A COMMUNICATION MODEL OF MODERNIZATION

Thesis for the Degree of Ph. D.
MICHIGAN STATE UNIVERSITY
RODOLFO N. SALCEDO
1968

This is to certify that the

thesis entitled

A COMMUNICATION MODEL OF MODERNIZATION

presented by

Rodolfo N. Salcedo

has been accepted towards fulfillment
of the requirements for

Ph.D. degree in Communication Arts

Everett M. Rogers
Major professor

Date Nov. 13/1968

ABSTRACT

A COMMUNICATION MODEL OF MODERNIZATION

by Rodolfo N. Salcedo

Path analysis and the Simon-Blalock goodness-of-fit procedure were the statistical techniques used in this study, which asked the basic problem: "What leads to modernization?" Modernization is the process by which individuals become non-traditional. No matter how defined, modernization involves changes or modifications in present states of affairs (Feldman and Hurn, 1968). It was proposed that innovativeness is the heart of the modernization process. Innovativeness is the degree to which a person is relatively earlier than other members of his social system in adopting new ideas and practices (Rogers, 1962, p. 20).

The objectives of the present study were two-fold. Through path analytic techniques, attempts were made: (1) to test Lerner's model of modernization at the individual level of analysis, and (2) to extend the modernization model by the inclusion of more variables. Interview data from more than 3,300 farm family heads, part of the U.S. Agency for International Development-sponsored diffusion research project in Brazil, India, and Nigeria, were used in this study.

Causal models were set up in the two phases of analysis in this study. The four variables in the first phase were: cosmopliteness, literacy, mass media exposure, and innovativeness. The Simon-Blalock procedure was employed to test the causal models against other alternatives.

The results of the Phase I analyses showed that cosmopoliteness is indeed the prerequisite for modernization. In Brazil, India, and Nigeria, increases in cosmopoliteness led to increases in mass media exposure which in turn led to innovativeness. Further, a direct causal link was established between cosmopoliteness and innovativeness in Brazil.

The Phase II analysis on the extension of the four-variable model was completed using data from Nigeria. Four more variables were introduced: education, social participation, empathy, and need-achievement. The same causal paths from cosmopoliteness to mass media exposure to innovativeness were found. Increasing cosmopoliteness resulted in increasing social participation, need-achievement, and empathy. Social participation also led to innovativeness. It would appear that the function of urban contact was primarily that of "triggering" the whole process of individual change. It enables the peasant to gain access to new information and alternative norms of behavior which he can later adopt or reject.

Mass media exposure plays a central role in the whole modernizing sequence in the present study. Increasing mass media exposure led to

increases in an individual's need-achievement, empathy, social participation, and innovativeness.

It was concluded that Lerner's aggregate-level model of modernization was at best partially supported at the individual level of analysis. However, the findings of the present study lend support to Lerner's most basic formulation that the development of these modernization variables do not occur in a haphazard manner although, at times, we are forced to study them singly.

A COMMUNICATION MODEL OF MODERNIZATION

By

Rodolfo N. Salcedo

A THESIS

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

DOCTOR OF PHILOSOPHY

Department of Communication

1968

Accepted by the faculty of the Department of Communication, College of Communication Arts, Michigan State University, in partial fulfillment of the requirements for the Doctor of Philosophy degree.

Everett M. Rogers
Director of Thesis

Guidance Committee: Everett M. Rogers, Chairman

G. R. Miller

R. V. Farace

_____

_____

ACKNOWLEDGMENTS

The author is greatly indebted to the following who, in one way or another, helped in the completion of this thesis:

Dr. Everett M. Rogers, Adviser and Chairman of the author's Ph.D. Guidance Committee, for initiating and maintaining the author's interest in this study. From him, the author received valuable time, materials and advice which contributed immensely to the completion of this dissertation. Perhaps, the author can not thank him enough for the other help he has provided during the course of his graduate study.

Dr. Bradley Greenberg, who was the author's academic adviser and who guided his graduate program during the early months of his study in the Department of Communication at Michigan State University. Dr. Greenberg's comments and suggestions on the thesis proposal and the early draft of this thesis served especially to clarify questions on design and organization.

Dr. Frederick Waisanen, who allowed this writer to present the thesis proposal to his graduate seminar on two occasions and whose ideas and critical suggestions have also greatly influenced the theoretic formulations of this thesis.

Dr. Vincent Farace for his suggestions in the proposal and early draft of this thesis which also led to the re-organization of this report.

Dr. Gerald Miller, whose comments and suggestions on the thesis proposal further encouraged the writer to undertake the present study.

Dr. David K. Berlo, Chairman of the Department of Communication, for his moral help and assistance during the author's hours of discouragement.

Dr. Lalit K. Sen, for discussing with the author some findings relevant to the India data.

Miss Judy MacGregor, Miss Marjorie Sarbaugh, Mrs. Shirley Sherman, and Mrs. Claudia Gean, for typing and mimeographing the early drafts of this thesis.

The Communication Research Services personnel at Michigan State University, for their valuable assistance in the analysis of the data.

The U.S. Agency for International Development sponsored project Diffusion of Innovations in Rural Societies, for allowing the author to use the data for this dissertation.

Fellow graduate students and colleagues, whose ideas the author has incorporated here.

His wife, Conchita and his son Rudolph John Patrick, who bore the brunt of the birth pains of this dissertation and to whom this thesis is dedicated.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

CHAPTER I

INTRODUCTION

> Since there is no singular theory of social structure in more than a definitional sense, there is no reason to expect a singular theory of change, since different types of social organizations set different variables for analyzing changes in patterns of actions (Moore, 1963, p. 24).

THE PROBLEM

The central problem of the present study is: "What leads to modernization?" In other words, given a system of variables which theoretically are related to modernization, what logical and causal inferences can be made from the relationships of these variables?

Rationale

More and more countries wish to become modernized. Some countries, mainly in the East, have less and want more. Other countries, mainly in the West, have more and are willing to help those in the East get more. Under these conditions, putting Western aid to work for Eastern development should be easy. But evidently, it had not been (Lerner, 1967, p. 104). A nation, or an individual, who at once recognizes the need for help and strives to maintain an identity, finds it difficult

to accept foreign aid without reservations. The questions of "Who am I?" and "Where am I going?" as related to national identity and national goals still ring as valid issues in national development. The realization that one can live a more "fortunate" life like others has led millions to break the bonds of tradition and adopt a new style of life. For some nations and some individuals, the transition from traditional to modern life style had been smooth. For others, the uncharted path to modernization had proven rough, sometimes fraught with revolutions, and punctuated by cries for neo-traditionalism.* How much and how fast seems to be unique to a country and to individuals, in order to maintain a state of dynamic equilibrium.**

Part of the problem involved in national development stems from the fact that national development planners are often too eager to direct modernization along the same path that the West has taken. Inayatullah (1967, pp. 98-102) among others,*** expressed this point succinctly; he argued vigorously for a pattern and purpose of development

---

*Neo-traditionalism is the process by which individuals change from a modern style of life to a more traditional style of life. This is modernization "in reverse" (Rogers with Svenning, 1968, p. 56). Akin to this notion is Srinivas' (1966, p. 1-45; 1966, pp. 55-56) notion of "Sanskritization". He argued that such neo-traditionalism often is motivated by the desire of lower caste individuals to appear more like Brahmans and other upper castes in India.

**Dynamic equilibrium refers to a state where imbalances in the system as a result of changes in certain aspects are checked by corresponding changes in other parts of the system. This is akin to Schramm's (1965, p. 259) notion of "systemic development".

***A review of other positions will be presented in Chapter II.

that will not necessarily be Western and will not be imposed on developing countries. He rejected the unilinear interpretation of history which presumes that all history is moving toward the same destiny. This view implies that where Western man had been, Eastern man will be.

We submit that most, if not all, of the developing nations are plagued with the problem of establishing priorities. Will first priority be given to education? Or to mass media development? To industrialization? Apparently, no nation is ever rich enough to afford to launch and subsidize all necessary development programs simultaneously. With limited resources, priorities must be set. The same problem confronts the change agent or foreign technical assistance adviser when asked the question, "What do we do first?"

DEFINING MODERNIZATION*

The introduction of the term "modernization" reflects the concern of social scientists who have found such concepts as "social change" sterile. They need concepts which are theoretically fruitful and can also generate "action-oriented research". A precise meaning for modernization has not yet been evolved (Weiner, 1966, p. 2; Sen, 1968, p. 2). Each of the social science disciplines has focussed on different elements of the modernization process. Economists see modernization primarily in terms of man's applications of technologies to the control of nature's resources in order to bring about the growth

---

*The later part of this section was drawn heavily from Rogers with Svenning (1968).

of output per head of population. Sociologists and social anthropologists have been primarily concerned with the process of differentiation that characterizes modern societies. They have explored the ways in which new structures arise to assume new functions or to take on functions once performed by other structures. Political scientists among others, have been concerned with some of the disruptive features of modernization but they have focussed particularly on problems of nation and government building as modernization occurs. They have also been concerned with the ways in which governments increase their capacity to innovate, adapt to change, to make policies for their society (Weiner, 1966, p. 3).

For this reason, the term "modernization" has been defined a number of ways. Rogers with Svenning (1968) defined modernization as the "process by which individuals change from a traditional way of life to a more complex, technologically-oriented and rapidly changing style of life." Inkeles (1967) described modernity as a mental set: less tied to time and place and things and more to the state of mind. Lerner (1958, p. 89) looked at modernization in its behavioral aspect: "...a secular trend unilateral in direction - from traditional to participant lifeways." Feldman and Hurn (1966, pp. 378-395) stated that "modernization refers to those social changes that generate institutions and organizations like those found in advanced industrial societies." These definitions imply a change from one state of affairs to another, from a traditional way of life, of thinking, to a technologically-advanced and rapidly changing style of life.

Some scholars suggest that the starting point in any definition of modernization is not in the character of the society, but in the character of individuals. Thus, Black (1966, p. 17) suggested that modern societies are characterized by the growth of new knowledge. McClelland (1966, pp. 28-39) from a psychological standpoint, underlined self-reliance and an achievement orientation as essential qualities of modern men. Both Anderson (1966, pp. 58-70) and Shils (1966, pp. 81-97), writing about the role of education in the modernization process, stressed the development of skills and a spirit of creativity.

Modernization is the process by which individuals become non-traditional. No matter how it is defined, the process of modernization involves changes or modifications of present states of affair. We suggest that change and propensity to change are the essence of modernity. Viewed in this manner, stability is anathema to the state of modernity. Modernization is a movement away from traditionalism.* In what direction, we do not profess to know.** Rogers and others (1968, p. 56) stated that, at any point in time, modernization in a particular country

---

*Weiner (1966, p. 7) differentiated tradition from traditionalism. The former refers to the beliefs and practices handed down from the past; as we interpret the past, our traditions change. In contrast, traditionalism glorifies past beliefs and practices as immutable. Traditionalists see tradition as static; they urge that we do things only as they have been done before. When people are attached to the past in such a way as they will not adopt new practices that modify past behaviors, we are confronted with an ideology of traditionalism. Traditionalism, by virtue of its hostility to innovation, is clearly antithetical to the development of modernization. Traditions, which are constantly subject to reinforcement and modification, constitute no such barrier.

**Waisanen (1968) is presently building a model of non-traditionalism, asserting that we can draw a picture of a traditional society because it existed and we still see it today. However, he claims that our present

may then follow one of the numerous possibilities conditioned by time, locale, history and its unique culture. Viewed in this light, modernization in less developed countries is a synthesis and will be different in each case.* Nevertheless, many scholars point to such characteristics as change-proneness, rapid change, technological orientation, faith in science, etc., as exhibited by Western man as evidences of a modern state.

We look at the process of modernization as a multi-variate phenomenon. Modernization is not uni-dimensional and therefore cannot be measured by any single criterion or index. Modernization is a process involving the interaction of many factors: "We need to measure more than one aspect of an individual's behavior in order to determine his status on the modernization continuum" (Rogers and others, 1968, p. 56).

The next section will discuss some of the core variables in the present study.

INNOVATIVENESS

We prefer to look at modernization as an individual process.** This process parallels national economic development. As individuals

---

state of knowledge precludes our being able to define a modern state, he stated further that modernization is a departure from a traditional state to another state. We still have very little knowledge about this new state. The present definition is in accord with this position.

*In a sense, then, modernization is not just a replacement of old ways by new ways, or as Weiner terms it, "putting new wine in old bottles".

**Rogers with Svenning (1968) distinguished "modernization" from "development". The former applies to the individual, while the latter applies to the nation as a whole.

change, nations change. We suggested earlier that change and propensity to change are the very essence of modernity.* Innovativeness is defined as the degree to which an individual is relatively earlier in adopting new ideas than other members of his social system (Rogers, 1962, p. 20). In a Guttman analysis of India data, Sen (1968) showed that innovativeness forms the highest scale among the six scalable variables in his measures of modernity.**

Adopting new ideas is certainly the heart of the modernization process. There are several reasons why innovativeness is a key variable in the modernization process. First, it offers a kind of "hard" data about the extent to which modernization has occurred. Ultimately, the degree to which an individual has accepted a more "complex, rapidly changing style of life" is best indicated by his actual use of new ideas. After all, increasing his cosmopoliteness, literacy and mass media exposure are all designed, in the end, to encourage him to adopt new ways of living. Second, the most easily measured indicator of his degree of modernization is innovativeness (Rogers with Svenning, 1968). Innovativeness indicates a behavioral change, rather than a mere cognitive or attitudinal change. This is not to say,

---

*Black (1966, p. 17) stated basically the same idea. From his vantage point as a historian, he claimed that modern societies are characterized by the growth of new knowledge and this presumes the existence of men with an increasing capacity to understand the secrets of nature and apply this knowledge to human affairs. Inkeles (1966) also concluded that among the characteristics of modern men is "the propensity to accept new ideas and practices."

**"Highest scale" means that innovativeness belongs to the top scale of the ordering of the modernization items from the highest or "hardest" to the lowest or "easiest."

however, that we are overlooking the attitudinal component of modernity. It could be argued, however, that given the choice between adoption and rejection, a peasant who decides to adopt a particular innovation has a more favorable attitude toward that innovation. We are arguing here that an attitude not strong enough to be manifested in an individual's behavior could be, in effect, inconsequential for our study. Our main interest, theoretically and practically, is in behavioral change.

Urbanization and Cosmopoliteness

Urbanization is the process through which a rural population moves toward an urban way of life, physically and/or psychologically (Sen, 1968, p. 23). According to Lerner (1964, pp. 61-65), urbanization is the historical precondition for other changes in society. Lerner (1958) operationalized this variable in terms of the proportion of a nation's population living in cities over 50,000.

There is another empirical aspect of orbanization which we would like to propose as an individual, and therefore, conceptual equivalent of the urbanization function at the national level. Urbanization may include "psychic migration" to cities (Sen, 1968, p. 25). In such a case, urbanization will refer to the process in which an individual or a group increasingly looks to the urban industrial society as a reference group, although it is physically isolated from such a society. We call this form of urbanization "cosmopoliteness". Cosmopoliteness is defined as the degree to which an individual's orientation is external to a particular social system (Rogers, 1962, p. 17). Cosmopoliteness, by definition, is an attitudinal component of modernization. We operationalize

cosmopoliteness in this study in terms of the number of trips an individual makes to cities or urban centers. As trips to urban centers become more frequent, the probability of becoming exposed to new ideas increases. This assumes that new ideas come mostly from urban centers.*

As early as 1943, Ryan and Gross found a very strong association between innovativeness and trips to urban centers, a phenomenon sometimes called the "Des Moines complex" among their respondents. This positive association between innovativeness and cosmopoliteness has since been confirmed in many studies. Unfortunately, the same cannot be said with equal confidence about living in urban centers and being innovative. Takeshita and others (1964), Bogue and others (1966), and Belcher and Hay (1959) found a negative correlation between living in urban centers and being innovative. However, Bonser (1958) found a positive association between these two variables.

While some breakdown in localiteness can be brought about by good roads and better transportation facilities, it remains an individual matter to develop an orientation which is external to the social system. Lerner's (1958) parable of the grocer and the chief and Ryan and Gross' (1943) "Des Moines Complex" both dramatically illustrate this point.

---

*Small group research, e.g., Zaleznik and Moment (1964) and Cartwright and Zander (1962), and formal organization research, e.g., Katz and Kahn (1966) showed that proximity is a very important factor in determining interaction patterns between individuals. The simulation of the diffusion of information (e.g., Deutschmann, 1962) makes the proximity factor one of the rules in increasing the probability of contact between a knower and nonknower of information.

Cosmopoliteness indicates an awareness of alternative norms of behavior to those in the social system of residence. A cosmoplite is not, therefore, unquestionably committed to local norms. He has shed the traditional mental isolation. He is part of a local social system but has an open mind (Sen, 1968, p. 33). Cosmopolites have reference groups outside their social system. In this sense, cosmopolites are less integrated with their social system, compared to the average members of the community. A major notion in this argument is that modernization or change is directed or brought about mainly by messages which emanate from external sources to the social system. We propose that communication is the vehicle through which these change-messages are brought to the attention of the villagers in less-developed nations.

Communication

Communication is the process by which messages are transferred from a source to a receiver. Usually, some external stimulus, perceived by the individual is impetus for behavior alteration (Rogers with Svenning, 1968). Inventions within a relatively closed social system* like a peasant village are rare events. If they occur, they are seldom seriously communicated with intent to influence others to adopt the same innovation.** Until there is communication of ideas from sources external to the village, therefore, little change can be expected

---

*An ideal closed social system precludes any inputs from external sources.

**This is related to Foster's (1965) "Image of Limited Good", a perception by peasants that all the desired items in life exist in limited quantities, and any attempt on the part of an individual to "get ahead" will be perceived as a threat to the rest of the community.

to occur in peasant knowledge, attitudes, and behavior. Viewed from this standpoint, the model we propose is a diffusion model*, involving intersystemic contacts between individuals via interpersonal or impersonal (mass media) channels.

Literacy

Literacy is the degree to which an individual possesses mastery over symbols in their written form. It enables villagers to gain direct access to printed mass media. Literacy also seems to unlock certain mental abilities (such as symbol manipulation and the capacity to think counterfactually) which may, in turn, lead to modernization. An individual who becomes literate has learned to learn by himself (Burnet, 1965). Lerner (1964, p. 64), in describing his theory of modernization, stated: "Literacy is indeed the basic personal skill that underlies the whole modernizing sequence....The very act of achieving formal control over a formal language gives people access to the world of vicarious experience."

Perhaps the most obvious effect of literacy is that as the individual gains reading skill, he is able to extend the scope of his world beyond his immediate experience through the print media. Mendez and Waisanen (1964) stated that mastery over symbols, with literacy as the requisite skill, puts the boundary of human experience beyond the

---

*Diffusion is the process by which an innovation spreads. The diffusion process is the spread of a new idea from its source of invention or creation to its ultimate users or adopters (Rogers, 1962, pp. 19-20).

social space. Since messages in the mass media are generally pro-change in nature, the peasant is exposed to favorable attitudes toward new ideas as well as specific and technical information that he may consider adopting. We might therefore expect peasants with high mass media exposure to be favorable toward change. Literacy then becomes a catalyst in the modernization process, unfreezing access to certain mass media of communication for the individual.

Lerner's (1958) formulations of political and economic development as a developmental sequence provided a strong influence in our causal formulation of the process of modernization. Lerner (1958, p. 348) stated that:

> ...We know that urbanization, industrialization, secularization, democraticization, education, media participation, do not occur in haphazard and unrelated fashion, even though we are often obliged to study them singly....*

In his study involving aggregate data from 71 countries, Lerner (1958) underlined the importance of literacy and mass media exposure, as spurred by increasing urbanization, in the development of wider economic (income) and political participation (voting). Lerner's thesis has generated much interest and controversy among scholars of modernization and national development. The central role he assigned to the mass media has greatly influenced communication research on modernization and national development.

---

*A more detailed review of Lerner's (1958) thesis will be presented in Chapter II.

The causal sequence of the four modernization variables in the individual level of analysis will follow Lerner's (1958) formulations. In our present model, cosmopoliteness or urban contact will replace urbanization as a prerequisite for modernization in the individual level. Increasing cosmopoliteness should lead to increasing literacy development and mass media exposure of the individual. These two variables -- literacy and mass media exposure -- while they have reciprocal relationships, should lead to innovativeness.

OBJECTIVES OF THE STUDY

Having proposed an individual model of modernization (which hopefully is a model equivalent of Lerner's model in the aggregate), the first objective of this study is to test Lerner's (1958) model of modernization at the individual level of analysis. We intend to use the path analytic technique and the Simon-Blalock goodness-of-fit procedures.* A basic postulate of causal analyses (e.g., path analysis) is that each "dependent" variable must be regarded as completely determined by some combination of variables in the system (i.e., 100 percent of the variance in each dependent variable must be explained by the independent variables in the system). The second objective of the present study is to extend the model of modernization developed by the inclusion of other variables.

---

*Chapters II and III will explain in greater detail the statistical method called "path analysis" and the Simon-Blalock goodness-of-fit procedure.

ORGANIZATION OF THIS REPORT

Chapter II will review Lerner's (1958) model of modernization. It also includes a review of path analysis and the Simon-Blalock method as applied in the work of McCrone and Cnudde (1968). Chapter III, on research methodology, begins with our position on causality and causal inference as this issue bears directly upon the nature of this present study. The data and the respondents, and the analytic schemes, are also explained in this chapter. The results of the two-stage analyses will be reported and discussed separately in Chapters IV and V. Chapter VI will present the summary and conclusions.

CHAPTER II

REVIEW OF LITERATURE

> No matter how defined, modernization necessarily involves an experience of social change for the modernizing population. People must change their personality, and/or their occupation, and/or their values and/or their loyalties (Feldman and Hurn, 1968, pp. 378-395.

This chapter briefly reviews Lerner's (1958) model of modernization. The chapter then reviews two schools of thought on modernization as a process. It may be noticed that, while the two schools of thought differ on the direction of development, the two schools seem to agree on change as an inevitable consequence of modernization. Further, the notion that modernization is a multivariate phenomenon seems to be in accord with the two positions. The rest of the chapter presents in detail the study of McCrone and Cnudde (1967) as an example of the use of path analysis, and of the Simon-Blalock procedures with social science data. The last section of this chapter discusses some limitations of the analytic techniques used in the present study.

LERNER'S MODEL OF MODERNIZATION

Related to McClelland's (1951) achievement motivation is Lerner's (1958) notion of empathy: the ability to see oneself in other people's roles, to think like them and to act like them.* Lerner (1964, p. 50) hypothesized that "high empathic capacity is the predominant personal style only in a modern society which is distinctly industrial, urban, literate, and participant."

Further, Lerner (1958, p. 60) theorized that modernization is the consequence of a developmental sequence beginning with

---

*Empathy was defined by Lerner (1964, p. 49) as the ability to relate oneself to a changing environment or the ability to introject other roles and to project oneself into different roles. Lerner (1964, pp. 48-59) sees the origin of empathy in urban living which later becomes an internalized value. Sen (1968, p. 32) challenged this notion about the origin of empathy and stated that the empathic ability itself and the potentiality for widening its range may be inherent in social living. Lerner (1963, p. 332) termed empathy as psychic mobility. He stated: "...the acquisition and diffusion of psychic mobility may well be the greatest characterological transformation in modernization ... For psychic mobility - what we have elsewhere called empathy - is the mechanism by which men transform themselves in sufficient breadth and depth and make social change self-sustaining." McClelland (1961, p. 76) defined achievement motivation as "the desire to do well, not so much for the sake of skill recognition or prestige but to attain an inner feeling of accomplishment." The development of empathy, spurred by exposure to the mass media, is said to set the dynamics of the psychological notion of relative deprivation in reverse: where people know of other people who live and enjoy other things, they come to want the same things. It is for this reason that we tie the notion of empathy with McClelland's (1961) notion of achievement motivation. Hagen (1962) reviewed Lerner's (1958) findings and stated that typically, one becomes empathic "through some not yet explained influence. Then, one becomes urban and comes to use modern communication media, and becomes literate. In the process, one loses localism and becomes part of national society."

urbanization:*

> The secular evolution of a participant society appears to involve a regular sequence of three phases. Urbanization comes first, for cities alone have developed the complex of skills which characterize the modern industrial economy. Within this urban matrix develop both the attributes which distinguish the next two phases -- literacy and media growth. There is a close reciprocal relationship between these, for the literate develop the media which in turn spread literacy.** But literacy performs the key function in the second phase. The capacity to read, at first acquired by relatively few people, equips them to perform the varied tasks required in the modernizing society. Not until the third phase, when the elaborate technology of industrial development is fairly well advanced, does society begin to produce newspapers, radio networks, and motion pictures on a massive scale. This, in turn, accelerates the spread of literacy. Out of this interaction develop those institutions of participation (e.g., voting), which we find in advanced, modern societies.

In the same study, Lerner (1958, p. 63) stated that:

> About 10 percent of the population must be urbanized before 'take-off' occurs.*** At this point, it becomes 'economical' to develop literacy and media; hence urbanization and other modernizing trends grow together for a period. But after a certain degree of urbanization exists, then further growth of cities no longer affects other factors in the same degree. Our analysis locates this 'critical optimum' at 25 percent, after which urbanization ceases to play a determinant role because enough people have been relocated in cities to assure the personnel requirements of modern production.

---

*In another study, Gerschenkron (1966, pp. 246-257) warned against converting historical facts into logical prerequisites. For example, he noted that Catholicism has apparently not impeded the extraordinary high rate of economic growth of many Latin American countries through the 1950's.

**An interdependent or reciprocal relationship wouldbe one in which a slight increase in the first variable would bring about a slight increase in a second variable, which would in turn bring about another slight increase in the first variable, which would be followed by another increase in the second variable, and so on. Perhaps, a panel study can confirm whether an interdependent relationship is present.

***This notion on "thresholds" will not be tested in the present study.

Lerner's model is an example of an adult model modernization model.* Presented diagrammatically, Lerner's thesis appears:

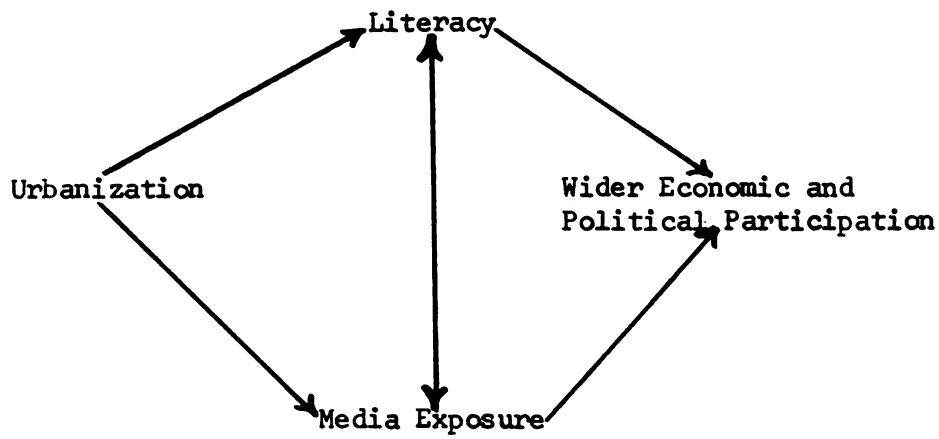


Figure II-1. Sequential and Co-Extensive Presentation of Lerner's (1958) Model of Modernization.**

---

*Other theories (e.g., Hagen's, 1962 and McClelland, 1951), could be classified as personality socialization theories. A socialization view of modernization such as Hagen's maintains that modernization starts in early life. It lies in the social-psychological processes of childhood personality development, where social values are learned. Hagen stressed the role of value changes in causing economic development, and suggested that achievement and autonomy are two values central to national development. These values, Hagen felt, arise historically when some elite groups in a traditional society suffers a "withdrawal of status respect" by being conquered or losing political power. After a period of "retreatism" and "inferiority", the offspring of these former elites emerge with a high degree of achievement and autonomy, as a result of their non-authoritarian child-rearing. These relatively-deprived minority groups then demonstrate their entrepreneural ability in economic growth. McClelland (1951), on the other hand, suggested that themes of children's stories may later develop the need to achieve among adults.

**Lerner (1958) operationalized urbanization as the proportion of a nation living in cities over 50,000; literacy as the proportion able to read in one language; mass media exposure as the proportion buying newspapers, owning radios and attending cinema; economic participation in terms of income and political participation in terms of voting.

Lerner's thesis was not satisfactorily confirmed by his data when reanalyzed by McCrone and Cnudde (1967). The causal sequence found by McCrone and Cnudde (1967) was from urbanization to education to mass media communication to democratic political development.*

Rogers (1968, p. 3) also explicitly pointed to the intervening role of mass media exposure in the modernization process. He presented the role of mass media exposure in modernization thus:

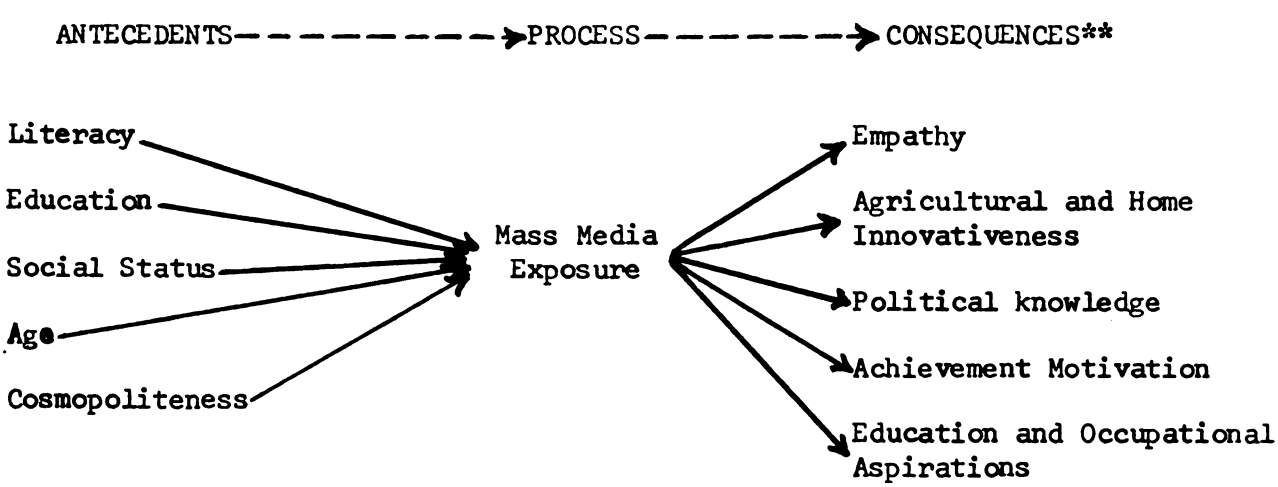


Figure II-2. Paradigm of the Role of Mass Media Exposure in Modernization (Rogers, 1968).

---

*The later part of this chapter reviews the work of McCrone and Cnudde (1967) in greater detail.

**The terms "antecedents" and "consequences" are utilized here by Rogers (1968) in the sense of probable time-order, but not necessarily to mean cause-effect.

Rogers (1968, p. 19) found in his study among Colombian peasants that mass media exposure leads to certain modernization consequences. Among these consequences were: empathy, agricultural innovativeness, political knowledge, and educational aspirations for children. Rogers concluded that the results of the "analysis indicated the general utility of regarding mass media exposure as an intervening variable between literacy and various measures of modernization."

Using cross-lagged correlational analysis,* Schramm and Ruggles (1967, pp. 57-75) found that "urbanization seems, on the basis of 1961 data, no longer to be so basic to the growth of literacy and mass media as Lerner (1958) has found it to be on the basis of data approximately 10 years older." The question was raised whether the spread of transistor radios, roads and rapid transportation facilities into the villages, overleaping illiteracy barriers and effectively reducing distance, have not made urbanization less essential to the general growth pattern of certain mass media systems, e.g., the print media.

VIEWS ON MODERNIZATION AS A PROCESS

It seems that there are at least two schools of thought regarding modernization as a process. One view, looks at modernization as unidirectional. Lerner (1966, p. 232) quoted Marx, who wrote more than a century ago:

---

*The assumption of cross-lagged correlations is that if two variables are correlated with data from the same sample at two points in time, "variable X at $time_1$ being correlated with variable Y at $time_2$, and Y at $time_1$ with X at $time_2$, then the higher correlation will tend to indicate a greater influence for the variable which is the earlier time in that higher correlation" (Schramm and Ruggles, 1967, p. 62).

> The more-developed society presents to the less-developed society a picture of its own future.

Moore (1963, p. 89) could also be classified here when he stated:

> What is involved in modernization is a 'total transformation of a traditional or pre-modern society into the type of technology and associated social organization that characterize the 'advanced', economically prosperous and relatively politically stable nations of the Western World.

Rostow (1961, pp. 6-7) talked of pre-conditions for "take-off" to modernity:

> The idea spreads not merely that economic progress is possible...judged to be good. Education, for some at least, broadens and changes to suit the needs of modern economic activity. New types of enterprising men could forward...willing to mobilize savings and to rake risks in the pursuit of profit or modernization.

The first view implies that modernization is a process of Westernization and/or Europeanization. Ethnocentric? Lerner (1966, p. 218) defended this position:

> This observational standpoint implies no ethnocentrism... the Western model of modernization exhibits certain components and sequences whose relevance is global (underscoring supplied). The model evolved in the West is a historical fact. That the basic model reappears in virtually all modernizing societies on all continents of the world regardless of variations in race, color or creed, has been demonstrated to my satisfaction. The point is that the secular process of social change, which brought modernization to the Western world, has more than antiquarian relevance to today's problems of social change. Indeed, the lesson is that contemporary modernization everywhere will do well to study the historical sequence of Western growth.

This view did not escape criticism. Inayatullah (1967, pp. 98-102) denied the universality of Lerner's (1958) findings. Sen (1968, p. 10) questioned the fact that Lerner dropped 25 percent of his data from 75 countries because they did not have comparable data, and that

these were all underdeveloped countries "at the bottom of the development ladder". Gusfield (1967, pp. 351-362) pointed out that the traditional societies have also been changing in their own way and their present "traditionalism" is the product of a long process of change. Modernization is a continuation of this change and there is no reason to believe that it would necessarily be in the same direction as the West. Stepan (1966, pp. 223-234) stated that the Latin American experience in modernization did not fit the uni-directional formulation of Lerner and others. Rogers and others (1968, p. 55) stated that:

> ...The main weakness of the unilinear theory of modernization is that it is a disguised evolutionary theory in which all less-developed nations are heading toward one goal....No one is sure what the Western nations will be by the time the traditional systems reach that goal.

Needless to say, one's view of modernization as a process greatly influences his way of looking at data and the statistical analyses he tends to use.

There is yet another approach to the study of modernization. This is the factor analytic approach to modernization. The essential purpose of factor analysis is data-reduction. Multi-variate analysis requires, in the end, a Gestaltic view of the multitude of variables involved. Factor analysis lends itself for this purpose. "Especially in those domains where basic and fruitful concepts are essentially lacking and where crucial experiments have been difficult to conceive"

(Thurstone, 1947, p. 56). Ascroft (1968) reviewed some factor analytic studies on modernization and national development (both at the individual and aggregate levels of analysis)* and concluded that "It would seem that modernization is multi-dimensional at the individual level, but unidimensional at the aggregate level of analysis." One plausible explanation is that correlational analyses at the aggregate level lose or suppress individual variance when such data are lumped together to represent a nation's aggregated score. This danger of the "ecological fallacy" has long been recognized. Robinson (1950) argued that it is incorrect to make inferences about correlations between variables with persons as the units of analysis when the basis of the correlational data is collectives as units of analysis.

In his review of the factor analytic investigations on modernization, both in the individual and aggregate levels of analysis, Ascroft (1968) saw three dimensions underlying the modernization process: (1) the capacity for communication via the mass media combined with the associated ability of individuals to absorb mass communication messages, (2) a change-prone generation of young adults who are disenchanted with their environment, and pressuring for the acquisition of new life styles, and (3) a cadre of innovative opinion leaders linked

*Examples of exploratory factor analyses of aggregate data on modernization are: Deutschmann and McNelly (1963), Schnore (1958), and Farace (1965; 1966). Other examples of exploratory factor analyses of individual data on modernization include: Deutschmann and Fals Borda (1962), Jain (1965), Rahim (1966), Donahew (1966), Ascroft (1966), Whiting (1967), Farace and others (1967), and Ascroft (1968).

with change agents.

As might be expected, a note of dissatisfaction was expressed by Ascroft (1968) in his review. True, factor analysis provided a "new Gestalt" from the host of variables. It showed him which variables clustered together, and which variables form separate dimensions. It did not tell him, however, which variables are most important.* According to Ascroft (1968), "we need to draw inferences about the relative time-order of variables in the process of becoming modern". The work of Schramm and Ruggles (1967), using the cross-lagged correlation technique, was an attempt to infer time-order among variables. In the interest of "action-oriented research" mentioned earlier, we would like to know not only which variables are related to each other, but also which variables would be most efficiently manipulated in order to hasten the process of modernization. This present study addresses itself to that question.

Beside the cross-lagged analysis proferred by Schramm and Ruggles (1967), there is yet another method of analysis which we could employ to answer our central question. This is the "method of path coefficients" (Wright, 1934, pp. 161-215). This method is used in the present study.

There is established precedence in the use of the path analysis technique with social science data. Boudon's (1965) highly mathematical treatise sought to point out that path analysis is only part of a more powerful general scheme which he called "dependence analysis."

---

*The question of "importance" of variables is discussed by Blalock and Blalock (1968, pp. 186 ff.).

Dependence analysis makes the same assumption regarding linearity and uncorrelated errors that are used in the Simon-Blalock models of causal inference. It provides causal dependence measures, on one hand, and makes it possible to test any hypothetical causal structure, provided basic assumptions are met (Boudon, 1965). Duncan (1966, pp. 1-16) reviewed the method of path analysis and its application to sociological data. McCrone and Cnudde (1967) used the Simon-Blalock causal model analysis on secondary data from Cutright (1963) and computed path coefficients for the causal model that was inferred from the use of the Simon-Blalock technique. Sewell and Shah (1967) used a combination of Pearsonian zero-order correlation, partial correlation, multiple correlation, and path analysis in their study of the relationship between socio-economic status and college plans of students, controlling for intelligence and treating parental encouragement as an intervening variable. In another study, Sewell and others (1967) presented extensive causal models by the use of path coefficients.

AN EXAMPLE OF PATH ANALYSIS

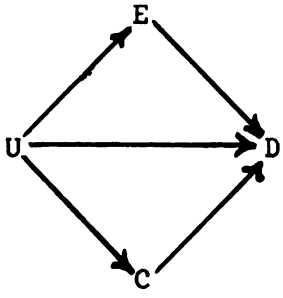
Perhaps a detailed review of McCrone and Cnudde's (1967) article best illustrates the use of the Simon-Blalock causal model analysis and path coefficients.* The authors stated that "the Simon-Blalock causal model analysis enables us to make causal inferences concerning the adequacy of causal models, at least in the sense that we can proceed by

---

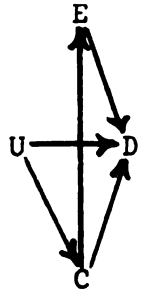
*The discussion of the method used in the present study will be presented in Chapter III.

eliminating inadequate models that make predictions that are not consistent with the data" (McCrone and Cnudde, 1967, p. 74). They dealt with four variables, namely: Urbanization, Communication, Education, and Democratic political development. On the basis of previous findings, among them Lerner's (1958) and Cutright's (1963), they proposed that the causal linkage could be pictured as: U→E→C→D.* It must be noted that these were secondary and aggregate data involving 76 nations.

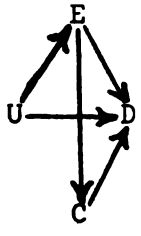
Seven logically causal paths between the four variables were presented. Three models were derived from these relationships:



Model 1a. No direct causal link between E and C.



Model 1b. Developmental sequence from U to C to D.



Model 1c. Developmental sequence between U to E to D.

Figure II-3. Alternative Models Showing Possible Relationships of the Variables Education and Communication to Urbanization (McCrone and Cnudde, 1967)

*The main independent variable (urbanization) and the main dependent variable (democratic political development) had been assigned their places in the causal sequence through the findings of previous studies.

The success of Model 1c in predicting the actual relationships between these three variables would confirm the notion that urbanization is the prerequisite to the widespread growth of literacy and education. The consequent educational development would then provide the mass public necessary for the growth of the mass media of communication.

Table II-1 clearly shows the excellent fit of the predicted and actual correlations for Model 1c as shown by the Simon-Blalock test of each alternative. This provides the basis for eliminating the other two alternatives and inferring that the direction of causation is indeed from urbanization to education to communication.

Table II-1. Prediction Equations and Degree of Fit for Models of Democratic Political Development Showing that Model 1c Gives a Better Prediction of Actual Relationships Between Urbanization and Communication (McCrone and Cnudde, 1967)*

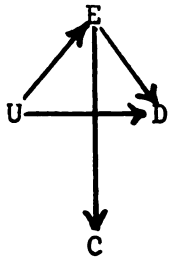
Model		Prediction	Degree of Fit	
		Predicted	Actual	Difference
1a	$r_{ue}r_{uc} = r_{ec}$	(.75) (.71) = .53	.85	.32
1b	$r_{uc}r_{ce} = r_{ue}$	(.71) (.85) = .60	.75	.15
1c	$r_{ue}r_{ec} = r_{uc}$	(.75) (.85) = .64	.71	.07**

*Figures in brackets are Pearsonian zero-order coefficients.

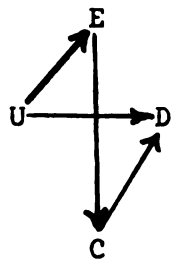
**A good fit (i.e., less than .10 difference), means that the causal path between urbanization and communication should be erased. This difference may be arbitrary on the authors' part.

Turning their attention to the second half of the democratic political development model, McCrone and Cnudde (1967) posited only two logically alternative causal models. This is due to the fact that they had already inferred the direction of causation between E and C from Model 1c. Model 11a predicts that the relationship between C and D is spurious due to common causation by E. If this model were to fit the data, education, not communication, would be confirmed as the final prerequisite to a successfully functioning political democracy. Model 11b posits a developmental sequence from E to C to D as interpreting the original correlation between E and D. If this model is confirmed, communication development would be seen as the final link in the chain of causation -- the spread of mass communication which penetrates and integrates society thereby laying the basis for democratic political development.

Table II-2 shows the prediction equations for Models 11a and 11b. These prediction equations confirm the inference and that the relationship between education and democratic political development is an indirect one through communication.



Model 11a. No direct causal link between C and D



Model 11b. Developmental sequence from E to C to D.

Figure II-4. Alternative Causal Models Showing Possible Relationships of Education and Communication to Democratic Political Development (McCrone and Cnudde, 1967).

Table II-2. Prediction Equations and Degree of Fit for Models of Democratic Political Development Showing Model 11b Gives a Better Prediction of the Relationships Between Education and Democratic Political Development (McCrone and Cnudde, 1967)

Model	Prediction	Predicted	Degree of Fit: Actual	Degree of Fit: Difference
11a	$r_{ec}r_{ed} = r_{cd}$	(.85) (.62) = .53	.80	.27
11b	$r_{ec}r_{cd} = r_{ec}$	(.85) (.80) = .68	.62	.06*

One final link, the direct original relationship between U and D remains to be tested. A final logically possible model would postulate that the developmental sequence form U to E to D accounts for the entire relationship between U and D. If model 111 were to be confirmed, the inference would be that there is no direct relationship between U and D.

U → E → C → D

Figure II-5. Model 111. Representing Developmental Sequence from U to E to C to D.

*The small difference (less than .10) means that the predicted and actual data agree considerably and that there is no direct causal linkage between education and democratic political development.

Table II-3 tests this possible alternative. The relatively poor fit (over .10 difference) indicates that Model 111 can be rejected and the direct link between U and D should be maintained.

Table II-3. Prediction Equation and Degree of Fit for a Model of Democratic Political Development (McCrone and Cnudde, 1967)

Model	Prediction		Actual	Difference
111	$r_{ue}r_{uc}r_{cd} = r_{ud}$	(.75) (.85) (.80) = .51	.64	.13

Before settling on the final system of causal relationship indicated by the use of the Simon-Blalock technique, McCrone and Cnudde (1967) evaluated the direct effects of each of the remaining paths through the computation of the path coefficients. The correlation coefficients utilized in the Simon-Blalock analysis, it should be recalled, only measure the degree of association between variables. It was found that the association between U and D is maintained even when the effect of the path from U to E to C to D is taken into account. Correlation coefficients, however, do not measure the amount of change in the dependent variable which is associated with changes in the independent variable. The primary concern at this stage is the measurement of changes in the dependent variable produced by changes in the independent variable. Path coefficients, therefore, are utilized because they measure the amount of change in the dependent variable

produced by standardized changes in the independent variable.

Figure II-6 shows two paths from U to D remain in associational terms. First, there is the developmental sequence from U to D with three links -- U to E, E to C, and C to D. Second, there is the direct link between U and D. Path coefficients for each of these links in the causal model are computed in Table II-4.

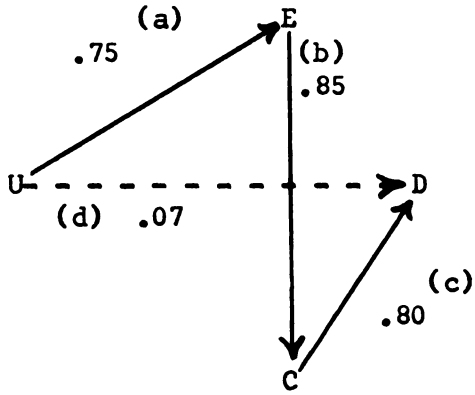


Figure II-6. A Causal Model of Democratic Political Developments Including Path Coefficients (McCrone and Cnudde, 1967).

Table II-4. Simultaneous Equations and Path Coefficients for the Causal Model in Figure 7 (McCrone and Cnudde, 1967).

Path	Equation	Path Coefficient
a	$b_{ue} + r_{ue} = 0$	.75
b	$b_{ec} + r_{ec} = 0$	.85
c	$b_{cd} + r_{cd} = 0$	.80
d	$b_{ud} + (b_{cd} \times r_{uc}) + r_{ud} = 0$	.07

An examination of the path coefficients placed on each link in Figure II-7 indicates the overwhelmingly important causal links in the process of democratic political development sequence from U to E to C to D. The direct effects of urbanization on democratic political development is negligible.

Conclusions

The following conclusion was given by McCrone and Cnudde (1967):

> ...This causal model, because it represents the beginnings of a parsimonious theory of, rather than mere correlates of, the process of democratic political development enables us to derive a series of empirical propositions concerning this crucial process:
>
> 1. Democratic political development occurs when mass communication permeates society. Education affects democratic political development by contributing to the growth of mass communication, therefore;
>
> 2. Mass communication occurs when literacy and educational levels arise in society. Urbanization affects democratic political development primarily by increasing educational level, which then increases mass communications, therefore;
>
> 3. Education and literacy development occur in urbanizing societies ... (McCrone and Cnudde, 1967, p. 78).

The study just reviewed (McCrone and Cnudde, 1967) used the Simon-Blalock method in building a causal model and used the path analytic technique to reinforce their argument about the causal nature of the relationships of their variables in the model. It should be noted that the Simon-Blalock procedure is not a prerequisite to doing the path analytic method. Very often, the choice of which method to use in building causal models would depend on the nature of the data available

and the purpose of the researchers (Shah, 1968).

Some Limitations of the Path Analytic Technique

Path analysis focuses on the problem of interpretation and does not purport to be a method of discovering causes. Linear causal models are conveniently developed by the method of path coefficients proposed by Wright (Duncan, 1966), originally intended for use in the biological sciences.

As statistical techniques, neither path analysis nor the Simon-Blalock procedure adds anything to conventional regression analysis. As a pattern of interpretation, however, path analysis is invaluable in making explicit the rationale for a set of regression calculations. Any causal interpretation of data must rest on assumptions - at a minimum as to the ordering of the variables here represented as uncorrelated residual factors. The great merit of the path analysis scheme is that it makes the assumptions explicit and tends to force the discussion to be at least internally consistent, so that mutually incompatible assumptions are not introduced inadvertently into different parts of an argument. With the causal scheme made explicit, moreover, it is in a form that enables criticism to be sharply focussed, and hence potentially relevant not only to the interpretation at hand, but also to the conduct of future inquiry. Another useful contribution of path analysis, even in the conventional regression framework, is that it provides a calculus for indirect effects. This involves subtracting from the correlations between the two variables the path coefficients between the same two variables. Duncan (1966, p. 15) quoted Wright as

saying that:

> ...The method of path coefficients is not intended to accomplish the impossible task of deducing causal relations from the values of correlation coefficients... In cases where the causal relations are uncertain, the method can be used to find the logical consequences of any particular hypothesis in regard to them. ...Path analysis is an extension of the usual verbal interpretation of the statistics, not of the statistics themselves. It is usually easy to give a plausible interpretation of any significant statistics taken by itself. The purpose of path analysis is to determine whether a proposed set of interpretations is consistent throughout.

Perhaps, Siegel and Hodge (1968, p. 57) summarized the limitations of path analysis more succinctly:

> At best, path analysis can only provide a general framework for the explicit representation of assumed causal relations. Every new problem must be evaluated according to its own merit. The method merely enables one to derive rigorously the implications of alternative causal assumptions; those derivations can, of course, lead one to discard some assumptions; but they by no means establish the veracity of those which can not be dismissed as erroneous representation of available data.

CHAPTER III

METHODOLOGY

> There appears to be psychological limits to persons' tolerance for chaos - and, incidentally, limits to their tolerance of endless repetitions (Moore, 1963, p. 6).
>
> It is the regression coefficient which gives us the laws of science (Blalock, 1961, p. 51).

CAUSALITY AND CAUSAL INFERENCE

For some time, a controversy has persisted concerning the ontological reality of causality and the question of pervasiveness of causality throughout the universe (Brecht, 1959). In brief, many of the objections to causal thinking reduce to two points: (1) that causality can never be verified empirically, and (2) that the notion of cause and effect is far too simple to describe reality, with causal laws being much more a property of the observer than the real world itself (Blalock and Blalock, 1968, pp. 155-198).* Nevertheless, philosophers and scientists

---

*Blalock (1968, p. 162) said that one of the ways commonly used in sociology for dodging causal terminology is to speak in terms of structures and their functions. But "function" is characteristically defined in terms of "consequences", which appears to be merely another word for "effects". Presumably, the functionalist objects primarily to the gross types of oversimplification implied in single-causation theories or those which stress a very small number of factors. Further, Blalock (1968, p. 162) said that another position is that "everything is related". While this position is theoretically beautiful, Blalock claimed that it is analytically sterile.

alike generally concur in the value of the search for causes. For example, Dewey (1938, p. 462) said:

> Recognition of the value of the causal category as a leading principle of existential inquiry is in fact confirmed, and the theory of causation is brought into consonance with scientific practice. The institution of qualitative individual existential situations consisting of ordered sequences and coexistences is the goal of all existential inquiry.

Similarly, Nagel (1961) concluded that the search for causes is of great utility, regardless of the reality or non-reality of causes, before men formulate statements about the interrelations of events.

Cause-and-effect is the conventional name for the interrelation between two successive events where the occurrence of the earlier is regarded as a condition for that of the latter (Brecht, 1959). It is noted that there are two important assumptions surrounding any statement that "event b is the effect of event a".*

1. Time order - that under like conditions, an event of the nature of a will always precede in temporal order the supposed effect, called event b.

2. Forcing quality - that the condition of event B and only b is to be ascribed to the impact or influence of a on b.**

---

*Selltiz and others (1951, p. 87ff) summarized the major types of evidences that are relevant to testing hypotheses about causal relationships: (1) evidence of concomitant variation, (2) time-order of occurrence of variables, and (3) elimination of other possible causal factors.

**Selltiz and others (1951, p. 81) discussed the notion of necessary and sufficient conditions: A necessary condition ... is one that must occur if the phenomenon of which it is a "cause" is to occur. A sufficient condition is one that is always followed by the phenomenon of which it is "cause." A condition may be both necessary and sufficient for the occurrence of a phenomenon. In such case, Y would never occur unless X occurred, and whenever X occurred, Y should also occur.

Both of these assumptions, based as they are on the results of particular observed cases only -- though very many of them -- are reached inductively in our minds; they are not immediately observed (Brecht, 1959). The same view was expressed by Blalock (1961, p. 173), who said that:

> Due to the inherent nature of the scientific method, there is a gap between the language of theory and research. Causal inferences belong to the theoretical level, whereas actual research can only establish covariation and temporal sequences. As a result, we can never actually demonstrate causal laws empirically. This is true even when experimentation is possible. Causal laws are working assumptions of the scientist, involving hypothetical statements of the if-then variety.

Supposedly, experiments establish causal linkage by demonstrating that changes induced in the experimental determinant by some agent produce differential effects over time in the dependent variable (Whiting, 1965). However, all that the experiment may do is to determine the time-order of occurrence of the observed events. The experimenter has introduced the supposed "cause" before the supposed "effect" is there at all. With random assignment of respondents to treatments, the experimenter assumes that all random errors have been taken care of, and whatever changes he observed in the dependent variable can be attributed to the effect of the manipulated variable. What he does, in effect, is block other alternative ways of explaining his findings. Blalock (1961, p. 173) said that "included among the if's of causal assertions is the supposition that all relevant variables have been controlled or can safely be ignored. This kind of assumption can never be tested empirically."

The notion of covariation is perhaps a complex matter. In the Pearsonian correlation sense, if two variables are related, they covary. Hence, a change in a may be followed by a change in b, and vice-versa. In other words, the change could be bi-directional; there is symmetry in the relationships. Obtaining the coefficient of determination, i.e., squaring the correlation coefficient, gives us the percentage of variance explained by each variable on the other. Notice that $r_{xy} = r_{yx}$. This assumes that all other variables that may be related to both a and b have been controlled or have negligible effects. Otherwise, the coefficient of determination may become meaningless. Bringing other variables into the picture formally implies partial (or part) correlation. Insofar as we are able to measure all other variables we can control for them. In one-time studies (e.g., surveys), this is called statistical control. It presupposes that one can control only for variables that are measured. In experimental situations other than the simple randomized design, statistical control is also possible for measured variables and the randomization procedure "takes care" of other variables not measured.

The assumption of the time-order of occurrence of variables in causation imposes a restriction on the directionality of co-variation. Hence, while $r_{xy} = r_{yx}$; the statement that: "If a then b" ≠ "If b then a". Indeed, these two statements do not exist in the same system.*

---

*Also, $b_{yx} \neq b_{xy}$.

It is not logical to find an event "caused" by another which has not yet occurred. Equations derived from these assumptions would necessarily be recursive, in the sense that they would be uni-directional, given some simplifying assumptions (Blalock, 1961; Duncan, 1966).

Only an experimental design can demonstrate the time-order of occurrence of events. Even so, this arbitrary manipulation of temporal order may do violence to the reality we seek to represent. The assumption of forcing quality is, perhaps, another matter. Even in experimental situations, we can only demonstrate co-variation, for indeed, the assumption that we have already controlled for all other variables through randomization may just be too much to assume, and this assumption is never tested empirically. That is why we still use statements of the "in-the-long-run" variety.* It is the impression of this writer that causal relations are necessarily deterministic, not probabilistic. Further, all probabilistic statements are statements about the likelihood of particular events occurring under the conditions specified in the hypothesis. Error is inherent in such probabilistic statements. To deny causation is a more comfortable position to maintain, than to attribute it. The burden of proof in the latter is much greater. On the other hand, we can infer that there is no causal relationship if two variables do not co-vary.

The moot question of causality led Zetterberg (1966) to say that a linkage between a cause and effect may be: (1) reversible or irreversible,

---

*The "in-the-long-run" statements are perhaps predicated on another assumption: ceteris paribus (e.g., same sample, same methods, same population, etc.). The confidence with which we state our findings even in experimental research heavily depends on this assumption.

(2) deterministic or stochastic (probabilistic), (3) sequential or co-extensive, (4) sufficient or contingent, and (5) necessary or substitutable. These may be useful in avoiding overstatements of relationships between two or more variables. Thus, it is more informative to say that the "linkage between a and b is irreversible, stochastic, sequential and substitutable", than merely saying that "a usually leads to b."*

Correlational analysis of surveys has always been thought to preclude determining causality. Clearly, correlational analyses may not indicate control over time-order, unless a panel instead of one-shot data-gathering is planned. But, like experimental designs, correlational analyses can also demonstrate co-variation. Given a choice between an experimental design and a survey design, we may choose the experimental design even after knowing its limitations (due to the ever-present error term in the equation, and because certain variables do not lend themselves to manipulation on practical and ethical grounds. However, given a survey design, we can still make causal inferences** about linkages in that:

1. There can be no causal relationships if two variables are independent, i.e., if they do not co-vary.

---

*Zetterberg (1965) proposed that a relation may be (a) reversible (if X, then Y; and if Y then x) or irreversible (if X, then Y; but if Y, then no conclusions about X); (b) deterministic (if X, then always Y) or stochastic (if X, then probably Y); (c) sequential (if X, then later Y); or co-extensive (if X, then also Y); (d) sufficient (if X, then Y, regardless of anything else) or contingent (if X, then Y, but only if Z); and (e) necessary (if X and only X, then Y) or substitutable (if X, then Y; if Z, then also Y).

**Causal inferences are probabilistic statements of the "if-then" variety consisting of induced relationships among concepts.

2. Changes in the dependent variable as a result of standardized changes in the independent variable could be measured with recourse to beta weights in the regression equation. These we call "path coefficients."*

In summary, we say that even an experimental design cannot demonstrate causation because the assumption that all other variables have been controlled through randomization cannot be tested empirically. Causal inferences belong to the theoretical level, while actual research can only establish co-variation and temporal sequences. Correlational analyses can also demonstrate co-variation and, given a panel study, time-order of occurrence of variables. Given a survey design, we can still make causal inferences about linkages in that: (1) there can be no causal relationships between two variables if they do not co-vary, and (2) changes in the dependent variable as a result of standardized changes in the independent variable could be measured. Path analytic methods

---

*Path coefficients are beta weights in a partial correlation analysis involving normalized scores. Path coefficients represent unique effects of one variable or another. In other words, path coefficients indicate how much a dependent variable would be expected to change per unit of standardized changes in the independent variable. Beta weights correspond to the slopes of the dependent variable on the independent variable in a regression analysis using normalized scores. The b in the equation $Y = a + b_x$ corresponds to the regression line in the analyses using raw scores. b is what is usually called the least squares (regression) coefficient. The following are three methods which could be used to estimate beta weights: (1) Divide each variable by its standard deviation and use the resulting normalized variable in the least squares analysis. The least squares coefficients would then be beta weights; (2) Substitute a matrix of simple correlations between the variables for the matrix of moments usually needed to calculate the least squares formula. The least squares coefficients would then be beta weights; (3) Calculate least squares coefficients and normalize them to beta weights by adjusting them by the standard deviations of the dependent variable and the independent variable. This is the method used by the MSU Computer Center in computing least squares (Michigan State University Series 7, 1966).

THE DATA AND THE RESPONDENTS

Available data from the Phase II study in the three countries of Brazil, India and Nigeria were used in this study. These data were gathered through the Research Project on Diffusion of Innovations in Rural Societies sponsored by the U.S. Agency for International Development with a grant to Michigan State University (Rogers, 1968). There were three major data-gathering phases in each country. The first phase was an analysis of the relative success or lack of success of programs of change in agricultural production in about 80 villages in each of the three countries. The unit of analysis in Phase I was the village. The second phase was an analysis of the data obtained mainly through interviews with villagers in about 16 to 20 villages in each of the three countries. The unit of analysis in Phase II and in the present study was the individual farm decision maker.

It should be noted that the variables included in the present study were not measured in exactly the same way, i.e., different questions were used to measure the variables which we have lumped under the same label for the three countries.* Table III-1 compares the Phase II methodologies in the three countries.

---

*Rogers (1968, pp. 15-16) discussed the problems of equivalence in cross-cultural research. The research staff attempted to measure the variables in the three countries based on concept equivalence, not operational equivalence. The concepts were measured as much alike as possible, but taking into account the various cultural factors and language difficulties which forced adaptations and modifications in the measure.

Table III-1. Comparative Methodology for Phase II in Brazil, India and Nigeria*

Characteristic	Brazil	Nigeria	India
1. Type of respondent	All farmers in the village who owned and operated some land	All farmers 20 years of age or older, farming some land	All farmer-operators under 50 who farmed at least 1 hectare (about 2.5 acres) of land
2. Sampling procedure	Judgment of villages, limited somewhat by convenience of travel, from among Phase I villages. Random sampling of respondents within village	Judgment of villages from the "success" villages in Phase I, limited by convenience of travel. Random sampling of respondents within village	Judgment of villages from among Phase I villages. Random sampling of respondents within village.
3. Number of respondents and villagers	1,306 farmers in 20 Phase I communities	1,346 villagers in 18 Phase I villages	680 farmers in 8 Phase I villages
4. Method of interviewing	Teams of 5-6 interviewers assigned to communities	9 teams of 2 members each assigned to villages (and supervised weekly)	Teams of 5 interviewers assigned to villages

*Adapted and modified from Rogers (1968).

MEASURES OF THE MODERNIZATION VARIABLES IN THIS STUDY

After all the items were selected through factor analyses, raw scores were standardized, summed, and later converted to t-scores to construct indices.* The following were the selected measures which made up the indices of the modernization variables in the three countries.**

1. Cosmopoliteness is the degree to which an individual's orientation is external to a particular social system (Rogers, 1962, p. 17). This was measured in terms of number of trips to urban centers the respondents had in 1966.

A. Brazil: 1. Number of visits to a large city in the past year. (One with more than 40,000 people).

2. Number of contacts per year with relatives living in large city. (One with more than 40,000 inhabitants).

B. India: 1. How many times visited a town last year.

2. How many times visited a city last year.

C. Nigeria: 1. Total score for visiting outside village.

2. Literacy was defined as the person's ability to read and/or write. Functional literacy was measured by a literacy test. The following were the specific measures of literacy in the three countries:

---

*T-scores for indices were obtained by multiplying the sum of z-scores by 10 and adding 50 to the product.

**Blalock (1968, pp. 189-190) stated that "standardization makes sense when one wishes to refer to specific populations and to measure importance in this context. If one is comparing several independent variables with respect to their relative contributions to some dependent variable, given a fixed amount of variation in each of the independent variables, then correlation coefficients make sense. Better still, one should compute standardized dependence coefficients (or path coefficients). These latter coefficients enable one to sort out the contributions of each independent variable even where one assumes that they are interconnected by rather complex causal paths."

A. Brazil: 1. Can you read a newspaper? (0 = no; 1 = dk; 2 = Yes).*

2. Functional literacy score in a test. Number of words missed was subtracted from 50.**

B. India: 1. Can you read a newspaper? (0 = No; 1 = dk; 2 = Yes).

2. Can you write a letter? (0 No; 1 = dk; 2 = Yes).

C. Nigeria: 1. Can you read English? (0 = No; 1 = dk; 2 = Yes).

2. Literacy test score - Number of words correct.***

3. Mass media exposure**** is defined as being in the audience for such communication channels as newspaper, magazine, radio and television (Rogers and others, 1968, p. 59).

---

*This scoring scheme enabled us to place the non-meaningful response ("don't know") in the mean of the categories. The error-check program done earlier showed that there are very few cases of this sort. An alternative considered was that ot dropping the respondents who had the non-meaningful response for the variable. However, the computer routine used in this analysis would not allow selective dropping of variables for respondents. It would, however, allow us to drop the whole data for the respondent. We would thus be sacrificing more data.

**In Brazil, the respondent was handed the reading card and told to read the following: "He who cannot read is like a blind man who has to be guided according to other people's wishes; or then he will stumble his way. The illiterate man is not altogether free; he is a slave of his ignorance. Never stop reading something every day and keep learning." This was adopted from a passage in the final lesson of an adult literacy course. Thus, ability to read it corresponds, at least roughly, to a certain level of training.

***In Nigeria, the respondent was handed the reading card and told to read the following: "He who cannot read is like a blind person who is being led lest he goes astray. He is dependent upon others. The book which he cannot read mocks him as a slave to ignorance."

****In Brazil, the intercorrelations of the mass media exposure items were relatively low, compared to those in the two other countries. Unlike India and Nigeria, Brazil appears to be relatively "media-saturated" in that exposure to a definite mass medium may no longer be strongly influenced by such factors as literacy, education, and income. However, this is just conjecture, and not a supporting fact.

A. Brazil:
1. Number of newspapers or magazines read (read to you) per month.
2. Respondent customarily received newspapers or magazines (0 = Never; 1 = sometimes; 2 = regularly).
3. Newspapers as sources of agricultural news. (0 = Never; 1 = sometimes; 2 = regularly)
4. Television as sources of agricultural news. (0 = No; 1 = dk; 2 = Yes).

B. India:
1. Do you listen to the radio? (0 = No; 1 = dk; 2 = Yes).
2. Do you listen to news over the radio? (0 = No; 1 = dk; 2 = Yes)
3. Do you listen to the radio farm forums? (0 = No; 1 = dk; 2 = Yes).
4. Did you read (had read to) magazines and newspapers in the past week? (o = No papers read/read to him; 1 = can't read but paper read to him; 2 = can read and read one or more papers).
5. Film exposure (0 = No; 1 = dk; 2 = Yes).

C. Nigeria:
1. Newspaper readership (0 = No papers read/ read to him; 1 = can't read, but had papers read to him; 2 = can read and read one or more papers).
2. Number of papers read/read to him.
3. Number of days listened to radio in past 2 weeks.
4. During 1966, read agricultural newsletter/ pamphlet (0 = no; 1 = dk; 2 = Yes)
5. During 1966, heard agricultural radio program (0 = no; 1 = dk; 2 = Yes).

4. Innovativeness is defined as the degree to which an individual is relatively earlier in adopting new ideas and practices than other members of his social system (Rogers, 1962, p. 20). We limited our measures of innovativeness to the relative time of adoption of agricultural practices. There are two reasons for doing this. One, our respondents were all farmers. Two, our measures of mass media exposure in the three countries tap heavily at exposure to agricultural ideas carried by the mass media.

In Brazil, the individual's innovativeness score was the sum of the normalized years of adoption of practices (after subtracting them from 67). Subtracting year of adoption from 67 (1967) enabled us to give a higher score to an individual who adopted a practice earlier than another individual. These were later converted to t-scores. The total number of agricultural practices available was 12. Each individual's innovativeness score was computed taking account of the actual number of practices that were applicable in his community.

In India, no data on years of adoption of these practices were available. Therefore, the individual's total innovativeness score was the sum of five agricultural practices adopted across all 10 possible practices. These individual items were standardized, summed, and later transformed to t-scores.

In Nigeria, the individual's innovativeness score was the sum of years of adoption of six agricultural innovations. Each year of adoption was subtracted from 67 and the differences were standardized and added across six practices. The sum was later transformed to t-scores.

Four other variables were introduced into the system in the Phase II analysis in Nigeria. The following were the measures of the four additional variables in Nigeria:

5. Education was defined and measured in terms of number of years an individual attended formal school. The scores ranged from zero for "never attended school" to six for "complete university training."

6. Need-Achievement was defined by McClelland (1961, p. 76) as "the desire to do well, not so much for the sake of social recognition or prestige, but to attain an inner feeling of personal accomplishment." The respondents were asked questions which tapped at their degree of economic aspiration. Their answers were rated on a 10-point scale ranging from zero for "no aspirations" to nine for an answer which indicated that the respondents pointed to the "general improvement" of the village. The second question was actually a sub-question of the first. The respondent's second response to the original question on his degree of economic aspirations was rated on the same 10-point scale.

7. Social Participation is the degree to which an individual interacts with his peers and colleagues. The respondents were asked how many different groups they belonged to. They were also asked the total number of positions they held in the groups.

8. Empathy is defined as the degree to which an individual is able to project himself into different roles (Lerner, 1964, p. 49).

The respondents were asked: (a) how they thought newspapers help farmers to progress, and (b) how they thought cinema could civilize the village. Their answers were rated on a four-point scale ranging from zero for "don't know" or "could not help" to three which indicated the "respondent's ability to recognize specific relationships" in answer to the two questions.

ANALYTIC SCHEME

There were two major phases of analysis in the present study. The first phase was an attempt to test Lerner's (1958) model of modernization at the individual level. This phase was limited to four variables in the three countries. The variables were: cosmopoliteness (x_1), literacy (X_2), mass media exposure (X_3), and innovativeness (X_4).

Phase I Analysis

Following Lerner's (1958) model of modernization and considering the arguments we presented in Chapter I about the role of cosmopoliteness and communication in the modernization of the individual, the paradigm for the four-variable analyses in the three countries is presented in Figure III-1.

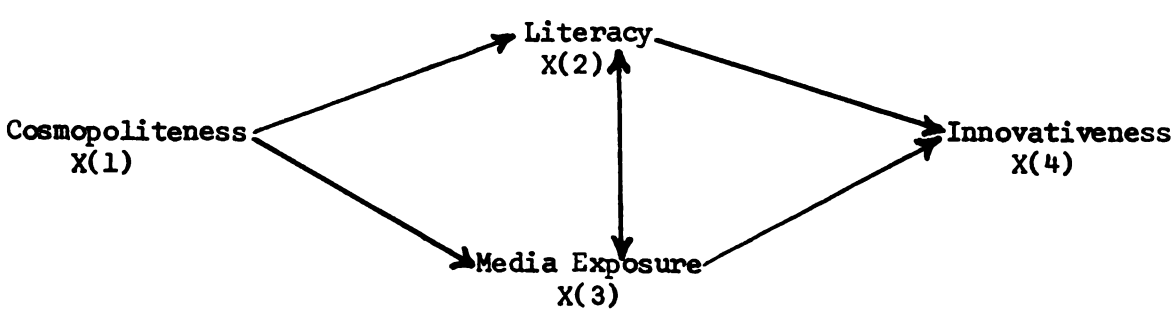


Figure III-1. Proposed Interrelationships of Four Modernization Variables in the First Stage of the Present Analysis.

For this phase, it was assumed that no other variables operated in the system. A fundamental postulate of causal analyses is that causal responsibility for all variations in each dependent variable can be allocated among explicit independent variables (Siegel and Hodge, 1968, p. 28). Duncan (1966, pp. 1-16) stated:

> Each 'dependent' variable must be regarded as completely determined by some combination of variables in the system. In problems where complete determination by measured variables does not hold, a residual variable uncorrelated with other determining variables must be introduced.

The prediction equations generated by the four-variable model in Figure III-1 were:

$$
\begin{aligned}
X_1 &= e_1 \\
X_2 &= b_{21}X_1 + e_2 \\
X_3 &= b_{31}X_1 + e_3 \qquad (1.1) \\
X_4 &= b_{42.3}X_2 + b_{43.2}X_3 + e_4
\end{aligned}
$$

Equation 1 in (1.1) says that cosmopoliteness (X_1) is independent of the other three variables in the system. It is a cause of, but not caused by, the three other variables in the system. Equation 2 says that literacy (X_2) is caused only by cosmopoliteness. Similarly, equation 3 says that mass media exposure is caused only by cosmopoliteness. Literacy and mass media exposure have interdependent relationships.*

---

*This part on the interdependent relationship between mass media exposure and literacy cannot be directly tested by our method due to the fact that our data gathering technique in this study was a one-time survey. Perhaps a panel study would confirm what we suggest here.

Equation 4 says that innovativeness is caused jointly by literacy and mass media exposure.

Notice that the arrows in Figure III-1 are uni-directional. An arrow coming from one variable to another would indicate that one variable is hypothesized as the direct cause of another. For example, in Figure III-1, cosmopoliteness is the direct cause of both literacy and mass media exposure. (The double-headed arrow between literacy and mass media exposure indicates that an interdependent relationship is hypothesized between these two variables). Given the uni-directional arrow from cosmopoliteness to both literacy and mass media exposure, these latter two variables (literacy and mass media exposure) cannot cause cosmopoliteness in the same system. In Figure III-1, each successive dependent variable is presumed to be caused by some of the previous variables (either directly or indirectly), but not by any which is presumed to occur later in temporal sequence. Hence, while literacy and mass media are joint causes of innovativeness in our model (Figure III-1), innovativeness cannot be treated in the same model as a cause of literacy, mass media exposure or cosmopoliteness. As Blalock (1968, p. 167) said: "... if $b_{ij} \neq 0$, we must automatically have $b_{ji} = 0$", meaning that if X_i cannot cause X_j in the same system.

The Assumptions in the Analysis*

The equation systems (1.1) discussed require certain assumptions about the behavior of the distant terms represented by the error term (e). Such assumptions are not too restrictive, according to Blalock (1968, p. 165). Generally speaking, the fewer restrictions we impose the less definite we can be about both the estimating process and the interpretation of coefficients. It is commonly assumed that the e's have a mean value of zero. In order to make conventional parametric significance tests (e.g., the t and F-tests), we must assume that the e's are normally distributed. It is usually also assumed that the e_1 appearing in the equation for X_i is uncorrelated with any of the remaining X'_s considered as possible causes of X_i. Otherwise, it is difficult to give meaningful causal interpretation to the various slopes. Finally, in order for ordinary least squares to give unbiased and efficient estimates, we must also assume that the e's are uncorrelated with each other. As Boudon (1966, pp. 199-235) showed, this particular assumption permits the unique identification of all coefficients except in the special case where one or more of e's are zero.**

The recursive equations of (1.1) do not actually yield testable predictions unless further assumptions can be made. But if additional restrictions are imposed, then we shall reduce a number of unknowns to less than the number of equations in the system, thus the equations

---

*This portion was heavily drawn from Blalock and Blalock (1968).

**Boudon (1968) said that coefficients are identifiable in recursive systems in that definite causal factors are identified to explain the variations in definite dependent variables in the system.

will not always fit the data. In effect, this means that the data must satisfy a number of conditions, one for each restrictive assumption we impose. If the conditions are not satisfied, then the model in question should be rejected or modified (Blalock, 1968, p. 169).

Actually, the restrictive assumptions can be very simple ones, namely that some of the beta coefficients are equal to zero. This means that some of the variables are not directly linked causally to each other. The model (Figure III-1) illustrates this. For example, innovativeness in the model is not directly linked with cosmopoliteness. Therefore, we must expect that the path coefficient or direct effect of cosmopoliteness on innovativeness controlling on both literacy and mass media exposure should be zero, subject to sampling error. We have, in effect, hypothesized that cosmopoliteness is an indirect cause of innovativeness through literacy and mass media exposure which act as intervening variables. Given the previous assumptions, we can then estimate the coefficients such as b_{ij} by ordinary least squares procedure using standard formulas for partial slopes. Thus, the estimate of b_{41} in equation (1.1) would be $b_{41.23}$* in conventional least squares notation.

With each pair of variables for which there is no direct causal link, there will be a corresponding prediction that the appropriate partial slope or correlation will be approximately zero. Thus, since there is no direct causal link between cosmopoliteness (X_1) and

---

*Should be read: "standardized beta weight or regression of variable 4 (innovativeness) on variable 1 (cosmopoliteness) controlling for variable 2 (literacy) and variable 3 (mass media exposure)." Here, we obtain the path coefficient from cosmopoliteness to innovativeness.

innovativeness (X_4), because both literacy (X_2) and mass media exposure (X_3) mediate in this relationship, $b_{41.23}$ and $r_{14.23}$ should be approximately zero, subject to sampling error. This should be confirmed, if the model is to be retained. The indirect effect, if sizeable, will be indicated in the model as direct effects.

The previous model predicts, therefore, that $r_{14.23}$ should also be approximately zero, since the ordinary least-square formulas for correlations and regression coefficients involve the same numerators (Blalock, 1968, p. 169). A second prediction says that $r_{14.3} = r_{14.2}$, and this should be greater than $r_{14.23}$. In other words, control for literacy should have the same effect as control for mass media exposure when relating cosmopoliteness and innovativeness. An added restriction is that these first-order partials should be greater than the second-order partial, which controls for <u>both</u> literacy and mass media exposure simultaneously. Again, these must be confirmed if the model were to be accepted.

The higher-order partials involve controls only for variables that are antecedent to or intervene between the two variables under consideration. They do not involve controls for variables which appear beneath the equations for the two variables being related. For example, we do not control for innovativeness (X_4) in relating cosmopoliteness (X_1) and literacy (X_2).

Statistical Methods Used

Notice that we are using the familiar dot notations (e.g., $r_{12.3}$, or the correlation between variables 1 and 2 holding variable 3 constant) for partial correlations since ordinary least squares can be used to estimate slopes or path coefficients. It should be clear by now that path coefficients are not new statistics. They are the beta weights (or in this study, standardized beta weights) in the ordinary least squares equation when certain assumptions are made. These assumptions have to do with the nature of the statistical tool itself and the nature of the model regarding the proposed interrelationships of the variables in the system. The Least Squares Delete (LSDel) computer routine of the Michigan State University Computer Center was used in the present study.*

A model set up to describe the interrelation between variables can be accepted or rejected on the basis of consistency with the correlation coefficients. Testing for the consistency of prediction of the model is the function of path analysis (Hilgendorf and others, 1967, p. 375). Equations of logical consistency can be given here as examples:

then $r_{ab} = 0$ (1.2)

*The LSDel computer routine computes, among others, the beta weight or direct effects of one variable on another controlling for all other variables which intervene in the relationship between the two variables. Each succeeding iteration of the routine drops out or

That is, if a and B lead to D independently, then the correlation between a and b must be zero or approach zero. If

$$a \longrightarrow b \longrightarrow d \qquad \text{then, } r_{aD} = r_{ab} \cdot r_{bD} \qquad (1.3)$$

In other words, if a leads to b which leads to D, then the correlation between a and D equals the product of the correlations between a and b and b and D. On the basis of this kind of reasoning, the analysis can eliminate the impossible arrangements of clusters in close connection with each other. (Hilgendorf and others, 1967, p. 378).*

While we heavily depend on the computer for our analysis, we also checked some of the path coefficients we obtained by using the hand formula provided by Hilgendorf and others (1967, pp. 378-379).

$$12.3 = \frac{r_{12} - r_{13}r_{23}}{1 - (r_{23})^2} \qquad (1.4)$$

This gives the path coefficient from X(1) to X(2) where X(3) is held constant. Where a relationship is examined with respect to more than one variable, the formula is expanded to:

$$12.34 = \frac{r_{12} - r_{1.34}r_{2.34}}{1-(r_{2.34})^2} \qquad (1.5)$$

eliminates a predictor variable which did not meet the criterion set in terms of the percentage of the total variance explained in the dependent variable uniquely attributable to that independent variable.

*Hilgendorf and others (1967) suggested that the more strongly related two variables are, the closer they are in the causal path that could be derived from the system.

and the r_{34} expression is approximated by the mean correlation of r_{23} and r_{24}. That is, the total formula may be written.*

$$12.34 = \frac{r_{12} - \frac{r_{13}r_{14}}{2} \quad \frac{r_{23}r_{24}}{2}}{1 - \frac{r_{23}r_{24}}{2}^2} \qquad (1.6)$$

These path coefficients are, as Duncan (1966, p. 6) stated, "Nothing other than the beta coefficients in the regression set-up, and the usual apparatus for regression calculation may be employed."

Although the Simon-Blalock goodness-of-fit procedure is not a prerequisite for doing the path analysis (Shah, 1968), we employed the Simon-Blalock techniques in order to test our models in Phase I against some alternative models which might provide a better fit to the data.

Hypotheses

This study did not formally express and test hypotheses. Specific hypotheses generated by the models in the three countries were tested and evaluated only in their implication to the models. In other words, the hypotheses in this study functioned only in as far as they would point to the logical consistency or inconsistency of the predictions of the models given the limits of the data analyzed.

*Our analyses showed that this formula only gives a rough estimate of the path coefficient.

The aim of the statistical analysis was to assess the causal links between variables in terms of the amount of variation explained and strength of association rather than in terms of statistical significance. This is because a sample of more than 1,000 respondents will make almost any relationship, regardless of how weak it is, staistically significant.* Concentrating on sizable coefficients seems a more prudent approach, than paying attention to very small relationships simply because they were "statistically significant." Statistical significance, as Kish (1959, p. 336) had so well stated, does not stand in one-to-one relationship to practical and theoretical significance.

The analysis proceeded to a closer look at the relevant relationships by means of regression coefficients and partial and multiple correlations. Standardized beta weights or path coefficients and partial correlations are presented in a parallel fashion as a check on each other. In most cases, it will be seen that the differences between them are quite small. Both coefficients are included in the path models employed to present the best fitting system of relationships.** It is important to remember that the path model as developed by the geneticist Wright and employed recently by Duncan (1966) and others, only serves the heuristic purpose of facilitating a concise, effective presentation

---

*Sewell and others (1967, pp. 15-16) expressed the same view. Due to the nature of our analysis, statistical significance is assumed, not tested, in this study. The notion behind this argument is that before any two variables are causally related, they must be significantly related in the zero-order correlation sense.

**Causal models like the ones developed here include path coefficients (outside the parentheses) and partial correlation coefficients (in parentheses).

of a theoretical system when certain assumptions can be justified and when the system is of a causal, rather than of a correlational nature. The models to be presented here are causal models. They present the best fitting sequence of assymetric relationships between the variables in the light of available data.

Phase II Analysis

It has been pointed out that one must always make assumptions about the behavior of variables left out of a theoretical system if he is to make causal interpretations of his findings. In particular, we have been assuming that each dependent variable is completely determined by the independent variables explicitly brought into the system.

The Phase II analysis was an attempt to bring explicitly more variables into the system. As planned, the country which best approximated Lerner's (1958) modernization model at the individual level will be subjected to the second phase of the analysis. The main aim of the second phase was to extend the model by the introduction of four other variables, namesly: education, social participation, empathy, and need for achievement. The second phase of the anlysis follows the statistical procedure used in the first phase.

The results of the Phase I analysis are presented and discussed in Chapter IV. Chapter V describes the findings of the second objective of the study: the extension of the model as developed in Phase I.

CHAPTER IV

FINDINGS AND DISCUSSION: PART ONE

> It was the pressure of communications which brought about the downfall of traditional societies (Pye, 1963, p. 3).

PHASE I ANALYSIS: THE FOUR-VARIABLE MODEL

Figures IV-1, 2, and 3 show the zero-order intercorrelations of the four variables for the three countries of Brazil, India, and Nigeria:*

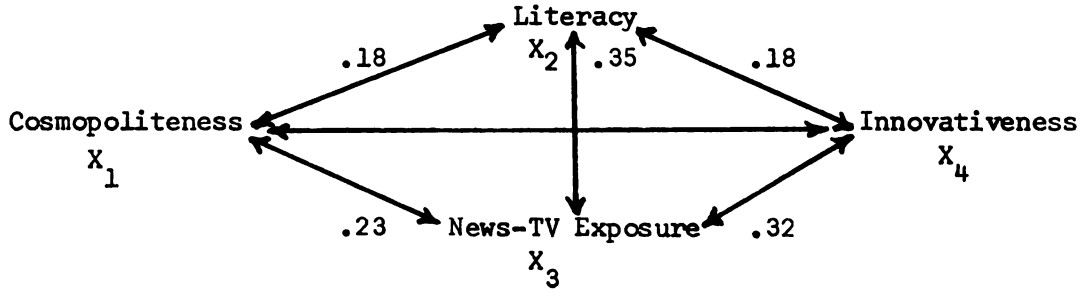


Figure IV-1. Intercorrelations of the Four Modernization Variables in Brazil.

---

*Figures on the arrows are zero-order (product-moment) correlations. The arrows are bi-directional in keeping with conventional practice in path analysis.

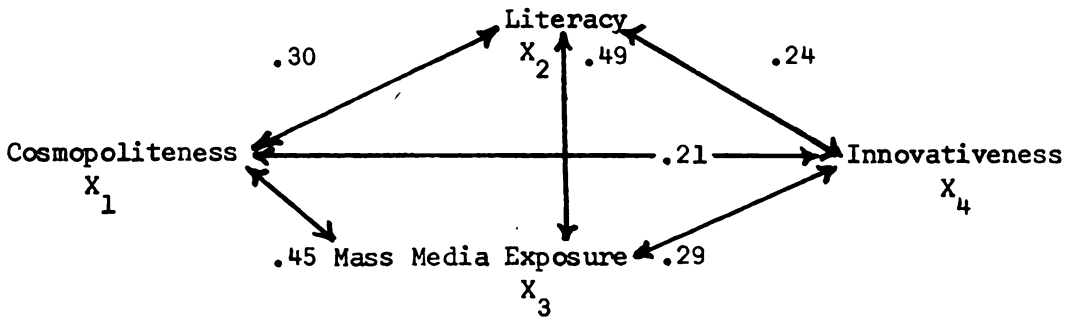


Figure IV-2. Intercorrelations of the Four modernization Variables in India.

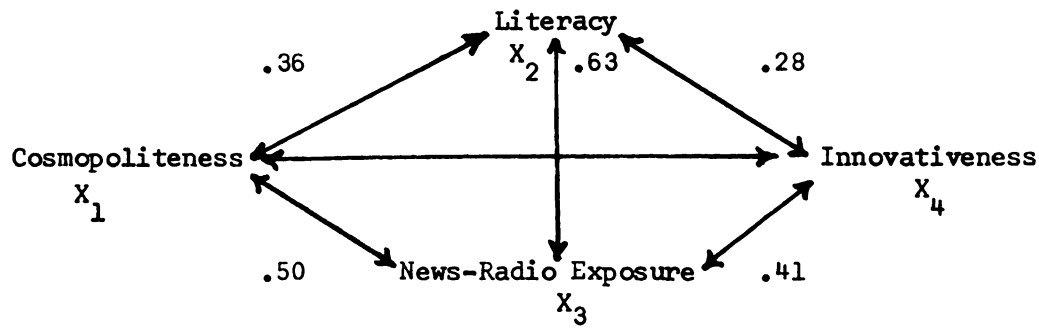


Figure IV-3. Intercorrelations of the Four Modernization Variables in Nigeria.

The data from Nigeria show stronger relationships among the four variables in the model, followed closely by the data from India. All the product-moment correlation coefficients are significant at the 5 percent level. The results of the factor analyses done separately

for each country suggest that only data from Nigeria and India would satisfy assumptions of linearity (see Tables IV-1 to IV-3). A major assumption in this statement is that the greater the relationship between two variables, the more likely that their relationship is linear.*

Table IV-1. Factor Loadings of Four Modernization Variables in Brazil.

Variable	Factor I=33%	Factor II=32%	H^2**
Cosmopoliteness	.0139	.8390	.70
News-TV Exposure	.7015	.3545	.77
Literacy	.8760	.0045	.62
Innovativeness	.2743	.6592	.51

Table IV-2. Factor Loadings of Four Modernization Variables in India.

Variable	Factor I=45%	Factor II=26%	H^2**
Cosmopoliteness	.7636	.0192	.58
Mass Media Exposure	.8202	.1890	.71
Literacy	.7218	.1909	.56
Innovativeness	.1529	.9812	.99

Table IV-3. Factor Loadings of Four Modernization Variables in Nigeria.

Variable	Factor I=48%	Factor II=28%	H^2**
Cosmopoliteness	.7940	-.0072	.63
News-Radio Exposure	.8078	.3929	.78
Literacy	.7782	.2186	.65
Innovativeness	.1616	.9682	.99

*See the Appendix for the scatter plots of means of the dependent variables across values of the independent variables. These scatter plots used raw scores.

**H^2 is a measure of communality shared by one varible with the rest of the variables in the input matrix. It is the proportion of variance explained by the two factors in the variable.

The three models in Figures IV-1 to IV-3 were subjected to path analyses. For example, in Brazil, to obtain the path coefficient between cosmopoliteness and literacy, and between cosmopoliteness and news-TV exposure, we do not control for any variable, as we hypothesized that cosmopoliteness causes literacy and news-TV exposure. In other words, we hypothesized that the best predictor of both literacy and mass media exposure is cosmopoliteness. In the three models, the direct effect of cosmopolitenss on innovativeness would be expressed in terms of highest (second-order) partial correlations as we have, in effect, hypothesized that cosmopoliteness affects innovativeness through mass media exposure and literacy, which serve as intervening variables. In relating literacy and innovativeness, the least squares formula should obtain $r_{42.3}$ and $b_{42.3}$. Similarly, at this point, we should control for literacy in relating mass media exposure to innovativeness. In other

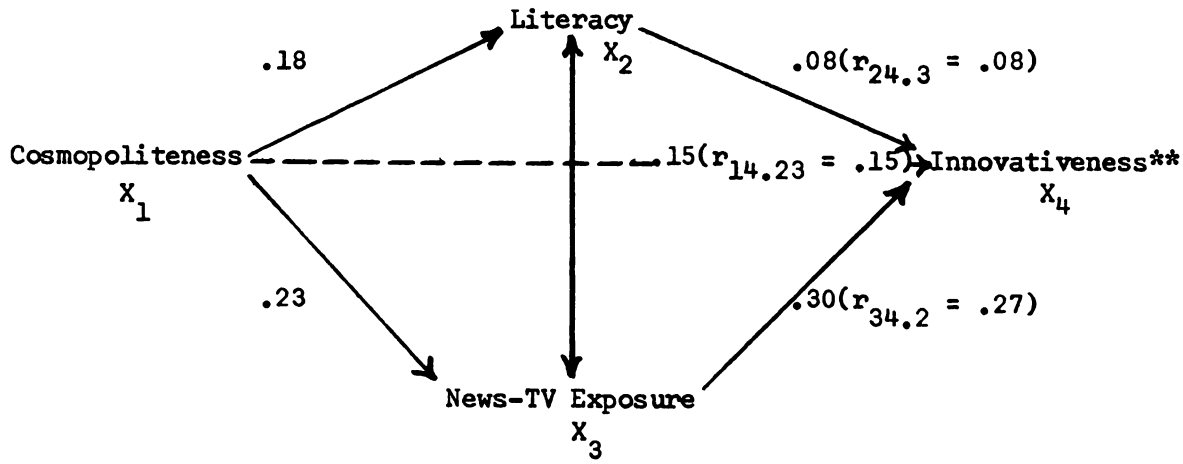


Figure IV-4. Path Analysis of Lerner's (1958) Model of Modernization in Brazil.

*Double-headed arrows indicate no causal relationship is hypothesized between two variables. Figures in parentheses are partial correlation coefficients while figures not in parentheses on the uni-directional arrows are path coefficients.

**The total variance explained in innovativeness by the three independent variables in Brazil is 13 percent.

words, except for the relationship between cosmopoliteness and literacy and between cosmopoliteness and mass media exposure, partial correlation analyses were used to determine the unique effects (or path coefficients) of the variables in the models.*

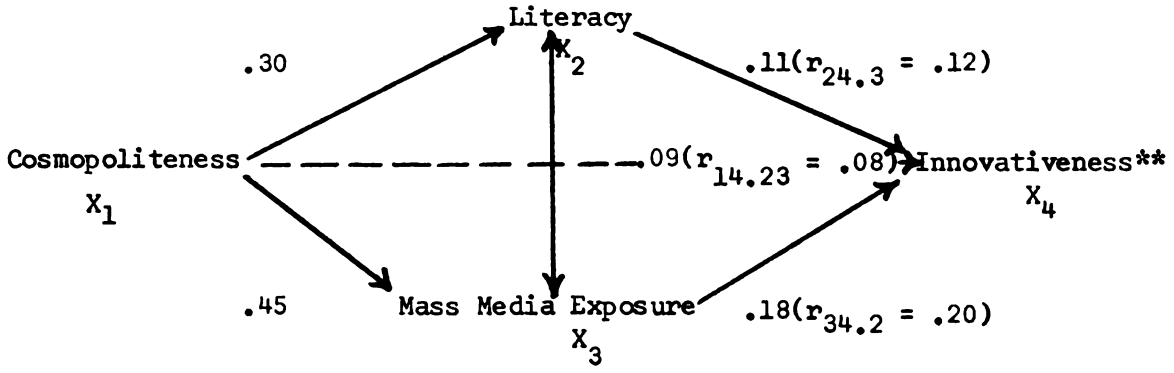


Figure IV-5. Path Analysis of Lerner's (1958) Model of Modernization in India.

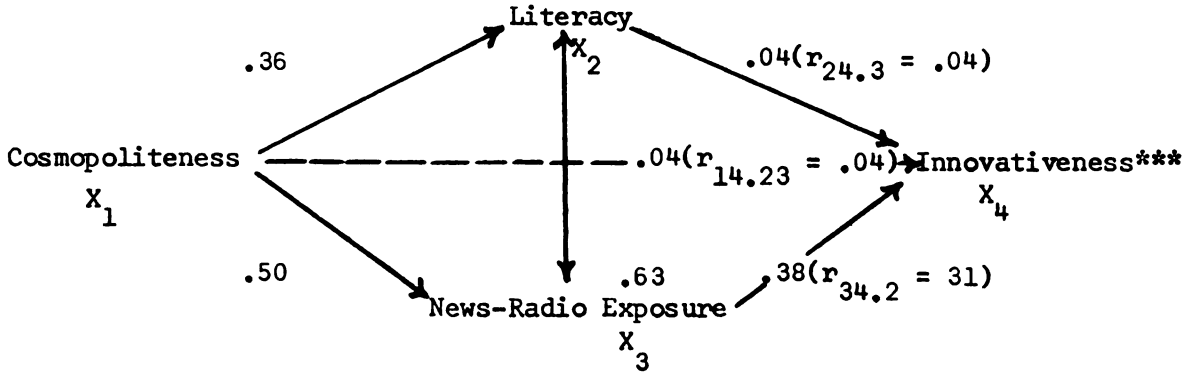


Figure IV-6. Path Analysis of Lerner's (1958) Model of Modernization in Nigeria.

*Double-headed arrows indicate no causal relationship is hypothesized between two variables. Figures in parentheses are partial correlation coefficients while figures not in parentheses on the uni-directional arrows are path coefficients.

**The total variance explained in innovativeness in India by the three independent variables is 11 percent.

***The total variance explained in innovativeness in Nigeria by the three independent variables is 17 percent.

Figures IV-4 to IV-6 show that cosmopoliteness does not have an equal magnitude of direct effects on both literacy and mass media exposure. The data from the three countries show that cosmopoliteness has stronger direct effect on mass media exposure than on literacy. Further, the effects of mass media exposure on innovativeness is greater than the effects of literacy on innovativeness. This is true for all countries in this study. As expected, the direct effect of cosmopoliteness on innovativeness is almost nil in India and Nigeria. In Brazil, however, there is a sizeable direct effect established between cosmopoliteness and innovativeness.

Testing Alternative Models

The results in Figures IV-4 to IV-6 suggest that some other alternative models might be more tenable in the light of available data. This entails testing the four-variable models as they now stand against other alternative models which may provide a better fit for the data. Table IV-4 summarizes the results of the Simon-Blalock analyses for all three countries.

Model 1a in the three countries suggests that there is no direct causal linkage between literacy and mass media exposure. This was not confirmed. On the contrary, it appears that there is a very strong causal link between these two variables. Model 1b suggests that there is no direct causal link between cosmopoliteness and literacy in the three countries. The success of Model 1b in the three countries suggests that the direction of causation is from cosmopoliteness to mass media

exposure to literacy. The findings in Model 1b in all three countries are consistent with the statement that cosmopoliteness is the prerequisite to widespread exposure to the mass media. Model 11a says that there is no direct causal link between mass media exposure and innovativeness. This was not supported in any of the three countries: all data show a very strong causal link from mass media exposure to innovativeness. Model 11b says that there is no causal link between literacy and innovativeness. This was supported in all three countries. This suggests that the causal path from literacy to innovativeness should be erased in all three countries. Further, it indicates that much of the effect of literacy on innovativeness is mediated by the mass media. Model 111 says that there is no direct causal link between cosmopoliteness and innovativeness, as this relationship is mediated by both literacy and mass media exposure. This was supported in India and Nigeria but not in Brazil. A direct causal link is established between cosmopoliteness and innovativeness in Brazil.

In summary, the results of the Simon-Blalock goodness-of-fit tests for alternative models could be presented diagrammatically in Figures IV-7 - IV-9.

Table IV-4. Prediction Equations for Goodness-of-fit Tests for a Communication Model of Modernization, Brazil, India, and Nigeria.*

Model	Prediction			Predicted	Actual	Difference
A. Brazil:						
1a. $r_{12} \times r_{13} = r_{23}$	.18	x .23	=	.04	.35	.31
1b. $r_{13} \times r_{23} = r_{12}$	.23	x .35	=	.08	.18	.10**
1c. $r_{12} \times r_{23} = r_{13}$	.18	x .35	=	.06	.23	.17
11a. $r_{23} \times r_{24} = r_{34}$	.35	x .18	=	.09	.32	.21**
11b. $r_{23} \times r_{34} = r_{24}$	.35	x .32	=	.11	.18	.07**
111b. $r_{13} \times r_{34} = r_{14}$	.23	x .32	=	.07	.22	.15
B. India:						
1a. $r_{13} \times r_{12} = r_{23}$	.45	x .30	=	.13	.49	.36
1b. $r_{13} \times r_{23} = r_{12}$	.45	x .49	=	.22	.30	.08**
1c. $r_{12} \times r_{23} = r_{13}$	.30	x .49	=	.15	.45	.30
11a. $r_{23} \times r_{24} = r_{34}$	.49	x .24	=	.12	.29	.17
11b. $r_{23} \times r_{34} = r_{24}$	.49	x .29	=	.14	.24	.10**
111. $r_{13} \times r_{34} = r_{14}$	.45	x .49	=	.13	.21	.08**
C. Nigeria:						
1a. $r_{13} \times r_{12} = r_{23}$	.50	x .36	=	.18	.63	.45
1b. $r_{13} \times r_{23} = r_{12}$	.50	x .63	=	.31	.36	.05**
1c. $r_{12} \times r_{23} = r_{13}$	.36	x .63	=	.23	.50	.22
11a. $r_{23} \times r_{24} = r_{34}$	.63	x .28	=	.18	.41	.23
11b. $r_{34} \times r_{23} = r_{24}$	.41	x .63	=	.26	.28	.02**
111. $r_{13} \times r_{34} = r_{14}$	.50	x .41	=	.20	.23	.03**

*Key to the variables in this table: 1 = cosmopoliteness; 2 = literacy; 3 = mass media exposure; and 4 = innovativeness.

**A good fit means that we can erase the causal linkage between these two variables in the system.

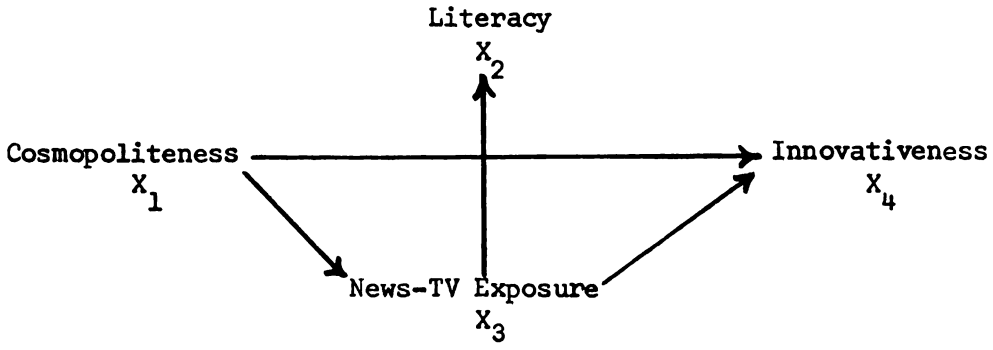


Figure IV-7. A Communication Model of Modernization in Brazil Showing Results of the Simon-Blalock Goodness-of-fit Tests.

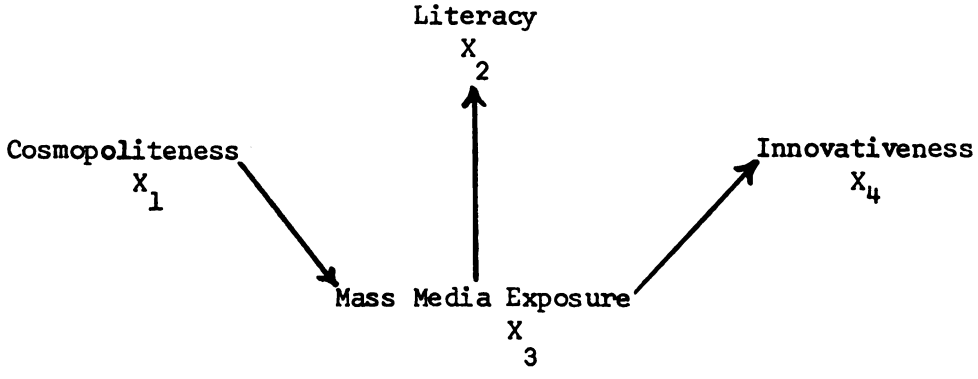


Figure IV-8. A Communication Model of Modernization in India, Showing Results of the Simon-Blalock Goodness-of-fit Tests.

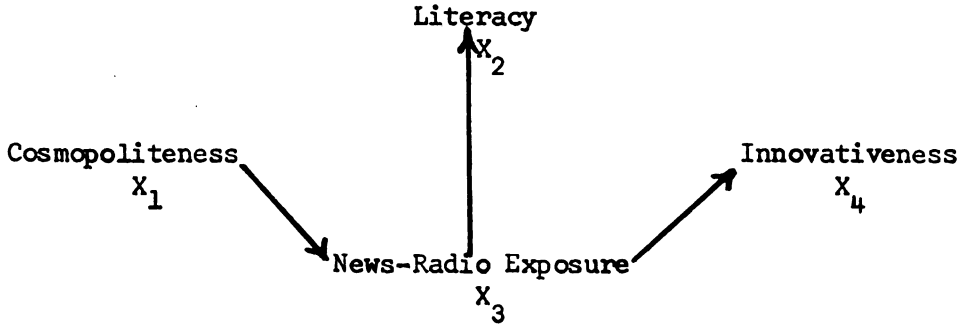


Figure IV-9. A Communication Model of Modernization in Nigeria, Showing Results of the Simon-Blalock Goodness-of-fit Tests.

Figures IV-7 to IV-9 show that cosmopoliteness is a prerequisite to extensive mass media exposure, which in turn increases both literacy and innovativeness. Also, in the case of Brazil, there is a direct effect of cosmopoliteness on innovativeness, contrary to the predictions of Figure IV-1. Recall that our models predicted that there is no direct causal link between cosmopoliteness and innovativeness in all three countries. This finding in Brazil suggests that the causal sequence is from cosmopoliteness directly to innovativeness.

It would seem that the data from the three countries do not support Lerner's (1958) model of modernization when tested against other alternative models. It must be remembered, however, that the Simon-Blalock procedure only enabled us to eliminate other alternative models in the sense that these alternative models did not fit the data from the three countries. The final acceptance or rejection of these causal models in Figures IV-7 to IV-9 rests upon the satisfaction of certain prediction equations which these models imply. Thus, in the path analytic procedure, certain variables were explicitly treated as intervening variables between an hypothesized "earlier" variable (e.g., cosmopoliteness) and an hypothesized "later" variable (e.g., innovativeness) in the system.

A series of prediction equations generated by the three models (Figures Ix IV-7 to IV-9) in the three countries were tested, with India and Nigeria drawing similar predictions because their results in the Simon-Blalock tests were similar. Following is a summary of the prediction equations in the three countries (Table IV-5).

Table IV-5. Summary of Prediction Equations Generated by the Three Communication Models of Modernization, After the Simon-Blalock Procedure in Brazil, India, and Nigeria.

Country/Equation	Path Coefficient Predicted	Path Coefficient Actual	Partial R	Variance Explained
A. Brazil:				
1. b_{31}**	≠ 0	.23		
2. $b_{21.3}$***	= 0*	.10	.10	
3. $b_{23.1}$	≠ 0	.32	.32	.13
4. $b_{32.1}$	= 0*	.31	.32	.15
5. $b_{42.3}$	= 0*	.07	.07	.13
6. $b_{41.3}$	≠ 0	.17	.17	.08
7. b_{43}	≠ 0	.32	.32	
B. India:				
8. b_{31}	≠ 0	.45	.45	
9. $b_{21.3}$	= 0*	.10	.10	
10. $b_{23.1}$	≠ 0	.44	.41	.25
11. $b_{32.1}$	= 0*	.39	.41	.34
12. $b_{41.3}$	= 0*	.10	.10	.09
13. $b_{42.3}$	= 0*	.11	.12	.10
14. b_{43}	≠ 0	.29	.29	
C. Nigeria:				
15. b_{31}	≠ 0	.50	.50	
16. $b_{21.3}$	= 0*	.07	.07	
17. $b_{23.1}$	≠ 0	.60	.57	.41
18. $b_{32.1}$	= 0*	.52	.56	.48
19. $b_{41.3}$	= 0*	.03	.05	.17
20. b_{43}	≠ 0	.41	.41	
21. $b_{42.3}$	= 0*	.04	.04	.17

*Beta weights and partial correlations should be equal to zero, subject to sampling error.

**Should be read: "direct effect of cosmopoliteness on mass media exposure"

***Should be read: "direct effect of cosmopoliteness on literacy controlling on mass media exposure."

Except for equation 18, all the predictions generated by the model in Nigeria were met (in Table IV-5). Contrary to the predictions, the results of equation 18 show that literacy also affects mass media exposure. On the other hand, equations 2, 4, 9, 12, and 13 in Brazil and India did not meet the predictions of their respective models. It appears that in Brazil and India, there is a direct, but almost negligible, causal link between cosmopoliteness and literacy after controlling for mass media exposure (equations 2 and 9, respectively). The results of equations 4 and 11 suggest that the causal arrows could also be from literacy to mass media exposure in Brazil and India. Recall that a similar finding was shown in Nigeria. Further, in the case of India, equation 13 shows that there is a direct, though relatively weak effect of literacy on innovativeness, even after controlling on mass media exposure.

In summary, a number of predictions generated by the models for Brazil and India (Figures IV-7 to IV-8) were not supported. Only one prediction in Nigeria was not supported, but this involved the crucial relationship between literacy and mass media exposure. Our findings suggest a strong interdependent relationship between literacy and mass media exposure in the three countries. In other words, we cannot say that the causal direction <u>is</u> from mass media to literacy. Recall that our measures of mass media exposure tended to overleap illiteracy barriers. This might be one reason why the role of literacy in this study is limited.

The finding on literacy and mass media exposure does not do violence to Lerner's (1958) model. However, the finding that cosmopoliteness has direct consequences for innovativeness requires that we take this variable into account in relating either literacy or mass media exposure to innovativeness in Brazil. This also means that we have to re-state the prediction equation for innovativeness in Brazil. Thus, second-order partial correlation analysis was used in relating the three variables, cosmopoliteness, literacy and mass media exposure to innovativeness in Brazil. The equations for India and Nigeria remain essentially the same in regard to innovativeness. Therefore, we are back to Lerner's model with some modifications.

Figures IV-10 to IV-12 show the modified versions of the communication models in the three countries.* Specifically, while at first, we hypothesized that cosmopoliteness causes literacy and mass media exposure, the three modified models show that cosmopoliteness causes mass media exposure while no causal relation is hypothesized between cosmopoliteness and literacy. Hence, the curved double-headed arrow between these two variables. Mass media exposure and literacy are hypothesized to be interdependently related, suggesting support for Lerner's formulations on these two variables.

---

*Figures on arrows outside the parentheses are path coefficients. Figures in parentheses are partial correlation coefficients.

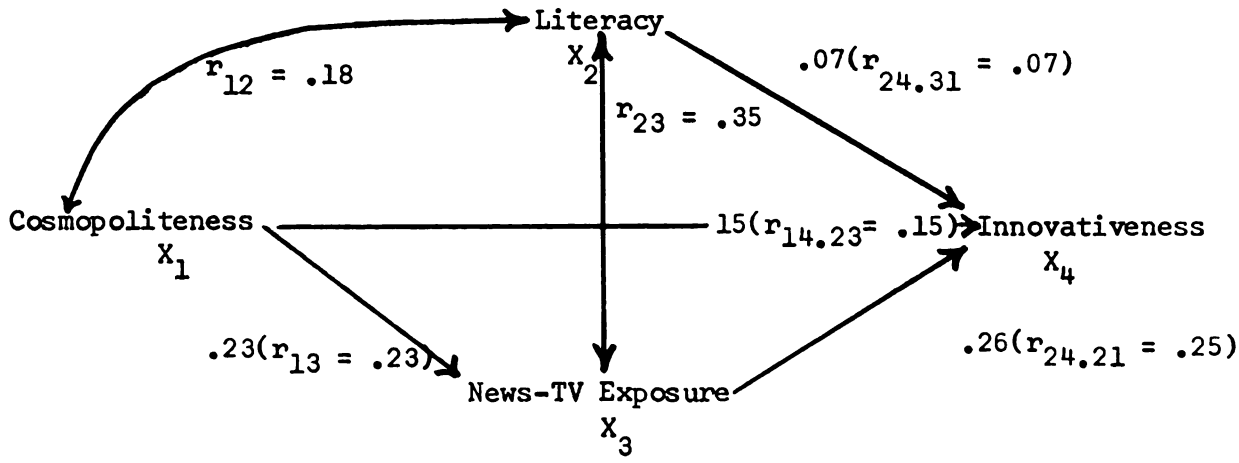


Figure IV-10. A Modified Communication Model of Modernization in Brazil Showing Path Coefficients and Partial Correlations After the Simon-Blalock Procedure.

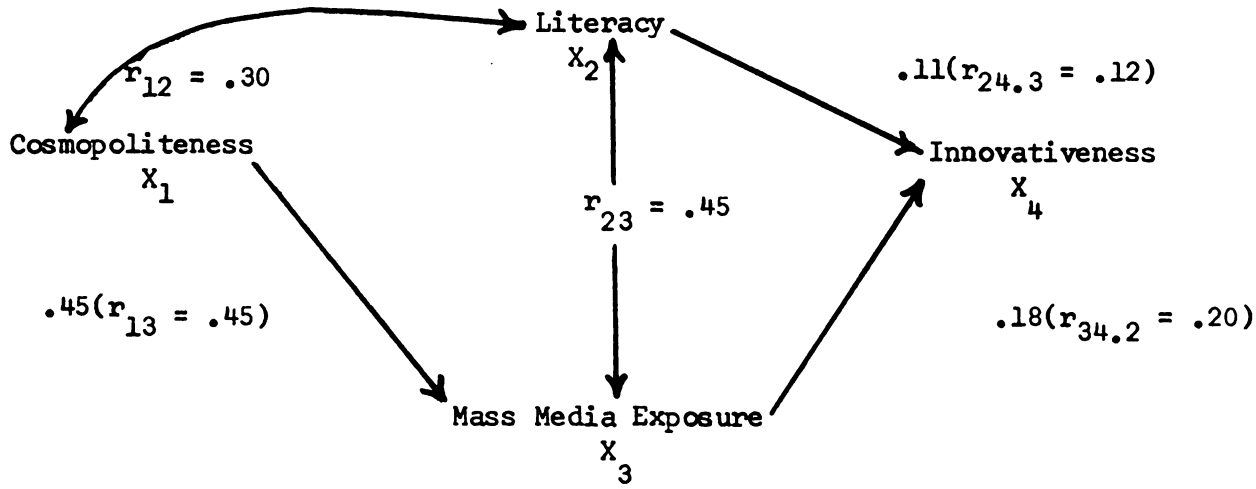


Figure IV-11. A Modified Communication Model of Modernization in India Showing Path Coefficients and Partial Correlations after the Simon-Blalock Procedure.

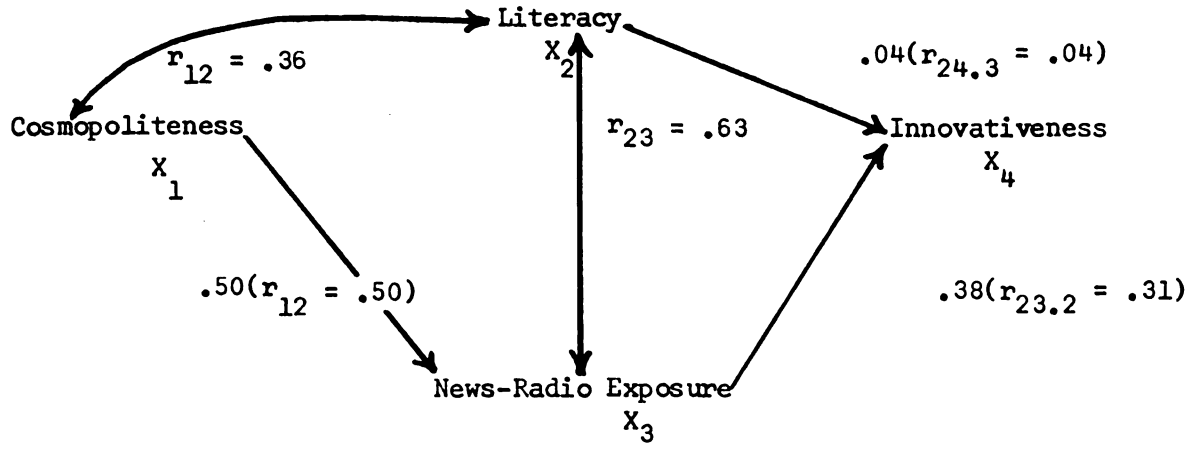


Figure IV-12. A Modified Communication Model of Modernization in Nigeria Showing Path Coefficients and Partial Correlations after the Simon-Blalock Procedure.

DISCUSSION

Partial support for Lerner's (1958) modernization model was obtained from data gathered from individuals in Brazil, India, and Nigeria. While Lerner was not able to assess the relative effectiveness, and therefore importance, of his modernization variables, our present analyses suggest that mass media exposure plays a central role in the individual's modernization process. Literacy's role in directly affecting an individual's innovativeness seems negligible. This seems contrary to Lerner's (1964, p. 64) formulation of the role of literacy, when he said:

> Literacy is indeed the basic personal skill that underlies the whole modernizing sequence.... The very act of achieving formal control over a formal language gives people access to the world of vicarious experience.

The interdependent relationship between mass media exposure and literacy strongly suggested by the present study lends partial support to Lerner's (1958) formulations. Apparently, literacy is not just a necessary condition for print media exposure; literacy is also developed and spread by exposure to the mass media. Recall that our measures of mass media exposure explicitly tapped, among others, the number of newspapers the individual had others read to him. Therefore, the argument that one is literate first before he gets exposed to the mass media (especially the printed page) may not be true in this study.* As Lerner (1964, p. 62) said: "...Literacy supplies media consumers who stimulate media production, thereby activating the reciprocal relationships whose consequences for modernization we have already noted."

The whole question of what it was in the mass media which made it so causally linked to innovativeness in our study could perhaps be partly answered by our measures of these two variables. We have measures which explicitly measured an individual's exposure to agricultural radio, agricultural newspapers, and agricultural pamphlets, and bulletins. This is true, at least in part, in all three countries. That mass media exposure therefore should have a causal link with agricultural innovativeness in the present study should only be logical.

In this phase, urban contacts lead to predictable consequences. The peasant farmer gets exposed to the mass media, further developing

---

*Deutschmann (1962, p. 13) found among his Colombian respondents that even illiterates have access to print media because they let the literate members of their families read to them.

his literacy levels which, in turn, equips him to gain further access to the mass media. Exposure to the mass media leads to agricultural innovativeness.

It would appear that our translation of Lerner's (1958) model from the aggregate to the individual level has done violence to the same model we sought to test. First, when we went to the individual level in our analysis, the correlations among the variables may have been lowered compared to what they would be in the aggregate. Notice that most of the correlations among the variables in the study reviewed on the aggregate level were very much higher than what we would normally except of the same variables in the individual level.* This might partly explain why Lerner's (1958) model did not "work" as we expected at the individual level. Second, our variable equivalent for Lerner's (1958) urbanization is cosmopoliteness. Urbanization was measured by Lerner in terms of the proportion of a nation living in cities over 50,000. We measured cosmopoliteness in the present study (although we defined it as an attitudinal component of modernization) in terms of number of trips to urban centers. Some scholars would call this merely physical mobility or physical contacts with urban centers. While our previous argument on the role of cosmopoliteness or, in this case, physically mobility to urban centers in the modernization process

---

*For example, work presently being done in India and Nigeria on "systems" variables which are aggregated measures of individual characteristics within villages showed very high intercorrelations of these "systems" variables but relatively low intercorrelations of the same variables at the individual level.

may not be seriously questioned, saying that urbanization and cosmopoliteness are functional equivalents might be erroneous. To the extent that this is true, we can partly explain why Lerner's (1958) model was not wholly supported. Third, as mentioned earlier, our measures of mass media exposure, which tended to overleap illiteracy barriers even in the print media, might have a limiting effect on the function of literacy in the modernization process. As a result, the role of literacy in terms of direct effects on innovativeness may have been curtailed.

Finally, consider the question of model equivalence. This was implied by the first three reasons. Recall that we proposed a conceptual model equivalent at the individual level of Lerner's aggregate-level model of modernization. We tested the model equivalent. Operationally, the two models are different in terms of the measures involved. We have reason to believe, however, that the two models are conceptually similar. Our present findings which gave partial support to Lerner's formulation indicate support for the presence of conceptual equivalence. We are inclined to attribute differences in findings to differences in the operationalizations, among others. The findings in the Phase II analysis (next chapter) which give added partial support to Lerner's formulations further support our argument.

SUMMARY

Following are the findings of our Phase I analyses of data from Brazil, India, and Nigeria.

1. Lerner's (1958) model of modernization on the aggregate level was at best partially supported at the individual level.

2. An interdependent relationship was suggested between mass media exposure and literacy, thus lending support to Lerner's (1964, p. 64) formulation regarding these two variables. Limitations stemming from our data-collection procedures and statistical analyses prevented us from confirming this relationship.

3. A direct causal path was found between cosmopoliteness and innovativeness in Brazil. However, this is relatively weaker than the direct causal link established between mass media exposure and innovativeness in the same country.*

4. In India and Nigeria the main causal sequence of the four modernization variables was from cosmopoliteness to mass media exposure to innovativeness. As suggested earlier, literacy has an interdependent relationship with mass media exposure.

5. No causal relationship is posited between cosmopoliteness and literacy in the three countries.

6. It would seem that peasants have to be increasingly oriented toward the urban center before they get exposed to the mass media. Since the mass media generally originate from the urban centers, peasants' physical mobility toward urban centers abets exposure to the mass media. Further, since the mass media contents are generally pro-change in nature (as in this study), this exposure leads to innovativeness.

---

* The new recursive equations that best fit the data in Brazil, India, and Nigeria may be rewritten as:

A. Brazil:

$$X_1 = e_1$$

$$X_2 = e_2 \qquad (2.1)$$

$$X_3 = b_{31}X_1 + e_3$$

$$X_4 = b_{41.23}X_1 + b_{42.13}X_2 + b_{43.12}X_3 + e_4$$

B. India and Nigeria:

$$X_1 = e_1$$

$$X_2 = e_2 \qquad (2.2)$$

$$X_3 = b_{31}X_1 + e_3$$

$$X_4 = b_{42.3}X_2 + b_{43.2}X_3 + e_4$$

CHAPTER V

FINDINGS AND DISCUSSION: PART TWO

> In the oral, traditional society, the provisions for wide-horizon communication are inefficient: the traveler and ballad singer come too seldom and know too little. A modernizing society required mass media (Schramm, 1963, p. 38).

PHASE II ANALYSIS: AN EXTENSION OF THE MODEL IN NIGERIA

In Chapter IV, we found that mass media exposure plays a very important role in the modernization process. It intervenes in the relationship between cosmopoliteness and innovativeness. Literacy was important in-so-far as it has an interdependent relationship with mass media exposure. This relationship between these two variables was strongly suggested by our earlier analyses. Our data showed that the direct effects of literacy on innovativeness was almost negligible.

The present chapter will describe the results of attempts to extend the four-variable model in Nigeria. There are several reasons for selecting Nigeria as the country where we extended the model. First, assumptions of linearity in our analyses were perhaps satisfied best in Nigeria as could be inferred from the relationships among the variables and the scatter plots (See Appendix). Second, we lack time measures of innovativeness in India. Third, overall, the data from

Nigeria seemed to have given the most support for Lerner's model when tested through path analysis (in the previous chapter).

The four other variables explicitly brought into the system were: education, empathy, need for achievement, and social participation. There is enough research evidence to suggest that these variables are indeed highly related to innovativeness, and consequently, modernization.*

Table V-1 presents the intercorrelation matrix of the eight modernization variables in Nigeria.

Table V-1. Intercorrelation Matrix of the Eight Modernization variables in Nigeria.

Variable	Literacy	Mass Media Exposure	Innovativeness	Education	Empathy	N-Ach	Social Participation
Cosmopoliteness	.36	.50	.23	.41	.33	.22	.29
Literacy		.63	.28	.70	.38	.21	.21
Mass Media Exposure			.41	.60	.44	.26	.33
Innovativeness				.32	.16	.16	.22
Education					.39	.20	.29
Empathy						.18	.26
Need for Achievement							.11

*Waisanen (1968) for example, reported that when indicants of modernization are plotted on the Y axis against education as the independent variable, he noticed that the indicators of modernization arise sharply from four to six years of education. Lerner (1958) said that the development of empathy arising from literacy and exposure to the mass media is another important variable in the modernization process. Need for achievement was espoused by McClelland (1961). Social participation is a composite index of membership in organizations- and being officers of organizations. This, in effect, is broader in scope than Lerner's (1958) measure of political participation (voting).

All the correlation coefficients are significant at the 5 percent level. As may be expected, the highest correlation between any two variables was between literacy and education. The first six variables, i.e., cosmopoliteness, literacy, mass media exposure, innovativeness, education, and empathy, are very highly related with each other. They largely form the first dimension in the factor analysis of eight modernization variables presented in Table V-2.

Table V-2. Factor Loadings of the Eight Modernization Variables in Nigeria.

Variable	Factor I = 40%	Factor II= 14%	H^2
Cosmopoliteness	.5991	.2755	.43
Literacy	.8046	.0639	.65
Mass Media Exposure	.8190	.2100	.71
Innovativeness	.4487	.2694	.27
Education	.8242	.0346	.68
Empathy	.6168	.1106	.39
N-Ach	.0976	.9623	.94
Social Participation	.4958	.0623	.25

The Suggested Causal Ordering of Variables

The suggested causal ordering of the eight modernization variables in this phase will be outlined briefly. Cosmopoliteness is the first variable in our causal ordering since no other variable is conceptualized as being prior to urban contacts. At the opposite end, innovativeness is the last variable in the causal ordering as it represents the behavioral indicator of change to be "explained" by the path model. We found earlier that mass media exposure intervenes

in the relationship between cosmopoliteness and innovativeness. We conceptualize mass media exposure in Phase II as a direct consequence of urban contacts. That is, in the model, no other variable should affect mass media exposure. We will not posit a causal relationship among mass media exposure, literacy, and education. Recall that our Phase I analyses suggested an interdependent relationship between mass media exposure and literacy. Lerner (1964, pp. 48-49) saw the origin of empathy in urban living and exposure to the mass media. Similarly, Rogers (1968, p. 19) found that empathy and need-achievement were two of the consequences of mass media exposure among Colombian peasants. Social participation is conceptualized in this phase as a consequence of urban contacts, mass media exposure, literacy, education, and empathy.

In summary, the general causal ordering of variables in this phase is hypothesized as:

X_1 = Cosmopoliteness

X_2 = Mass media Exposure

X_3 = Literacy

X_4 = Education

X_5 = Empathy

X_6 = Need-Achievement

X_7 = Social participation

X_8 = Innovativeness

The predictive equations for the hypothesized relationships among the variables are:

$$X_1 = e_1$$

$$X_2 = b_{21}X_1 + e_2$$

$$X_3 = e_3 \qquad (3.1)$$

$$X_4 = e_4$$

$$X_5 = b_{51.234}X_1 + b_{52.134}X_2 + b_{53.124}X_3 + b_{54.123}X_4 + e_5$$

$$X_6 = b_{62}X_2 + e_6$$

$$X_7 = b_{71.2345}X_1 + b_{72.1345}X_2 + b_{73.1245}X_3 + b_{74.1235}X_4 + b_{74.1235}X_4 + b_{75.1234}X_5 + e_7.$$

$$X_8 = b_{82.7}X_2 + b_{87.2}X_7 + e_8$$

Equation 1 says that cosmopoliteness is not caused by any of the variables in the system. Equation 2 says that mass media exposure is the direct consequence of urban contacts. Equations 3 and 4 show that literacy and education are not caused by any variable in the system. Equation 5 says that empathy is caused <u>jointly</u> by cosmopoliteness, mass media exposure, literacy, and education. The terms for the partial correlations indicate that we are going to obtain the <u>unique</u> effects of these "independent" variables on the "dependent variables" in the system. Equation 7 shows that social participation is caused jointly by cosmopoliteness, mass media exposure, literacy, education, and empathy. Again, notice the partial correlation terms in the equation.

Equation 8 says that innovativeness is caused jointly by mass media exposure and social participation. Figure V-1 shows the diagrammatic representation of the proposed relationships among the eight modernization variables in Nigeria.*

A series of predictions implied by the model in Figure V-1 were tested. For example, since we do not have a direct causal path between cosmopoliteness and innovativeness, the partial correlation between these two variables controlling on mass media exposure and social participation should be approximately zero. The corresponding beta weight should also be zero, subject to sampling error. Further, since there is no direct effect indicated from cosmopoliteness to need-achievement, the partial correlation between these two variables controlling on mass media exposure should also be zero, subject to sampling error. Table V-3 presents the summary of tests of predictions generated by the model in Figure V-1.

---

*A "round-by-round" multiple correlation analysis run on these variables such that each variable is predicted by all the other variables in the system served as an approach in studying all the possible relationships among the variables. This approach enabled us to identify variables which co-vary appreciably. It would be noticed, however, that the nature of our analysis and theoretic formulations would not accommodate all the possible relationships implied in Appendix D. For example, our theory says that mass media exposure should lead to innovativeness. Therefore, we set the regression of mass media exposure in innovativeness in our model equal to zero. Also, our measures almost precludes the possibility of empathy "causing" mass media exposure in this study. Therefore, we also set the regression of mass media exposure on empathy equal to zero.

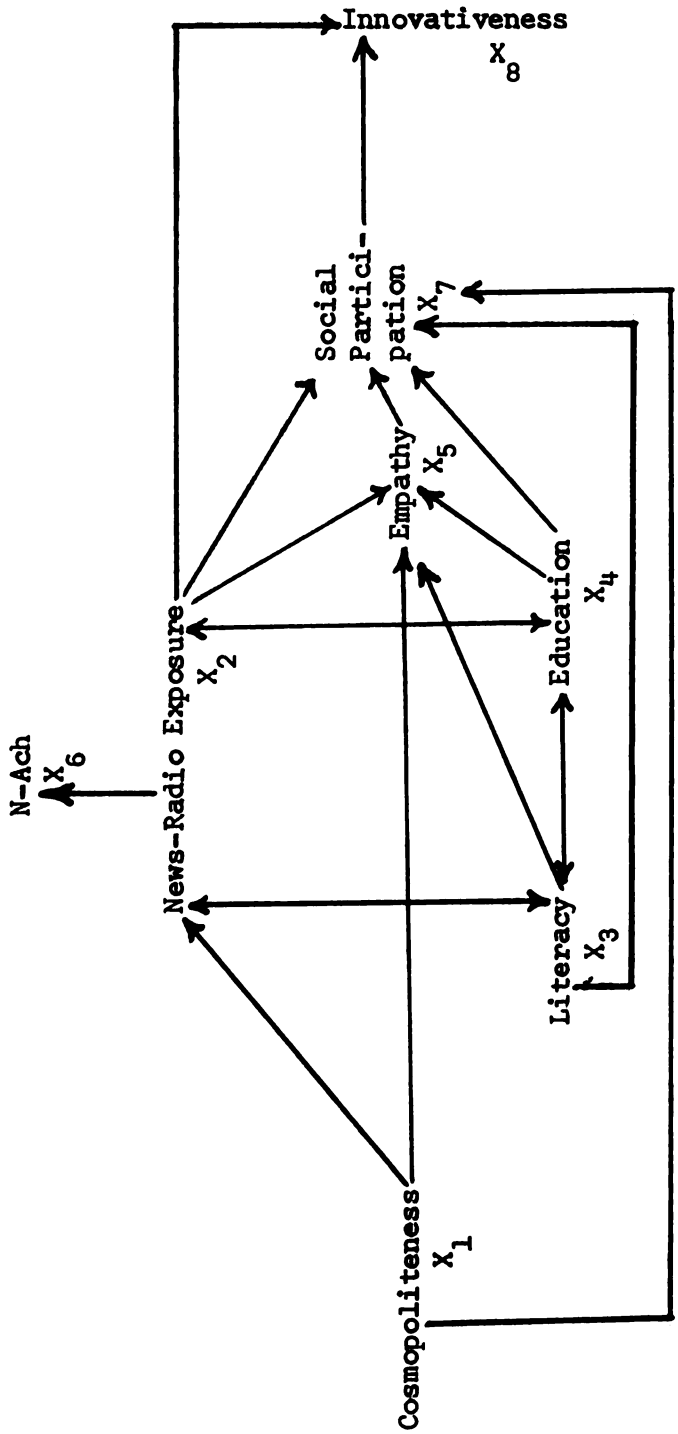


Figure V-1. Diagrammatic Representation of the Proposed Relationships Among the Eight Modernization Variables in Nigeria*

*Double-headed arrows indicate no causal relationships had been hypothesized between variables.

Table V-3. Summary of Partial Correlation Results as Tests of the Predictions Generated by the Model in Figure V-1.*

Equation	Beta Weight		Partial	Variance	
	Predicted	Actual	R	Explained	R
1. $b_{61.2}$	= 0**	.13	.11	.08	.28
2. $b_{63.2}$	= 0**	.08	.07	.07	.27
3. $b_{64.2}$	= 0**	.02	.02	.07	.27
4. b_{21}	≠ 0	.50	.50		
5. $b_{51.234}$	≠ 0	.12	.12		
6. $b_{52.134}$	≠ 0	.24	.19	.23	.48
7. $b_{53.124}$	≠ 0	.12	.09		
8. $b_{54.123}$	≠ 0	.11	.08		
9. $b_{71.2345}$	≠ 0	.14	.13		
10. $b_{72.1345}$	≠ 0	.19	.14		
11. $b_{73.1245}$	≠ 0	-.11	-.08	.16	.40
12. $b_{74.1235}$	≠ 0	.16	.11		
13. $b_{75.1234}$	≠ 0	.11	.10		
14. $b_{81.27}$	= 0**	.02	.02		
15. $b_{82.7}$	≠ 0	.37	.36		
16. $b_{83.27}$	= 0**	.04	.04		
17. $b_{84.27}$	= 0**	.02	.02	.18***	.42
18. $b_{85.27}$	= 0**	.03	.03		
19. $b_{87.2}$	≠ 0	.10	.10		
20. $b_{86.27}$	= 0**	.06	.06		

*Key to the table: 1 = cosmopoliteness; 2 = mass media exposure; 3 = literacy; 4 = education; 5 = empathy; 6 = N-ach; 7 = social participation, and 8 = innovativeness.

**Should be equal to zero, subject to sampling error.

***The total variance explained in innovativeness by both mass media exposure and social participation in innovativeness is 18 percent. Cosmopoliteness, need-achievement, literacy, education, and, empathy do not significantly add to the predictability of innovativeness in Nigeria (see Appendix D).

Only one prediction was not met by the model in Figure V-1. Our analysis show that the unique effect of cosmopoliteness on need-achievement controlling on mass media exposure is .13 with a partial correlation of .11 (equation 1 in Table V-3). A somewhat unexpected finding, however, deals with the relationship between literacy and social participation. It appears that the unique effect of literacy on social participation is negative ($b_{73.1245} = -.11$; $r_{73.1245} = -.08$).

Only social participation and mass media exposure have direct effects on innovativeness. Further analyses show that there is a sizeable unique effect of mass media exposure on innovativeness even after a fourth-order partial correlation controlling on education, literacy, empathy and social participation ($b_{82.3457} = .33$; $r_{82.3455} = .24$). This finding indicates that the effect of mass media exposure on innovativeness is not dependent on increases in the other four variables. Recall that the zero-order correlation between mass media exposure and innovativeness is .41.

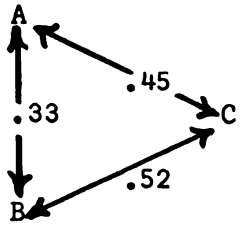
The finding that cosmopoliteness also affects an individual's need-achievement has direct consequences on the computation of path coefficients between cosmopoliteness and need-achievement and between mass media exposure and need-achievement. Thus, originally, we hypothesized that the sole cause of need-achievement was mass media exposure. A recomputation of the path coefficient between mass media exposure and need-achievement involves partialling out the effects of cosmopoliteness. Similarly, when we compute the path coefficient from cosmopoliteness to need-achievement, we should control on mass media exposure.

The new prediction equation for need-achievement is therefore rewritten as:

$$X_6 = b_{61.2}X_1 + b_{62.1}X_2 + e_6$$

All the other prediction equations remain the same as the data s how a good fit for the hypothesized model. Figure V-3 shows the modified model with the recomputed partial correlations and path coefficients.

At this point, we warn the reader about the problem we met especially in Phase II analysis.* The problem could be summarized in Figure V-2.



$r_{ac.b} = .34 \quad r^2 = .12$

$r_{bc.a} = .44 \quad r^2 = .19$

Total partial $r^2 = .31$

$R^2_{c.ab} = .35$

Figure V-2. Set-up of the Problem Met in the Present Study (Figures on Arrows are Zero-Order Correlation Coefficients).

*Kamerschen (1968) and Sewell and others (1967, pp. 17-18) addressed themselves to this question in their studies using path analysis.

Two independent variables "A" and "B" are each highly related to the dependent variable "C" and are also highly related to each other. Employing any system of analysis based on partial correlations or partial beta coefficients (Path coefficients), we will ascertain the effects of "A" on "C" controlling for "B" and the effects of "B" on "C" controlling for "A". When we compute these partials or beta weights, we are ascertaining the effects that the unique influences that "A" and "B" have on "C". By computing partials or beta weights, we are preventing the common variance of "A" and "B" to exercise its effects on "C". This can be seen clearly in the fact that while the multiple correlation (squared) in Figure V-2 amounts to about .35, the sum of the squared partials comes only to .31. Clearly, something is lost in the process. The higher the correlation among the independent variables (e.g., mass media exposure, literacy, education, and cosmopoliteness), the greater the amount of variance shared by them, and thus, the greater the underestimation of the unique effects of each independent variable on the dependent variable.*

No satisfactory solution was provided by Sewell and others (1967) and Kamerschen (1968) to this problem. It is therefore important for the reader to bear in mind that the unique influences of the variables indicated in Figure V-3, while they may be representative in relative magnitude, may be underestimated.

---

*As more and more independent variables are added in the prediction equation, this becomes less of a problem as there comes a point when the sum of the squared partials would exceed the multiple correlation.

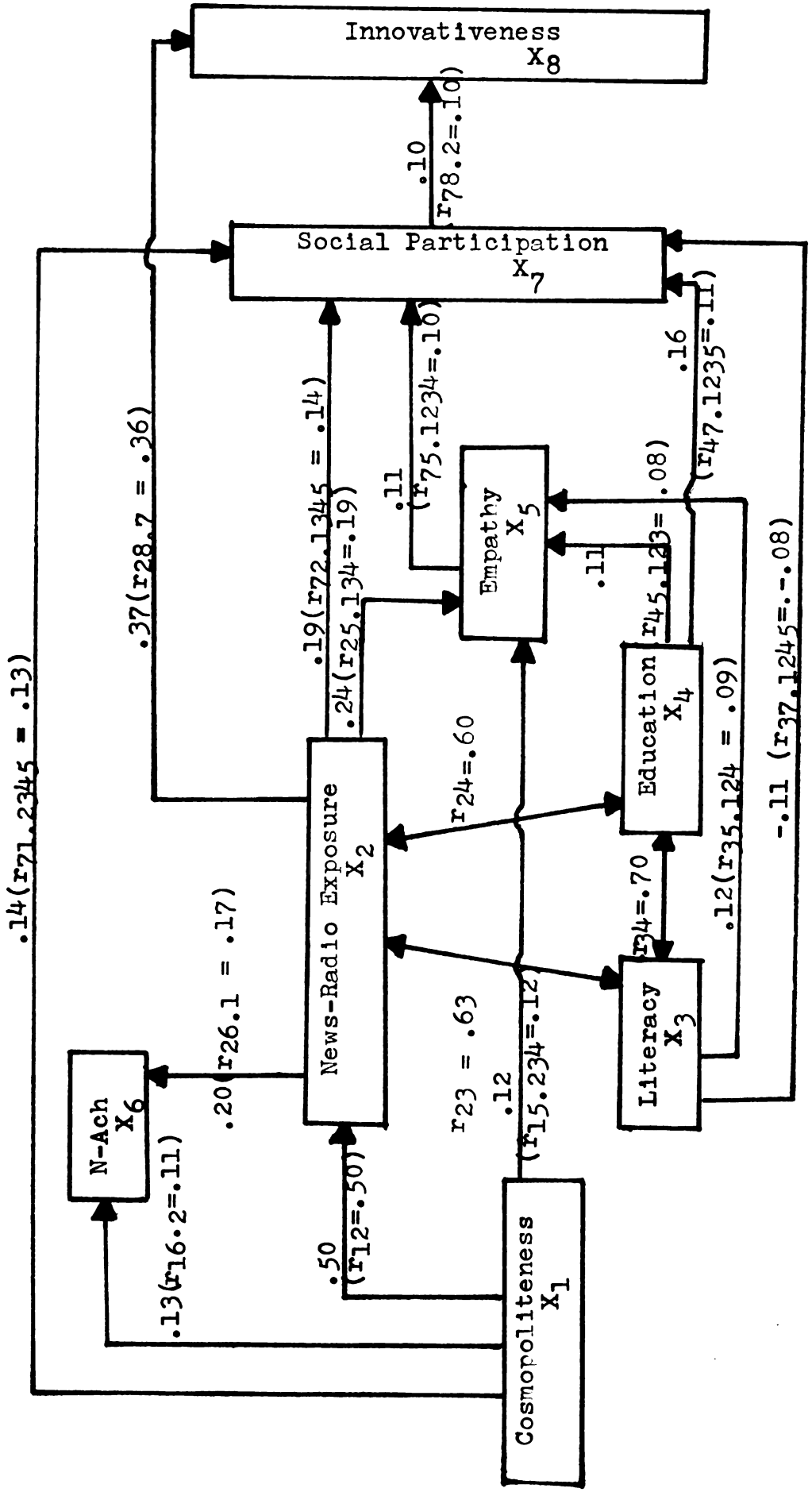


Fig. V-3. A Communication Model of Modernization in Nigeria Showing Recomputed Path Coefficients and Partial Correlations*

*Figures outside the parentheses are path coefficients. Figures in parentheses are zero-order or partial correlation coefficients. Bi-directional arrows indicate no causal hypotheses.

DISCUSSION

If we picture a relatively closed social system like the peasant village, we can say that change, if it is to occur more rapidly, has to come from external influences. These external influences may impinge on the individual in two forms: (1) either peasants travel out of their village and come in contact with new ideas through other people in urban centers and return to introduce change, and/or (2) external influences, either personal (e.g., the change agent) or impersonal (the mass media), could come to the village and introduce change.* In the causal model we developed, we treated these outside influences explicitly in the form of urban contacts and the mass media of communication, newspaper and radio exposure. We argued that the individual's physical and psychological or vicarious contacts with another social system would create an awareness on his part of some other alternative forms of behavior which he could later adopt or reject.

The relative positions of cosmopoliteness and news-radio exposure in the whole modernizing sequence (Figure V-3) suggest a diffusion-process answer to the problem we raised earlier. Recall, too, that we argued earlier that unless there is communication from external sources, little change can be expected in peasant's knowledge, attitude and behavior. The role of cosmopoliteness in the whole modernizing sequence hypothesized in this study seems to be essentially that of

---

*A major notion in this argument is that village norms work essentially in the service of status-quo.

providing the "triggering" mechanism for change. In our conceptualization, the peasant farmer must get exposed to alternative ways of living and behaving if change is to occur. Urban contacts represent a form of intersystemic communication between a relatively traditional social system (a peasant village) and a relatively advanced social system (an urban center). Urban contacts abet exposure to the mass media since the mass media are more or less externally-based. Mass media exposure, in turn, leads to behavioral changes represented in this model by agricultural innovativeness.

Lerner (1964, p. 61) said that "increases in urbanization(the transfer of the population from scattered hinterlands to the urban centers) tend in every society to multiply national increases in literacy and media participation". Further, Lerner (1964, p. 62) stated that "... for rising media participation tends to raise participation in all sectors of the social system". Our present study also showed that out of this increasing mass media exposure also come increasing empathy, need-achievement, social participation, and innovativeness. We found that increasing urban contacts also bring about increases in an individual's social participation measured by his memberships in and being an officer of a number of organizations. That some of these organizations may be based outside the peasant village should further support our argument. Also, increasing one's social environment through social participation apparently requires that the individual be equipped to function efficiently within his new social milieu. Thus, increases in education, and empathy also lead to increases in social participation.

The finding that urban contacts, mass media exposure and literacy and education are causally related to the development of empathy may be logical in this study. Intuitively, at least, our measures of empathy are such that only cosmopolite, the literate, the media-exposed, and the educated, would score highly.* Also, our measures of these variables would almost preclude the possibility in this study that empathy will cause urban contacts, mass media exposure, literacy, and education.

We also found that both cosmopoliteness and mass media exposure jointly develop an increase in the individual's need-achievement. What was surprising was that need-achievement does not have any causal relation to innovativeness or any other variable in the system. Perhaps, this variable measures some other dimension as indicated in our factor analytic results. We may need a better measure of this variable in order to do justice to McClelland's (1961) notion.

The role of literacy in the modernizing process, as far as out data would indicate, is somewhat fuzzy. Due to our suggestions of a strong interdependence among literacy, education, and mass media exposure, literacy's only causal link is with empathy and social participation. Recall, however, that the unique effect of literacy on social participation tends to be negative. This situation defies explanation for the moment. On the other hand, in the four-variable model and again in the extension of our analysis, mass media exposure

---

*Lerner (1964, p. 72) said: "Top opinion-holders were typically literate, urban, media participants, and high empathizers. Among the illiterates, those living in cities tended to have more opinion than rurals, those with a significant measure of media exposure scored higher than those without such exposure."

plays a central role in the whole modernizing sequence. It serves as an intervening variable for the effects of cosmopoliteness on innovativeness in this study. In all instances, the unique effects attributable to mass media exposure in the regression analyses we did in Table V-3 were relatively the greatest.

SUMMARY

Following are the salient findings in our Phase II analysis, which is an extension of the four-variable model of modernization in Nigeria.

1. Change, and consequently individual modernization, occurs when the individual becomes aware of alternative norms of behavior either through the mass media and/or social participation.

2. Out of this exposure to the mass media also come about increasing empathy, need-achievement, and social participation.

3. We suggested strong interdependent relationships among mass media exposure, literacy, and education.

4. Mass media exposure and social participation, both of which lead to innovativeness, arise out of urban contacts. Therefore,

5. Modernization starts when an individual goes out of his village and comes in contact with new ideas and practices which he could later decide to adopt or reject.*

*Looking back, this writer is reminded of Waisanen's (1968) model of non-traditionalism in which he begins by picturing an individual in a relatively traditional social system who has come to be aware of alternative norms of behavior in another social system. The individual's dissatisfaction with the present state of affairs in his social system caused him to develop an orientation which is external to his present system. His reference groups are outside his social system. He is a member, but not necessarily committed to the norms of his social system. His increasing dissatisfaction with his social system norms would either ultimately drive him away from the village or make him instigate changes within his village. Waisanen's (1968) vent is more psychological than our present tack. However, our prior reasoning agrees well with his approach.

CHAPTER VI

SUMMARY AND IMPLICATIONS

SUMMARY

This study asked the question: "What leads to modernization?" The objectives of this study were: (1) to test Lerner's (1958) model of modernization, and (2) to extend the model by the inclusion of more variables in the system. Interview data from more than 3,300 farm family heads in Brazil, India, and Nigeria, gathered as part of the Michigan State University Diffusion Research Project, were used.

The statistical techniques used in the present study were the Simon-Blalock goodness-of-fit procedure and path analysis. These analyses begin with a set of variables which are theoretically related to a dependent variable, which is to be "explained" in the study. All possible relationships among the variables are then examined. A causal model or diagram showing the hypothesized relationships among the variables is developed. Then, a recursive system of regression equations is presented. These regression equations dictate the nature of analysis. By substituting actual data into the recursive system, the researcher is able to observe the goodness of fit between the hypothesized model and actual data.

Path analysis is a method of analyzing causal models. It uses standard linear regression formulas. Path analysis, multiple correlation, and partial correlation analyses are highly interrelated statistical methods. Notice that these statistical methods require the same assumptions of linearity and uncorrelated error. While the multiple correlation analysis seeks to identify a parsimonious set of predictor variables which explain the greatest amount of variance in a dependent variable, path analysis extends the interpretation of the standardized beta weights path coefficients in the regression equation. The method of path analysis forces the discussion to be at least internally consistent in such a way that mutually incompatible assertions are not inadvertently presented in the argument. For example, within the same path model, if A leads to B, then, B should not lead to A. The hypotheses of one-way causation (or causal inferences) imply that the researcher has theory and logic which could demonstrate support for the consistency of the argument. The path model derived from the analysis could then be tested for goodness-of-fit with the data.

The use of path analysis in the present study enabled us to make causal inferences about the relationships among the variables in the model. Further, we were able to estimate how much change could be expected in the dependent variable as a result of one unit of standardized changes in the independent variable. These two functions of path analysis have not been previously demonstrated using the same variables.

Causal inferences derived from the models through path analytic techniques are made possible through such assumptions and limitations as uncorrelated errors, and hypothesizing a one-way causation between variables. Thus, if $b_{yx} \neq 0$, then $b_{xy} = 0$. This limitation enables the researcher to hypothesize the direction of probable causation among the variables in the system. Unless the independent variable is hypothesized to be the sole cause of a dependent variable in the system, the computation of path coefficients usually involves partial regression analyses. In path analysis, special attention is given to the path coefficients. The use of standardized beta coefficients provides the following advantages to the researcher: (1) statistical determination of goodness of fit for the causal model examined, and (2) determination of the relative strength of path relationships within the model. In this study, "causal inferences" and "causality" are used interchangeably for the sake of convenience. Statements of the "if-then" variety in this study are only causal inferences.

In the Phase I analyses, the Simon-Blalock goodness-of-fit technique was used to test the path models against other alternative models which might provide a better fit for the data. Path coefficients were computed for the models inferred to provide the best fit. As a consequence, the recursive equations were re-stated with the corresponding modifications.

The main findings of the Phase I analyses, which tested Lerner's (1958) model of modernization at the aggregate level, were:

1. Lerner's (1958) aggregate-model of modernization was at best partially supported at the individual level.

2. An interdependent relationship was hypothesized between literacy and mass media exposure, thus lending support to Lerner's formulations about these two variables.

3. A direct causal path was found between cosmopoliteness and innovativeness in Brazil. However, this is relatively weaker than the direct causal path established between mass media exposure and innovativeness in the same country.

4. In India and Nigeria, the main causal sequence was from cosmopoliteness to mass media exposure to innovativeness. As suggested earlier, literacy and mass media exposure are interdependently related.

5. It would seem that peasants have to be increasingly oriented toward the urban center before they become exposed to the mass media. Since the mass media generally originate from urban centers, peasants' physical mobility toward urban centers abets exposure to the mass media. Further, since the mass media contents are generally pro-change in nature (as in the present study), this exposure leads to innovativeness.

The Phase II analysis done in Nigeria introduced four more variables in the system. The four other variables were: education, empathy, social participation, and need-achievement. Basically, the same causal paths were found from cosmopoliteness to mass media exposure to innovativeness. Further, increasing cosmopoliteness also led to increasing social participation, need-achievement, and empathy. The effect of cosmopoliteness on innovativeness was an indirect one through

mass media exposure and social participation. Further, the effects of literacy, education, and empathy on innovativeness were indirect through social participation. Increases in mass media exposure also led to increases in social participation and need-achievement.

Cosmopoliteness becomes the triggering mechanism for change. Mass media exposure plays a central role in the modernizing sequence, enabling the individual to gain knowledge of new ideas which he later may decide to adopt or reject.

DISCUSSION

Assuming the feasibility of inferring time-order of occurrence of these variables in the recursive systems presented in Chapters IV and V, these causal models lend themselves to a stimulus-response type of interpretation. The path coefficients, it should be remembered, indicate how much the dependent variable would be expected to change per unit of standardized changes in the independent variable. There is no assurance that such change will occur in the independent variable. Therefore, the question "Which variables are important?" could be asked.*

There seem to be at least two intuitive ways of looking at relative importance, according to Blalock (1968, pp. 186-187). The first might be labelled a quantitative approach. The underlying notion is that one should compare the relative magnitudes of partial correlation coefficients of all independent variables with a dependent variable. Whichever

---

*The same question was asked by Coward and others (1968) after they presented a causal model to explain the degree of commercialization in farming.

variable has the higher correlation is then called the more important variable. Thus, one may compare the relative importance of cosmopoliteness, mass media exposure, social participation, and education on the dependent variable of innovativeness, controlling on the other three independent variables in each case. This approach seems to involve an extension of analysis techniques used whenever the independent variables are completely unrelated.* However, it breaks down whenever the variables are themselves causally related, as in the case of the present study.

A second theoretical criterion has been more frequently used in historical discussions of causal chains. In brief, the argument runs as follows. If A causes B which in turn causes C, then A is more important than B. Changes in A are more basic in the sense that these changes will themselves produce changes in B. For example, in our model, it might be argued that urban contacts are more fundamental than either mass media exposure or social participation. It can be seen that this theoretical or causal criterion need not lead to the same conclusions as the quantitative criterion. As already pointed out, in the simple

---

*Blalock (1968, p. 186) said that: "If it could be assumed that the causal factors are operating completely independently of each other, so that they are uncorrelated in a population or independently manipulable in an experimental design, then the problem is quite straightforward. One of the main advantages of the complex experimental designs studied by statisticians is their symmetry, through which causal variables are made independent of each other. In such designs, one can break up the total variation in the dependent variable into components unambiguously associated with each independent variable. But complications arise if the causal variables are themselves interrelated."

causal chain A→B→C, the correlation between B and C will ordinarily be stronger than that between A and C. Also, the expected value of $r_{ac.b}$ is zero since the effect of A on C is only indirect. Thus, the quantitative criterion would point to B as more important than A, whereas the strictly theoretical criterion would favor A.

IMPLICATIONS FOR ACTION

There is yet another question that we must ask if we intend to use findings such as these for guides in development programs. The question is: "Which variables lend themselves to more efficient manipulation in the system?" It would appear that the following variables could be manipulated: cosmopoliteness (urban contact), mass media exposure, social participation (membership in organizations), literacy, and education. Literacy training and education represent comparatively long-term investments in both time and resources. Social participation, as far as our data are concerned, arises out of increases in urban contacts, mass media exposure, empathy and education. Recall that we argued that the individual must be literate, educated, and media-exposed in order to function efficiently in a new social milieu. This narrows down our choice between cosmopoliteness and mass media exposure.

Investments in encouraging urban contact through improved roads or bus service other than those voluntarily undertaken by the present farmer (e.g., field trips, visits to demonstration lots, excursions, etc.), may be less costly. At the same time, cosmopoliteness serves to start the whole sequence of modernization in our models. However, the

direct effects of cosmopoliteness on change are almost nil. Also, we implied earlier that the basic function or urban contact is that of facilitating the individual's exposure to new ideas from interpersonal and/or impersonal sources. This leaves the mass media for our consideration.

It would seem reasonable to suggest, as does Schramm (1964, p. 257), that "a developing country should not hesitate to invest in a well-considered program of mass media development and use". We will, however, couch this statement in light of our present findings among the three countries and among the variablee explicitly included in the analyses. The overwhelming relative importance of mass media exposure in this study is readily apparent.*

It would be ideal if development planners could start and continuously subsidize all phases of development simultaneously. However, as we argued previously, no nation seems to be rich enough to afford this approach. With limited resources, priorities must be set. Fortunately, these causal factors explicitly drawn into our causal models are not completely independent of each other to necessitate our manipulating them separately. A mathematical liability need not be a practical liability, too. As in any other system, changes in one aspect should ultimately be felt in other aspects in spring-action fashion.

---

*Further analyses show that radio exposure has greater direct effects on innovativeness than newspaper exposure in India. However, the reverse is true in Nigeria: the direct effect of newspaper exposure on innovativeness is greater than that of radio. Recall that in India, exposure to the Radio Farm Forum was among our measures of radio exposure while in Nigeria, exposure to agricultural pamphlets and bulletins were among our measures of print media exposure.

NEEDED RESEARCH

It should be apparent that the present causal models are by no means complete. The introduction of new variables into the system may serve to alter causal paths already established. Recall that one of the postulates of causal analyses (e.g., path analysis), is that each dependent variable must be regarded as completely determined by some combination of the independent variables explicitly brought into the system. Recall, too, that our model was able to explain only 18 percent of the variance in agricultural innovativeness in Nigeria. We could perhaps be more confident in what we say here regarding the implications for action if we accounted for more variance in innovativeness in the present study. The search for other variables which would increase the predictability of agricultural innovativeness should tackle two aspects of the problem: (1) theoretic, and (2) measurement problems. Recall that path analysis begins with the researcher identifying a system of independent variables which the best available theory says are related to a dependent variable to be explained in the study. Previous research and theory should help the researcher hypothesize which variables are causally related and which are not. For example:

1. Our theoretic system implied that behind the individual's urban contact is an attitudinal component of modernity which we shall call "high value for change in agricultural practices." Also, the interpersonal aspect of communication in the form of social participation has been implied in our Phase II models. We could, perhaps, add

agricultural change agent contact, and agricultural opinion leadership as other predictor variables. Notice that we stressed "agricultural" in these added variables. There are two reasons for doing so. First, we found in the present study that the more directly related two variables are in terms of their measures or operationalization (e.g., exposure to agricultural innovations through the mass media, and agricultural innovativeness), the more direct the causal relationships between these two variables.

Secondly, from the measurement point of view, we could be more confident that we are indeed tapping a single conceptual dimension in our independent variables. To illustrate this point, it is conceivable that urban contact and general mass media exposure would result in the peasant farmer gaining knowledge about other ways of living, which might ultimately pull him away from the farm. That is, urban contact and mass media exposure may ultimately make the farmer abandon his farm and move to the city. Some scholars call this phenomenon "urban pull". While this move from the farm to the city still represents change and therefore is sufficiently covered by our model, urban contact and general mass media exposure may not contribute significantly to the predictability of our dependent variables as presently operationalized in terms of agricultural innovativeness.

2. A combination of individual measures and "systems" (aggregate-level) measures may be used to predict individual agricultural innovativeness. This procedure recognizes the fact that the individual's

behavior is a joint function of his individual characteristics and the norms of his village regarding that particular behavior. Other researchers (e.g., Davis and Saxena) are presently working on this problem.

3. Although it is not the purpose of the present study to establish thresholds, such questions as the following are relevant: "How many visits to cities or urban centers are needed to start the system going?" Or, for that matter, in the aggregate, how many cosmopolites are needed? Lerner (1958) suggested an optimum level (10 percent) for his urbanization variable, and Waisanen (1968) suggested a minimum level of five to six grades of education. We still do not have studies which addressed themselves to the critical thresholds for each variable in the system.

Future research should look in these, and other, directions so that we may someday better understand the modernization process.

BIBLIOGRAPHY

Allport, G., "Attitudes", in C.A. Murchinson (ed.), A Handbook of Social Psychology, Worchester, Mass., Clark University Press, 1935, pp. 798-844.

Anderson, A., "The Modernization of Education", in Weiner (ed.), Modernization: The Dynamics of Growth, Basic Books, Inc., New York, 1966, pp. 68-80.

Ascroft, J., A Factor Analytic Investigation of Modernization Among Kenya Villagers, M.S., thesis, East Lansing, Michigan State University, 1966.

_____, "The Web of Modernization" in Rogers with Svenning, Modernization Among Peasants: The Impact of Communication, New York, Holt, Rinehart and Winston, 1968.

Belcher and Hay, "Use of Health Care Services and Enrollment in Voluntary Health Insurance in Hancock County, Georgia", Agricultural Experiment Station Bulletin, 1959.

Berlo, D., (ed.), "Mass Communication and the Development of Nations," The International Communication Institute, Michigan State University, East Lansing, 1968.

Black, C., "Change as a Condition of Modern Life", in Weiner (ed.), Modernization: The Dynamics of Growth, pp. 17-27.

Blalock, H., Causal Inferences in Non-Experimental Research, The University of North Carolina Press, 1961.

_____, "The Measurement Problem: A Gap Between the Languages of Theory and Research", Chapter I in Blalock and Blalock (eds.), Methodology in Social Research, 1968, pp. 5-27.

_____, "Theory Building and Causal Inferences", in Blalock and Blalock (eds.), Methodology in Social Research, McGraw-Hill, 1968, pp. 155-198.

Bogue and others, The Rural South Fertility Experiments, University of Chicago, Communications and Family Study Center, 1966.

Bonser, "Better Homemaking Practices Through Rural Community Organizations", Agricultural Experiment Station, Tennessee, 1958.

Boudon, R., "A New Look at Correlational Analysis," Chapter VI in Blalock and Blalock (eds.), Methodology in Social Research, McGraw-Hill Book Co., 1968, pp. 199-235.

_____, "A Method of Linear Causal Analysis: Dependence Analysis", American Sociological Review, June 1965, Vol. 30, pp. 365-374.

Brecht, A. Political Theory, Princeton, New Jersey, Princeton University Press, 1959.

Burnet, Mary, Abc of Literacy, Paris, UNESCO, 1965.

Cartwright and Zander, Group Dynamics: Research and Theory, Second Edition, Row, Peterson and Co., Illinois, 1962.

Coward, and others, "Social Psychological Aspects of Market Interaction in a Subsistence Economy: A Case of Path Analysis", Paper presented at Rural Sociological Society Meetings, Boston, Mass., 1968, 31 pp.

Cutright, P., "National Political Development", in Polsby N. (ed.), Political and Social Life, Boston, Houghton Miffin, 1963, pp 569-582.

Deutschmann, P., "Machine Simulation of Information Diffusion in a Small Community", Unpublished paper, San Jose, Costa Rica, PIIP, 1962.

_____, and Fals Borda, La Communication de las Ideas Entre los Campisinos Colombianos, Bogota, Unibersidad Nacional de Colombia, Monografia Sociologicas, 14, 1962.

_____, "The Mass Media in an Underdeveloped Village", PIIP, San Jose, Costa Rica, 1962, 14 pp.

_____ and McNelly, "A Factor Analysis of Characteristics of Latin American Countries", American Behavioral Scientist, 1966.

Dewey, J., The Theory of Inquiry, New York, Henry Holt, and Co., 1938.

Donahew, L., "From Blagat to New Bethel: A Factor Analytic Study of Variables Measuring Communication Receptiveness to Change in an Appalachian County", Paper presented at the Association for Education in Journalism, 1966.

Duncan, O., "Path Analysis: Sociological Examples", The American Journal of Sociology, Vol, 72, No. 1, July 1966, pp. 1-16.

Farace, R., "Mass Communication and National Development: Some Insights from Aggregate Analysis" in Mass Communication and the Development of Nations, East Lansing, Michigan State University, International Communication Institute, 1966.

_____, "Mass Communications, Political Participation and Other National Characteristics: A Factor Analytic Investigation", Paper presented at the Association for Education in Journalism, Lincoln, Nebraska, 1965.

Farace, and others, "An Exploration of Factors Underlying the Economic, Modernization and Communication Characteristics of Puerto Rican Farmers", East Lansing, Michigan State University Report No. 4.

Feldman, A., and Hurn, C., "The Experience of Modernization", Sociometry, Vol. 29, No. 4, December 1966, pp 378-395.

Festinger, L., A Theory of Cognitive Dissonance, Stanford University Press, 1957.

Foster, G., "Peasant Society and the Image of the Limited Good", American Anthropologist, Vol, 67, No. 2.

Gersenkron, A., "The Modernization of Entrepreneurship", in Weiner, (ed.), Modernization: The Dynamics of Growth, 1966, pp. 246-257.

Gusfield, J., "Tradition and Modernity: Misplaced Polarities in the Study of Social Change", American Journal of Sociology, 72:1967, pp. 351-362.

Hagen, E., On the Theory of Social Change: How Economic Growth Begins, Homewood, Ill., Dorsey Press, 1962.

Hilgendorf, and others, "The Combined Use of Linkage and Path Analysis in the Development of Causal Moderls", Human Relations, Vol. 20, 1967 pp. 375-386.

Hirshmann, A., "Obstacles to Development: A Classification and a Quasi-Vanishing Act", in Economic Development and Cultural Change, July, 1965.

Inayatullah, "Toward a Non-Western Model of Development", in Lerner and Schramm (eds.), Communication and Change in Developing Countries, East-West Center Press, Honolulu, 1967, pp. 103-125.

Inkeles, A., "Becoming Modern", Paper presented at MSU, East Lansing, 1967.

_____, "The Modernization of Man", in Weiner (ed.), Modernization: The Dynamics of Growth, 1966, pp. 138-150.

Jain, Navin, The Relation of Information Source Use to the Farm Practice Adoption and Farmer's Characteristics in Waterloo County, M.S. thesis, Guelph, Canada, University of Guelph, 1965.

Kamarschen, D., "Literacy and Socio-Economic Development", Rural Sociology, 33:1968, pp. 175-188.

Katz and Kahn, The Social Psychology of Organizations, John Wiley and Sons, 1965, pp. 222-258.

Lerner, D., "Enlightenment and Communication", in Hollis Peter (ed.), Foundations for Research on Human Behavior, Ann Arbor, Michigan 1966, pp. 212-242.

_____, The Passing of Traditional Society: Modernizing the Middle East, The Free Press of Glencoe, 1958.

_____, The Passing of Traditional Society: New York, The Free Press of Glencoe, First Paperback Edition, 1964.

_____, "Toward a Communication Theory of Modernization", in Pye (ed.), Communications and Political Development, Princeton, New Jersey, Princeton University Press, 1963.

McClelland, D., The Achieving Society, D. van Nostrand Co., Inc., 1961.

McClelland, D., "The Impulse to Modernization", in Weiner, (ed.), Modernization: The Dynamics of Growth, 1966, pp. 28-39.

McCrone and Cnudde, "Toward a Communication Theory of Democratic Political Development: A Causal Model", American Political Science Review, 61:1967, pp. 72-79.

Mendez and Waisanen, "Some Correlates of Functional Literacy", Paper Presented at the Ninth Congress of Inter-American Society of Psychologists, Miami Beach, 1964.

Moore, W., Social Change, New Jersey, Prentice-Hall, Inc., 1963.

Nagel, E., The Structure of Science: Problems in the Logical of Scientific Explanation. New York, Harcourt, Bruce and World, 1961.

Pool, E., "Communications and Development" in Weiner, (ed.), Modernization: The Dynamics of Growth, 1966, pp. 98-109.

Rahim, S., Diffusion and Adoption of Agricultural Practices: A Study of Patterns of Communication, Diffusion and Adoption of Improved Agricultural Practices in a Village in East Pakistan, Comilla, Pakistan Academy for Village Development, 1961.

Robinson, W.S., "Ecological Correlations and the Behavior of Individuals", American Sociological Review, XV, 1950, pp. 351-357.

Rogers, E., Diffusion of Innovations, The Free Press, 1962.

_____, and others, "Overview", Michigan State University, 1968.

_____, "Mass Media Exposure and Modernization Among Peasants", Chapter III, in Berlo, (ed.), Mass Communication and the Development of Nations, International Communications Institute, Michigan State University, 1966.

_____, with Svenning, Modernization Among Peasants: The Impact of Communication, New York, Holt, Rinehart and Winston, 1968.

Rockeach, M., Beliefs, Attitudes and Values, Jossey-Bass, Inc., San Francisco, 1968.

Rostow, W., The Stages of Economic Growth, Cambridge, 1961.

Ryan and Gross, "The Diffusion of Hybrid Seed Corn in Two Iowa Communities", Rural Sociology, Vol, 8, 1943, pp. 15-24.

Schnore, L., "The Statistical Measurement of Urbanization and Economic Development", Land Economics, 37, 1961, pp. 229-245.

Schramm and Ruggles, "How Mass Media Systems Grow", in Lerner and Schramm (eds.), Communication and Change in the Developing Countries, East-West Center Press, 1967, pp. 57-75.

_____, W., "Communication Development and the Development Process", in Pye (ed.), Communication and Poltical Development, Princeton University Press, 1963.

_____, Mass Media and National Development, Stanford University Press, Stanford California, 1964.

Seigel and Hodge, "A Causal Approach to the Study of Measurement Error", Chapter II in Blalock and Blalock (eds.), Methodology in Social Research, McGraw-Hill, Inc., pp. 28-59.

Sen, L., "The Concept of Tradition and Modernity: A Re-Evaluation", Paper presented at the Second World Congress of Rural Sociology, Drienerlo, Enschede, Netherlands, 1968.

Selltiz and others, Research Methods in Social Relations, (Revised One-Volume Edition), Holt, Rinehart and Winston, 1951.

Sewell and others, "Educational and Occupational Achievement of Wisconsin Farm Boys", paper presented for the Joint Session of the Rural Sociological Society and the American Sociological Association, August 1967, 45 pp.

_____, and Shah, "Social Class, Parental Encouragement, and Educational Aspirations", Paper presented at the 62nd Annual Meeting of the American Sociological Association, 1967, 29 pp.

Shah, V., Personal communication to the author, 1968.

Shilis, E., "Modernization and Higher Education", in Weiner (ed.), Modernization: The Dynamics of Growth, 1966, pp. 81-97.

Singer, and others, "The Modernization of Religious Beliefs", in Weiner, (ed.), Modernization: The Dynamics of Growth, 1966, pp. 55-67.

Srinivas, M., Social Change in Modern India, Berkeley, University of California Press, 1966.

Stepan, A., "Political Development Theory: The Latin American Experience," Journal of International Affairs, Vol. XX, No. 2, 1966, pp. 223-234.

Strotz, R. and Wold, H., "Recursive vs. Non-Recursive Systems: An Attempt at Synthesis", Econometrica, 28, April, 1960, pp. 417-427.

Takeshita and others, "A Study of the Effectiveness of the Pre-Pregnancy Health Programs in Taiwan," Eugenics Quarterly, 2, 1964, pp. 222-233.

Thurstone, L., Multiple Factor Analysis: A Development and Expansion of the Vectors of Mind, The University of Chicago Press, Chicago, Ill., 1967.

Waisanen, F., "A Model of Non-Traditionalism", presented at the graduate seminar, MSU, 1968.

Weber, M., The Protestant Ethic and the Spirit of Capitalism, trnas, Talcott Parsons, London, G. Allen and Unwin, Ltd., 1930.

Weick, K., "Task Acceptance Dilemmas: A Site for Research on Cognition", in Cognitive Consistency, Feldman (ed.), Academic Press, Inc., 1966, pp. 225-255.

Weiner, M., (ed.), Modernization: The Dynamics of Growth, Basic Books, Inc., New York and London, 1966.

Whiting, G., "Adoption of Agricultural Innovations in Rural Brazil", East Lansing, Michigan State University, Dept. of Communication, Mimeographed Report, 1967.

_____, "Field Experiments on the Diffusion of Innovations", Working paper No. 4, Revised January, 1965.

Wilber, G., "Causal Models and Probability", Social Forces, pp. 81-89.

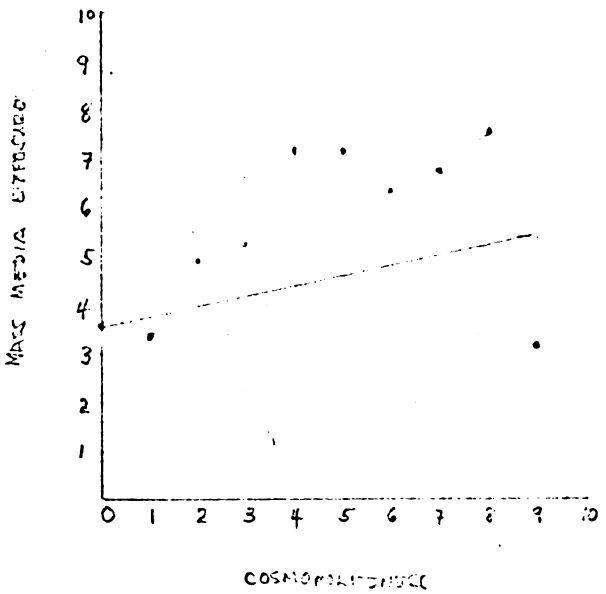
Wright, S., "The Method of Path Coefficients", Annuals of Mathematical Statistics, 5, 1934, 161-215.

Zaleznik and Moment, The Dynamics of Interpersonal Behavior, John Wiley and Sons, Inc., New York, 1963.

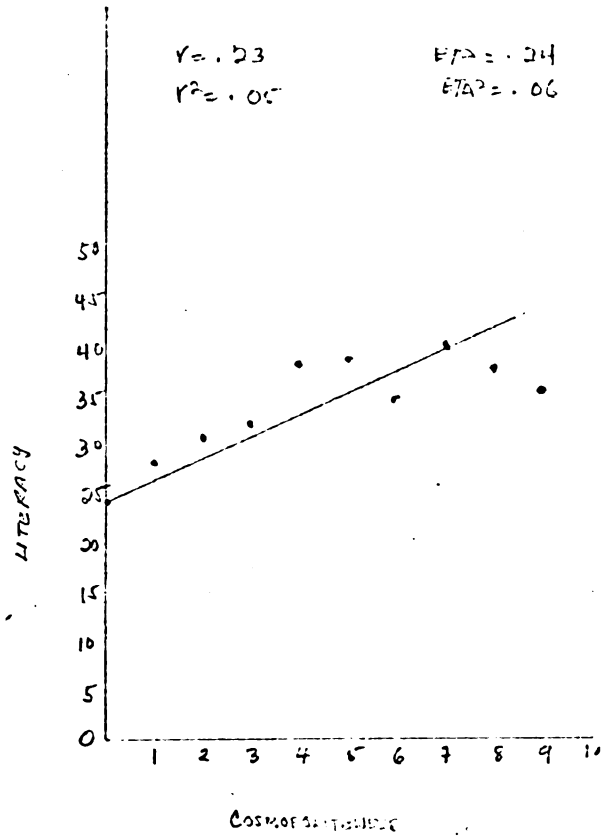
Zetterberg, H., On Theory and Verification in Sociology, N.J., Bedminister Press, Revised Edition, 1963.

APPENDICES

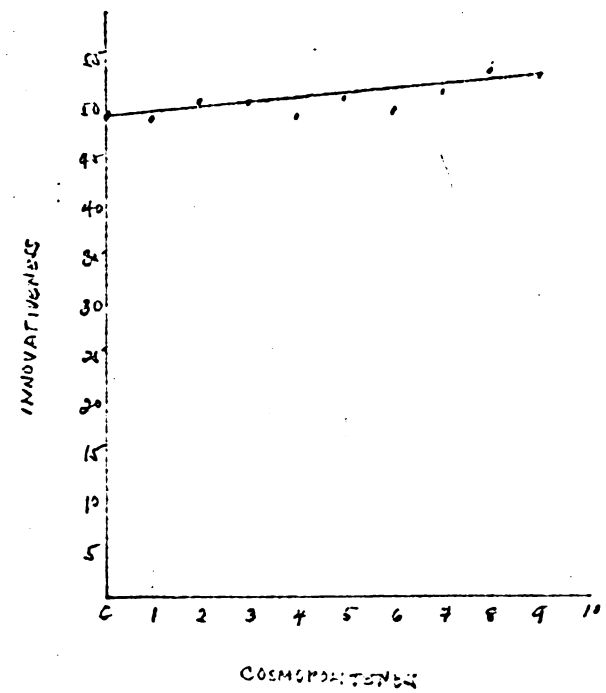
r = .14
r² = .02
ETA = .18
ETA² = .03



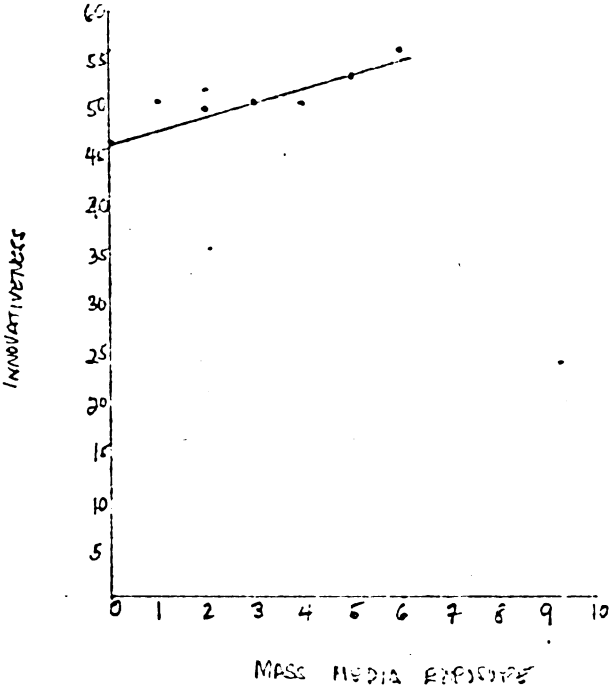
r = .23
r² = .05
ETA = .24
ETA² = .06



r = .12
r² = .01
ETA = .14
ETA² = .02

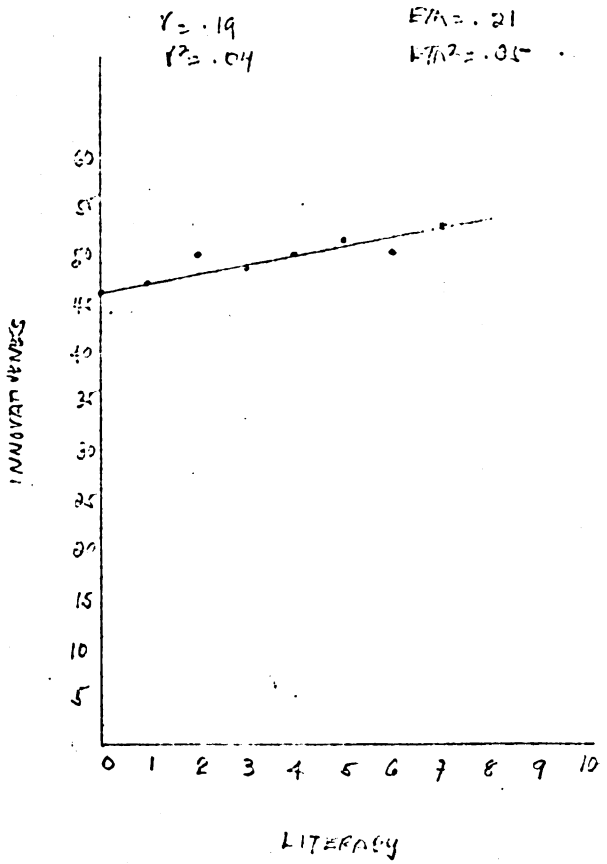


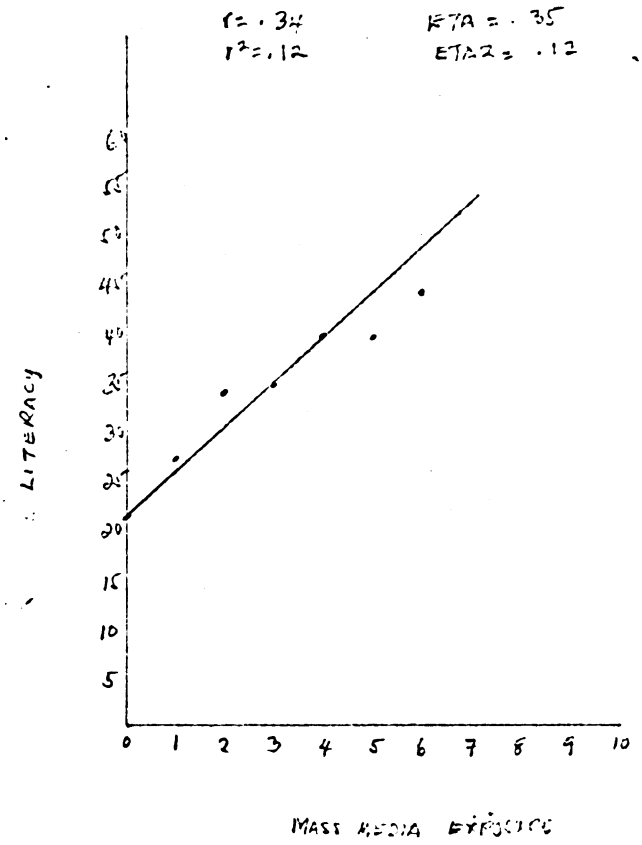
r = .33
r² = .11
ETA = .34
ETA² = .12

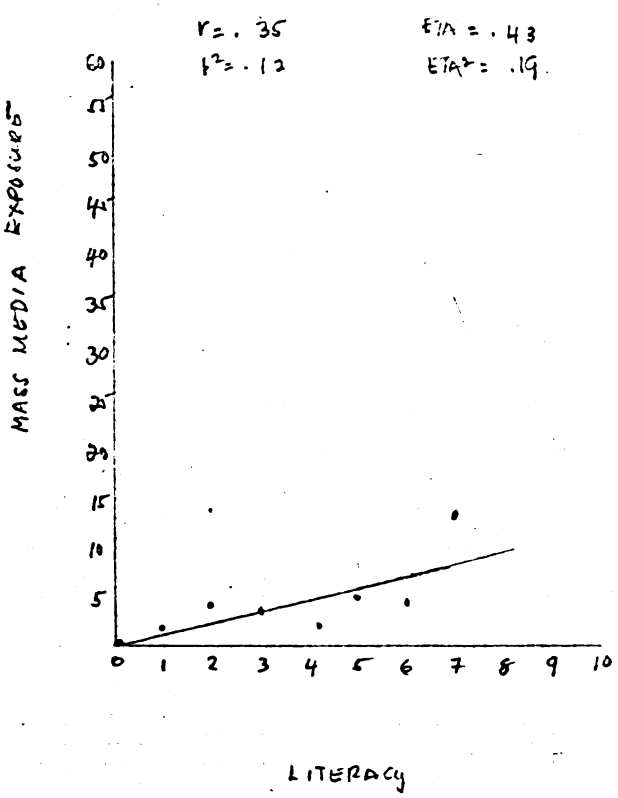


Scatter plots. Brazil 47

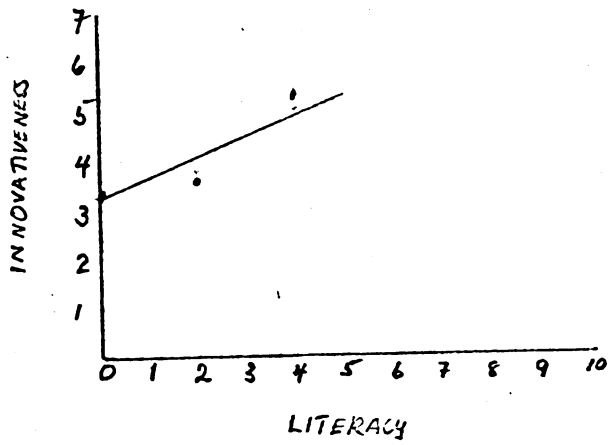
APPENDIX "A": Scatter Plots, Brazil



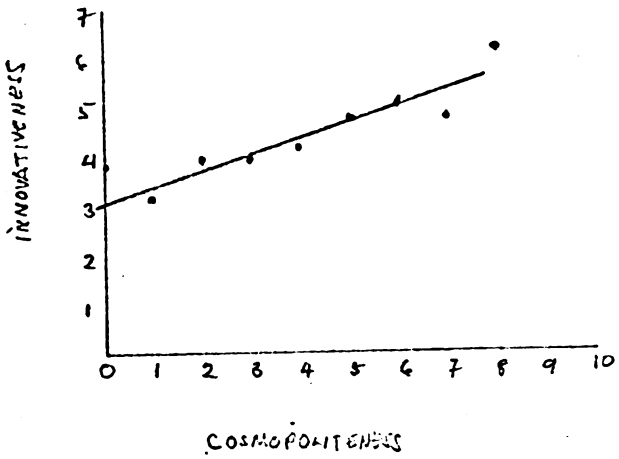




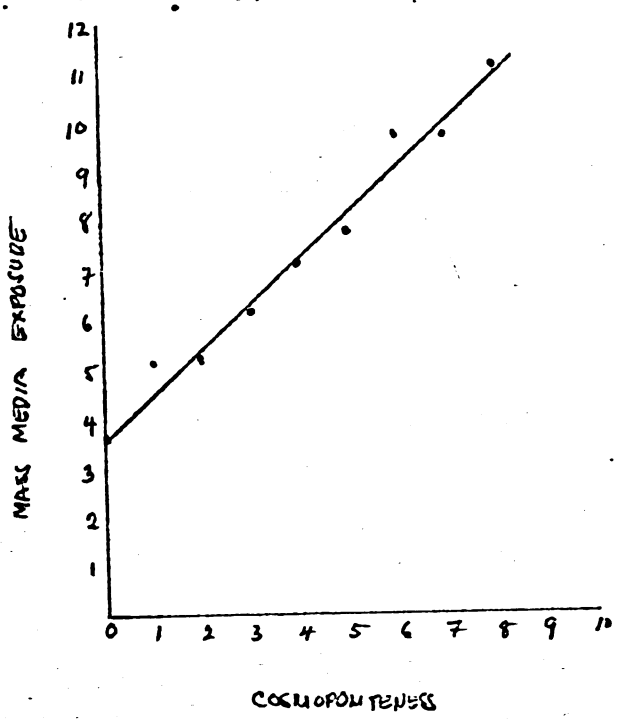
$r = .24$ ETA = .26
$r^2 = .06$ $ETA^2 = .07$



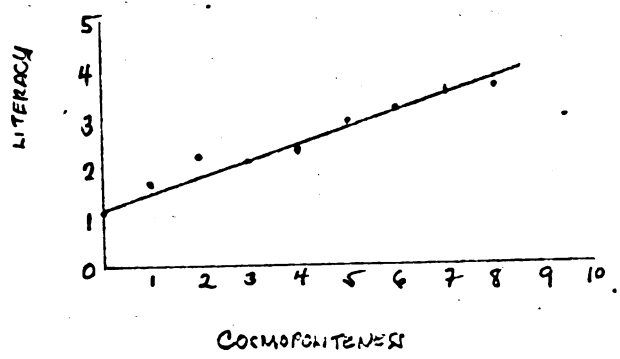
$r = .21$ ETA = .24
$r^2 = .04$ $ETA^2 = .06$



$r = .52$ ETA = .53
$r^2 = .27$ $ETA^2 = .28$

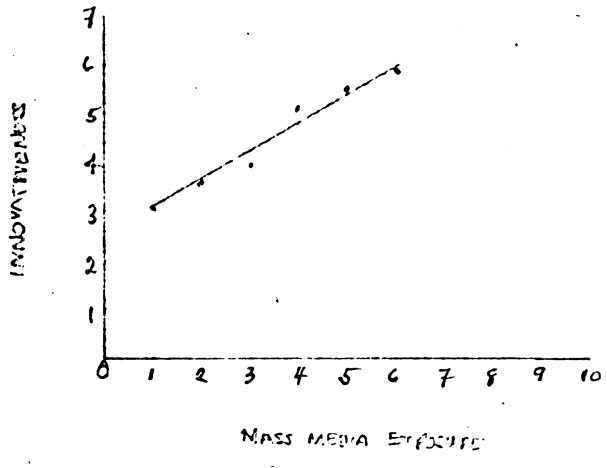


$r = .41$ ETA = .42
$r^2 = .17$ $ETA^2 = .17$

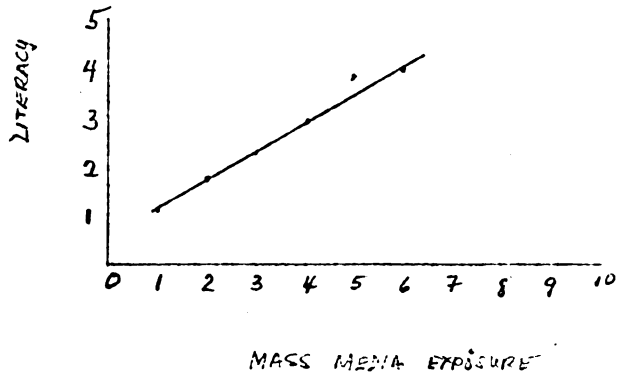


Scatter plots India #1

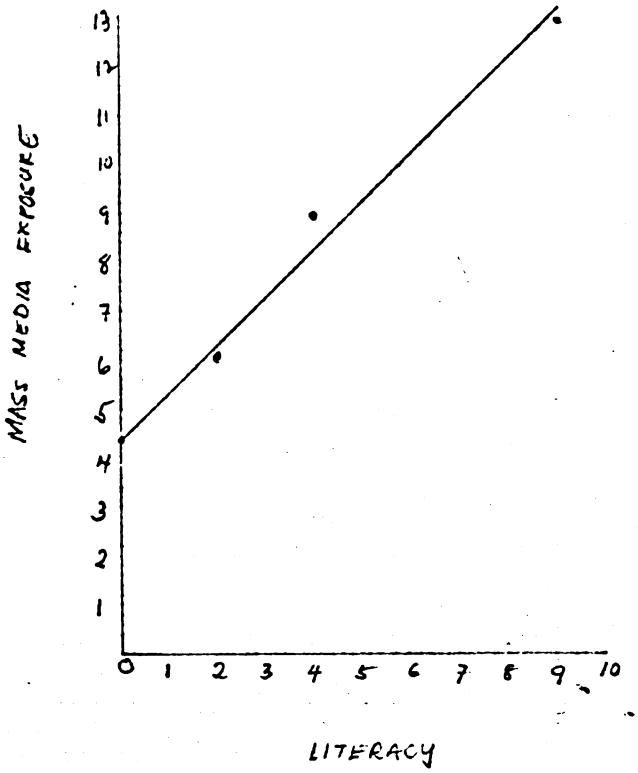
$r = .30$ ETA = .30
$r^2 = .09$ $ETA^2 = .09$



$r = .54$ ETA = .55
$r^2 = .30$ $ETA^2 = .30$



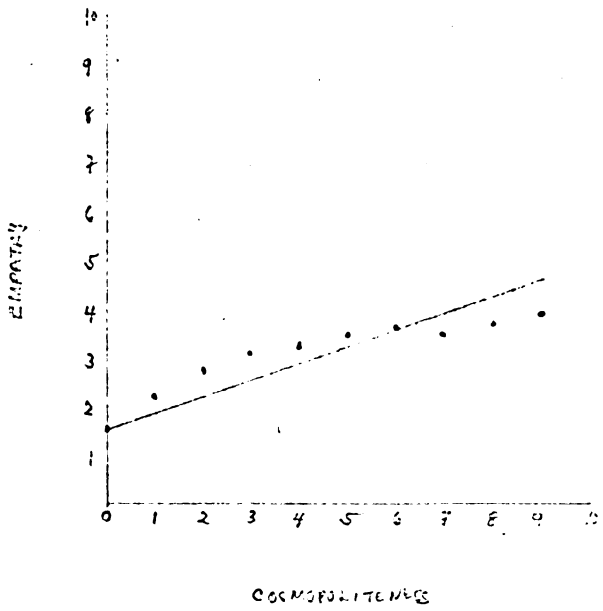
$r = .52$ ETA = .52
$r^2 = .27$ $ETA^2 = .27$



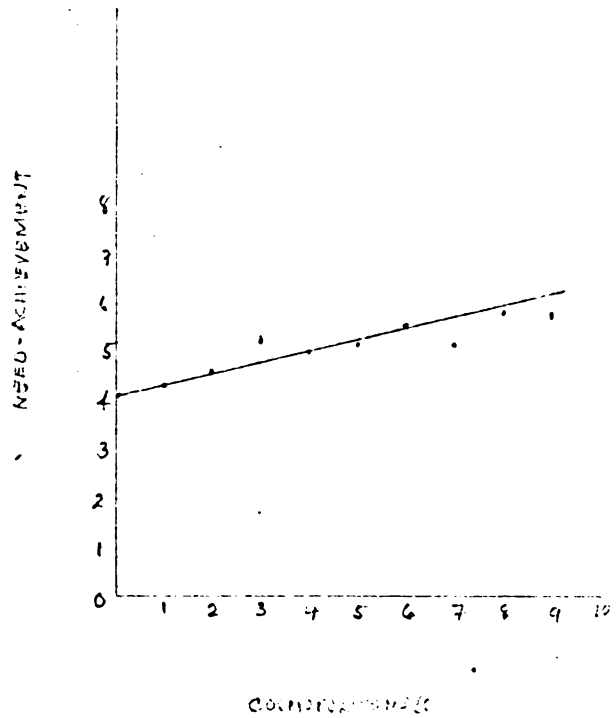
Scatter plots India#2

APPENDIX "C": Scatter Plots, Nigeria

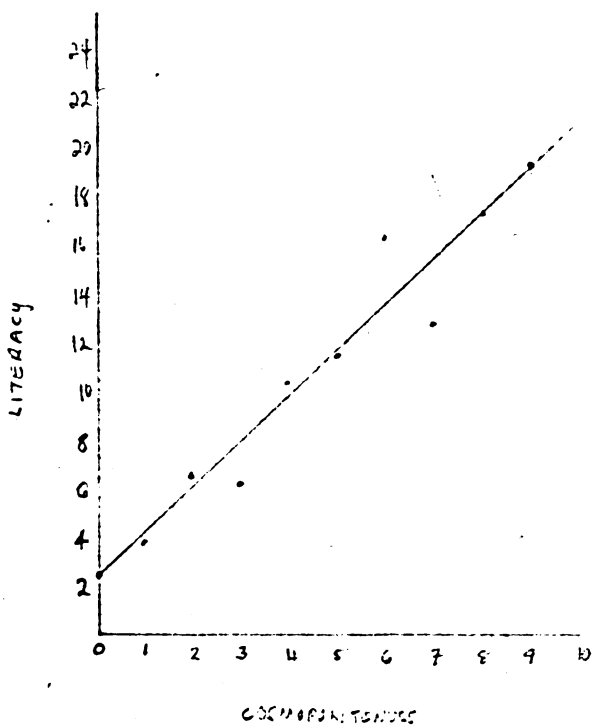
$r = .36$ ETA = .38
$r^2 = .13$ ETA^2 = .14



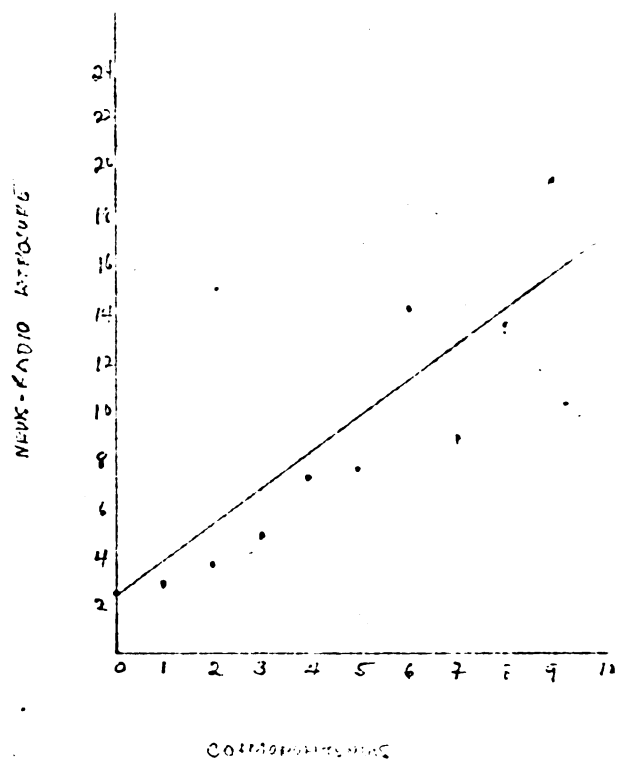
$r = .23$ ETA = .24
$r^2 = .05$ ETA^2 = .06



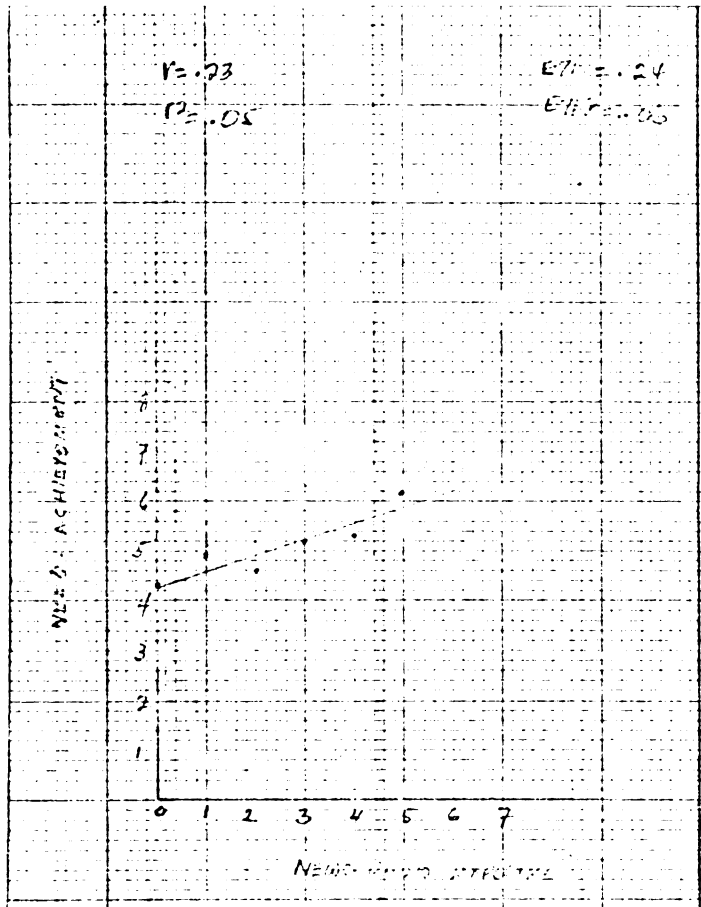
$r = .38$ ETA = .38
$r^2 = .14$ ETA^2 = .14

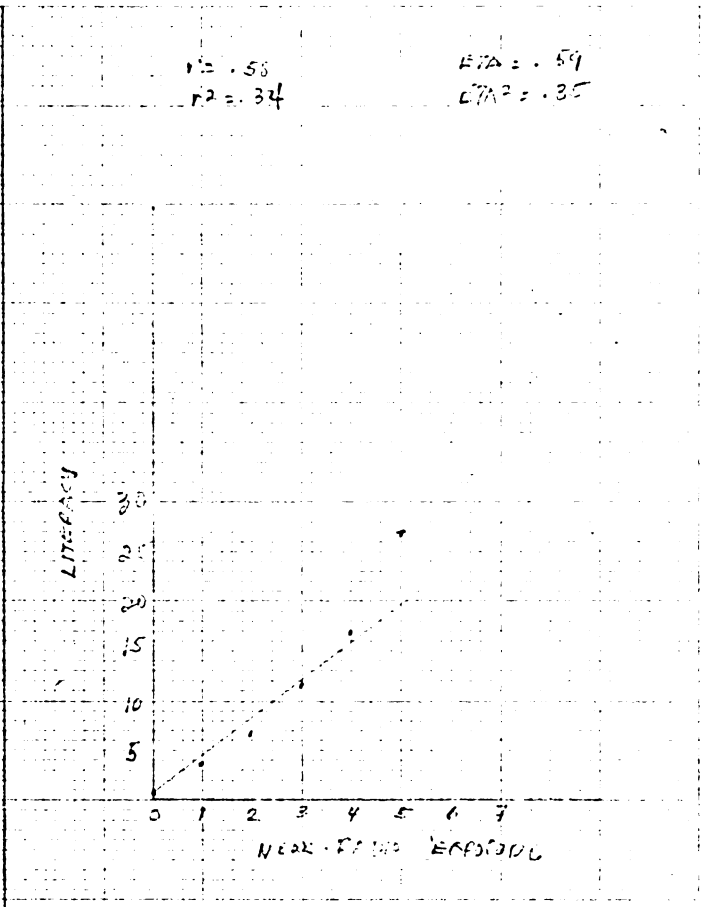


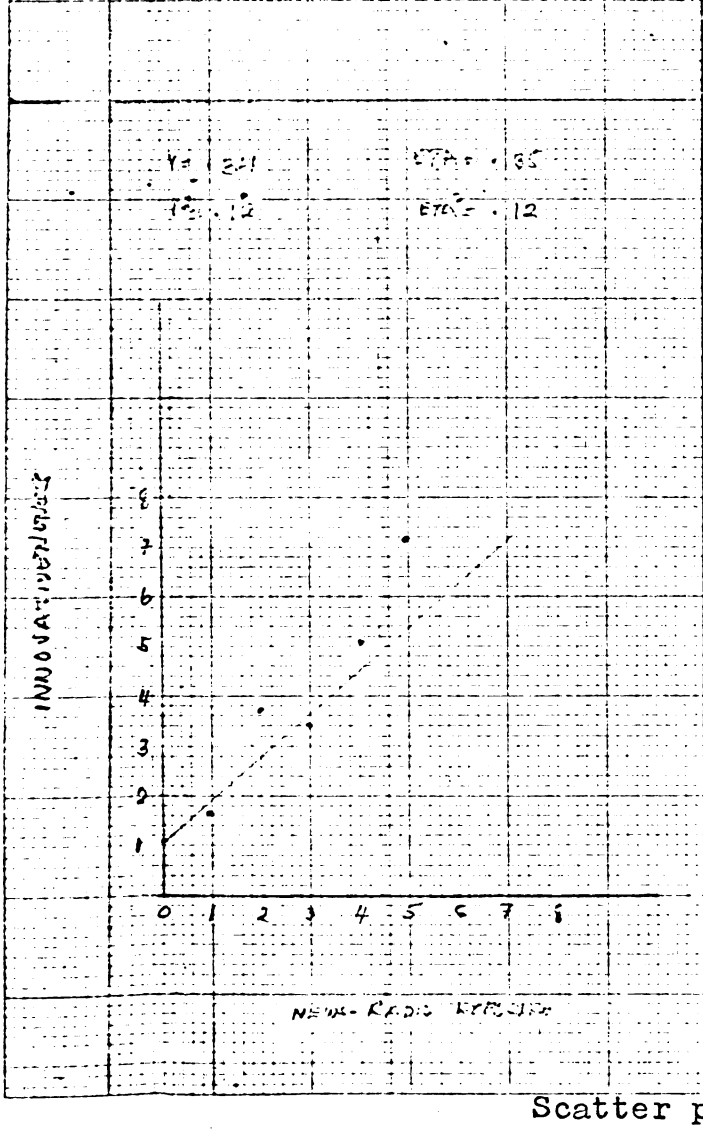
$r = .47$ ETA = .49
$r^2 = .22$ ETA^2 = .23

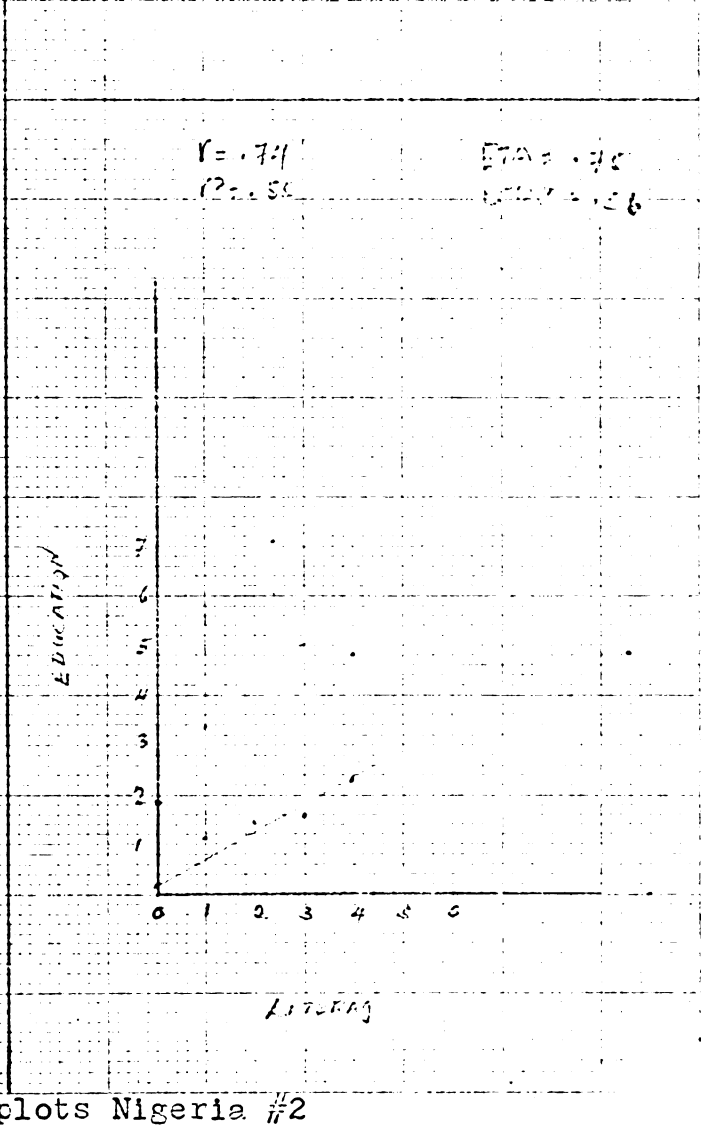


Scatter plots Nigeria#1

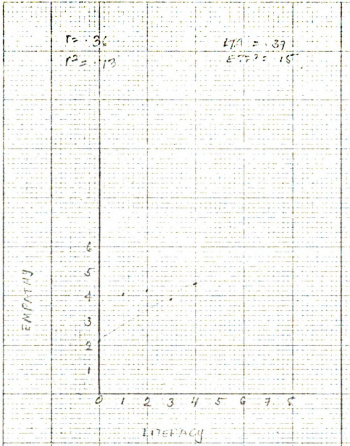


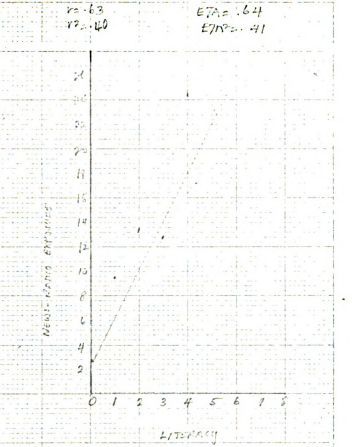


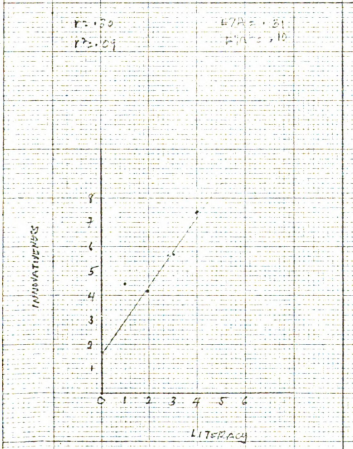


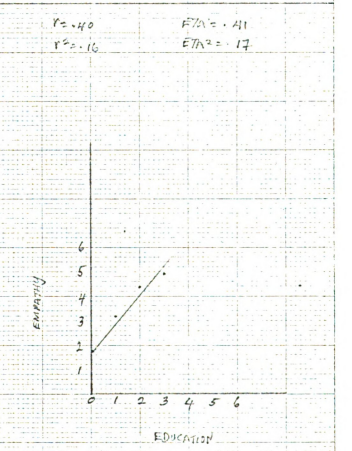


Scatter plots Nigeria #2

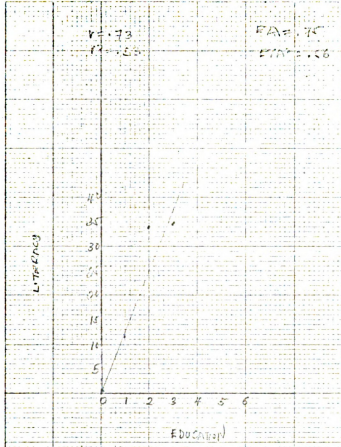


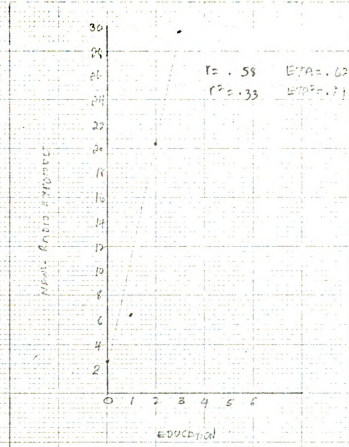


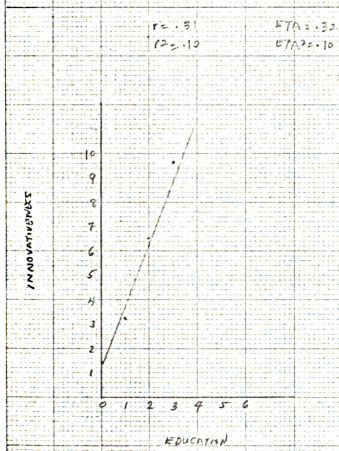




Scatter plots Nigeria #3



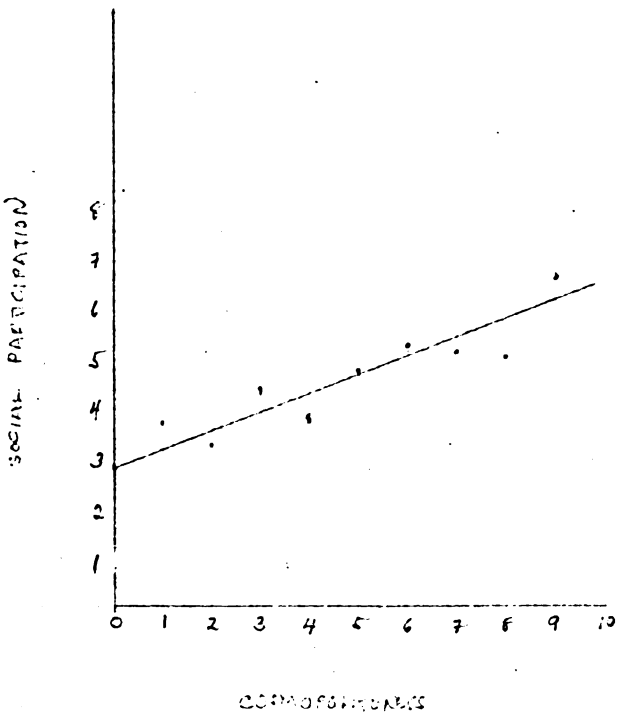




Scatter plots Nigeria#4

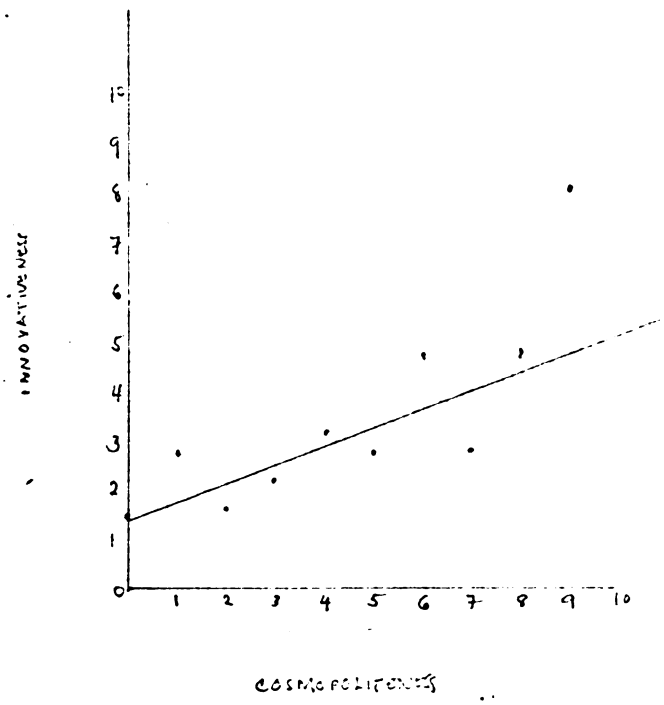
r = .29
r^2 = .08

ETA = .31
ETA^2 = .10



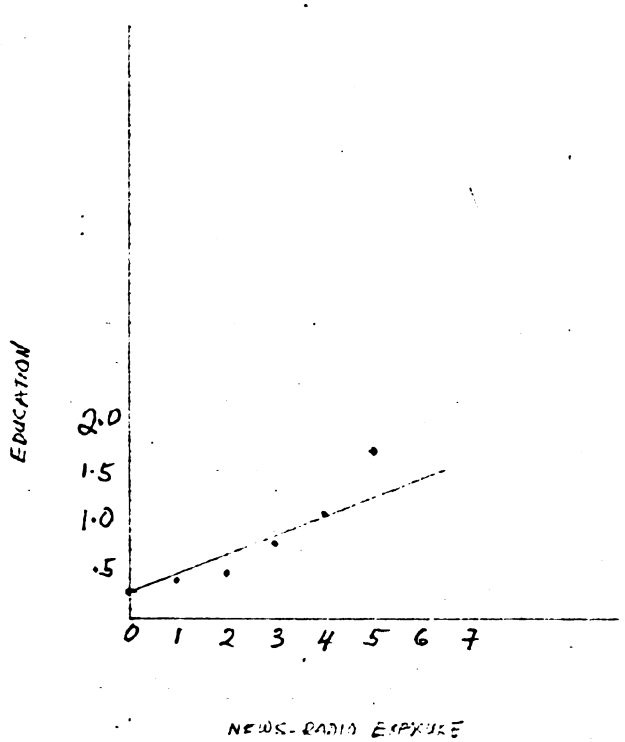
r = .24
r^2 = .06

ETA = .24
ETA^2 = .06



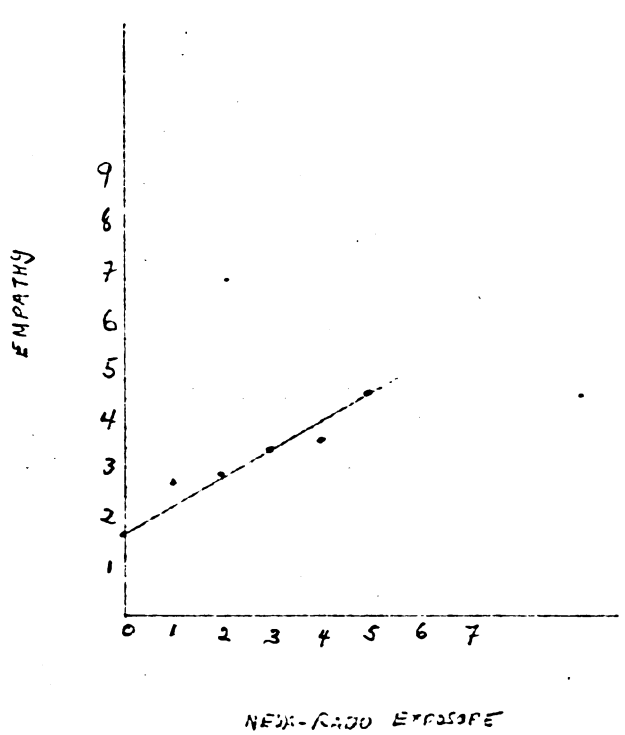
R = .53
R^2 = .28

ETA = .55
ETA^2 = .30



R = .44
R^2 = .19

ETA = .45
ETA^2 = .20



Scatter plots Nigeria II

APPENDIX "D"

Results of the "Round-byRound" Multiple Correlation Analysis in Nigeria.

"Dependent" Variables	"Best" Predictor(s)	Beta Weight	Highest Order Partial	Variance Explained*
Empathy	Literacy	.12	.09	
	Mass Media Exposure	.20	.15	.24
	Cosmopoliteness	.10	.10	
N-Ach	Mass Media Exposure	.12	.08	.09
	Cosmopoliteness	.11	.10	
Literacy	Mass Media Exposure	.31	.31	.57
	Education	.50	.51	
Mass Media Exposure	Empathy	.12	.16	
	Literacy	.31	.31	
	Innovativeness	.17	.24	.57
	Cosmopoliteness	.20	.25	
	Education	.18	.18	
Innovativeness	Mass Media Exposure	.33	.24	.18
	Social Participation	.09	.09	
Social Participation	Empathy	.11	.10	
	Literacy	-.11	-.08	
	Mass Media Exsure	.16	.11	.16
	Cosmopoliteness	.14	.13	
	Education	.16	.11	
Education	Literacy	.52	.51	
	Mass Media Exposure	.18	.18	.56

*Total variance explained in the "dependent" variable by all the seven independent variables.

APPENDIX "E"

Variable	Brazil		India		Nigeria	
	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.
Education	1.10	0.80	1.37	1.29	0.59	0.83
Innovativeness	49.87	9.86	4.41	3.37	2.71	5.82
Social Participation	1.44	3.06	0.56	1.04	4.00	3.38
Cosmopoliteness	2.19	2.40	23.31	28.82	3.35	3.89
Mass media Exposure	4.66	8.71	7.30	4.42	6.15	9.95
Literacy	30.30	23.13	2.47	1.91	7.87	14.84
Empathy	3.85	2.05	3.78	2.37	2.65	2.08
N-Achievement	6.64	2.37	1.74	1.02	4.77	2.48