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The University of Oklahoma, Ph.D., 1974
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THE UNIVERSITY OF OKLAHOMA

GRADUATE COLLEGE

PREDICTIVE CORRELATES OF INNOVATIVENESS IN THE DIFFUSION OF A NON-TECHNOLOGICAL INNOVATION IN AN AFRICAN SETTING

A DISSERTATION

SUBMITTED TO THE GRADUATE FACULTY

in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

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CARLEY H. DODD

Norman, Oklahoma

1974

PREDICTIVE CORRELATES OF INNOVATIVENESS IN THE DIFFUSION OF A NON-TECHNOLOGICAL INNOVATION IN AN AFRICAN SETTING

APPROVED BY

DISSERTATION COMMITTEE

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DISSERTATION

PREDICTIVE CORRELATES OF INNOVATIVENESS IN THE DIFFUSION OF A NON-TECHNOLOGICAL INNOVATION IN AN AFRICAN SETTING

Considering the lack of prior diffusion research over non-technological innovations, the present study represents a field survey of the diffusion of Christianity in Ghana, West Africa. The purpose of the study was to empirically examine correlates of diffusion of membership in churches of Christ as a non-technological innovation. Four hundred twenty-two subjects were surveyed utilizing a cluster sampling procedure.

Utilizing four social variables (age, education, opinion leadership, and degree of literacy), four communication variables (social interaction, newspaper exposure, cosmopoliteness, and magazine exposure), and a social system variable (village size), the data were correlated with the one criterion variable, innovativeness. Innovativeness was defined as the degree of early or late adoption as measured by time of adoption. A multiple correlation of the nine predictor variables with the criterion variable indicates significance ($R=.411$, $p<.01$, $R^2= 16.86\%$). However, age, village size, and newspaper exposure explained almost as much variance as all

nine predictor variables (R^2= 16.11%). A partial correlation of each predictor variable with the criterion variable indicated that age and village size are uniquely and singly correlated with innovativeness (age= -.285, p<.01, village size= -.122, p<.05). The other predictor variables failed to significantly correlate with innovativeness at the .05 level.

Discovery of a non-linear relationship between village size and innovativeness (eta= .667) led to post-hoc analysis. Splitting subjects into residents of large and small villages substantially increased variance explained (24 and 28 percent respectively), using the same method of data analysis as with the total pool of subjects.

Though the adjustment of the village variable increased prediction, the author concluded that even greater prediction would result from utilization of different variables. Following a brief critique of diffusion research, suggestions were also offered for different methodologies, designs, and models for future research. Other suggestions include development of better measuring instruments and the use of computer simulation.

PREDICTIVE CORRELATES OF INNOVATIVENESS IN THE DIFFUSION OF A NON-TECHNOLOGICAL INNOVATION IN AN AFRICAN SETTING

CHAPTER I

INTRODUCTION, RATIONALE, AND HYPOTHESES

When examining the communication of new ideas and their consequences in a social system, scholars are studying a special type of communication called diffusion of innovations. Most prior research has centered around the communication or diffusion of technological innovations. That emphasis in turn highlights a sparsity of non-technological diffusion research. Rogers and Shoemaker (1971) called particular attention to this gap in diffusion literature: "Actually, most innovations studied in past research have been both technological and material." Rogers and Svenning (1969) strongly encouraged research in non-technological innovation diffusion. The terms "technological" and "material" are used synonomously throughout this discussion.

This sparsity suggested a research question concerning this study: "What variables either combined or singly are significant predictive correlates of innovativeness in the

adoption of a non-technological innovation in a cross-cultural setting?" A corollary to this research question is: "How do the results of this study compare with the results of material innovation research in terms of variance in innovativeness explained?" This second question involves some comparison with previous research findings. The data gathered for this study provided an empirical base from which to answer both research questions.

Working from the theoretical position of diffusion of innovations advocated by Rogers (1962) and by Rogers and Shoemaker (1971), the present author conducted a field survey of the diffusion and adoption of Christianity among nationals in Ghana, West Africa. The resulting data formed a largely unanalyzed data bank from which to explore relationships that might explain innovativeness in the adoption of a non-technological innovation. The data for this study come from the data bank.

Considering the scope of the research questions, this chapter is organized into a literature review followed by a section containing a rationale and a list of hypotheses for this study. The third section delineates the sampling procedures and the subjects studied. Chapter II contains the method of data analysis, Chapter III describes the results, Chapter IV discusses the results, and Chapter V contains a summary and conclusions.

Research on Predicting Innovativeness

The research perspective of the diffusion or communication of innovations has a long history. A thoroughly historical analysis of diffusion research is tangential to the purposes of this study. However, a brief mention of historical perspectives provides a logical introduction.

The study of diffusion began in the nineteenth century among anthropologists.* In the early days of anthropology, debates raged over the importance of invention compared with diffusion. However, as this area of anthropology developed its focus sharpened toward a general concern over the exchange of ideas and technologies between societies. The classic case of the steel ax introduction among the Yir Yoront in Australia (Sharp, 1953) underscored a definitive anthropological concern of the relationship of culture and social change. Applied anthropology especially bases its concern with social consequences of an innovation by analyzing cultural values of a society and the "cultural fit" of an innovation in that society (Firth, 1958; Arensburg and Niehoff, 1964). Anthropological research usually consists of participant observation in a small social system, often a village. Because of the microcosmic level of research, generalization tends to be limited.

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*In an anthropological sense, "diffusion" is the view that explains change in a society as resulting from introduction of innovations from another society. Kroeber (1937) noted that early diffusionists contributed primarily to calling importance of diffusion to the attention of the social scientists.

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The largest and most enduring tradition of diffusion research is rural sociology. As early as 1925 Wilson and others were examining the relationship of innovations adopted to their cost of diffusion (Wilson and Gallup, 1955). In the early 1940's, the classic study of diffusion and adoption of hybrid seed corn in Iowa (Ryan and Gross, 1943) influenced subsequent research. Investigators began to examine the correlates of innovativeness and the various roles of communication channels. From the numerous relationships demonstrated, explanatory generalizations emerged.

From that historical point, investigators pursued what could be called communication-related aspects of the diffusion process, as exemplified by such classic studies as Lazarsfeld, Berelson, and Gaudet (1944), Menzel and Katz (1955). Communication researchers have studied the diffusion of news events via interpersonal and by mass media channels. For instance, the study of the Dallas assassination (Greenberg, 1964) and other news event diffusion studies (Deutschmann and Danielson, 1960) stem from a communication perspective. More recently, diffusion research has focused cross-culturally. One classic cross-cultural study is Deutschmann's (1963) research analyzing mass media sources among Colombian villages. From a communication point of view Everett Rogers and the Department of Communication at Michigan State University heightened research efforts in cross-cultural diffusion. Rogers has been prolific in his research efforts. Most notable has been his attempt to

synthesize hundreds of diffusion studies from numerous academic traditions and disciplines and to work toward a theory of communication of innovations (Rogers, 1962; Rogers and Shoemaker, 1971).

A perennial question throughout the several research perspectives has centered on the problem of determining what factors abet or mitigate the relatively early or late adoption of an innovation. In other words, why do some people adopt earlier than others in their social system? The quest to answer that question has led to investigations to predict innovativeness.

Innovativeness is defined as the degree to which a person is earlier than others in his social system in adopting an innovation (Rogers and Shoemaker, 1971). Diffusion researchers usually investigate this facet of adoption behavior by testing variables that seem useful in predicting innovativeness. These variables are studied as correlates of innovativeness (Rogers and Jain, 1968). In other words, one goal of diffusion research is to predict innovativeness by explaining the maximum amount of variance in the innovative behavior of adopters (Rogers and Havens, 1962).* To maximize variance explained in field studies, social scientists realize the

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*The term "prediction" as used in this study "refers to the fact that we are using information about one variable to obtain information about another" (Runyon and Haber, 1971). The term does not necessarily imply "futurity." A strong correlation between X and Y, for instance, indicates that the presence of X "predicts" Y and the presence of Y "predicts" X.

importance of utilizing multivariate analysis techniques. Analysis in sociological research has shifted from a cause-and-effect analysis to the study of complex situations in which a number of variables are explored to determine the degree that each acts uniquely (Costner and Wager, 1965). Likewise, diffusion researchers have utilized multivariate analyses to explain innovativeness in the adoption of innovations.* Adopters of an innovation vary at the rate with which they adopt. In explaining this variation, adoption behavior has been correlated with numerous variables (Fliegel, 1956; Chattopadhyaya and Pareek, 1967).

Having briefly explored the historical base of and the nature of research to predict innovativeness, let us review findings from research efforts representative of cross-cultural communication study predicting innovativeness. Before reviewing cross-cultural research, let us quickly mention three cases of farm innovation adoption in the United States. One of these cases serves as a model for later research in

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*In past research two general methods have been used to predict human behavior. Using a clinical approach, Niehoff (1966) developed a set of variables to predict whether or not a change attempt was successful. This approach requires an intuitive assessment of factors that predict change. However, most other studies depend upon statistical methods of prediction using multivariate correlation analyses such as partial correlation, multiple correlation, and factor analysis. Multiple correlation is the most commonly used technique for predicting innovativeness (Rogers and Svenning, 1969). See also Cohen (1962), Strauss (1960), Ramsey, Polson, and Spencer (1959), Katz (1963), Menzel and Katz (1955), Marsh and Coleman (1954). It is hoped that future research will incorporate several approaches to assess diffusion efforts.

predicting innovativeness.

In a farm study in the United States, Copp (1958) reported four significant predictor variables in farm practice adoption. Gross farm income, membership in farm organizations, discerning ability, and level of living were significant predictor variables explaining 52 percent of the variance. Out of a similar concern, Rogers (1958) explained 17 percent of the variance in farm adoption behavior with three variables: attitudes toward change, social status, and communication competence.

In an earlier study of innovativeness, Fliegel (1956) found that four of six variables explained 32 percent of the variance in innovativeness. The variables were familism, information contact, level of living, and attitude toward innovations. Size of farm operation, and authority with respect to decisions on farm matters were two variables that failed to correlate significantly with innovativeness. This particular study is somewhat representative of later cross-cultural research predicting innovativeness and is therefore useful as an example of innovativeness research. Data for Fliegel's study were gathered by E.A. Wilkening in Sauk County, Wisconsin, where 170 farm owners, randomly sampled, were interviewed. Data from that survey formed an information base from which Fliegel conducted his study. The six variables were chosen for two reasons: (1) they represented research variables from previous research, and (2) the data were available as measures

of these variables. The purpose of the study was to test hypotheses of relationships while taking into account intercorrelations among predictor variables. Various indices were utilized to measure the six predictor variables. Adoption scores from eleven farm practices were used as criterion variables. Fliegel's general research hypothesis was that there are significant relationships between adoption of new farm practices and any one of the predictor variables when the effects of others are taken into account. A multiple correlation yielded a coefficient of .57 between the six predictor variables and the adoption of new farm practices. In light of 68 percent unexplained variance, Fliegel suggested other variables for future research.

Moving from studies in the United States, let us examine research efforts representative of cross-cultural communication study predicting innovativeness. In their study of modern and traditional Colombian villages Rogers and Svenning (1969) found five predictor variables that explained 34.9 percent of the variance in agricultural innovativeness in modern villages. Empathy, opinion leadership, farm size (labor units), farm size (land units), and school teacher contact constituted the five predictor variables. The two best predictor variables were empathy and opinion leadership. In traditional villages, they found that eleven predictor variables explained 66.4 percent of the variance in agricultural innovativeness. The eleven variables were magazine exposure, home innovativeness,

empathy, farm size (land units), farm size (labor units), opinion leadership, farm intensification scores, farm production, desire to increase farm size, self-perceived innovativeness, farm land cultivated, and reputation as a good farmer. Magazine exposure appeared as the best single predictor in the traditional villages. Concerning home innovations in modern villages, seven variables accounted for 53 percent of the variance: cosmopoliteness, political knowledgeability, lack of farm fragmentation, social status, self-perceived opinion leadership, functional literacy, and farm size. Similar results were found concerning home innovativeness in traditional Colombian villages where predictor variables of present debt, cosmopoliteness, empathy, formal education, farm intensification scores, farm size, and contact with federal agricultural bank explained 52.9 percent of the variance. One difficulty is that there were few universal predictor variables predicting innovativeness between the two studies. The reason is that the research dealt with two different innovations: agricultural innovations and home innovations. Their difference necessitated different predictor variables.

In another study of Colombian peasants, Paul Deutschmann and Orlando Fals-Borda (1962) found that mass media exposure, farm size, education, cosmopoliteness, awareness of innovations, and use of written farm accounts were variables that contributed up to 56.3 percent of the variance explained in innovativeness. Studying Colombian farmers, Havens (1963)

explained 47.5 percent of the variance with three variables: mass media exposure, level of living, and age. Whittenbarger and Maffei (1966) explained 44.4 percent of the variance in innovativeness with variables of information-seeking activity, knowledgeability, farm size, and attitude toward credit (Rogers and Svenning, 1969).

Among peasant farmers in India, Chattopadhyaya and Pareek (1967) used fatalism, authoritarianism, and liberalism to explain 59 percent of the variance in innovativeness. Also in India, Moulik, Hrabovsky, and Rao (1966) explained 81 percent of the variance with the variables attitude toward an innovation, knowledge of the innovation, economic motivation, innovation proneness, and contact with extension agents. However, Junghare (1962), whose research was also conducted in India, explained only 23.8 percent of the variance with six variables: change agent contact, formal participation, socioeconomic status, education, economic status, and age.

Beal and Sibley (1966) found that age, education, literacy, cosmopoliteness, source credibility and farm size explained 42 percent of the variance among Guatemalan Indian farmers (Rogers and Svenning, 1969). Other variables utilized in predicting innovativeness are sociopsychological variables, such as gross farm income, professionalism, mental flexibility, discerning ability, level of living, familism, information contact, and attitude toward innovation. Some of these variables could also be called physical variables (Fliegel, 1956;

Copp, 1958).

From the above literature survey, it is evident that numerous variables predict innovativeness. Contribution of variables depends upon (1) the geographical region under investigation, (2) the innovations studied, (3) the predictor variables selected from all possible alternatives, and (4) unique operationalizations each researcher employs. That diversity offers a certain breadth of research, but also highlights a lack of commonality of predictor variables studied. One attempt to synthesize comes from a factor analytic study. With data from Kenya, Colombia, and India, Rogers (1969) found four key factors in predicting innovativeness: (1) external communication contact, (2) orientation to change, (3) leadership status, and (4) economic resources. Ascroft and Rogers (1970) depict another categorization of core predictor variables: (1) social variables (age, education, opinion leadership, etc.); (2) communication variables (cosmopoliteness, mass media exposure, etc.); (3) economic variables (farm size, farm income, etc.); and (4) modernization variables (aspirations, fatalism, empathy, etc.). Other important variables include the change agent (Roling and Ashcroft, 1970) and social system variables (Saxena and Davis, 1970; Davis, 1968).

Rationale and Hypotheses

One of the limitations of previous studies predicting innovativeness is an overwhelming emphasis on technological innovations in general and agricultural innovations in particular.

That difficulty highlights a rationale for the present study: namely, that from a communication perspective, there is a noticeable lack of research on non-technological innovations. There are studies of news diffusion from the United States, but little research of a non-technological innovation outside the United States. Regarding this point, Rogers and Svenning (1969) wrote:

> To date, most diffusion research has concentrated on the study of technological innovations that have a material referent. . . To what extent will generalizations hold for nonmaterial innovations? We do not yet know (p. 312).

The theoretic underpinning of diffusion of innovation studies stems largely from analyses of technological change from several cultural perspectives. Only a few studies even deal with religious change from a communication perspective. Wood and Zald (1966) empirically analyzed the resistance sources to organizational policy on racial integration in the Methodist church in the United States. Niehoff and Niehoff (1966) followed the influence of religion on socioeconomic development. Taken as a whole, however, studies dealing with religious innovations generally do not offer an empirical investigation of the adoption of the innovation in a cross-cultural context. Furthermore, they lack a concentration on theoretical variables from a communication of innovations perspective.

Therefore, we are brought to the research question which opened this chapter: What variables are significant correlates predicting adoption of a religious innovation in

an African culture? Working from a diffusion paradigm and from previous literature, the purpose of the present study is to empirically examine significant correlates of innovativeness which predict adoption behavior of "Christianity" as an innovation in Ghana, West Africa. Drawing from the literature, the present study utilized four social variables* and four communication variables** as predictors of innovativeness of a non-technological innovation. A ninth predictor variable was village size, a social system variable.

Hypothesis 1. The first hypothesis is a general research hypothesis positing a significant correlation between the combined effect of the nine predictor variables and the one criterion variable of innovativeness. A second general hypothesis states that there are significant correlations between any one of the predictor variables and the criterion variable when the effects of the others are taken into account. This second general hypothesis can be broken into nine specific hypotheses, corresponding to the nine predictor variables (hypotheses 2-10 below). The results of this hypothesis testing enabled us to determine the relative predictability of each of the predictor variables.

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*The four social variables include age, education, degree of literacy, and opinion leadership.

**The four communication variables include newspaper exposure, magazine exposure, social interaction, and cosmopoliteness. Each of the nine predictor variables is discussed later as is the criterion variable.

Hypothesis 2. There is a significant correlation of social interaction with innovativeness holding the effects of the other predictor variables constant. Junghare (1962) reported that formal participation contributed significantly to explain variance in adoption of a farm innovation. As a related variable to formal participation, social interaction measures the amount of communication and integration of the individual with others in the social system. Finley (1968) noted that social participation is related to innovativeness. Therefore, social interaction as a communication variable is hypothesized as a significant variable for this study.

Hypothesis 3. Cosmopoliteness is significantly correlated with innovativeness holding the effects of the other predictor variables constant. Previous research demonstrated that earlier adopters tend to travel outside their social system more than later adopters (Ryan and Gross, 1943; Beal and Sibley, 1966; Deutschmann and Fals-Borda, 1962; Rogers and Svenning, 1969). On the basis of prior research, therefore, cosmopoliteness appears to be a significant variable to predict innovativeness in this study.

Hypothesis 4. Degree of literacy is significantly correlated with innovativeness holding the effects of the other predictor variables constant. Literacy as a variable was used in technological innovation studies by Rogers and Svenning (1969) and by Beal and Sibley (1966). Degree of literacy appeared important as a variable in non-technological diffusion

as well.

Hypothesis 5. Newspaper exposure is significantly correlated with innovativeness holding the effects of the other predictor variables constant. Rogers and Svenning (1969) demonstrated the importance of newspaper exposure as a variable. Deutschmann and Fals-Borda (1962) also examined mass media exposure as a correlate of innovativeness.

Hypothesis 6. Magazine exposure is significantly correlated with innovativeness holding the effects of the other predictor variables constant. In their study of Colombian villages, Rogers and Svenning (1969) found that magazine exposure appeared as the best single predictor of innovativeness. On the basis of this finding and other previous research using mass media exposure (see above), magazine exposure appears to be a significant predictor of innovativeness for this study.

Hypothesis 7. Age is significantly correlated with innovativeness holding the effects of the other predictor variables constant. Prior research demonstrated the importance of the age variable in predicting innovativeness (Junghare, 1962; Havens, 1963; Rogers and Shoemaker, 1971). The age variable should prove valuable in the present study also.

Hypothesis 8. Education is significantly correlated with innovativeness holding the effects of the other predictor variables constant. Prior research demonstrated the importance of the education variable (Rogers and Svenning, 1969; Junghare, 1962). The same variable should prove useful in

predicting innovativeness in this study.

Hypothesis 9. Degree of opinion leadership is significantly correlated with innovativeness holding the effects of the other predictor variables constant. Rogers and Shoemaker (1971) noted that opinion leaders are generally more innovative than non-opinion leaders. Conceptually, opinion leadership refers to those persons from whom others in a social system seek information and advice, informally. As a research variable, opinion leadership was a significant predictor by Moulik and others (1966) and by Rogers and Svenning (1969). On the basis of prior research, this variable is included in this study also.

Hypothesis 10. Village size is significantly correlated with innovativeness holding the effects of the other predictor variables constant. Previous research has indicated the importance of farm size in explaining innovativeness (Rogers and Svenning, 1969; Deutschmann and Fals-Borda, 1962; Whittenbarger and Maffei, 1966). Although prior research has not utilized village size, such a variable appears important for this study.

In all, nine predictor variables are to be correlated with innovativeness as the criterion variable to determine the maximum amount of variance that can be explained singly and in combination by the predictor variables. Eight of the predictor variables use the individual as the frame of reference (Ascroft and Rogers, 1970), and one variable is a social system

variable (Saxena and Davis, 1970). Chapter II contains the operationalizations used in collecting the data.

Method of Data Collection

The research was conducted on the basis of multi-stage cluster sampling for at least two reasons. (1) No list of individuals was available. (2) Also, since funds were limited, cluster sampling yielded a lower cost per individual element (field cost) mainly due to lower traveling costs since individual elements were located in clusters (Hirsch, 1969; Labowitz and Hagedorn, 1971).

The researcher had access to the help of eleven other people with whom he traveled to Ghana. These eleven were college students trained for interviewing. Village units containing the appropriate individual elements were assigned to the interviewers who traveled in pairs to the villages. Of seventy-two possible village units (congregations of churches of Christ), thirty-four units were chosen that represent seven of eight political units in Ghana. The thirty-four village units sampled represented 47 percent of the possible units that could have been chosen.

Total individual subjects numbered 422, being distributed according to rural and urban areas. Each subject was behaviorally defined as "baptized believer who considered himself a member of the church of Christ." As defined, individual adopters were the units of analysis for the study. Groups of adopters meeting in villages were the units for sampling

purposes.

Summary

This chapter describes the literature, rationale, and hypotheses for the research as well as a description of the method of data collection. Variables studied in the literature review are of four types: social variables, communication variables, economic variables, and modernization variables. Drawing from two of those categories, this study utilizes four social variables and four communication variables to conduct a research study investigating correlates of innovativeness of a non-technological innovation. Also, the social system variable of village size is included as a predictor variable. The uniqueness of the study lies in its investigation of a non-technological innovation. The purpose of the study is twofold: (1) to test the selected variables as predictive correlates of innovativeness, and (2) to compare those findings with research from the communication of innovations perspective dealing with technological innovation research.

CHAPTER II

METHOD OF DATA ANALYSIS

This chapter first delineates and operationalizes the nine predictor variables used to predict innovativeness in this study. The second section explains the measure used for the criterion variable. Then, the third section explains the statistical techniques applied to this research.

Predictor Variables

Nine variables were selected to explain and predict innovativeness. The variables were selected on the basis of (1) their utility in past research, and (2) probable function as to their predictive usefulness. Each individual predictor variable is listed below. An explanation is given under each variable. The operationalizations can be contextually located in the survey questionnaire in Appendix A. The nine independent variables can be classified according to the following system: (1) social variables (age, education, literacy, opinion leadership); (2) communication variables (magazine exposure, newspaper exposure, cosmopoliteness, social interaction); and (3) social system variable (size of village).

Social interaction was measured by the question "How

many times a day do you talk with neighbors?" The resulting interval level scale depicts social interaction.

Cosmopoliteness was measured by the question "Within the last year have you travelled to Kumasi or Accra?" (the two largest cities). Following each "yes" answer, subjects were asked, "How many times?" The scale values run from zero times to ninety-nine times.

Newspaper exposure was measured by frequency of reading the newspaper by asking, "How often do you read a newspaper?" The scale values ran from zero times to daily, which was a scale value of four. Other scale values are given below.

Magazine exposure was measured by the question, "How often do you read a magazine?" The scale values ranged from zero times to daily. Other scale values are 1= less than monthly, 2= monthly, 3= weekly, and 4= daily.

Literacy was determined by asking, "Do you read?" and "What language(s) do you read?" The answers to those questions form an interval level scale of number of languages read. The scale ranged from 0 to 4, zero meaning illiteracy and four meaning literacy in four languages.

Age of respondent was measured by asking the respondent for his age.

Education of respondent was measured by asking the number of years of schooling the respondent had completed. The answers ranged from zero to twenty.

Degree of opinion leadership as measured in this study is a self-perception measure, one of three commonly accepted methods of determining opinion leadership (Rogers and Shoemaker, 1971). Four questions were asked the respondent: (1) "Do most people ask you for your advice on farming?" (2) "Do most people ask you for your advice in settling disputes?" (3) "Do most people ask you for your advice on religious questions?" (4) "In general, do other people ask you for your opinion?" (This measure is similar to that asked by Lazarsfeld, Berelson, and Gaudet, 1944). For each question, a value of 0 was assigned for each non-opinion leader and 1 assigned to an opinion leader. The sum of the scores for each item yields an opinion leadership score with a range from 0 to 4. Zero indicates no degree of opinion leadership while a score of four indicates a high degree of opinion leadership.

Village size is a variable directly relevant to the social system as a unit of analysis. Each interviewer classified the village according to its population which ranged from a few hundred to 99,000 for the two cities.

Criterion Variable

The criterion variable is innovativeness, conceptually defined as the degree to which a person is early or late in adopting an innovation relative to other members of his social system (Rogers and Shoemaker, 1971). Innovativeness is measured by the year the subject adopted the innovation. A recall question formed the basis of measurement: "What year were you

baptized?" Previous research has utilized a vector measurement of distance indicated by a person's adopter category. Often, more than one innovation is studied simultaneously in which case a researcher adds the several adoption scores combining them into a single innovativeness score. However, the present study examines only one innovation as the criterion variable and employs a more direct measurement of innovativeness as the actual time when a person adopted the innovation. This measure is conceptually consistent with the notion of innovativeness. The resulting interval scale is statistically functional.

Unfortunately, no single questionnaire applies to all diffusion research. Consequently, this researcher devised a composite questionnaire incorporating the various measures of the variables. Items were chosen on the basis of (1) their theoretical and practical usefulness, (2) ease of measurement and handling, (3) previous utility in research.

One of the problems that exists in cross-cultural research is appropriate semantic and linguistic usage to convey the researcher's intentions in his questions. This problem focuses squarely on the wording of the measuring instrument. Two steps hopefully reduced the language problem. (1) This author read a number of relevant works dealing with West African culture and talked with informants before the questionnaire was finalized. (2) A second measure involved adjustment on the field. Even though English is Ghana's national language,

differences exist in language usage. Consequently, several changes were enacted. For instance, the word "billboard" was changed to "signboard" and the term "moving pictures" was changed to "cinema."

Data Analysis

The choice of data analysis procedures for this study stems from the research questions. (1) Underlying the first research question and hypotheses for this study are two more specific questions: (a) Will all predictor variables together explain a significant amount of the variance? This question can be answered by applying a multiple correlation statistic which is a statistical tool designed to produce the maximum possible correlation between a criterion variable and a weighted sum of two or more predictor variables (Ferguson, 1966; McNemar, 1969). In mathematics, the multiple correlation is as follows:

$$R_{1.\ 2\ 3\ 4\ 5\ 6\ 7\ 8\ 9\ 10}$$

where

1= the criterion variable innovativeness
2= the predictor variable social interaction
3= the predictor variable cosmopoliteness
4= the predictor variable literacy
5= the predictor variable newspaper exposure
6= the predictor variable magazine exposure
7= the predictor variable age
8= the predictor variable education
9= the predictor variable opinion leadership
10= the predictor variable village size

Nine predictor variables will be correlated together with one criterion variable. (b) The second part of the first research

question asks if there is a differential effect of each predictor variable that singly explains the unique amount of variance contributed by each variable. The statistical procedure to answer this question is the partial correlation which deals with the residual relationship between two variables when the common influence of one or more other variables has been removed (Ferguson, 1966). The partial correlations in this study are as follows:

$r_{1\ 2.\ 3\ 4\ 5\ 6\ 7\ 8\ 9\ 10}$

$r_{1\ 3.\ 2\ 4\ 5\ 6\ 7\ 8\ 9\ 10}$

$r_{1\ 4.\ 2\ 3\ 5\ 6\ 7\ 8\ 9\ 10}$

$r_{1\ 5.\ 2\ 3\ 4\ 6\ 7\ 8\ 9\ 10}$

$r_{1\ 6.\ 2\ 3\ 4\ 5\ 7\ 8\ 9\ 10}$

$r_{1\ 7.\ 2\ 3\ 4\ 5\ 6\ 8\ 9\ 10}$

$r_{1\ 8.\ 2\ 3\ 4\ 5\ 6\ 7\ 9\ 10}$

$r_{1\ 9.\ 2\ 3\ 4\ 5\ 6\ 7\ 8\ 10}$

$r_{1\ 10.\ 2\ 3\ 4\ 5\ 6\ 7\ 8\ 9}$

In this way, we can determine the unique contribution of each predictor variable with the influence of all remaining predictor variables removed. We also anticipate the possibility of rank ordering the strength of each variable's contribution on the basis of the variance explained (r^2). (2) The corollary research question for this study asks for a comparison of correlates of innovativeness between technological studies and

a non-technological study represented by this research. The coefficient of multiple determination (R^2) is the comparable index of variance explained.

Summary

This chapter explained the predictor variables and the criterion variable used in this study as well as the method of data analysis. To answer the first research question, a multiple correlation technique indicates the total amount of variance that all the predictor variables together explain. Partial correlations reveal the unique correlation of each individual predictor variable with the effects of the other variables held constant. The coefficient of determination is the comparable index with which to answer to the second research question of this study.

CHAPTER III

RESULTS OF THE STUDY

The purpose of this chapter is to present the results of the study. To facilitate reporting, relevant data is presented under a restatement of each hypothesis. However, discussion of the results is primarily reserved for the following chapter.

Of the 422 subjects sampled in the data collection, 411 were ultimately processed, since eleven subjects responded with incomplete information. This slight attrition rate is not considered significant.

Of the ten hypotheses only three were statistically confirmed. Multiple correlation and partial correlations were employed to test each hypothesis. Tables are provided for the statistical outcomes. Appendix B contains the regression prediction equations.

Hypothesis 1

> There is a significant correlation between the combined effects of the predictor variables and the one criterion variable of innovativeness.

This general hypothesis was confirmed. The multiple correlation of innovativeness with the nine predictor variables

showed a significant relationship (R= .4106, p<.01). The variance explained by these predictors is 16.86 percent (table 1). However, we should note that most of the variance explained can be attributed to three variables: age, village size, and newspaper exposure. These three variables alone account for over 16 percent of the explained variance (table 2).

The second general hypothesis stated that there are significant correlations between any one of the predictor variables and the criterion variable when the effects of the others are taken into account. This second general hypothesis is tested by nine more specific hypotheses represented below.

Hypothesis 2

> There is a significant correlation of social interaction with innovativeness holding the effects of the other predictor variables constant.

The partial correlation indicated that social interaction is not a significant variable and that the hypothesis is not confirmed ($r_{1\ 2.\ 3\ 4\ 5\ 6\ 7\ 8\ 9\ 10} = .024$). The partial correlation in this case approximates the Pearsonian zero order correlation (r= .021). Both show no statistical significance. Social interaction accounted for only .08 percent additional variance explained in the total multiple correlation (table 1).

Hypothesis 3

> Cosmopoliteness is significantly correlated with innovativeness holding the effects of the other predictor variables constant.

TABLE 1

MULTIPLE R, R^2, AND HIERARCHY OF VARIABLES ACCOUNTING FOR EXPLAINED VARIANCE#

Variable	Variance Explained (r^2)
Age	13.16%
Village Size	1.57%
Newspaper Exposure	1.38%
Opinion Leadership	.40%
Education	.22%
Social Interaction	.08%
Magazine Exposure	.01%
Cosmopoliteness	.01%
Degree of Literacy	.01%
	Total R^2= 16.86%
	R= .4106*

*p<.01
N=411

#The percent figures depicted here represent additional common variance explained by including a particular variable. For instance, village size adds 1.57 percent more common variance explained to the total multiple correlation, newspaper exposure adds 1.38 percent more, etc.

TABLE 2

COMPARISON OF TOP 3 PREDICTOR VARIABLES EXPLAINING VARIANCE WITH THE LAST 6 PREDICTOR VARIABLES[#]

Variable	Variance Explained	Variable	Variance Explained
Age	13.16%	Opinion Leadership	.40%
Village Size	1.57%	Education	.22%
Newspaper Exposure	1.38%	Social Interaction	.08%
		Magazine Exposure	.01%
		Cosmopoliteness	.01%
		Degree of Literacy	.01%
Total (R^2)	16.11%		.73%

[#]The percent figures depicted here represent additional common variance explained by including a particular variable.

The partial correlation of cosmopoliteness and innovativeness demonstrated that the data do not confirm this hypothesis ($r_{1\ 3.\ 2\ 4\ 5\ 6\ 7\ 8\ 9\ 10} = .01$). The Pearsonian zero order correlation likewise failed to demonstrate any significance ($r = .01$). In light of this finding, this hypothesis should not be accepted. Cosmopoliteness accounted for only a small amount of additional common variance explained in the multiple R (table 1).

Hypothesis 4

> Degree of literacy is significantly correlated with innovativeness holding the effects of the other predictor variables constant.

The partial correlation of degree of literacy correlated with innovativeness revealed a non-significant correlation ($r_{1\ 4.\ 2\ 3\ 5\ 6\ 7\ 8\ 9\ 10} = .01$). As an additional finding, a significant Pearsonian correlation was found ($r = .157$). Nevertheless, hypothesis 4 cannot be accepted on the basis of the evidence supplied from the non-significant partial correlation. Degree of literacy accounted for only a negligible amount of additional common variance explained by the total R (table 1).

Hypothesis 5

> Newspaper exposure is significantly correlated with innovativeness holding the effects of the other predictor variables constant.

The results of the partial correlation analysis reveal that there is no significant partial correlation between news-

paper exposure and innovativeness ($r_{1\ 5.\ 2\ 3\ 4\ 6\ 7\ 8\ 9\ 10} = .052$). An additional calculation, the Pearson r correlation, reveals a significant relationship (r= .191). However, the hypothesis is based on the partial correlation of the specified variables. On the basis of the evidence, this hypothesis cannot be accepted. Newspaper exposure explained 1.57 percent added variance and is the third strongest variable for this study in explaining variance. Predictive ability of newspaper exposure is very low as illustrated by the regression line in Appendix B.

Hypothesis 6

> Magazine exposure is significantly correlated with innovativeness holding the effects of the other predictor variables constant.

The partial correlation of magazine exposure with innovativeness reveals that there is not a significant relationship ($r_{1\ 6.\ 2\ 3\ 4\ 5\ 7\ 8\ 9\ 10} = .020$). Even though the simple Pearson r indicates a significant relationship (r= .171), this hypothesis should not be accepted because of the evidence from the partial correlation. Magazine exposure accounted for only .04 percent additional common variance explained by the multiple R (table 1).

Hypothesis 7

> Age is significantly correlated with innovativeness holding the effects of the other predictor variables constant.

The partial correlation between age and innovativeness resulted in a significant relationship ($r_{1\ 7.\ 2\ 3\ 4\ 5\ 6\ 8\ 9\ 10}$=

-.285). The simple Pearson correlation for age with innovativeness was also significant (r= -.362). Age was the strongest variable in the study, accounting for 13.16 percent of the common variance explained. On the basis of the evidence, we can accept the research hypothesis that age is significantly and uniquely correlated with innovativeness. Based on the regression equation predictive ability of the age variable is moderate to low (Appendix B).

Hypothesis 8

> Education is significantly correlated with innovativeness holding the effects of the other predictor variables constant.

The partial correlation between education and innovativeness did not indicate a significant relationship as hypothesized ($r_{1\ 8.\ 2\ 3\ 4\ 5\ 6\ 7\ 9\ 10} = .036$). However, the simple Pearson correlation was significant (r= .15). Nevertheless, we cannot accept this hypothesis since evidence does not indicate a unique correlation of education with innovativeness. Education as a predictor variable contributes only .13 percent of the added common variance explained by the multiple R (table 1).

Hypothesis 9

> Degree of opinion leadership is significantly correlated with innovativeness holding the effects of the other predictor variables constant.

The partial correlation between opinion leadership and innovativeness indicated a non-significant relationship

TABLE 3

PARTIAL CORRELATIONS AND PEARSON r's OF THE NINE PREDICTOR VARIABLES WITH INNOVATIVENESS

Variable	Partial Correlations	Simple Pearson r
Social Interaction	.024	.021
Cosmopoliteness	.010	.010
Degree of Literacy	.010	.157**
Newspaper Exposure	.052	.191**
Magazine Exposure	.020	.171**
Age	-.285**	-.362**
Education	.036	.150**
Opinion Leadership	-.075	-.091#
Village Size	-.122*	-.148**

N= 411

Significant at the .06 level. However, the alpha level assumed for this study is p<.05.

* p<.05

**p<.01

($r_{1\ 9.\ 2\ 3\ 4\ 5\ 6\ 7\ 8\ 10} = -.075$). A simple Pearson correlation was also non-significant at anything less than the .05 alpha level ($r = -.091$). On the basis of this evidence we cannot accept this hypothesis and conclude that the finding occurred by chance error. Opinion leadership accounted for .40 percent of the additional common variance explained by the multiple R (table 1).

Hypothesis 10

> Village size is significantly correlated with innovativeness holding the effects of the other predictor variables constant.

The partial correlation between village size and innovativeness indicated that there is a significant relationship ($r_{1\ 10.\ 2\ 3\ 4\ 5\ 6\ 7\ 8\ 9} = -.122$). The simple Pearson correlation is also statistically significant ($r = -.148$). Village size is the second most important variable in explaining variance for this study, although common variance added is relatively small (1.56 percent). On the basis of the evidence, we can accept this hypothesis and conclude that the relationship between village size of the respondent's village and innovativeness did not occur merely by chance. The regression equation nevertheless demonstrates that the predictive ability for village size is very low (Appendix B).

Summary

The purpose of this chapter is to present the results of the study. Of the ten hypotheses, only three were accepted.

That acceptance was based on their statistical significance. There was a significant multiple correlation of all nine predictors with innovativeness which explained almost 17 percent of the variance. However, three of the variables combined explained over 16 percent of the variance. Those variables are village size, age, and newspaper exposure. The other six variables contribute negligible amounts of explained variance. For comparison, the partial correlation and the simple Pearson zero order correlation are included in the outcome of each hypothesis tested. Also, regression equations and their graphs illustrate the relationship reported (Appendix B). The following chapter discusses these results more thoroughly and provides an interpretative framework. Also, the next chapter compares the findings from the present study with findings from material innovation research.

CHAPTER IV

DISCUSSION

Chapter I raised two research questions that formed the perimeters of this study: (1) "What variables either singly or combined are significant predictive correlates of innovativeness in the adoption of a non-technological innovation in a cross-cultural setting?" and (2) "How do the results in this study compare with the results in material innovation research?" The answer to the first research question comes from the report in the previous chapter indicating that all nine predictors act in combination to explain a statistically significant amount of variance. When the predictor variables are placed in their descending order of importance, however, it is clear that three variables account for most of the explained variance: age, village size, and newspaper exposure.* Despite the significant relationship between these predictor

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*A formula useful to determine how many predictor variables are necessary to significantly explain as much variance as all nine predictor variables is $F = \frac{(R^2 - r^2) / p - r_v}{(1 - R^2) / N - p - 1}$, where p=number of original predictor variables, r_v=number of reduced predictors, r^2=variance of reduced predictors, R^2=multiple correlation of total predictors (McNemar, 1969). Beta weights for variables are found in Appendix B.

variables and innovativeness, a comparatively large amount of variation remains unexplained (84 percent). Although three hypotheses were confirmed, their strength does not present conclusive evidence for these variables as strong predictors of innovativeness. Furthermore, the unique contribution of social interaction, cosmopoliteness, degree of literacy, magazine exposure, education, and opinion leadership to the variance in innovativeness is non-significant. In answer to the second research question, the writer concludes a low comparison with the results of previous research predicting innovativeness. Later tables in this chapter report the comparison.

Now remains the question of why only three variables demonstrated some common variation with innovativeness, and the remaining six variables showed no significant relations. Additionally, we must ask why the study yielded such a low coefficient of multiple determination in light of much higher results in previous research. We can answer both questions under the framework of intrinsic and extrinsic explanations for the results. "Intrinsic" connotes those internal factors within the research itself that influence the outcome (i.e., statistical operations, etc.). "Extrinsic" involves those external factors that influence the research results (choice of variables, etc.).

Intrinsic Explanations

By the use of intrinsic explanations we specifically are dealing with three possibilities: intercorrelations among

predictor variables, violation of correlational assumptions, and the possibility of no relationship.

The highest Pearson r of any of the predictor variables with the criterion variable is the correlation of age with innovativeness (r= -.362). By itself, this correlation explains 13 percent of the variation. The fact that the coefficient of multiple determination explains a mere additional 3 percent of the variance suggests a high intercorrelation among predictor variables. In other words, we can expect a multiple correlation to be higher with low intercorrelations among the predictor variables (McNemar, 1969). Table 4 presents data to suggest that the intercorrelations among the top three predictor variables are statistically significant but low (newspaper exposure, age, and village size). The low intercorrelations diminish the intercorrelation hypothesis as an intrinsic explanation for the research results and in fact augment the independence of these three variables.

A second intrinsic explanation is the possibility of correlational assumption violation. For instance, violation of the correlational assumption of normality can produce a significantly lower correlation particularly if skewness occurs in opposite directions between two variables (McNemar, 1969). However, recent investigations plead that violation of the normality assumption is valid unless both variable distributions are oppositely and extremely skewed (Terwilliger and Rosse, 1970). Otherwise, the correlation coefficient is

TABLE 4

PEARSON CORRELATIONAL MATRIX OF VARIABLES STUDIED

	Social Inter.	Cosmop.	Degree Liter.	Newsp. Expo.	Magaz. Expo.	Age	Educ.	Opinion Leader	Village	Innov.
Social Interaction	1.000									
Cosmopoliteness	.079	1.000								
Degree of Literacy	.074	.017	1.000							
Newspaper Exposure	.038	.021	.454**	1.000						
Magazine Exposure	.032	-.039	.351**	.766**	1.000					
Age	.060	.086	-.210**	-.212**	-.209**	1.000				
Education	.026	-.014	.581**	.484**	.409**	-.232**	1.000			
Opinion Leadership	.105*	.048	.115*	.036	.015	.105*	.123*	1.000		
Village Size	-.111*	-.217**	-.068	.076	.093	.096	.161**	-.029	1.000	
Innovativeness	.021	.009	.157**	.191**	.171**	-.362**	.151**	-.091	-.148**	1.0

*p<.05 N=411

**p<.01

sufficiently robust for non-normal distributions (Terwilliger and Rosse, 1970; Runyon and Haber, 1971). In answering research questions for this study, therefore, the robustness of the r appears to depreciate any potential problems of normality. However, another possibility concerning the violations of assumptions of the correlational model is the violation of the linearity of relationship assumption. Correlational statistics assume linear relationship and will yield a low correlation if a bivariate relationship is non-linear. Even though the r between village size and innovativeness was significant, the eta was calculated. Analysis of the eta showed that the relationship was significantly non-linear. Examination indicates that the relationship between village size and innovativeness probably follows the quadratic equation $y = ax^2 + bx + c$. Based on this knowledge, a post-hoc analysis was conducted. By splitting subjects into large and small village residents, variance explained was substantially increased (24 and 28 percent respectively). Appendix C reports this analysis. As the linearity assumption applies to the second research question in this study, we find no basis of comparison. Prior research predicting innovativeness reports little testing for non-linearity of relationship. Further research in innovation diffusion should test for non-linearity.

The third intrinsic explanation possibility is simply that no strong relationships exist between the predictor variables and the criterion variable regardless of the infallability

of other intrinsic factors. Only further testing will reveal the consistent nature of variables predicting nonmaterial innovation adoption.

Extrinsic Explanations

A second set of explanations for the data results falls under the category termed extrinsic. Specifically, we are questioning the choice of the variables (criterion and predictor), the generalizability of variables to nonmaterial diffusion research, the operationalization of variables, and the sensitivity of the diffusion perspective to explain adoption behavior.

One extrinsic explanation for the results is the possibility of the wrong choice for the criterion variable. Previous research has utilized innovativeness as a criterion variable, as did this study. However, we find a potential limitation with this criterion variable. Innovativeness measures time of adoption within a sample of adopters and by its nature excludes non-adopters. Perhaps a more significant criterion variable, then, would be adoption or non-adoption. In this case, a research question would incorporate a different focus by asking for variables that predict adoption or non-adoption of an innovation. Depending upon our future research questions, variations of adoption behavior measurement may be needed. Even if they are unique, variations in measurement may serve to increase statistical prediction. Only future research can confirm or disconfirm the use of "innovativeness" as the

criterion variable in multiple regression studies of this kind.

A second extrinsic explanation hinges around the choice of the predictor variables chosen for this study. This alternative hypothesizes that maximum prediction did not occur because there are better variables with which to predict. Our rationale assumed that characteristics associated with social variables should discriminate early adopters from late adopters. The use of communication variables assumed in part that communication source usage creates a broad information base by which a person makes a decision to adopt an innovation or by which a "climate of change" occurs whereby sensitivity toward change is heightened. Nevertheless, it would be erroneous to assume that only these variables contribute to an explanation of adoption behavior. Several categories of other variables should be included for optimum explanation of variance. Socio-psychological variables could include such notions as fatalism, familism, attitude toward innovations, and attitude toward change. These variables serve as potential indicators of attitudes and values that predict behavioral change. Socio-economic variables such as social status, social mobility, level of living, and annual income also are potential predictors of individual change. Personality variables may likewise discriminate certain psychological dispositions that in turn correlate with personal predisposition for change; e.g., dogmatism, empathy, and achievement motivation are personality variables

that were previously studied in diffusion research (Rogers and Shoemaker, 1971). Other communication variables appear useful in predicting innovativeness such as change agent contact, change agent message encoding behavior, knowledge of the innovation, exposure to interpersonal channels, and attitude toward mass media. An additional set of variables of potential worth would be cultural factors such as traditionalism-modernization dimensions, cultural values, and religious world view. A reasonable speculation is that attitude toward animistic beliefs, for instance, would predict the acceptance of a religious innovation. Other variables could be listed as well (Havelock, 1973). Therefore, one may speculate that the inclusion of a different set of predictor variables may in fact yield higher statistical prediction.

A corollary consideration of the possible problem associated with the wrong choice of predictor variables is that whatever variables predict technological change simply do not apply to nonmaterial adoption. The comparison of the present study with results from previous research indicates inappropriateness of the nine predictors chosen for this study (table 5). Specific comparison of variables from previous research with variables utilized in this study also reveals no consistent comparison across all the studies listed (table 6). These comparisons lead us to conclude that the generalizability of predictor variables from technological diffusion studies to non-technological diffusion research is inappropriate.

TABLE 5

HIERARCHY OF VARIANCE EXPLAINED (R^2) IN PREVIOUS RESEARCH

Investigator	Location	Variance Explained	Number of Predictors	Predictors Common to the Present Study
Moulik and others (1966)	India	81.0%	5	none
Rogers and Svenning (1969)	Colombia (traditional)	66.4%	11	opinion leadership magazine exposure
Chattopadhyaya and Parcek (1967)	India	59.0%	3	none
Deutschmann and Fals Borda (1962)	Colombia	56.3%	6	mass media exposure education cosmopoliteness
Rogers and Svenning (1969)	Colombia (modern)	53.0%	7	cosmopoliteness opinion leadership literacy
Rogers and Svenning (1969)	Colombia (traditional)	52.9%	7	cosmopoliteness education
Copp (1958)	United States	52.0%	4	none
Havens (1963)	Colombia	47.5%	3	mass media exposure age
Whittenbarger and Maffei (1966)	Colombia	44.4%	4	none
Beal and Sibley (1966)	Guatemalan Indians	42.0%	6	age education literacy cosmopoliteness

TABLE 5 (continued)

Investigator	Location	Variance Explained	Number of Predictors	Predictors Common to the Present Study
Rogers and Svenning (1969)	Colombia (modern)	34.0%	5	opinion leadership
Fliegel (1950)	United States	32.0%	6	none
Junghare (1962)	India	23.8%	6	formal participation education age
Rogers (1958)	United States	17.0%	3	none

TABLE 6

COMPARISON OF PREDICTOR VARIABLES COMMON TO PREVIOUS RESEARCH

Investigators	SI	Cosm	Lit	News	Mag	Age	Educ	OL	VS	Number Common	Common R^2
This study	.08	.01	.01	1.38	.01	13.1	.22	.4	1.5		16.84
Moulik & others (1966)										none	
Rogers & Svenning (1969)					20.3			7.2		2	27.5
Chattopadhyaya & Pareek (1967)										none	
Deutschmann & Fals-Borda (1962)	(specific figures unavailable)									3	
Rogers & Svenning (1969) (modern-home)		21.9	5.2					6.6		3	33.7
Rogers & Svenning (1969) (tradition-home)		14.1					9.3			2	23.4
Copp (1958)										none	
Havens and Flinn (1970)						3.5	3.2			2	6.7
Whittenbarger & Maffei (1966)										none	
Beal & Sibley (1966)	(specific figures unavailable)									4	
Rogers & Svenning (1969) (modern-agric.)								8.2		1	
Fliegel (1956)										none	
Junghare (1962)	(specific figures unavailable)									3	
Rogers (1958)										none	

*Figures are reported in terms of the percentage of the variance explained.

A third extrinsic explanation concerns operationalization of conceptual variables. To consider this alternative assumes quality of conceptual choice of the variables but inadequacy of their operationalizations. Do the operational indices in fact measure what they are intended to measure? In the absence of validity measures, we cannot definitely answer.* Because of cultural and linguistic differences among research efforts, investigators often resort to "conceptual equivalence" of a variable operationalization. However, conceptual equivalence does not insure standard operationalizations of the concepts. Consequently, one problem of comparing research results lies in the variety of operationalizations for the same variable across various research reports. At the same time, correlations may be low because of the operationalization and its potential for imprecise measurement. Unfortunately, in the absence of reliability and validity measures, we can only depend upon future research to deal with this problem.

Finally, another extrinsic explanation for the data results of this study stems from a critical analysis of the diffusion perspective. An examination of the theoretical and methodological approach embraced in the present research reveals

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*There is a noticeable gap in cross-cultural research of validity measurements between conceptualization and operationalization (Guilford, 1954; Williams, 1968). One exception is the opinion leadership scale (self-designating type) which correlates highly with judges' rating of opinion leaders and sociometric choice scales (Rogers, 1962; Rogers and Svenning, 1969).

some weaknesses of the approach. Since this study typifies much diffusion research, the shortcomings mentioned indict diffusion research as a whole.

First, the data often depend upon subject recall. Time may distort the individual's recollection of details and facts. However, that recollection seems to be a function of salience of the innovation, of elapsed time, and of recall ability. Observation indicates that for this data, the adoption of a religious innovation was salient. Consequently, the details surrounding that decision tended to be remembered. For instance, interviewers were surprised when respondents recalled the exact day, month, and year of baptism. However, we have no other evidence upon which to evaluate accuracy of other recall questions.

A second drawback to the espoused methodological approach is the emphasis on the individual as the unit of analysis. Certainly the individual has characteristics that lend themselves to correlational analysis with adoption behavior. No doubt communication networks and channels play a role in the dissemination and transmission of information that leads to adoption. However, one must not overlook intervening systems variables. For instance, village norms or taboos may be intervening variables retarding information-processing. Respect for opinion leaders may depend on village norms toward education, age, and travel experience. We should emphasize that an entire series of possible intervening social system

variables have been excluded from this study that in fact may be better predictors. This study emphasizes the individual as the unit of analysis to the exclusion of dyadic and group relations. One might expect that diffusion occurs through interpersonal "branches" and that these networks or chains predict adoption better than an individual's social characteristics or his communication sources. Frequently, we study social and communication variables in isolation from knowledge of contiguous social relationships. A type of chain analysis in future research could be helpful.

Third, because of the organismic variables in this study and because no manipulation has occurred, no cause-and-effect generalizations emerge from the data. Although the multiple correlation approach helps ferret out intervening variables, only future research can determine more precisely the cause-and-effect relationships. In connection with the correlational nature of this study, we should underscore a difficulty with correlations. A statistically significant correlation may be so low as to be almost meaningless. With a large number of subjects, even very low correlations can be significant. Since trends, patterns, and eventually generalizations emerge from such correlations, one should cautiously examine the strength of relationships.

Another difficulty concerns generalizability or external validity (Kiesler, Collins, and Miller, 1968). Despite a careful delineation on the basis of an emic behavioral

operationalization, the sample may be too narrow from which to generalize as the diffusion of a non-technological innovation. The question becomes how typical is the adoption process in becoming a member of the Church of Christ compared with adoption of any other religious innovation or ideology? In a larger sense, this diffusion research is comparable to a case study limited to a particular innovation, in a particular locale, studying particular variables, at a particular time.

A further difficulty is that the diffusion process of the innovation study was probably incomplete at the time the research was gathered. Only twelve years had elapsed since the introduction of this particular innovation. Since time constitutes an important element in diffusion research, perhaps a more complete "incubation" period is necessary for a broader perspective. This problem of incomplete diffusion at the time of measurement is a problem for diffusion research in general (Rogers and Shoemaker, 1971).

Still another problem focuses on the survey technique itself. Translation problems in cross-cultural communication research leads one to question an instrument written by researchers from a Western perspective used in an exotic culture. Since English is Ghana's national language the problem was somewhat reduced. Nevertheless, linguistic equivalence even among English speakers is difficult. Even though we initiated precaution to reduce this problem, it doubtless persisted. Secondly, in cases that necessitated translation from the

English questionnaire to Twi, the author has question about linguistic equivalence. An additional problem inherent to survey research is that of "breadth but no depth." Numerous respondents participated in the data collection. However, interviews were consistent in not following information leads and probing further. Without probing, the research becomes vulnerable to loss of potential relationships and information. Social research does not always combine open-ended questions with closed questions, a fact contributing to potential information loss. Finally, the problem of response bias typically becomes a difficulty in the internal validity of the data. This problem especially emerges in the use of cluster sampling. From all available evidence in the data bank used for this study, an overall response bias did not occur among the total population. There is no evidence, however, to confirm or disconfirm existence of response bias among subjects living in the same village.

Additionally, the present study is typical of most diffusion research in its measurement of adoption behavior after-the-fact. The problem is common to any social scientific research studying a phenomenon without a comparative experimental base in an after-only design. In this sense, diffusion research on innovativeness becomes "post-dictive." Little research has examined predictive validity. Future research should incorporate a comparative base of non-adopters with adopters. Then a field experiment could test relationships

in a before-after design.

Before the question of theoretical insensitivity can be resolved, further research of non-technological innovations must be conducted. The difficulties mentioned above eventually may precipitate rejecting the diffusion theoretical perspective. However, these problems as yet appear surmountable in future research efforts. Until more research concerning non-technological innovation occurs, evidence precludes discarding the diffusion framework.

Summary

This chapter discussed the results of the study and the answers to the two research questions in light of intrinsic and extrinsic explanations. For the first research question, we conclude that two of the three intrinsic explanations account for the low correlations. Violation of the correlational assumption of linearity was a factor for village size, since village size is related non-linearly with innovativeness. A second feasible and more obvious intrinsic alternative is that no strong relationships exist. There appears to be one major extrinsic explanation for the results from the first research question: the wrong variables were chosen to explain a large amount of the variance. In light of that explanation other variables were suggested for future research. Corollary to that conclusion is that wholesale application of variables from technological innovation research to non-technological innovation research is inappropriate. Other intrinsic and

extrinsic explanations were raised, but evidence under those categories is too inconclusive for further generalization.

The second research question led to demonstration of an overall low comparison between this study and previous research in terms of variance explained. One intrinsic explanation for the low comparison lies in the non-linear relationship between village size and innovativeness. When the non-linear correlation is taken into account, the variance explained increases up to 12 percent (Appendix C). Considering extrinsic explanations, we conclude that the wrong choice of predictor variables accounts for the low comparison. Inclusion of variables more highly correlated with innovativeness probably would have yielded a higher coefficient of multiple determination with which to compare. Although other intrinsic and extrinsic factors were advanced, insufficient evidence precludes their inclusion as significant explanations.

CHAPTER V

SUMMARY AND CONCLUSIONS

The research questions for this study were twofold. First, we asked what combination of variables significantly predict innovativeness in the adoption of a non-technological innovation diffused cross-culturally. Using multiple and partial correlation techniques among nine predictor variables and one criterion variable (innovativeness), we discovered that age, village size, and newspaper exposure are three significant variables that act in combination to significantly predict innovative adoption behavior. In connection with their combined effect, we also found that age and village size were significant predictors individually and uniquely. Our second research question then asked how the results answering the first research question compared with results from technological innovation research. Based on the amount of variance explained, the results are comparatively low. One probable reason is that variables applied from technological innovation diffusion research to non-technological innovation research do not sufficiently characterize the process of ideological diffusion. A battery of other variables was suggested by which we can analyze and predict innovativeness. The results from

both research questions were discussed in light of intrinsic and extrinsic explanations. For instance, in light of a large amount of unexplained variance, we also considered the possibility of theoretical and methodological insensitivity. Although the research highlighted weakness in the study and in diffusion research as a whole, further evidence is needed to render final judgment. At this time it appears that the theory is not so much at fault as is the choice of variables.

On the strength of the relationships determined from the analysis, the researcher concluded two basic propositions. One is that age is a significant variable to predict innovativeness. The negative correlation indicates, specifically, that the older a person is the likelier his early adoption in relation to others from that population. This finding should add to our knowledge of the theoretical relationship between age and innovativeness, since prior theoretical findings are based on technological innovations research. A second conclusion is that village size is a significant variable in predicting innovativeness. The non-linear relationship indicates that the respondents in the smallest and in the largest villages tended to adopt earliest. Village size is a unique conceptual variable. Its significant correlation with innovativeness should add to the literature by virtue of its uniqueness.

In general, the study uniquely demonstrated the possibility of testing and comparing theoretical hypotheses from

technological innovation research with non-technological innovation research. One of the strengths of diffusion-oriented theory lies in its ability to be tested. In this sense, the paradigm provides a "testing ground" for cross-cultural communication hypotheses.

The present study encouraged the researcher to explore possibilities for future research that could greatly add to our knowledge of communication in other cultures. The remainder of this chapter contains some of those intuitive explorations.

As suggested earlier in this study future research predicting innovativeness should consider a battery of variables potentially related to innovativeness. Factor analysis would prove useful to arrange unidimensional scales. In this way, we would be assured that variables not overlap. Suggested categories of variables should include interpersonal communication variables, mass media variables, economic variables, social variables, psychological variables, and systems variables. Another category consideration centers on cultural values and world view. Very little attention has been paid to world view as an antecedent condition for adoption from a diffusion perspective. In many cases, recognition of our need to use different variables stems from the fact that diffusion research tends to concentrate on the same variables in every research project. We often study the same variables that investigators tested thirty-five years ago, resulting in little

more than confirmation or disconfirmation of hypotheses. Testing different variables in varied ways would prove invaluable toward providing new and better generalizations.

In addition to diffe: nt variables, future researchers should utilize different methodologies. In the first place, field experimentation could be coupled with survey research to determine cause-and-effect relationships. Instead of after-only designs, we need designs that employ before-after measures. Typically, scientific methodology demands quantitative measures. To these quantitative measures, however, we should also add a combination of other research techniques such as (1) participant observation, (2) panel studies, (3) in-depth probes using case studies of adopters, non-adopters, and/or other informants. The case study subjects could be drawn randomly from the population or from the sample. The consequent in-depth interviewing allows flexibility.

Future research should also be concerned with standardization of measurement instruments and operationalizations of conceptual notions. Such an endeavor would eventually promote building validity and reliability measures. Lack of standardization results in difficulty with theory testing.

Another suggestion for future research concerns computer simulation. Limited work in computer simulation is underway, but much more resource needs to be exerted. Basically, the technique uses computer technology to anticipate diffusion outcomes on the basis of data conditions. For

diffusion application two areas of computer simulation seem promising. (1) Computer simulation allows a testing of prediction equations. (2) The technique could serve change agents in their practical anticipation of possible outcomes. Eventually, an "innovativeness anticipation" scale could be devised to help change agents in their decision-making.

Finally, future research would be enhanced by experimentation with different models of communication. Diffusion research usually bases its framework upon a linear model of communication. Its consequent methodologies for testing variables employ linear assumptions. However, as a part of the present research has demonstrated, at least one variable is non-linearly related to the criterion variable. Future research methodology should consider testing hypotheses with additional testing for non-linearity. Going beyond methodology, an entirely new model of communication could be utilized for diffusion. It is possible to develop spirical or otherwise multidimensional models from which to test generalizations and to build hypotheses toward a theory of diffusion. The geometrical theoretical relationships suggested by Kurt Lewin's field theory, for instance, offer some thought-provoking material. In our desire for adequate predictive model development, we must not overlook value in present models, for they stand as touchstones that deserve continued testing and ultimate expansion. Yet as we test, we should also strive to develop new models by which to discover knowledge. Hopefully,

that knowledge will be used for the betterment of man's communication milieu.

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APPENDIX A

QUESTIONNAIRE USED FOR THE PROJECT DATA BANK

Respondent's Name _____ Population _____
Telephone Access _____
Telegraph _____
Access to Ham Radio _____

QUESTION	RESPONSE
1. What year did you first learn about the churches of Christ?	1. _____(year)
2. Where did you first see or hear about the churches of Christ?	2. _____ _____ your village outside village
3. From whom did you first see or hear about the church of Christ?	3. List Name _____
4. After you first became aware of the churches of Christ, did you seek any additional information about the church or its beliefs?	4. ____yes ____no
a. If yes, from whom?	a. (1) person _____(name) (a) friend _____ (b) relative _____ (c) other _____ (2) If from a person then what was his occupation at that time? merchant__ tradesman__ wife-mother__ farmer__ professional__ other__ (3) If a person, then list age___ education_____ other____
b. If yes, what year/month?	b. _____(year,month)
5. Did you talk with anyone about your decision to be baptized?	5. ____yes ____no
a. with whom?	a. family___ Christian friend___ non-Christian friend____
b. Where did he/she/they live?	b. village__ outside village__
c. What year/month?	c. _____(year,month)
6. Did you have Christian friends (members of churches of Christ) before you became a Christian?	6. ____yes ____no
7. What year were you baptized?	7. _____(year)
a. Baptized by whom?	a. _____(name)
b. What was his occupation?	merchant___ tradesman____ wife-mother___ farmer____ professional___ other___
c. His age?	c. ____(age)
d. His education level?	d. _____(education)
8. Have you ever quit participation in church?	8. ____yes ____no
9. How many times a day do you talk with neighbors?	9. _____(number)
10. Do you belong to any other groups besides Church?	10. educational___ social___ occupational___ other___
11. Within the last six months have you travelled outside your village/compound?	11. ____ ____ _____ yes no how many times
12. Within the last six months have you travelled outside your province/clan/region?	12. ____ ____ _____ yes no how many times
13. Within the last year have you travelled to Kamasi or Accra?	13. ____ ____ _____ yes no how many times
14. Do you own a radio?	14. ____ ____ _____ yes no how many times

15.	Do you have access to a telephone?	15. ____yes ____no ____na
16.	Do you have access to a telegraph?	16. ____yes ____no ____na
17.	Do you have access to a ham radio?	17. ____yes ____no ____na
18.	Do you have access to a television?	18. ____yes ____no ____na
19.	How many kilometers have you ever been from home?	19. _____(number)
20.	Do you listen to someone else's radio?	20. ____yes ____no ____na
21.	Do you read?	21. ____yes ____no ____na
22.	What languages do you read?	22. ___English ___Efik ___Other
23.	Place the following reading materials in order of their importance to you (from most to least, 1-4).	23. rank order: item frequency books ____ _____ newspaper ____ _____ magazine ____ _____ billboards ____ _____ (other) ____ _____ daily d weekly w monthly m other o
24.	Have you seen any moving picture films in the last year?	24. ____yes ____no ____na
25.	Do you farm today as you did five years ago?	25. ____yes ____no ____na
26.	Do you agree with most people in your village?	26. ____yes ____no ____na
27.	Do you disagree with most people in your village?	27. ____yes ____no ____na
28.	Do you like most people in your village?	28. ____yes ____no ____na
29.	Do you dislike most people in your village?	29. ____yes ____no ____na
30.	Are most of your friends now in the Church?	30. ____yes ____no ____na
31.	How many members are in your immediate household?	31. _____(number)
32.	How many in your household are members of the Church of Christ?	32. _____(number)
33.	Your age?	33. _____(age)
34.	Your occupation?	34. merchant ___ farmer___ professional ___ other___
35.	Your educational level? (number of school years completed)	35. _____(number)
36.	To whom would you go for information about farming/crops?	36. _____(name)
	a. What's his/her relationship to you?	a. friend___ relative___ other___
	b. Does this person live in your village/compound?	b. ____yes ____no ____dk
	c. Is this person a member of your church?	c. ____yes ____no ____dk
37.	To whom would you go for help in settling a dispute?	37. _____(name)
	a. What's his relationship to you?	a. friend___ relative___ other___
	b. Does this person live in your village/compound?	b. ____yes ____no ____dk
	c. Is this person a member of your church?	c. ____yes ____no ____dk
38.	To whom would you go for religious information?	38. _____(name)
	a. What's his/her relationship to you?	a. friend___relative___ other___
	b. Does this person live in your village/compound?	b. ____yes ____no ____dk
	c. Is this person a member of your church?	c. ____yes ____no ____dk
39.	Do most people ask you for your advice on farming?	39. ____yes ____no ____na
40.	Do most people ask you for your advice on disputes.	40. ____yes ____no ____na
41.	Do most people ask you for your advice on religious questions?	41. ____yes ____no ____na
42.	In general, do other people (such as neighbors, friends etc.) ask you for your opinion?	42. ____yes ____no ____dk
43.	Are there printing facilities in this village?	43. ____yes ____no ____dk
44.	Is there a community billboard?	44. ____yes ____no ____dk

APPENDIX B

PREDICTION EQUATIONS FOR THE TEN HYPOTHESES PREDICTING INNOVATIVENESS

ILLUSTRATION 1

REGRESSION EQUATION FOR ALL NINE VARIABLES PREDICTING INNOVATIVENESS

$R = .411$ $R^2 = 16.86\%$

$$Y = .005X_1 + .002X_2 + .032X_3 + .129X_4 + .043X_5 - .074X_6 + .03X_7 - .17X_8 - .008X_9 + 11.825$$

ILLUSTRATION 2

REGRESSION LINE FOR SOCIAL INTERACTION
PREDICTING INNOVATIVENESS

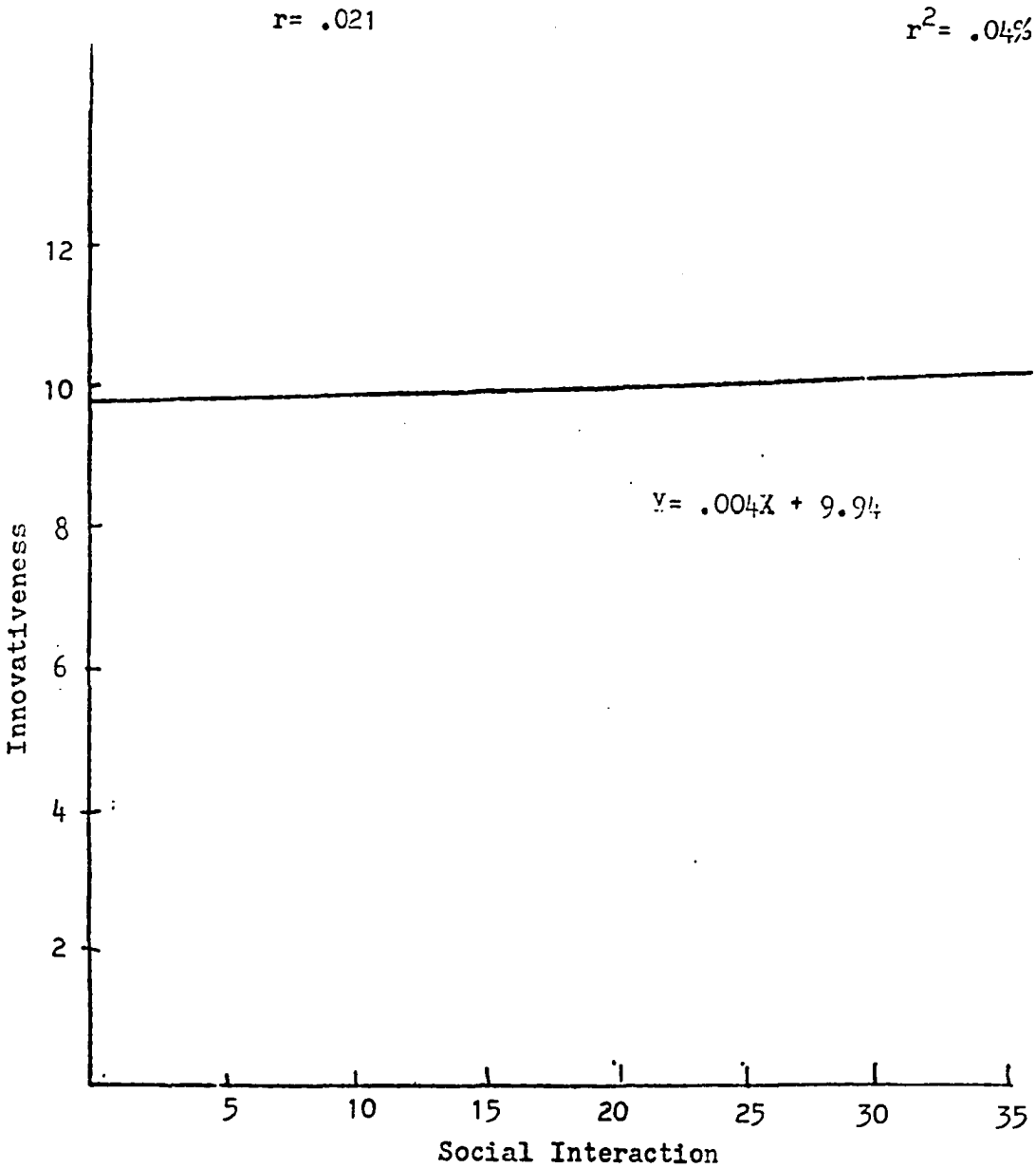


ILLUSTRATION 3

REGRESSION LINE FOR COSMOPOLITENESS
PREDICTING INNOVATIVENESS

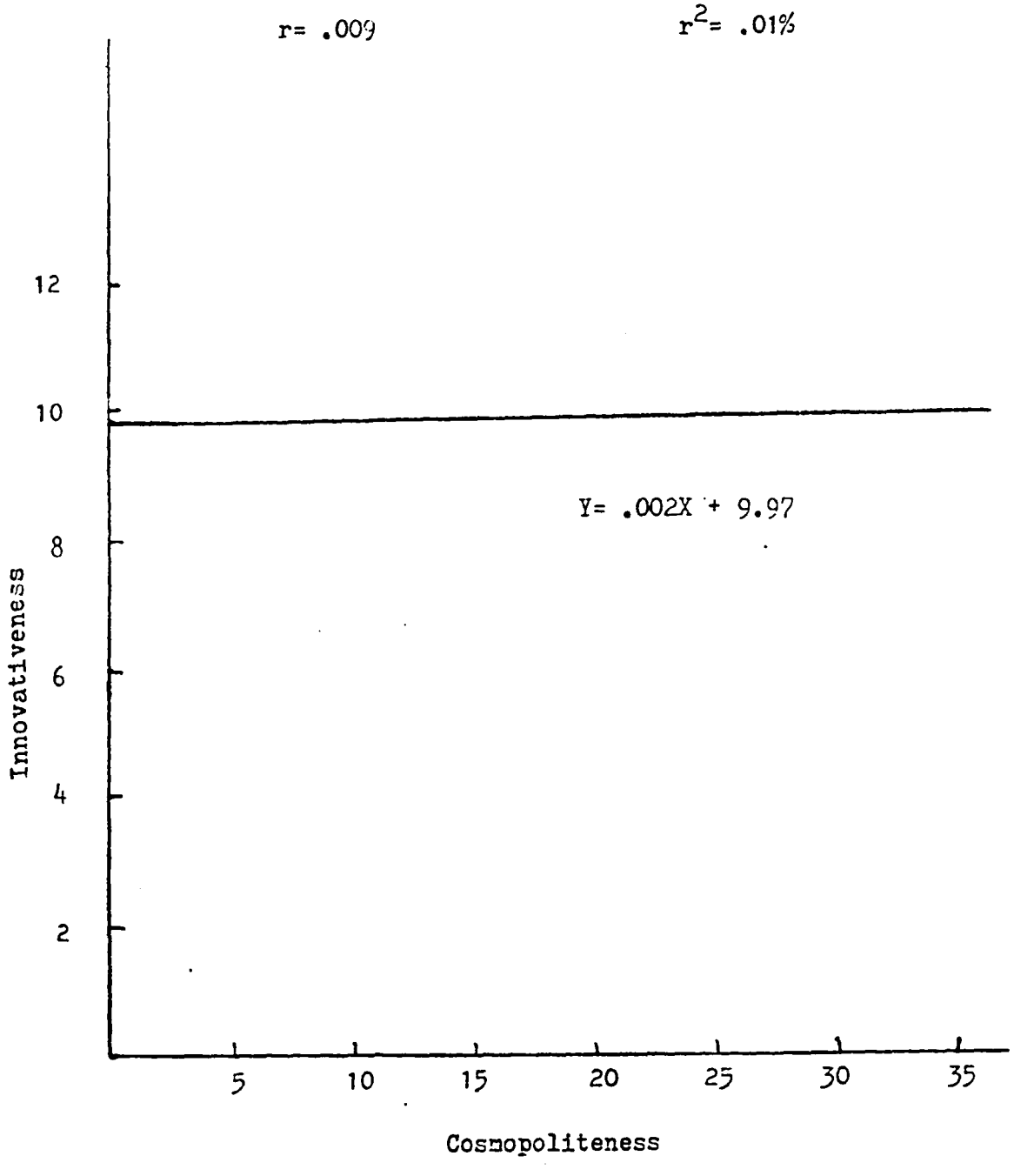


ILLUSTRATION 4

REGRESSION LINE FOR DEGREE OF LITERACY PREDICTING INNOVATIVENESS

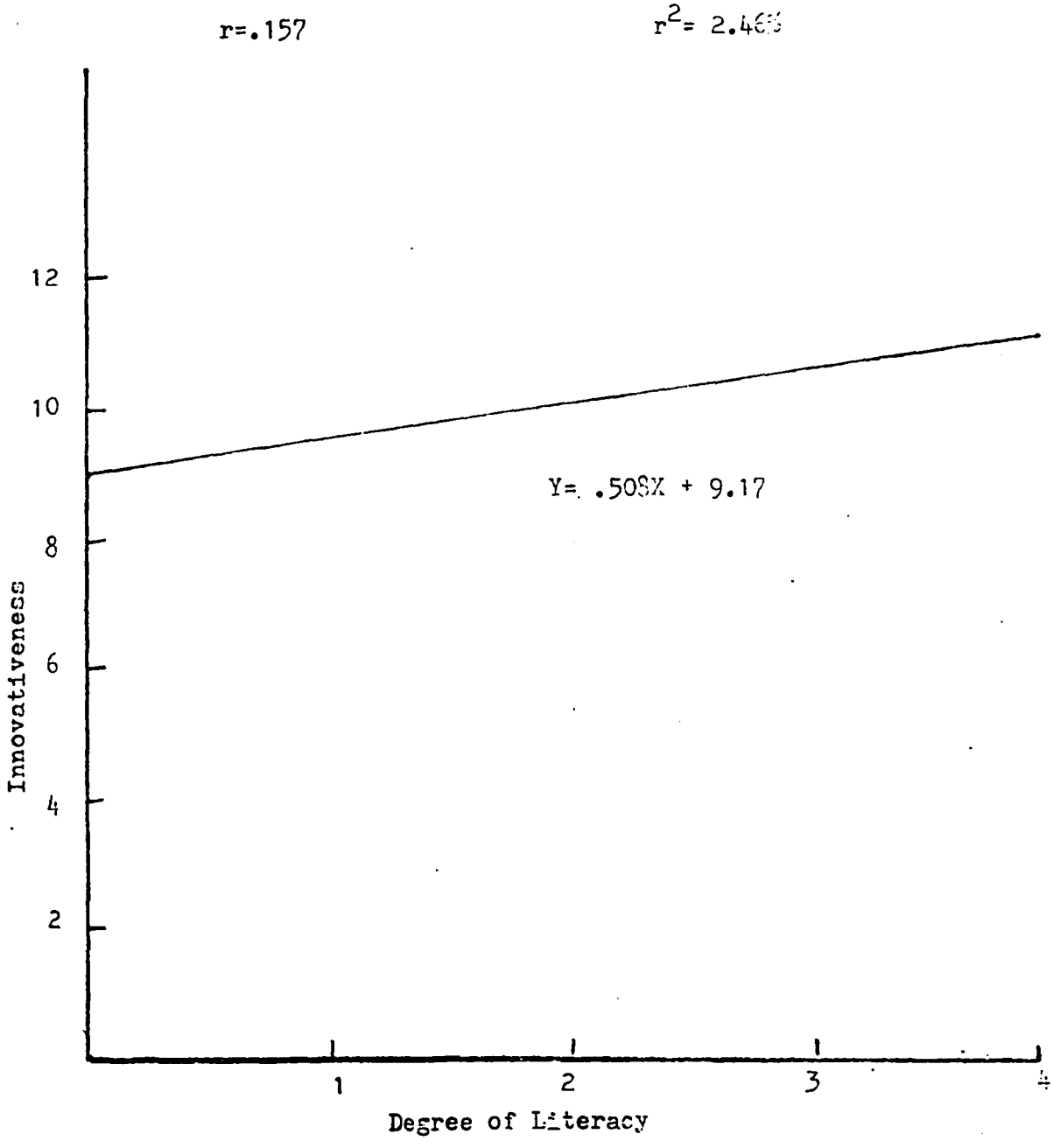


ILLUSTRATION 5

REGRESSION LINE FOR NEWSPAPER EXPOSURE
PREDICTING INNOVATIVENESS

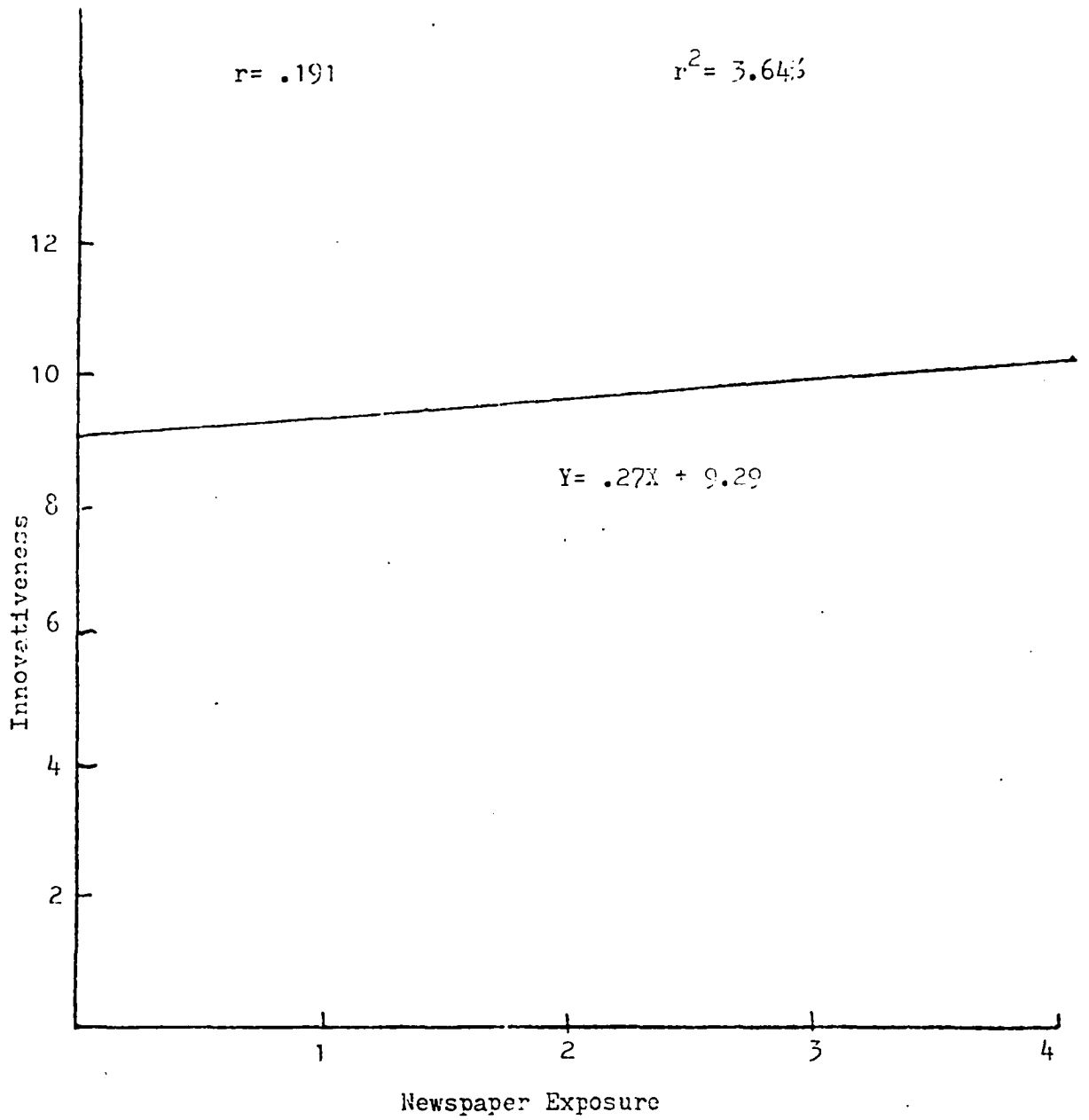


ILLUSTRATION 6

REGRESSION LINE FOR MAGAZINE EXPOSURE
PREDICTING INNOVATIVENESS

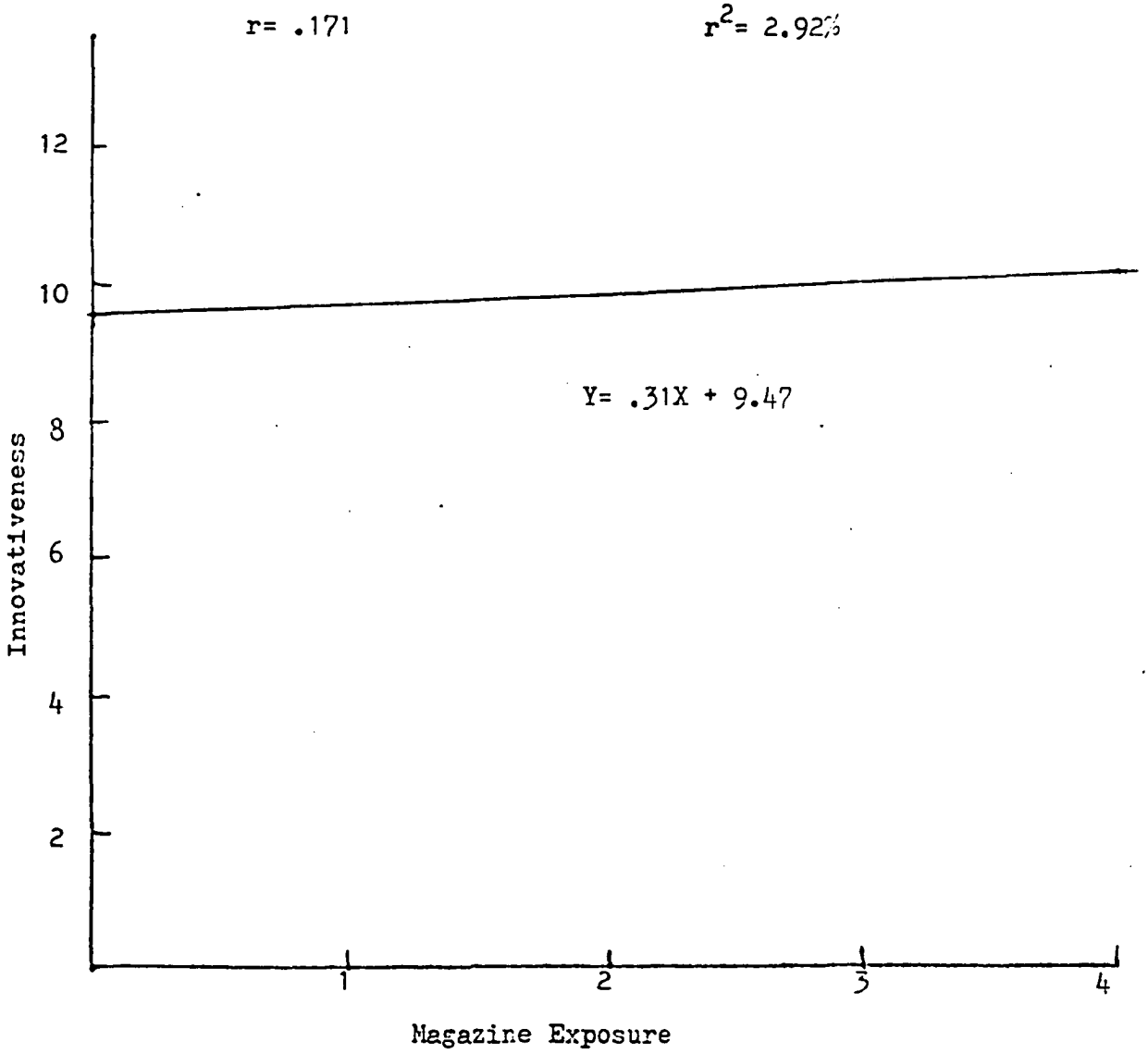


ILLUSTRATION 7

REGRESSION LINE FOR AGE
PREDICTING INNOVATIVENESS

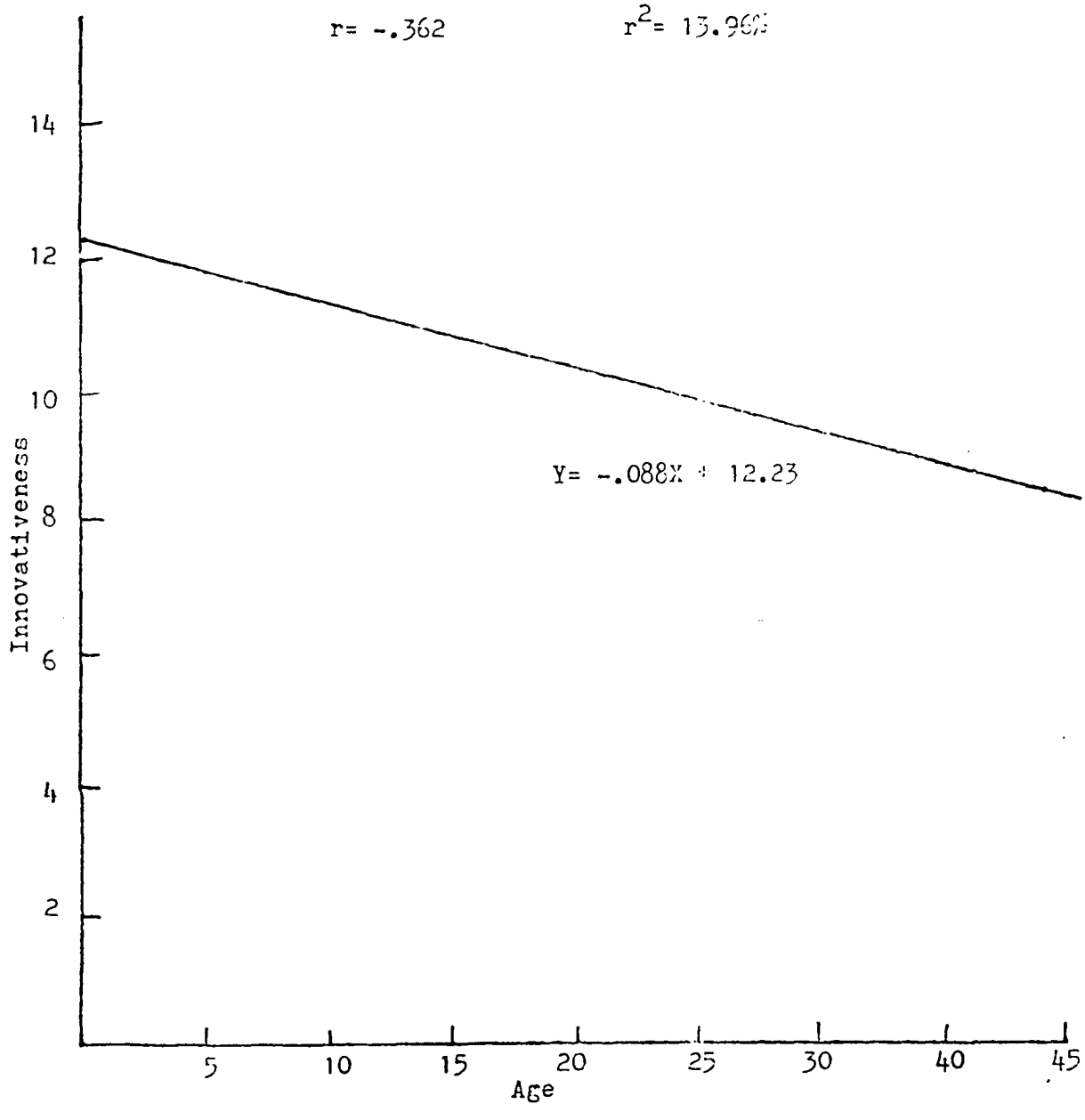


ILLUSTRATION 8

REGRESSION LINE FOR EDUCATION
PREDICTING INNOVATIVENESS

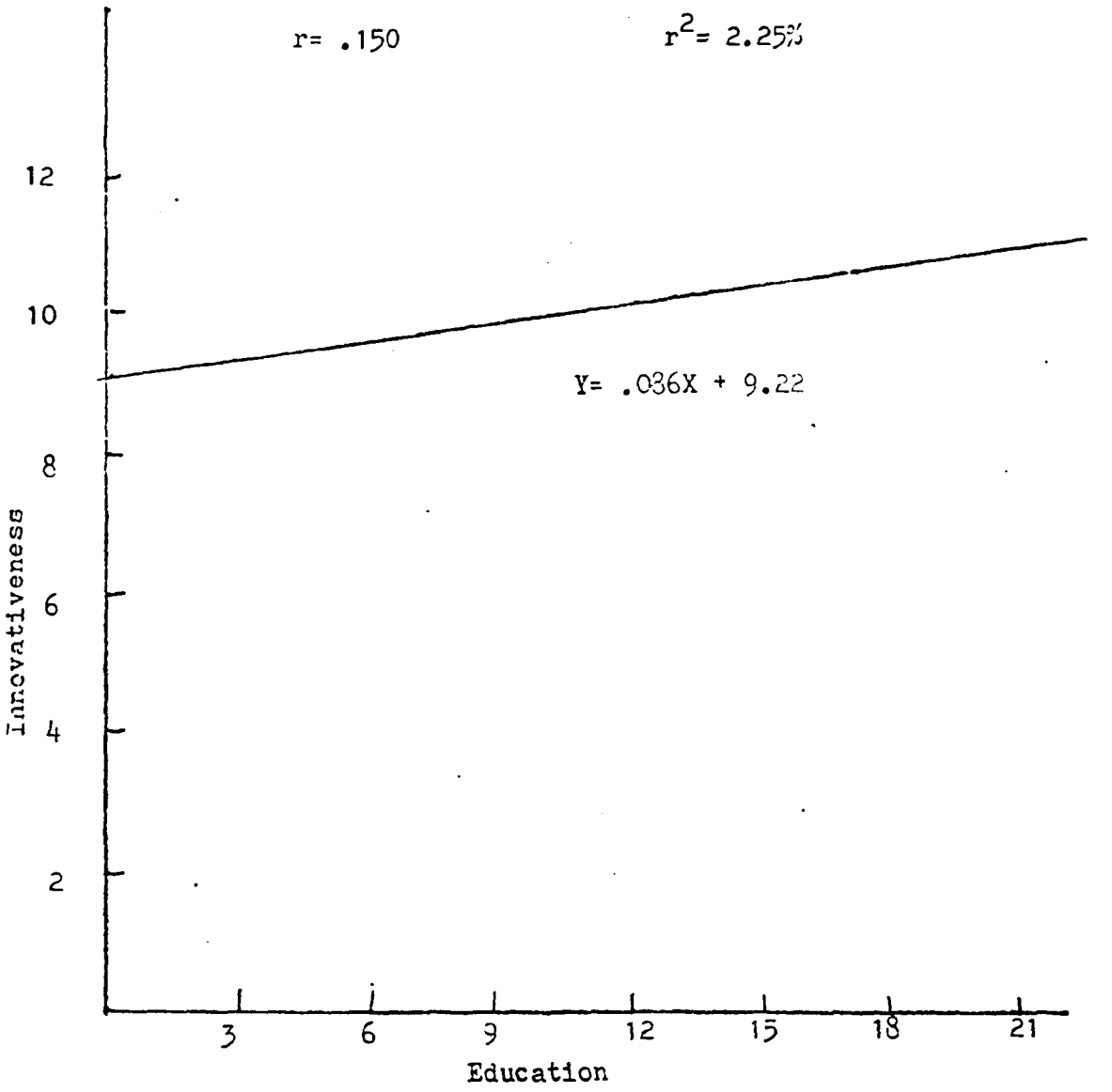


ILLUSTRATION 9

REGRESSION LINE FOR OPINION LEADERSHIP
PREDICTING INNOVATIVENESS

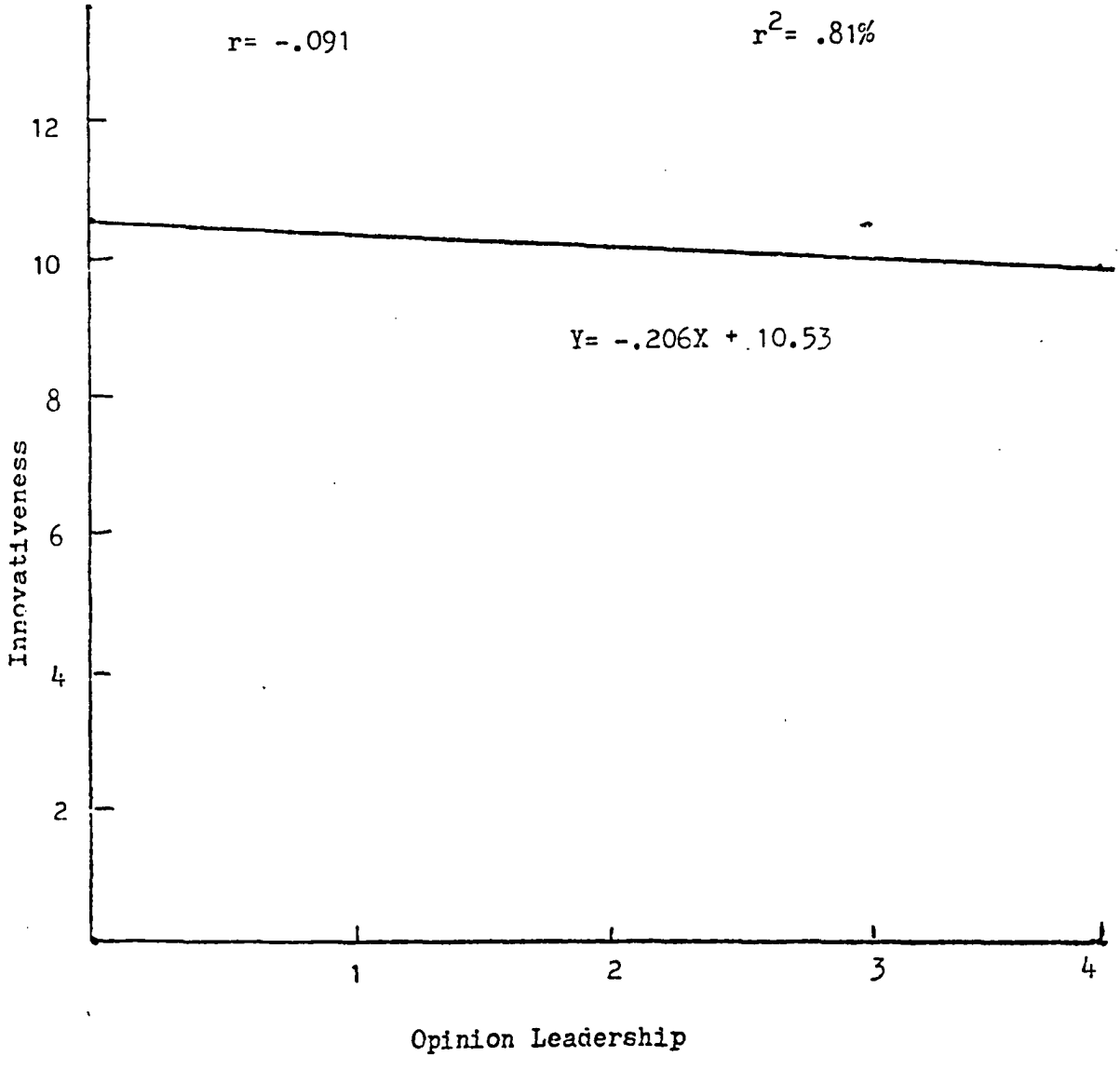
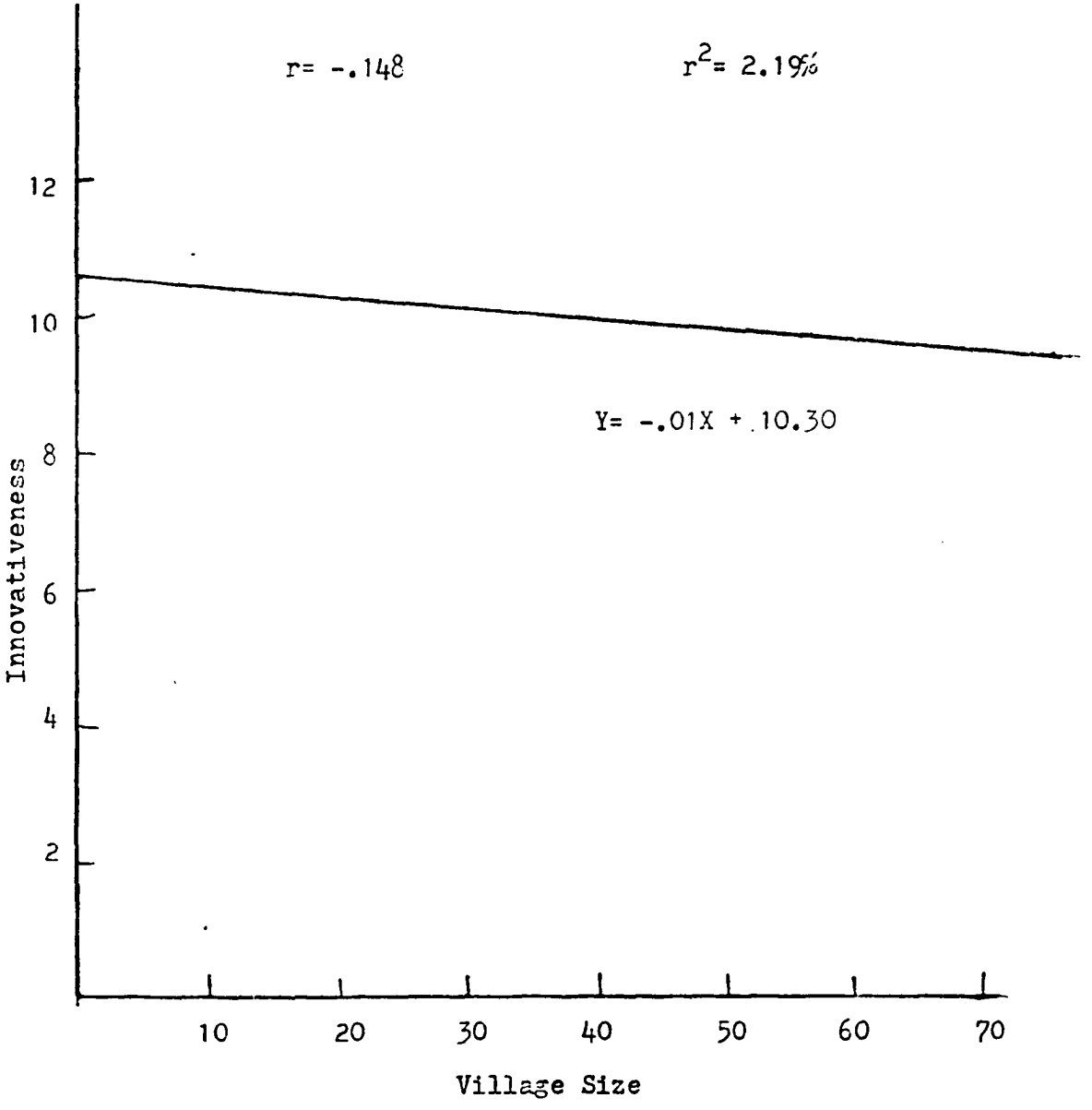


ILLUSTRATION 10

REGRESSION LINE FOR VILLAGE SIZE
PREDICTING INNOVATIVENESS



APPENDIX C

POST-HOC ANALYSIS: A COMPARISON OF LARGE AND SMALL VILLAGE RESPONDENTS

Post-Hoc Analysis: A Comparison of Large and Small Village Respondents

The discussion of the results from this study reveals a need for post-hoc analysis of the data to examine further possibilities. A central question that emerges across the discussion of all the variables utilized in this study concerns a homogeneity factor among villages. It seems reasonable to speculate that there is homogenous set of factors influencing respondents in small villages different from another set of common factors influencing respondents in large villages and cities. A comparison between respondents in small villages with respondents in large villages should reveal variance contributed by village size as a social system variable. To put this speculation to the test, two ex post facto research questions were asked. (1) What variables would explain the maximum amount of variance among respondents in small villages? (2) What variables would explain the maximum amount of variance among respondents in large villages? To test these questions, the respondents were split into those living in small villages (up to 6,000) and those living in larger villages and cities (above 6,000). The same statistical procedures and the same predictor variables from the original analysis are utilized

in this analysis. These procedures should determine the comparative importance of communication and of social variables within both large and small villages.

Table 7 indicates that village size, newspaper exposure, age, and opinion leadership are four variables that explain 28.6 percent of the variance among adopters in small villages. From the correlation report (table 8) it is evident that these variables are uniquely correlated with innovativeness and are thus significant predictors.

Table 7 also reports that age, village size, social interaction, and opinion leadership are significant predictor variables in combination that explain 24.01 percent of the variance among adopters in large villages. The only unique and significant correlates with innovativeness in the large village condition are age and village size (table 8).

From the data comparison we conclude that village size and age are significant predictive variables across all conditions of village size. The data also reveal that communication sources vary as predictors of innovativeness from large to small villages. In large villages, there is a tendency (though non-significant) for innovative persons to be more interpersonally orientated in their social system than those persons in small villages ($r = .079$ in large villages compared with $r = -.043$ in small villages). Compared with large villages, small village groups demonstrated a higher correlation of newspaper exposure and innovativeness ($r = .355$ compared with $r = .057$

TABLE 7

CUMULATIVE TOTALS OF VARIANCE EXPLAINED ACCORDING TO VILLAGE SIZE

Small Village		Large Village		Total Village	
Variables	Variance Explained	Variables	Variance Explained	Variables	Variance Explained
Village Size	15.91%	Age	17.07%	Age	13.14%
Newspaper Exposure	24.35%	Village Size	23.30%	Newspaper Exposure	14.50%
Age	27.61%	Social Interaction	23.74%	Village Size	16.06%
Opinion Leadership	28.60%	Opinion Leadership	24.01%	Opinion Leadership	16.47%
Education	28.70%	Cosmopoliteness	24.14%	Education	16.69%
Social Interaction	28.77%	Degree of Literacy	24.23%	Social Interaction	16.77%
Magazine Exposure	28.81%	Newspaper Exposure	24.40%	Magazine Exposure	16.81%
Cosmopoliteness	28.86%	Education	24.48%	Cosmopoliteness	16.83%
Degree of Literacy	28.91%	Magazine Exposure	24.52%	Degree of Literacy	16.86%
	R=.538		R=.495		R=.411
	N= 182		N= 229		N= 411

TABLE 8

PARTIAL AND PEARSON CORRELATIONS ACCORDING TO VILLAGE SIZE

	Small Village		Large Village		Total Village	
Variable	Partial	Pearson r	Partial	Pearson r	Partial	Pearson r
Social Interaction	-.024	-.043	.059	..079	.025	.021
Cosmopoliteness	.014	.009	.045	.034	.010	.009
Degree of Literacy	.014	.259**	.037	.070	.010	.157**
Newspaper Exposure	.132#	.355**	.038	.057	.052	.191**
Magazine Exposure	.030	.302**	.000	.067	.020	.171**
Age	-.141#	-.326**	-.361**	-.413**	-.285**	-.362**
Education	.020	.308**	.017	.019	.036	.150**
Opinion Leadership	-.098	-.111	-.059	-.076	-.075	-.091#
Village Size	.289**	.399**	-.213**	-.307**	-.122*	-.148**

#closely approaches significance

*p<.05

**p<.01

N= 182 (small village)

N= 229 (large village)

N= 411 (total village)

for large village condition). As a final communication variable, cosmopoliteness is not a significant variable in either condition.

Significant contrasts were evident on social variables among large and small village conditions. Significantly correlated with innovativeness in the small village condition were variables of degree of literacy (r= .259), age (r= -.326), education (r= .308). Opinion leadership correlated in a negative trend (r= -.111). When comparing with the large village condition, these social variables demonstrate trends and patterns in the small village condition different from the large village condition.

As an additional social variable, age is a significant predictor variable for innovativeness. Furthermore, other patterns and relationships emerge in conjunction with the age variable. For instance, age is negatively and significantly correlated with degree of literacy (r= -.377), newspaper exposure (r= -.244), and education (r= -.428) in the small village condition. Among respondents living in large villages, age is significantly and positively correlated with cosmopoliteness (r= .207), opinion leadership (r= .149) and negatively correlated with newspaper exposure (r= -.201). From these results it appears that older respondents in small villages are less educated, speak fewer languages, and read the newspaper less than younger subjects. In large villages, older respondents travel significantly more than younger subjects

and perceive themselves as opinion leaders. However, older respondents in this category read the newspaper less than younger respondents. In both the small village and large village conditions, older persons tended to adopt the innovation earlier than younger subjects.

Moving from social variables, we also noted significant differences when village size was correlated with innovativeness in the large and in the small village conditions. In the large village condition, there was a significant negative correlation ($r = -.307$). In the small village condition, there is a positive significant correlation ($r = .399$). These trends suggest a non-linear relationship between village size and innovativeness among total subjects in the sample. The non-linear trend was demonstrated by subsequent analysis.*

The above post-hoc analysis of variables correlated with innovativeness suggests several generalizations. It appears that mass media channels are more important to subjects living in small villages than subjects living in large villages. Interpersonal channels appear more important to subjects living in large villages than to subjects living in small villages.

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*The curvilinear relationship is tested by first calculating eta, the correlation ratio for curvilinearity. The relationship is then tested for significant difference from the linear relationship by the formula $F = \frac{\eta^{2} - r^{2} / k-2}{1 - 2 / N-k}$, where k=number of arrays, and N=total cases. Eta for this data is .667, and F=141, $p<.01$. (See Ferguson, 1966, p. 248). The graph for this data seems to follow the general equation $y = ax^2 + bx + c$.

TABLE 9

CORRELATIONAL MATRIX FOR POST-HOC ANALYSIS IN SMALL VILLAGES

	Social Inter.	Cosmop.	Degree Liter	News. Expo.	Magaz. Expc.	Age	Educ.	Opinion Leader	Village Size	Innov.
Social Interaction	1.000									
Cosmopoliteness	.014	1.000								
Degree of Literacy	.013	.030	1.000							
Newspaper Exposure	.029	.084	.529**	1.000						
Magazine Exposure	.039	-.028	.362**	.705**	1.000					
Age	.088	.077	-.374**	-.244**	-.244**	1.000				
Education	.058	.092	.706**	.524**	.422**	-.428**	1.000			
Opinion Leadership	.099	.011	.151#	.030	-.033	.065	.108	1.000		
Village Size	-.051	-.044	.154#	.172*	.159*	-.238**	.246**	-.024	1.000	
Innovativeness	-.043	.009	.259**	.355**	.302**	-.326**	.308**	-.111	.399**	1.0

#closely approaches significance

N= 182

*p<.05 **p<.01

TABLE 10

CORRELATIONAL MATRIX FOR POST-HOC ANALYSIS IN LARGE VILLAGES

	Social Inter.	Cosmop.	Degree Liter.	Newsp. Expo.	Magaz. Expo.	Age	Educ.	Opinion Leader	Village Size	Innov.
Social Interaction	1.000									
Cosmopoliteness	.235**	1.000								
Degree of Literacy	.044	-.009	1.000							
Newspaper Exposure	.012	-.002	.391**	1.000						
Magazine Exposure	.052	.043	.348**	.811**	1.000					
Age	.036	.207**	-.016	-.201**	-.197**	1.000				
Education	.049	-.118	.484**	.419**	.363**	-.044	1.000			
Opinion Leadership	.116	.204**	.080	.034	.048	.149*	.129	1.000		
Village Size	-.107	-.280**	-.144*	-.048	-.029	.145*	.027	-.098	1.000	
Innovativeness	.079	.034	.070	.057	.066	-.413**	.019	-.076	-.307**	1.0

*p<.05 **p<.01

N= 229

In both conditions, self-perceived opinion leaders tended to adopt earlier than non-opinion leaders (although the trends are nonsignificant statistically). The same trend for opinion leaders was revealed in the total sample (r= -.091).

In sum, by splitting respondents into those living in small villages and those living in large villages the amount of variance explained is increased substantially. Compared with the total sample, we can predict 12 percent more variance in small villages using four predictor variables and 8 percent more variance in large village groups using four variables. We conclude that there is an important interaction occurring between the predictor variables and village size. Village size stands independently predicting the occurrence of communication variables and of social variables as predictors of innovativeness.

Even after the post-hoc analysis, we still face several deficits in the research. We still lack a content analysis to examine more specifically how print media make any difference in adoption-oriented behavior. Other communication variables and social variables that demonstrate significance are often too low to place much confidence therein. Only future research can determine the causative relationship among these and other variables in predicting innovative adoption behavior of a non-technological innovation. There is still a large amount of unexplained variance. Utilization of specific batteries of variables, experimental designs that tap cause-and-effect,

and a union of research methodologies are needed in future research to enlarge our knowledge of predicting innovativeness among respondents in adopting non-technological innovations.