social status of seekers affects homophily with respect to innovativeness, a designated attribute of seeker-sought dyads. To improve the measure of homophily, it is suggested that sociometric choices be obtained in terms of specific criterion. For each criterion, the sociometric choices should preferably be limited to one or two, instead of multiple selection. Homophily in interpersonal communication can be fruitfully utilized in analyzing the nature of dyadic contacts between members in informal and formal organizations.

4. In order to understand the effect of communication structure on innovation diffusion, greater importance needs to be given to sociometric analyses designed to map the

patterns of communication in terms of communication within subgroups, in terms of contact patterns between subgroups and in terms of the communication linkage of liaison persons with the subgroups. It is suggested that the sociometric mapping of a communication structure might be based on saturation sampling so that each individual can be located within the networks of interpersonal contacts. It is also suggested that characteristics and behavioral attributes of liaison persons should be analyzed in order to increase our understanding about the interrelationship between the liaison person and the subgroups he links. The general purpose of such research investigations will be to map important aspects of the communication structure in comparative social systems by the use of sociometric methods. The method of structural analysis developed by Weiss and Jacobson (1955) can be usefully employed both in informal and in formal systems.

Instead of saturation sampling, it is also possible to incorporate sociometric designs within the framework of survey research methods by the use of "snowball sampling." The purpose of such research is to determine the sociometric chains of interpersonal communication which extend among individuals in a social system. Initially a selected sample of respondents are interviewed. The sampling plan then

follows out the chains of sociometric contacts in the social system. Thus, in snowball sampling the investigator has two populations: (1) one of individuals originally selected, and (2) others who are sociometrically selected by them. The incorporation of sociometric type data into survey research allows the investigator to locate each interviewed individual within the networks of voluntary relations which surround them (Coleman, 1958).

5. Field experiments, dealing with diffusion of a specific package of information about an innovation, can also be conducted in a limited number of comparable social systems. The purpose of such field experiments will be to determine the degree to which a communication structure influences the rate of diffusion in these systems. Experiments of this nature are costly because they require collection of sociometric data at two points of time. However, sociometric data gathered in field experiments can also be fruitfully used in computer simulation as a step toward prediction of innovation diffusion.

It is important here to note that there are certain methodological limitations insofar as direct relationships between some sociometric measures of interpersonal communication contacts and measures of individual behavior are concerned.

However, variations in communication structure between social systems can be fruitfully utilized in the comparative analysis of these systems with respect to some criterion variable. The present thesis suggested a perspective that can be useful in the comparative analysis of the effect of communication structure in the diffusion of innovations in informal social systems.

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