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MICHIGAN EXTENSION AGENTS' ATTITUDES TOWARD COMPUTERS AND COMPUTERIZED EXTENSION FORWARD PLANNING AND CONSULTING PROGRAMS: THE TELPLAN SYSTEM

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By

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ABSTRACT

MICHIGAN EXTENSION AGENTS' ATTITUDES TOWARD COMPUTERS AND COMPUTERIZED EXTENSION FORWARD PLANNING AND CONSULTING PROGRAMS: THE TELPLAN SYSTEM

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A survey of the literature shows that computers and computerized decision making aids are becoming integral parts of agricultural education programs and in particular the Cooperative Extension Services.

The purpose of this study was to investigate, with respect to computers and the Telplan System, the relationships between the dependent variable, attitude, and the independent variables: age, level of formal education, length of employment, position held with the Extension Service, previous experiences with computers and the Telplan, frequency of usage, and the number of programs of the Telplan System used.

Two instruments were developed to gather data from 283 field Extension agents of all the counties in Michigan. The usable data collected from 224 agents were subjected to cluster analysis in order to first treat and remove the

error of measurement or unreliability and second determine and establish the attitude clusters. The cluster analysis yielded nine clusters of which three were made up of the computer items of the attitude scale and the remaining were related to the Telplan System items.

Seven null hypotheses were tested to determine the relationships between the attitude clusters and the independent variables. All the hypotheses were tested at the .001 level of significance.

The pertinent findings and conclusions of the study were:

1. Of the nine attitude clusters, six accounted for nearly 90% of all the variance contributed.

2. Age, level of formal education, length of employment, position held, and experiences with computers and the Telplan did not seem to be predictors of attitudes toward computers and the Telplan System.

3. Frequency of usage of the Telplan was related significantly to the two attitude clusters, Problem-Solving and Fear/Threat. The less frequent usage of the Telplan, the more distrust the agents felt toward the System. The result of this distrust manifested itself as a fear/threat factor to personalized Extension work and consequently the agents feared that they might be replaced by computers.

4. The number of the Telplan programs used was not an indicator of attitudes. However, at the level of $.001 < \alpha \leq .05$, this variable indicated significant relationships with the clusters Problem-Solving, Limitations, and Fear/Threat. In particular, complexity and inapplicability of most of the programs were the reasons for using none or fewer programs of the Telplan System.

5. The major factors for using a Telplan program were the usefulness of the Telplan program in and its applicability to the real field problems. Program number 31, Least-Cost Dairy Ration, was used more frequently than any other programs of the Telplan. Extension home economists and 4-H youth agents found the Telplan to be greatly related to educational services in agriculture but less to 4-H and family-living extension. These agents were found to be in need of more information and continuing training as related to the Telplan System.

To the memory of

Mrs. Marion A. Parker

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

CHAPTER I

INTRODUCTION

Extension agents of the Cooperative Extension Service have the primary function of providing the resources of the U.S. Department of Agriculture and the Land-Grant institutions to the people of a state. Extension agents operate types of extension programs which enable both rural and urban people to acquire the knowledge and skills which they need in order to adapt to changing social, economic and cultural conditions.

Extension agents are presumed to be acquainted with their clientele and with the problems peculiar to their clientele's geographic areas, and also they are presumed to have an understanding of the social, economic and cultural aspects of the clientele with whom they work.

From the beginning of the extension programs of the Cooperative Extension Service, a major emphasis has been placed on agricultural extension programs which include efficiency in agricultural production, conservation, development, and the use of natural resources and management of farm and home.

Due to the complexity of the problems related to today's agriculture and the needs of farmers the extension agents have had increasing demands made on them since traditional methods will no longer suffice. Now extension agents must seek alternative solutions or new solutions altogether in order to assist farmers as adequately as possible.

Background of the Problem

The hope and desire to advance education significantly by means of technology was stated in the 1972 UNESCO Report, Learning to Be. The declaration was as follows:

> Science and technology must become essential components in any educational enterprise; they must be incorporated into all educational activity intended for children, young people and adults, in order to help the individual to control social energies as well as natural and productive ones--thereby achieving mastery over himself, his choices and actions ... (Fare, 1972)

This declaration and numerous other similar declarations show plainly the undeniable and gradual incorporation of technology into the educational process.

Of all the new technologies influencing education, computers seem to have become the most dominant ones because of their unlimited potentials. In fact, the technology in the last decade has had such powerful impact on society that its profound effects have been often compared to changes brought about by the industrial revolution (Ashly, 1972).

The real impact of computer technology on the society will take place when computers are to be mass produced. In fact, during the past decade "the size and cost of computer

hardware has been dropping an order of magnitude every three to five years" (Kibler and Campbell, 1976). This drop will eventually level off but it will continue to be the trend at least through the 1980's. Kibler and Campbell point out that "using existing technologies there are currently a number of table top computers, weighing as little as 35 pounds and costing about $8,000." They go on to predict that by using the new technologies the size of computers will be dropped to such an extent that in less than one decade there will be "a complete computer weighing less than a pound and costing less than $100."

Computer manufacturers through intense competition have been trying to grab a bigger piece of the unlimited market. This has brought in its wake extraordinary advances in computer hardware. In 1975, the experimental development of a chip with five million bits per square inch was announced by International Business Machines (IBM Annual Report). This announcement was soon followed during the same year with one from Intel Corporation. Intel announced that a memory with a density of close to one million bits per square inch had become operational. If we consider a computer such as the IBM 7094 which had only 400,000 bits of memory, we can realize the tremendously rapid pace of movement in the field of hardware.

Educational institutions have been involved with computers since the early development of electronic technology. Over two decades ago in the 1950's, Stanford University

began using computers for instructional purposes. This was the beginning of Computer Assisted Instruction (CAI) activities (Suppes, 1971).

The computer instructional activities as Darby (1972) points out are categorized mostly in problem solving, counseling, simulation and gaming, data processing, mediated drill and computer-assisted instruction. CAI has had a rapid growth and some apparent success over the past few years (Hess and Tenezakis, 1973). At the present time, almost all major universities and colleges across the country are involved to varying degrees with some activities in computer-assisted instruction.

Education, in addition to being affected by the impact of the new technology, has also created a prime market for technological products. Because this prime market is so evident the computer manufacturers have been and are trying to show that there is "one best way" to revolutionize and "cure" shortcomings of education and that is a "computerized education system". William Norris (1977), proposes a "system" which he believes will provide a "better" alternative in education. He states that the "system" will be "a learning center network [where its] primary technological alternative is CBE, computer-based education." Norris further describes this "learning center network" as follows:

> The system is computer-controlled and the main method of delivery is computer-aided instruction with integrated terminal subsystems which include videodiscs, audio input and output, and touch input. Structured computer conferences of up to 40 students can be held, or a single student can interact with

> another student or instructor as desired. The key to this system will be computer-aided and computer-managed instruction, but other types of media will be offered as appropriate.

Norris feels that "one difficult problem" which will create an obstacle in acceptance and subsequent use of this system "will be teachers' perception of a threat to their jobs." He further assures the teachers that CBE "will not replace the teacher in many courses". He states that in case the system creates a surplus of teachers, we can shift the services of teachers to other areas, for instance "continuing education" for which the demand is growing and "will require more teachers". However, with further regard to continuing education, Norris states that continuing education is an "area where we should begin pilot operations. Because of the rapid generation of new knowledge, CAI is particularly advantageous in this area. The new methods will bring young and old together in learning centers".

From the early advent of electronic computers, agriculture and agricultural education, along with the other educational fields became involved with this new technology. This involvement intensified sharply as the problems in modern agriculture became more complex and the necessity of using computers in complex problems became apparent. For example, the problem of farm records and bookkeeping had always been--and will be--of major importance in commercial farm business, but by the 1940's more and more farmers became eligible to pay federal income taxes, the importance of a good set of farm records became more apparent as an

essential part of running a farm properly. Extension workers, during the pre-electronic data processing days used to audit farmers' record books, either manually or as it became possible in the early 1950's with the help of some advanced mechanical data processing (Brown and Dexter, 1974).

In 1963, with the installation of CDC-3600 computer, Michigan State University through a grant from the Kellogg Foundation began implementing a computer record keeping project called TELFARM, for Today's Electronic Farm Records for Management. By 1967 as "a natural outgrowth" of the Telfarm program, the University undertook a "program to establish An Automated Farm Planning System and Consulting Services", later called TELPLAN, which stands for Today's Electronic Planning (Doneth and Boger, 1967).

The Telplan System is described as follows:

> The Telplan system is an operational example of the sharing of computer expertise for educational purposes in either the classroom or extension work with farmers, consumers, families, businesses, and others. With a minimum investment in professional time or budgeted operating funds, a professional worker can gain access to the system and use programs developed and perfected by extension specialists and researchers from several states. (Harsh, 1977).

Extension agents in most Michigan counties have direct access to the Telplan System via touch-tone and hard-copy terminals. The System has over 70 different programs available in it (Appendix G) and is operated though the Cooperative Extension Service at Michigan State University with the use of computers at the University of Michigan. The

System is also used by other educational institutions, agri-business firms and other agricultural businesses in Michigan, 22 other states, and Canada as well. However, in Michigan, as is the case for all other states, Extension agents are the major users of the Telplan System. The agents have become the liason persons for these "forward planning programs" because they answer the needs of not only the farmers, but those of other clientele as well. Therefore, the Extension agents are instrumental in the whole operation of this computerized forward planning and consulting system.

Significance of the Study

Slade (1970) with regard to new educational technologies stresses that in this era we are in reality dealing with "two languages...both of them very powerful. One transmits data in motion. The other transmits the image in motion. One is the computer, the other film, television..." Slade's assertion is of special importance when one considers how one of these "two powerful languages"--computer--can--and indeed does--dominate and control the other language--film, television... In 1973 the Carnegie Commission on Higher Education stressed the point by indicating that the computer is a technology having great potential for integrating other media for educational use.

The role of the computer with its technological potential in the society merits important consideration.

Berkeley (1962) feels that the use of computers will cause a vast number of societal changes. As a result, Walker and Cotterman (1970) indicate, necessary adjustments must be made in order for social organizations, education, ethical standards, value systems, individual roles and goals, to be meaningful in the computer era. In 1972, a recommendation from the Committee on Computer Education of the Board of Mathematical Sciences pointed out that a modification in the American educational system must be made in order that every individual can became acquainted with the nature of computers and their potential role in this society.

The above statements pose a number of questions, such as what "necessary adjustment" to the computer era must be made and how; what is the real role of computers in education; what do computers have, if anything, to do with the "quality" of education or are they just another media bringing about individualization in schooling; In terms of the use of computers in education the advancement of hardware is more significant and has the priority over "courseware"? Some authorities in computers (Norris, 1977) by indicating the highly advanced and sophisticated hardware technology, feel that educational problems and even "that of unequal opportunity in education" can and will be solved by transferring the whole educational system to a proposed "primary alternative" computer-based education (CBE) system. Thelen (1977) reacts to this proposal as: "Once again we hear that it (CBE) will solve the two major problems--cost

and quality--in education. And once again the bottom-line claim boils down to doing 'what the present educational process does'." Regarding the individualization in schooling as a result of CBE, a computer expert (Oettinger, 1969) notes that while "we cannot ignore the fact that [the computer] technology does offer us hitherto undreamt of possibilities" it is unrealistic to think that CAI can do much to further quality education, if the latter depends upon "individualization".

A large number of educators believe that more emphasis must be placed on the development of suitable and effective courseware--rather than hardware--for the use of computers in education. Skinner (1977) feels that "the most effective first step in developing a technology of teaching should be an analysis of the behavior of the student, not an exploration of the possible uses of hardware." The difficulties in developing "courseware" and in general the use of computers in education, seem to appear with the question of which philosophical and theoretical assumptions in education ought to be used as a basis for the software development. It is during the process of the development of programs for a computer that the philosophical and theoretical considerations of the "author" determine the outcome of the function of the computers. If the computer teaching programs are dull and unimaginative; the responsibility lies on the part of the author rather than that of the computer. "The prevalent pedagogical style of existing [computer]

teaching programs is 'drill and practice', a style favored by behaviorists and others who demean the human mind into a simple Stimulus-Response machine. Humanists, don't forget that computer programs can be written in many other modes more suited to humanistic assumptions!" (Nold, 1975).

Courseware and computer program development become significantly important when they are to be applied specificantly in continuing education and in general in lifelong learning.

This is due to the requirement of "a rather abrupt shift in perceptions of learning systems" when the relationship of technology and media to lifelong learning is considered (Niemi, 1974). Niemi further states:

> The application of technology and media to lifelong learning requires us to establish a rationale, so that people might understand the effects, even the controls, created by media and technology over their lives. Also a rationale might diminish some of the frustrations that have marred the initial shining faith in the power of the media for educational purposes.

With regard to program development for and application of technology to education, Wedemeyer (1971) proposes a plan with three distinct stages, each of which takes precedence over the other. State one is the development of a rationale that must be based on and emphasizes the human and human concerns. These concerns, he states, are those that come from a set of value systems with the goal of learners' personal development. The second stage is courseware and program development. Finally it is in the third stage that hardware and its integration with the first two stages are to be realized.

Computer-based education is not considered to be an individual method of learning, however, individuals use it whether or not a supervising educator is present. This causes a lack of interaction in the educational process which might result in undesirable outcomes. Niemi (1974) states:

> The interaction missing from programmed instruction is possible in computer-assisted instruction. But, while it provides learners with individualized instruction, does it give them the humanistic dimension characteristic of some other learning systems? The answer is "no". What is needed, in addition to experience directed toward behavioral goals are experiences directed toward humanistic goals. Humanism does not deny behaviorism. Instead, it provides a valuable tool to deal with those problems the behavioristic approach is unable to handle so effectively and efficiently. Of course, if humanistic goals are to be met through computer-assisted instruction, the teacher or the adult educator responsible for this directed study may have to assume different roles. Instead of acting as a disseminator of information, he could operate as a facilitator who explores with learners questions that seek to analyze a problem and discover a solution.

Need for the Study

At the present time, the use of computers is very common and will become ever more widespread in the coming years. However, overwhelming evidence indicates that the success and failure of computers and computer educational use, like any other innovation in education are dependent upon the perceptions of the users (Christopher, 1969; Reese, 1967; Sherman, 1970). How teacher, Extension agents, or any other occupational and professional groups perceive computers depends upon the attitudes they hold. Favorable

and unfavorable attitudes held by these professionals will greatly influence the implementation of computer-based programs. Many teachers, Grossman (1970) points out, like other similar groups, treasure the traditional ways, therefore failing to employ innovations. He feels that when a new technology in education is introduced, because teachers have become "prisoners of familiarity", they wait to see if the feasibility of the innovation has been demonstrated by someone else. Therefore innovations often become stagnant or irrelevant because educators are releuctant to be the innovators.

The studies done by Goodman (1968), Lacy (1962), Reese (1967) and by many other researchers have assisted in explaining the behavioral characteristics of professional groups and the reasons why innovations are accepted or rejected by these groups. In general, all studies of educators' attitudes show not only the importance of behavioral characteristics which accept or reject educational change, but also they reveal the factors which influence attitudes. Attitudinal differences of educators often affect how they perceive facts and what conclusions they may reach (Grossman, 1970).

Acceptance of computers by farmers has always been of great significance and receives the careful attention of extension researchers, specialists and agents. Jerry Borg (1974), an agricultural educator, feels that the agents must try to create a favorable attitude among farmers

toward computers because "computers are here to stay and are a growing part of agriculture. We need to use them to the fullest [and] most intelligent use. Today's farmer must be thinking ten or fifteen years in the future. Management is the key and a dispensible management tool is the computer." Borg states further that in order for a farmer to accept the computer "as a piece of farm equipment", it is the responsibility of the agent to learn about "the farmers' attitudes" and develop an understanding of how farmers perceive new methods for solving their problems.

In the case of extension agents, as adult educators, the acceptance or rejection of computer forward planning programs by their clientele as well as the subsequent success or failure of those programs may be directly related to the extension agents' attitudes. As Anastasiow (1968), in the case of teachers, states:

> The attitude of the teacher is very important in determining the attitudes students will bring to their work on the terminals.

Harsh and Hathoway (1971) in describing the problems associated with the computerized forward planning programs (TELPLAN) state that "we have observed a somewhat slower acceptance rate [among farmers] than we anticipated. The exact reasons for this are hard to pinpoint." In the case of extension agents they indicated that it is difficult to get agents to employ the computer model in solving problems. It seems that one reason for this reluctance to use computers is "the heavy reliance on 'rules of thumb' (which

in this case results in the fact that) they consider the use of a computer model nonessential."

Constantly there are comparisons made between the abilities of man and those of computers. These comparisons frequently lead to the conclusion that one of the principal limits on the use of computers is not the technical state of the art but rather the attitudes held by the potential computer users. The value of measuring attitudes has been revealed many times. The identification of attitudes of extension agents toward computers may facilitate the implementation of the computerized extension programs within the extension operation.

The need for research on the identification of the attitudes of agents toward computers and in particular the TELPLAN system can be summarized as follows:

1. The complex problems of today's agriculture necessitate the use of computers and highly sophisticated computer programs in problem solving.
2. Research findings show that favorable or unfavorable attitudes of users toward computers are related to the acceptance or rejection and subsequent success or failure of computers and related programs. Yet, there is no research dealing with those variables which could influence the acceptance of computers and TELPLAN programs.
3. Studies dealing with attitudes of extension agents toward computers and computerized forward planning programs are scarce.

4. The final product of the research may aid administrators, researchers, extension specialist and program planners in the identification of the shortcomings (if any) and problems associated with the use of computers and computerized "forward planning and consulting" programs. As a consequence this could bring about the means by which the computer and the Telplan System will be used to their fullest potential in aiding Extension agents as well as farmers and agricultural continuing education in general.

Statement of the Problem

No reference to research was found concerning the attitudes of Extension agents toward computers and the use of computers and computerized Extension "forward planning consulting" programs. Evidence is needed as to whether computers can be used more efficiently by the Extension agents in providing more completely the Extension faculty resources of Michigan State University to farmers and other clientele.

The attitudes of an occupational group toward an alternative or a new way of planning and implementing programs are often used to determine the success or failure of the programs. Therefore, an investigation of the attitudes of Extension agents toward computers and computerized programs is essential.

Purpose of the Study

It is the intent of this study to investigate the relationships between several independent variables and the attitudes of Michigan Counties Extension agents toward computers and the Telplan System. The results of studies undertaken by Havelock (1973); Cordell (1968); Evans (1961); Hadleman (1960); and other researchers show that age, sex, previous experiences, personal flexibility, and a number of other variables may be related to and influence an individual's attitude toward an innovative educational technology. Therefore, specifically, the purpose of this study is to investigate, with respect to computers and the Telplan System, the relationship between the dependent variable, attitude, and the independent variables: age, level of formal education, length of employment, position held with the Extension Service, previous experiences with computers and the Telplan, frequency of usage of the Telplan System, and the number of Telplan programs used by the agents.

Hypotheses

Based on the purpose of the study and a preliminary review of the literature, the following general hypothesis (in a multivariate null form) has been formulated for investigation.

There are no significant relationships between the attitudes and the selected personal characteristics: (1) age, (2) level of formal education, (3) years of employment,

(4) previous experiences with computers and the Telplan, (5) frequency of usage of the Telplan, (6) number of Telplan programs used, and (7) employment position held with the Extension Service.

Delimitations of the Study

The study will be delimited to include:

1. All Cooperative Extension agents (field agents) in the state of Michigan.

2. The seven independent variables used in measuring the attitudes of the Extension agents. These independent variables include: age, level of formal education, position, past experiences with computers and the Telplan System, length of employment, frequency of usage, and the number of Telplan programs used.

Definition of Terms

Attitude: For the purpose of this study the term refers to "An attitude is an organized and consistent manner of thinking, feeling, and reacting with regard to people, groups, social issues, or, more generally, any event in one's environment. Its essential components are thoughts and beliefs, feelings (or emotion), and tendencies to react" (Lambert and Lambert, 1964).

Educational Technology: "is a systematic way of designing, carrying out, and evaluating the total process of learning and teaching in terms of specific objectives, based on

research in human learning and communication, and employing a combination of human and non-human resources to bring about more effective instruction" (Presidential Commission on Instructional Technology, 1970).

Computerize Forward Planning and Consulting Programs--The Telplan System: For the purpose of this study, this term refers to a collection of computer programs developed "for educational purposes in either the classroom or extension work with farmers, consumers, families, businesses" (Harsh, 1977). The term is interchangeably used with the term 'The Telplan System', which stands for: Today's Electronic Planning. The Telplan System includes the use of the computers at the University of Michigan and the resources of the Cooperative Extension Service at Michigan State University and Michigan Counties Extension Offices.

Courseware: The term is interchangeably used with the term "software" with the exception that courseware are those computer programs which are used for instructional purposes in education.

Touch-Tone and Hard-Copy Terminals: The term touch-tone terminal refers to a special touch-tone telephone which handles the perforated data cards. A speaker connected to the telephone line allows the University of Michigan computers to communicate with the user. The term hard-copy terminal refers to a teletype which prints the messages on paper while in use and is in connection with the computer by telephone.

Organization of the Study

This study consists of five chapters and seven appendices.

Chapter I contains the introduction, the background of the problem, the significance of the study, the need for the study, the statement of the problem, the purpose, the general hypotheses, the delimitations of the study, the definitions of the terms and the organization of the study.

In Chapter II the pertinent literature on studies as related to the computer in education, the computer in continuing education, the computer in agricultural extension education, and the Telplan System are reviewed.

Methods and procedures are included in Chapter III. In this chapter the construction and validation of the attitude scale and the background questionnaire are described, the population is defined, the collection of the data, the measurement model and the procedure for a priori, and a posteriori cluster analysis of the data are described and explained. The chapter also contains the reliability analysis, other statistical procedures used, and a summary.

Chapter IV presents a detailed description of the analysis and findings of the data, and a summary.

Chapter V contains the summary and conclusions.

CHAPTER II

REVIEW OF THE LITERATURE

In this chapter, the topics central to the study undertaken are reviewed and presented. Since this study involved several areas including agriculture, computer science, continuing education, continuing/extension agricultural education, technology in education, sociology and psychology, background data did not follow a single developmental pattern. Therefore, the related literature was reviewed in three areas: 1) the computer in education, 2) the computer in continuing education, and 3) the computer in agricultural extension education and the Telplan System. Since subjects, attitudes, and measurements of attitudes are reviewed and reported in numerous studies and research, no attempt has been made to include a general review of the literature as related to these two subjects. Rather, the research specifically related to attitudes concerning the computer and technology are reviewed and included in the aforementioned three areas.

Considerable research has been conducted in a variety of subjects as related to the computer in education (item 1). However, a concerted effort has been made to include only those studies for item 1 which have a bearing on the problem

under study. The restrictions set for the above items 2 and 3, and the fact that the role of the computer in continuing education and agricultural extension education is fairly new, limited the number of published and unpublished studies. A computer-based literature search (ERIC) revealed a total of 78 citations by November 1978. Of these 78 only a few were relevant to the items 2 and 3. This indicated an insufficiency of research conducted as related to computer technology in continuing education, the computer, and computerized programs in agriculture.

The Computer in Education

The use of the computer in education started from a limited usage in the late 1950's and increased to a rapid pace during the 1960's and the 1970's. The rate of growth of the use of the computer in education in particular computer assisted instruction (CAI), according to Atkinson and Wilson (1969) contributed to the tremendous expansion of computer technology, the increasing financial support by the federal government and the potential of CAI in individualizing instruction.

The increasing federal government support for the use and incorporating the computer in education was largely based on the 1967 President's Science Advisory Committee report. The Committee, through several recommendations, invited support from institutions and the government for educational computer needs. Included in the recommendations were: that the continuing educational computer service should be shared

by the government; that the research and education in computer science should be extended through the federal government support; that the use and development of computer services be encouraged and spread among the secondary schools with the cooperation of the universities.

In addition, the research and projects as related to computer technology in education have been actively supported by the Office of Education. Since 1965, Title IV of Elementary and Secondary Education Act (ESEA of 1965) has become a basis to support many of the research and development for computer technology in education. The planning and operational usage of computers have also been supported under Title I and III of ESEA of 1965.

In order to upgrade staff in the area of computer sciences and educational computer use grants were provided by Title VIII of the National Defense Act (NDEA), the Vocational Education Act of 1963 and the Education Professions Development Act of 1967. The establishment and operation of electronic computers to assist in financial and student records, student course work and the transmission of library materials were provided by Title VIII of the 1968 Amendments to the Higher Education Act of 1965.

The ever increasing power and the usage of computers have created the concern for the social impact of computers. In 1974, the Institute for the Future (IFF) sponsored four workshops to explore the issue of the social impact of computers. The workshops included: 1) computers as tools in decision

making, 2) computer usage in financial operations, 3) computers as shapers of perceptions, behavior, and attitudes, and 4) individual access to computers (Amara, 1974). The IFF in discussing the framework for assessing social impact of computers, emphasized that "the introduction of computer technology into any real-world situation-if it is significant may create changes in how data is collected, generated, analyzed, processed, stored, and disseminated. If this were not so, then its impact would be either negligible or very difficult to trace." As on what basis the social impact of computers was to be measured, it was concluded that:

> within the value system, impact may be measured in terms of those quality-of-life indicators that are the most disaggregated, personal, and value-laden. Among the indicators are privacy, equality of opportunity, choice, diversity, openness, participation, human control, customization, gainful employment and many others. Ultimately the assessment of social impact requires judgements about the relationship of choices involving computer uses to the likely impact which such choices will have on those indices of personal well-being.

In order to prevent the possible hazards computers might create and to realize the the greatest potential benefits from computers widespread knowledge about them is essential. Thus an educational program was based on this premise. This program was an outgrowth of the workshop on computers as shapers of perceptions, behavior, and attitudes. The principal issue of this workshop was to ensure for those whose lives are touched and as a result affected by information service the widest choice possible. The following are a review of the research papers introduced to this particular workshop:

In 1973, Marvick conducted "a shared-time omnibus survey" in Los Angeles to assess the impact of computerization. The survey included questions that covered issues from acceptance of computerization in educational and medical programs, experience with computers in job training or on the job, to the type of personal problems created by computers. The data collected indicated a need for further research to examine and to assess "the impact of increased familiarity with computers on the effectiveness with which individuals solve problems." It was also emphasized that in order to find out how over time, a person adjusts to a particular work environment, longitudinal studies must be undertaken if the object is to gather information on computer perceptions, attitudes and behavior.

Anderson (1974) while attempting to build an inventory of research related to attitudes toward computer technology found that the data on perceptions of computerization were "very uneven." Methodology used for research were "poor", and most results were "either very uninteresting nor illuminating."

One of the other major workshop themes was "research on the development of humane or responsive design criteria." Using this theme it was noted that the individual must be considered to be an integral part of the information system and it was emphasized that:

> A deeper understanding must be achieved of substitutes for 'human niceties and social rituals' in an information context, as well as of those characteristics that

> are intrinsic in a human being's makeup. Humanizing has a different meaning at each level at which an information system is to be made responsive to the needs of an affected group. In all of this, simply exhortations about responsive systems to system designers will not suffice; public-policy guidance must be developed, buttressed ideally by a discerning and literate public (or consumer).

Regarding the issues cited above the report indicated that actual computer literacy stood in sharp contrast to the level it should be to result in adequate knowledge of computers by the public. Computer literacy should be accepted "as a desirable social good", which in this case the design of long term comprehensive computer literacy programs in all sectors of society would be easily realized. It was noted that "the goal of achieving increasing computer literacy is not to forestall possible conflicts in computer use but rather to raise the level of computer awareness so that users may exploit computer systems more fully and protect themselves from possible abuses."

Related to the problems of computer literacy, Ashenhurst (1974) emphasized several observations and recommendations, including the following:

--While not working directly with computers, most people's attitudes toward computers are generally based on their experience with information systems in which the computer is only a part.

--In addressing issues of computer literacy and attitudes, a clear distinction must be made between information systems (information-processing and decision making environment within which the computer is imbedded) and computer systems

(physical hardware).

--Depending on circumstances, computers are often viewed as pets, inanimate objects or persons. These views toward computers have not been studied carefully, if at all.

--Public attitude toward the computer and the public knowledge of the computer is "generally inaccurate and grossly oversimplified." Measurements of such attitudes "do not adequately convey the dichotomy that exists in the minds of most people concerning the positive and negative aspects of computer (and information) systems."

--There exists a major need for the development of models of what attitudes toward computer systems are, how those attitudes are formed, and how to track them.

--Computer attitudes "often depict man's private hopes and fears rather than any external reality."

--It is essential to determine the requirements necessary to fit an information system into the environment in which it will operate. This is important since sufficient emphasis is not placed on the information-analysis phase when most information systems are designed.

--Increasing public computer literacy and public pressure are needed to prevent the continuing design and application of information systems in "inhuman ways."

Smith et al. (1974) noted that in order to achieve a widespread computer literacy five to ten years would be needed. Since computer technology is here to stay and growing, computer literacy is intrinsically good and important.

As far as the measurments of computer perceptions and attitudes were concerned, White, et al. (1974) predicted that the computer may gradually lose its identity to be a source for attitudes as it "progressively becomes submerged in the information system" in which the computer is a part. White and others also noted that for educational training programs, "for understanding social change", for public policy making, and the like, measurements of attitudes toward computers, "must serve as inputs." It was indicated that the basic problems were not those of measurements only, but "those of anticipating and forecasting the impact of future computer technology."

Literature often refers to the computer versus the human. The notion that machines may perform human tasks and the fear of displacement by machines has been along with technological development since the early years of the Industrial Revolution. Over half a century ago, a poem titled "Antiquated" was written by a teacher.

> Mr. Edison says
> That the radio will supplant the teacher
> Already one may learn languages by means of
> Victrola records.
> The moving picture will visualize
> What the radio fails to get across.
> Teachers will be relegated to the backwoods,
> With fire-horses
> and long-haired women;
> Or, perhaps, shown in museums.
> Education will become a matter
> Of pressing the button.
> Perhaps I can get a position at the switchboard.
>
> (V. Church, 1925)

Computers with their extraordinary potentials seem to be considered as more of a threat to humans than any other technologies since computers can perform functions much more quickly and efficiently than humans can. Therefore, job displacement of humans because of computers is a very real threat. Tannenbaun, et al. (1974) reported that insufficient attention was being directed to "job displacement and work-pattern shifts created by computers." Barre (1966) in a study of the relationships of attitudes of human interaction with machines, asked his subjects to rate different concepts, including computers, using 42 pairs of adjectives as rating devices. Barre found that those of the respondents who underrated the concepts had the fear that the machine might replace them and thus they did not trust the machines.

A research was conducted by Purdy (1975) to study the attitudes of 225 faculty members of a California community college toward technological teaching media, including computer assisted instruction. A participant observer methodology was used to reveal the teacher's choice of technological aids. The researcher reported that one group of teachers who felt more comfortable with the traditional type of classrooms and teaching methods indicated a fear of being replaced by new teaching media. These faculty members believed in general that new teaching aids "were a hindrance rather than a help."

Is the computer a replacement for the human and machine education a substitute for human interaction? No research

was found to address these questions. In many opinion articles, the authors rationalized that the answers were negative. Assimov (1976) dismissed the idea that machine education could not replace human interaction. However, he believed that it could be a supplement only. He declared:

> "human interaction could proceed all the better were it not oppressed by the negative conditioning of an association with a dull and uninspired mass-education procedure involving subject matter that has nothing to do with the interaction."

Tannebaun, et al. (1974) related to the computer versus human interface, noted that "desirable benefits" may be produced if a computer system were to displace a function previously performed by a human. However, they pointed out that:

> the interface is almost always incomplete in some human sense--personal rituals and niceties are lost. Although an impression of a two-way communication channel between the consumer and the system may be created, in fact, the interface responds more like a one-way channel, in a seemingly impersonal manner.

Hess and Tenejakis (1973) conducted a research to study the long-term effect of the computer and in particular computer assisted instruction (CAI) on educational institution and on the teacher's role. Attitudes of 189 students from a California junior high school toward the computer and CAI as compared to their attitudes toward other sources of instruction and information (textbooks, the teacher, ---) were studied. The subjects were divided into CAI group and non-CAI group. The researcher reported that "the data showed that the CAI/non-CAI dichotomy accounted for the greatest number of significant relationships (at or beyond the .05 level of significance.)" The result indicated that "all the students

had a more favorable image of the computer than of the teacher." Non-CAI group indicated a more favorable attitude toward the computer as compared to the teacher. They concluded that:

> the greater confidence demonstrated toward the computer as compared to the teacher appears to have resulted from differences that the students perceived in the learning situation in which they found themselves when working at the computer terminal and in class with the teacher. For the CAI students in particular, the feeling that the situation managed via computer was more likeable and more fair than that monitored by the teacher seemed to be based on their experience of getting messages that they understood and immediate (and factual) feedback on the quality of their performance.

The findings, Hess and Tenejakis indicated, may have the implications that there will be a shift in the function and roles of the teacher. In particular, they predicted that the role of teacher as "dispenser of incentives and rewards in both curricular and noncurricular areas" will be reconsidered. They noted that if the shift were to take place, the teacher then "will have time to think creatively about education", perhaps to take learning out of the classroom and into community agencies, museums, factories, and natural settings."

Suppes and Morningstar (1972), however, as the result of their research related to CAI concluded and predicted that:

--The widespread use of computer technology will burden education with impersonalized teaching

--The widespread use of computer technology will bring about inordinate standardization of education

--The widespread use of computer technology will result in the presentation to students of curriculum (the type of work) that is almost simpleminded in character because of the

limitations of computer technology and the problems that must be overcome by using it

--The widespread use of computer technology will make men slaves to machines and as a result dehumanizes society

As a final review in this section, the literature shows that the effectiveness of educational technology has been of concern to educators and researchers. Cunningham (1976) in pointing out that although a limited research was conducted to date, the findings were "encouraging." In the discussing of research carried out by Jamison and others (1975), Cunningham noted that as far as CAI was concerned, the researchers concluded that additional teacher's effort was not required for practice and drill on the computer. Drill and practice took less time on the computer. Although no significant differences in achievement were found, the findings indicated that achievement, "particularly for slower students" seemed to improve when as a supplement "small amounts of CAI" were used.

The Computer in Continuing Education

In 1972, Grabowski in exploring the role of the computer in adult education (for ERIC) concluded that there was a limited usage of computers in instruction and continuing education for adults. He attributed the reasons for this mostly to cost factor and the difficulties that CAI created for many adults, especially those involved in adult basic education (ABE).

In 1976, Paeschke in examining the administrative and instructional uses of the computer in adult education found that expense, lack of creativity, information and stimulation had been a hinderance to the development of the computer in adult education. Paeschke by referring to a 1969 USOE Ad Hoc Study Group pointed out that cost was among the major concerns and recommendations for formulating future directions of computer applications in continuing education. The Ad Hoc Group along with other recommended that: 1) unless significant reductions per user cost could be made, the widespread use of many of the computer applications would not become feasible, and 2) systems for services currently available and for expected future functions should be developed in such a manner that the per user cost should probably not increase by more than two percent.

Grabowski in referring to the studies undertaken by Longo, Schwartz, and Ford, et al., however, noted that there were factors under which that the high cost of computer usage might be justified. A significant reduction of the amount of training time in teaching basic electronics in the U.S. Army, for instance, was a major factor (Longo, 1969). A ten percent saving of time was also reported by Schwartz (1966) in the required time for the completion of a CAI utilized course for electronic technicians as opposed to conventional methods. Nonetheless, there was no significant difference in examination scores between the two groups using CAI and other methods. Ford, et al. (1970) compared a group of

U.S. Navy personnel using CAI to those receiving standard training. It was found that "posttest" performance and speed consistently favored "the group utilizing CAI."

As the difficulties that CAI usage created for adults, Grabawski reported a study conducted by Cole (1971) at North Carolina State University . The participants of ABE programs were found to be more anxiety prone from difficulty in mastering the use of CAI and the computer. When a simplified CAI for easier personal feedback and work with the computer was used, it was concluded that the system did not interfere with progress of the learning process.

In an overview of CAI for adult educators, Dick (1969) indicated an extensive use of computers in adult education at North Carolina and Florida State Universities. Three field studies to evaluate the CAI programs were conducted. In the first study, 23 participants using CAI showed significant superiority in final grades when compared to those who used conventional methods. Although there was considerable time saving, no great acceleration of participants' pace through the materials was realized.

For the second study, CAI materials were revised. A time saving of about 15% for CAI group was achieved. However, the two groups had approximately equal performance.

For the third study, the length of the CAI materials was reduced to two-thirds of the previous length. Again, equal performance by the 29 participants and the conventional group was achieved. Dick concluded that the participants saw "the

major benefit of CAI in terms of its self-pacing aspects." He also noted that after some exposure to the computer and CAI, most participants seemed "to develop a very personal feeling toward the computer."

CAI in ABE, Dick stressed, was critically important to the learning of basic skills. Here, the drill and practice mode of the CAI system created a private learning situation for the adults in which they could make numerous mistakes and the computer also provided many types of materials for basic skills.

Problem solving by the computer was also of prime importance in ABE. Dick noted that "the analogue in ABE or even with teenagers would be to provide real life problems" in the problem solving mode. Before designing and developing materials and programs for the problem solving mode and in general CAI in ABE, it was also necessary to determine the level of capability of the users.

The accountability for delivery of services in ABE had come under increasing scrutiny by 1975. In a report to Congress, the General Accounting Office (GAO) indicated that the "statistics compiled at the local program level, and ultimately reported to the Office of Education and summarized nationally, which have been unreliable and have overstated program accomplishments." Paeschke (1976) pointed out that this accountability and the recommendation by GAO for improvement in program reporting data and subsequent requests by the USOE for more reliable collection of data prompted some states

to improve their management information systems by using computerized data collection, analysis, and retrieval system. A survey about ABE programs was conducted to gather information from the federal regional officers and state ABE programs administrators. The following were found:

--Several states have used the computer for research purposes notably in the area of statewide needs assessments of potential adult education audiences and of adult educators for staff development.

--Three states (Arizona, Texas and Wisconsin) are using computer analysis for all aspects of data required for annual federal performance report and for data of interest to state agencies.

--Two states (Massachusetts and Rhode Island) are using the computer for analysis and reporting performance data on clients.

--One state (Arkansas) is using the computer to analyze data on adult education staff.

--Several state expressed interest in future computerization of data collection.

The survey further revealed the reasons for computerizing the ABE programs. These included: need for collecting reliable and accurate data; need to deal with and handle large volume of data; need for understandable, timely reporting and program information. It was also found that two modes of collection of data existed: time-sharing and batch. Paeschke noted that "the most cost-effective means of analyzing and reporting program data" was the batch mode. The time-sharing mode which enabled "a greater flexibility in delivery of more varied report", however, was more costly. Flowchart and description of system design of a statewide ABE computerized data collection, analysis, and retrieval system can be found in Appendix F.

The following represent reviews of selected projects as related to administrative uses of the computer in continuing education. Included are: 1) Continuing Education Unit (CEU) computer-assisted system at West Virginia University (Hadsell and Ervin, 1975) and 2) administrative uses of the computer in Massachusetts ABE programs (Paeschke, 1974).

CEU* Computer-Assisted System at West Virginia University

The CEU has been developed to fill the need for a uniform unit measurement for non-credit Continuing Education programs and activities. It is a mechanism by which a majority of the programs and activities could be recorded. Thus, as the CEU becomes more standard the need for systematic record keeping becomes mandatory and computerization a necessity. Prior to 1971, West Virginia University had kept records by manual methods only. In the summer of 1973 the decision was made to computerize records. Included in the objectives and goals were: 1) that each Continuing Education participant would have his transcript record continually updated and available for transfer; 2) that records be available on a permanent basis and available on request; 3) that appropriate data be available to Institutional Research for reporting requirements; 4) that the computerized data system be flexible for expansion or modification; 5) that the computer be for assistance utilization, rather than to control the system.

*One Continuing Education Unit (CEU) is 10 contact hours of participation in an organized continuing education experience under responsible sponsorship, capable direction and qualified instruction.

In order that the CEU system provide flow overview, each course is coded by a Specialist and the CEU system designed to aid Extension Specialists in performing the administration of the CEU-WVU task statewide. A master file management programming keeps participants' files constantly updated.

In summary, the CEU-WVU consists of two master files: 1) Course Master file, and 2) Participant Master. The course key is the logical link between the Participant Master file and Course Master file. The system can also perform an audit check. Fundamentally, the process of collecting of participant and course registration forms are monitored by the CEU system. The audit link of the system rejects incomplete transactions and the invalid links at program execution line alerts the system user through diagnostic messages. The cost of the CEU project at WVU is not cheap, but neither is it exhorbitant. An estimated 75% of the total cost could represent human resources.

After one year West Virginia University began programming CEU System II. This initial CEU System emphasized user-sector or recording of participant activities coupled with management reports. CEU System II will continue to do this and new additions can be made in the future as necessary.

Administrative Uses of the Computer in Massachusetts ABE Programs

The continual on-line application of the computer usage for information regarding attendance and student record accounting is the application used by the administrations

in Massachusetts. The application is on a decentralized time-sharing basis, therefore, the state centers have the responsibility for input, manipulation, and retrieval of data. As with all computer programs some problems encountered have been: 1) computer down-time and other hardware problems and 2) the necessary high degree of training required for terminal operators.

In order to accomodate the diverse needs of its adult clientele the Massachusetts Adult Education began its use of computer application in 1971. The original use was for instructional purposes but early on it included attendance data. The terminal at Springfield was connected with the Time Share Corporation in Hanover, New Hampshire to provide application. By January 1974 opportunity for expansion throughout the state materialized as the network for adult learning centers was approved by the state. By June 1974 the seven centers linked to the computer housed in the mathematics department of the Springfield Public Schools included both administrative and instructional uses of the computer.

During the first year of implementation the following were included:

1) training sessions and workshops to prepare learning center staffs, directors and terminal operators.
2) two major record keeping programs were developed and implemented.
3) to increase capacity and service of learning centers new and more sophisticated hardware was installed.

4) Center's individual prescriptive programming was improved.

During the second year of implementation the following were included:

1) the administrative and educational uses of the center's computer were strengthened.
2) a more flexible prescriptive writer for use of all centers was developed.
3) a mobile field coordinator began training center directors and terminal operators as well as taking care of on-site problems.

The learning centers using mostly individualized instruction annually service some 8,000 clients who have less than a high school degree. Although each center is unique in staff composition, materials and student population some commalities exist, such as:

1) basically similar clientele
2) predominately individualized instruction
3) administrative routine in regard to management of instruction and data.

The predominant goal of the computer project is to provide a computerized system comprehensive enough to encompass all aspects of learning center management which are: 1) individualized curriculum, 2) management of student records, and 3) management of student attendance.

All these needs apparently are being met by the computer system in Massachusetts because of the effective link up of

each center's terminal with the main computer. For example, the focus of the record keeping system is the storage, manipulation and retrieval of student record information and an up-to-date file on each student is a reflection of a given center. Record data on any student at any center can and should be complete (up-to-date) and therefore, retrieval upon request by those needing information (e.g. government agencies.)

A review of Attendance Accounting system reveals that the reason for keeping accurate attendance is that many programs are funded solely based on student attendance. Record data such as individual student records or the entire center's records are retrievable. The system, by examining selected data stored on students, can provide techniques for analyzing the reasons for inactivation. The inactivation may be examined, for example, by program goal, sex, age, referral group. The center, thus, is able to provide for many research questions.

***

Computer technology has also been applied to continuing education instructional process. These uses have been in the forms of CAI and computer managed instruction (CMI). Paeschke (1976) in a study of the computer models in adult education concluded that CMI seemed to improve the effective delivery of instruction to students; "student responsibility for learning experiences" was increased from the use of CMI; because CMI was able to reduce cumbersome and routine management tasks, the teacher flexibility and availability to students were increased.

CMI in adult education settings has been used primarily for college level courses with emphasis on: 1) educational concern for individualized and personalized instruction, and 2) management aspects of learning process indicate a need for assistance (Paeschke, 1976).

The Capital Area Career Center in Mason, Michigan uses computers for many aspects of individualized instruction in an occupational setting. Student competencies are compared with task analysis. Data from the task analysis is computerized and students are given learning prescription based on their competencies and the skills needed for the particular tasks. Computer reports indicate student progress to the instructor (Danford, in Mitzel, ed: 1974).

Clinical experience plus CMI was used at Florida State University to prepare teachers of special education (Schwartz and Oseroff, 1972).

A review of the research in regards to CMI indicate the preliminary findings:

1) CMI can be cost effective in comparison with conventional and CAI instruction.
2) CMI can individualize effectively the students' learning experiences, given suitable organization and development.
3) CMI combined with CAI can be used to expand instruction possibilities.

Final results from research indicate a general superior performance of CMI groups which included instruction in social

work, teacher education for children with special needs, elementary education, and educational psychology. Also the maximal quality in the learning experience was achieved in a social work education course at Florida State University using a combination of CAI and CMI. (Lawler, 1972).

A combination of CAI and CMI at Florida State University instructional laboratory proved a very cost effective approach. (Krombrout, 1970).

Researchers in adult education have also been concerned with the attitudes of the adult users toward the computer, CAI, and CMI. This has had emphasis particularly in ABE. The interest has been whether positive or negative attitudes of adult students or users affect the process of learning experience or the uses of the computer.

The attitudes of participants of ABE programs toward the computer and CAI were measured and investigated by Sherman and Klare (1970). The study revealed a degree of anxiety as related to the computer among the non-CAI group and the CAI group. In spite of the anxiety, however, both groups showed eagerness to use the computer and CAI. In general, the CAI group had more positive attitude toward the CAI.

In 1970, Scanland attempted to determine whether the attitude of the black adults toward education could be positively changed utilizing CAI. The findings showed that the instruction by computer in the CAI group as compared to the non-CAI group resulted in a significant change of attitudes in a positive direction. The researcher noted that "the

reaction of the adult subjects to the unique experience of direct communication with a computer is important to the field of adult education."

The Computer in Agricultural Extension Education and the Telplan System

According to Miller (1970), there has been a rapidly growing usage of the computer and the computer-processed information in agriculture. Farmers have been utilizing computers and computer services to increase their managerial efficiency. Land grant universities, commercial organizations and the Cooperative Agricultural Extension Services have been major sources of computer services to farmers especially to the ones with small farm operations.

Researchers have indicated varying reasons for computerizations of many aspects of agriculture. These range from fast delivery of the services in extension education for farmers, to the need of developing management information systems in agricultural cooperatives. According to Axinn (1969), the use of the computer could be considered an "exciting" communication channel between one of the components of agriculture information system, extension/education, and the other components, "production, supply, marketing, (and) research."

Before the computerization of an existing information system takes place, Townsend (1970), and other researchers stated the system must be sufficiently clean and efficient.

If the existing information retrieval system were not reasonably clean and effective, Townsend noted, the computer not only "will speed up the inefficiencies of the present system", but it will "further complicate matters." The computer should be considered as a tool and if utilized effective, it would enhance the existing system of collection and distribution of information (Thompson, 1971).

In the process of computerization, therefore, a number of questions arise. These according to Sofranko (1974), normally include: Are Extension staff primary users of the data retrieval system? What would be the role of Extension in data collection and data use? What type of data are needed and useful and for what purpose? Will the role of the Extension agent change as a result of better access to more data and how? How adequate is it--the existing data availability for the agents?

Sofranko in an attempt to explore the above as well as a number of other questions, surveyed the Illinois Cooperative Extension staff. The researcher made several assumptions including: any "data delivery system ought to try to determine who its clientele are or will be, and their current and anticipated data needs." The findings of the study indicated that the Extension staff's use of data was largely related to their personal needs, meaning that the staff (79%) used the type of data that helped them to determine and to keep up with changes and needs in their programs. The researcher concluded that in determining the utility of a data delivery

system and types of data, the potential users should be surveyed to verify their needs and the types of data that suits them. It was also concluded that "as far as Extension staff were concerned, data retrieval systems and access functionally depend on an instructional component that teaches new data uses and analytical skills."

In establishment and development of computerized educational, consulting and planning aids the extension administrators, according to Harrison and Raides (1974), "must decide" what role state Extension agents and specialists will have. Further, the role of computer and computer programs in delivering educational services to the clientele must be decided by the Extension staff.

Harrison and Raides stressed that at the beginning stage of computerization of educational and planning aids, one major question would be whether to "take the computer to the farmer" or ask the clientele to "come to the computer." In either of the cases, the role of the Extension agent would be of primary concern and should be established. The authors further, in proposing a computerized management system for Extension (Figure 2.1), stressed the crucial role of the agents in operation and delivery of the computerized services. They noted that the two following prerequisites must be met in order for the agents to be willing to involve themselves:

1. The computer system must be accessible, dependable, and easy to use. Current computer equipment is capable of fulfilling this requirement.

2. The library of computer programs must be sufficiently large and diverse so that farmer problems

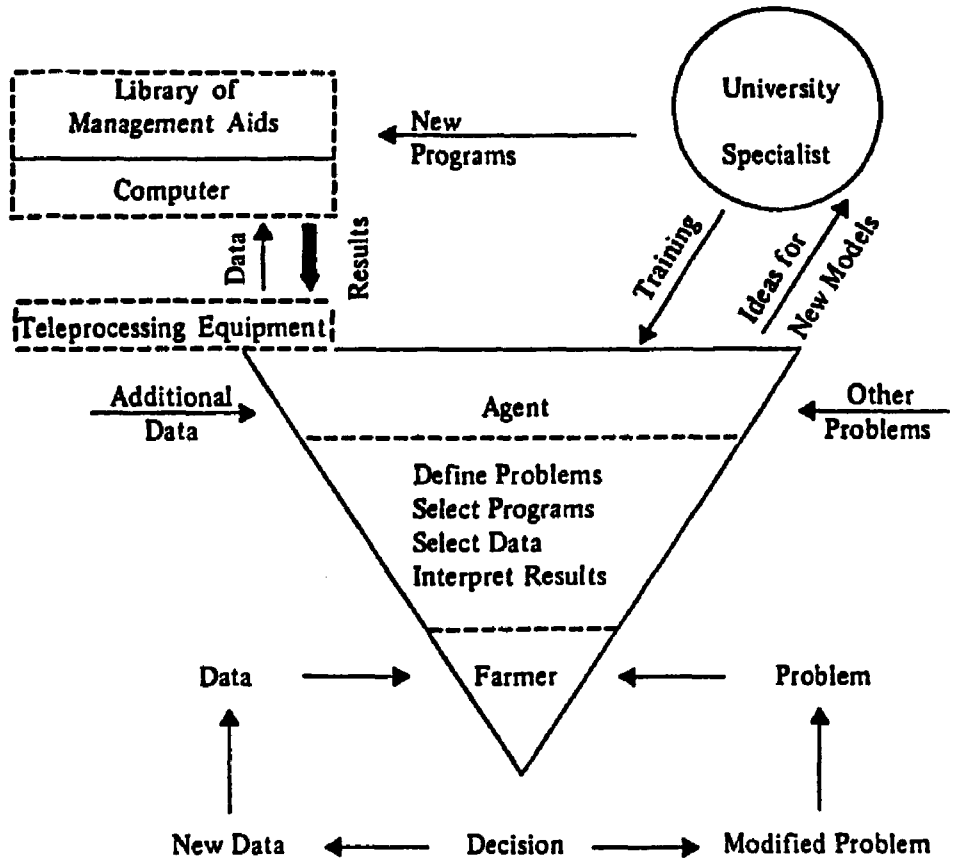

Figure 2.1. A Computerized Management System for Extension (Harrison and Raides, 1974).

> suggest a given program and not vice versa. If we view the library as containing all programs on any computer, regardless of its location, then the library is already quite large. In addition, the number of readily available programs is growing rapidly as the staff capable of generating programs enlarges. Thus, the software may be nearly overcome and is, in any case, diminishing.

Some would argue that another prerequisite for the agents' willingness to involve themselves might be the demand by farmers for educational decision making and services. Harrison and Raides indicated that this was not "necessarily true." The farmer's educational need, would be certainly an understanding of what the computer can do for them and how

much in the way of benefits they can expect from the computer and at what costs. The agents' "actions", thus, could demonstrate if the usage of the computer would be feasible.

Is there any reluctance on the part of the agents to become involved with computerized educational, consulting and planning programs? If there is, why? Literature referred mostly to "fear of the unknown", "fear of being replaced by a machine", and a variety of other reasons.

Purdy (1975), in an attempt to study as to why some faculty of a community college used new media, including computer aids, found that for most teachers having control over the learning setting was of "crucial importance." In the study, the non-computer aid user group was found to have the feeling and reason that "personal control guaranteed order and thus the self-respect necessary to function as a teacher." Norris (1977) contended that teachers "strongly resisted the acceptance" of computerized aids because of the perception of losing their jobs and being replaced by computers.

Communication gap between the developers of computer programs for Extension and the users--the agents--has also been mentioned as one important problem in acceptance and usage of computerized programs. Harrison and Raides (1974) noted that in order for the agents to get to know the programs and subsequently use them in the field, it was required to communicate with the agents on what was needed. Thompson (1971), in a study of the usage of computers by agricultural cooperatives in the state of Oregon concluded that the utilization of

computers was hindered by "the magnitude of the communication gap between computer people and management." The findings showed that the firms which had developed methods of involving management in the determination and applications of computers programs, were using their systems to maximum.

Another factor that literature referred to as having importance on the acceptance and success of the computerized system for Extension was agent training. Harrison and Raides (1974) noted that the significance of agents training was two fold: 1) when an agent had mastery over the use and subject matter, there was a higher likelihood that the agent would be more successful with the computerized Extension aids, and 2) the effectiveness and efficiency of both specialists and agents could greatly improve as a result of the adoption of computerized aids and this could be directly related to the necessary training for the agents.

Harch (1971), reported that it was essential to increase the frequency of the training sessions for the county agents in Michigan to enable them to understand and operate the programs of the Telplan System. The increase in the number of training sessions was based on the assumption that as the result field acceptance of the Telplan System could be helped.

Other factors that were frequently referred to in the literature as having impact on the acceptance and subsequent usage of computerized systems in Extension included complexity and applicability of the programs. Harrison and Raides in

discussing a study of software for farm management Extension (Candler, et al., 1970) stressed that "clarity, speed, and reliability" of the programs of a system were important. The conclusion was that the "bottleneck" was the applicability and usefulness of computer programs. It was argued that if the agents find the programs useful and applicable for their field needs they would willingly accept and rapidly adopt the system.

In a study of a college faculty attitudes toward technology in education, Purdy (1975) reached the conclusion that:

> Many administrators believe a teaching innovation has been introduced successfully if they set up some hardware and see a few students using it (learning resource centers frequently fall into this category.) But unless the concerned faculty perceive the innovation as a useful teaching device and incorporate it in their own teaching, it remains an adjunct, doomed to remain on the periphery.

The complex models of the Telplan System were found to have lower utility among the agents in Michigan (Harsh, 1971). The conclusion was that those programs of the system which needed "greater amount of input" for solving a field problem were used by a smaller number of the agents. Computer errors were also another problem for the agents, which resulted in lowering the agents' level of confidence in a model. It was found that certain programs of the System had "a very high utility among the farmers", and therefore, were heavily used by the agents. These programs were found to have high applicability to real farm problems. The author concluded that it was crucial to develop computer models that were useful in

the field and were also free from problems before including them in the Telplan System.

In 1973, Schoonaert studied the adoption of program number 31 of the Telplan System (called Least-Cost Dairy Ration) by 48 Ingham County, Michigan dairymen. He found that the adoption rate for the group of herdowners under study was statistically significant ($p < .05$). It was concluded that the dairymen "did adopt" the program "because of its effectiveness, potential to reduce feed costs while maintaining milk production, and its practicality".

Schoonaert also reported a pilot program conducted by Hutjens, et al. (1972) to study the utilization of the same program number 31 of the Telplan System in eight Minnesota counties. The agents in those counties were surveyed to find the future usage, time, and cost saving as the result of utilization of, and educational effectiveness of the program. The findings showed that up to 40 cents per cow per day was the amount of cost savings for a dairyman, while the increase in milk production for another dairyman was 10 pounds per cow per day. A projection by the agents in those counties indicated that in the next year (1972-73), a very high number of dairymen (297) would utilize the program.

In a 1971 report, Harsh noted that only 11 programs of the Telplan System (the total number of programs in the System by 1971, was 30) could be considered extensively used by the agent in Michigan. The report indicated that in the first six months of 1971, these 11 programs were used (by

Michigan Extension agents and all other users) a total of 2119 times (89%) as compared to only 274 times (11%) for the remaining 19 program.

Michigan Extension agents (field staff), as reported by the Harsh and Hathaway (1970,1971,1972,1973,1974, and 1975), utilized the Telplan System (Touch-Tone System usage) 983 times in 1970 to a maximum of 4,065 times in 1973. This maximum dropped to a lower number of usage (3,646 times) by the agent in 1974, while the total number of usage by all the users steadily climbed throughout the period of 1970 to 1975. No reasons for the decline of usage by the agents were stated in the reports. The decline occured even though the number of programs in the library of the Telplan System was increased from 30 in 1970 to 57 in 1975.

One of the charcteristics of the Telplan System is the usage by touch-tone system. (the touch-tone system usage in the Telplan System operation has been an on-going program since the creation of the System in 1967). It is in fact a dial-access system which operates in connection with the libraries of the Telplan System. This characteristic has resemblance to the concept of distance education with telephone and the computer as mediums. The touch-tone system (and recently a growing number of hard-copy terminals) in Michigan counties assist the agents to "take the computer to the farmer". One of the reasons for establishing the dial-access system has simply been the lack of possibility for the agents (or the clientele) to go to the site housing the

computer. Flink, 1975), indicated that the aforementioned reason was one of the bases for distance education in the discussing of a report by Park (1974), Flink stated that the continuing education needs of medical doctors, social workers and nurses in Wisconsin were being met using a system which was developed by means of telephone lines to receive telelectures.

Using telephone as a medium of instruction has considerable disadvantages in distance education, however, according to Flink (1975), when compared to advantages, the disadvantages could "almost be ignored". By referring to Short (1974) and Yeomans and Lindsy (1969), Flink noted that the advantages were": "flexibility", "low cost", and the possibility "to reach and provide remote areas with qualified instructions".

The disadvantages of the telephone as a medium in distance education, as indicated in the literature, were mainly: using audio transmission as the only means for delivering information, and the emphasis that telephone instruction seemed to be "impersonal". Flink argued that "the only way to eliminate this impersonality" was to have "face-to-face instruction".

The question of whether telephone instruction was effective in advancing learning was also addressed in the literature. Flink (1975), discussed a project called DIAL (Direct Instruction for Adult Learning) which started in Virginia in 1970 (Byrd, 1972). An evaluation was carried out to compare telephone instruction and conventional methods of classroom

instruction. However, Kelly (1977), noted that a "significant positive correlation between the level of participation" in the Miami-Dade Community College distance learning program and "the level of performance in the course examinations" were found. This program utilized audio, video, and printed materials jointly with a computer for the distance education.

The literature revealed a variety of studies and findings as related to attitudes of users and learners toward the instruction media. One such research was done by Neidt and Baldwin (1970) who studied the attitudes of two groups of professional engineering students. The group which was enrolled in off-campus courses was found to have less favorable attitudes toward the courses. However, the findings showed that the use of a medium such as videotape recordings was effective in meeting the continuing education needs of the off-campus engineering group.

The literature also indicated that in the study of attitudes, personal characteristics of the subjects had been taken into considerations (e.g. Havelock 1973, Reese 1967, and Evans 1961). These characteristics frequently included age, past experiences, level of formal education, and a number of other variables. In a study of business faculty and staff attitudes toward computers, as an example of the literature, Reese (1967), found and concluded that age, level of management skills, and academic rank did not seem to be the indicators of attitudes. However, Evan, et al. (1961), found that, for instance, past experiences were indicative of favorable attitudes.

Summary

The literature reveals that there has been a rapidly growing usage of the computer and computer-processed information in agriculture. The computer has been utilized in agriculture for a variety of purposes from increasing managerial efficiency to complex problem solving. Major sources of computer services to farmers have been for the most part from land grant Universities, Cooperative Extension Services, and commercial organizations.

Computer technology has been applied to education instructional process since the late 1950's. The applications have been mostly in the forms of CAI and CMI. The literature indicates, however, that until the early 1970's there was a limited usage of the computer in continuing education. The usage is growing with the applications mainly for administrative purposes and for instruction of adults.

There are limited amounts of research and studies dealing with the subject of the computer in continuing education, agricultural education, and specifically the attitudes of the users toward computers and computerized programs in continuing/agricultural education. However, a portion of the literature appears to explore the reasons for using or not using the computer and computerized programs by teachers, Extension agents and other users. The literature reveals that the apparent common reason for not using computers are fear of the unknown and fear of being replaced by machinery.

CHAPTER III

METHODS AND PROCEDURES

This chapter presents the methods and procedures for the study. Included are the development and validation of the instrument to measure the attitudes of extension agents toward computers and the Telplan System, a background questionnaire, and a description of the population. In addition the methods used for collection and statistical treatment of the data, and a summary are presented.

Attitude Scale Construction

A search of the literature was made to determine and select the most appropriate instrument to measure the attitude of the extension agents toward computers and the Telplan System. As a result, it was decided to utilize the method of attitude measurement originated by Likert (1932). This method of summated-ratings consists of a series of opinion statements with a range of alternatives from strongly agree, agree, undecided, disagree to strongly disagree for the respondents to indicate their feelings toward some issue--in this case computers and the Telplan System.

For the development of a Likert-type attitude scale, Likert established several criteria. Namely, (1) it is desirable to prepare more statements that are likely to be used in the final scale; (2) each statement should be worded and phrased to indicate only one issue; (3) statements must indicate the feelings about an issue; (4) each statement should have one interpretation, and (5) each statement should be constructed in such a way that subjects with different attitudes could indicate their feelings in a varying manner, so each item could create substantial variance, and statements should not be of factual nature.

In addition to the above, a number of other criteria were established. This was necessitated because of the nature of statistical treatments (reliability analysis and cluster analysis) for the analysis of the data. Items were to be constructed in such a way that the whole scale could be divided into distinct subscales (or clusters). In this case, the items forming one subscale should have similar meaning and correlate significantly with each other. One important criterion was to provide "the possibility of failure" for items of subscales (Hunter and Gerbing 1979). Since it was possible that one or more items in each subscale could fail to have significant correlation with other items and this would be detected in the statistical analysis, each important idea was to be represented by three items or more.

Sample size and the population's characteristics prompted the following considerations.

a. The large sample size (283 agents), provided for no limitations in the maximum or minimum number of items for the attitude scale. Hunter (1978) points out that "the maximum number of items needed depends on the statistical quality of the items and on the number of persons in the study".
b. It was learned that with the exception of several new agents, almost all the extension agents were familiar with the Telplan System. However, a group of the agents were to be considered as users and another group as non-users of the system. Thus, it was decided to construct two separate general subscales, one representing attitudes toward computers and the other attitudes toward the Telplan System.

A preliminary attitude scale consisting of 74 items was constructed. It was reviewed by research faculty and consultants. As a result, 14 items were deleted and the scale was revised several times. These 14 items were rejected for representing factual data or being ambiguous.

Attitude Scale Validity

The revised attitude scale of 60 items was submitted to four judges with experience in computers and the usages of computers in education and business. The judges were asked to estimate and rate the face validity of each item on a

continuum from 4 for "very high face validity" to 0 for "no apparent face validity".

The final face validity for each item and the whole scale were calculated as the following:

Let R_i = face validity of each item estimated by judge i, (i = 1,2,3,4)

Since the highest possible rating for each item by each judge could be the number 4, then a divisor (D) could be derived:

$$D = \sum_{i=1}^{4} 4 = 16 \qquad (3.1)$$

And therefore, the face validity for each item:

$$F_j = \sum_{i=1}^{4} R_i/16 \quad \text{for } j = 1,2,\ldots,60 \text{ (number of items)}$$

or

$$0.000 \leq F_j \leq 4.000 \qquad (3.2)$$

Finally, the whole scale face validity F,

$$F = \sum_{j=1}^{60} F_j/60 \qquad (3.3)$$

The computed face validity for each item and the whole scale are recorded in Table 3-1.

For each item and the whole scale a face validity of $0.750 \leq F_j \leq 1.000$ indicates high to very high face validity.

TABLE 3.1. Computed Face Validities of the Attitude Scale Items and the Whole Scale

Item Number	Face Validity	Item Number	Face Validity
01.	.875	31.	.875
02.	.937	32.	.750
03.	.875	33.	.937
04.	.875	34.	.937
05.	.875	35.	.875
06.	.937	36.	.875
07.	.937	37.	.812
08.	.937	38.	.812
09.	.500	39.	.812
10.	.812	40.	.812
11.	.687	41.	.750
12.	.687	42.	.687
13.	.687	43.	.875
14.	.187	44.	.812
15.	.625	45.	.750
16.	.625	46.	.875
17.	.750	47.	.875
18.	.687	48.	.875
19.	.625	49.	.937
20.	.625	50.	.687
21.	.750	51.	.812
22.	.812	52.	.937
23.	.875	53.	.812
24.	.875	54.	.687
25.	.687	55.	.750
26.	.750	56.	.750
27.	.937	57.	.750
28.	.937	58.	.937
29.	.875	59.	.937
30.	.750	60.	.812

Face Validity for the Attitude Scale --- .797

Items 09 and 14 with the corresponding face validities of .500 and .187 were deleted from the final attitude scale.

A value of $.501 \leq F_j \leq .749$ indicate a medium to high face validity. Finally, $0.000 \leq F_j \leq .500$ are considered to be of low to very low face validity.

As shown in the table all items except 9 and 14 with the corresponding face validity of .500 and .187 have high face validity. The computed face validity of the whole scale (F = .797) is high also.

Items 9 and 14 were deleted from the scale and to each statement of the final 58 item scale a continuum of SA for strongly agree, A for agree, N for neutral or undecided, D for disagree, and SD for strongly disagree were assigned. This final scale was prepared for a pilot test among several extension agents (Appendix A).

It was necessary to identify a group of extension agents with which to pretest the attitude instrument. Interviews with the Regional Supervisors of the Cooperative Extension Service at Michigan State University, resulted in selecting the extension agents in five counties. These five counties consisted of Clinton, Eaton, Ingham, Jackson, and Shiawassee. A total of 26 extension agents in these counties represented 9 percent of the population sample. There were both users and non-users of the computers and the Telplan System among these agents and all of the counties were equipped with computer terminals. These agents represented all different classifications and positions of the counties' extension agents. In addition, the close distance of the counties' offices was a decisive factor, since it was

decided that offices to be visited by the investigator in order to explain the instruments, purpose of the study, and also, through interviews to gather information helpful in collection of the data. The agents were asked to review the attitude instruments (and the background questionnaire), to make suggestions and comments for each statement and the whole scale, and finally to indicate their feeling on the five point continuum.

A total of 17 responses were returned which indicated 65 percent of the pilot sample. An analysis of responses revealed that all items except items numbered 32 and 45 were suitable for the collection of data. Minor revisions were made in the statements of items 32 and 45. It was decided to analyze the gathered data from the pilot sample along with the data to be collected from the population sample of the study.

Background Questionnaire Development

In order to gather information as related to the personal data of the respondents, a background questionnaire was developed (Appendix A). The independent variables of interest were the agent's age; the highest level of formal education; the length of employment by the Extension Service; position held; and experience with computers and the Telplan System.

Preliminary interviews with the extension specialists and agents resulted in inclusion of two other variables in

the background questionnaire. These were frequency and rate of usage of the Telplan System. In addition, one optional section was designed to identify the specific programs of the System that were in frequent usage by the agents.

The respondent's age and level of education were categorized. The length of employment was considered as "number of months of employment" in the analysis of the data. Statements related to the experience with computer and Telplan System were developed and included in the questionnaire. As for position with the Extension Service, the agents were asked to write their official employment titles. This resulted in ten different position categories as shown in Table 3.2.

It was decided to analyze and interpret the data for each of the above employment categories.

The background questionnaire was reviewed by two judges and together with the attitude scale was distributed among the pilot sample. The agents in the sample were asked to answer and react to the questions and statements of the questionnaire. The responses did not result in revision of the questions and statements.

Description of the Population

The population of the study consisted of all the Cooperative Extension Agents in the state of Michigan. These were county, multi-county, area, and district extension

TABLE 3.2. Rates and Percentages of Responses by Position Categories*

Position Category**	Mailed	Returned	Percentages
01. County Extension Directors	79	63	80
02. Agricultural Extension, Agricultural Marketing, Field Crop, Food and Nutrition Agents	35	31	89
03. Home Economics Extension Agents	69	50	72
04. 4-H Youth Extension Agents	62	52	84
05. Horticultural Extension Agents	7	4	57
06. District Farm Management, Resource Development, Forestry and Marine Agents, and Extension Leaders	14	12	86
07. District Marketing, Consumer Marketing Information, Public Policy and Public Affairs Agents	8	6	75
08. Extension Dairy Agents***	2	2	100
09. Multi-County and Regional Agents	6	5	83
10. Extension Livestock Agents***	1	1	100
Returns with blank responses for position	-	4	-
TOTAL	283	230	81

*The 26 agents of the pilot sample are included.

**Each of the categories 2,6,7, and 9 indicate a combination of extension employment titles for two reasons: (1) Agents' responses with these specific titles, and (2) For the purpose of analysis of the data as related to the various categories.

***These two employment titles were considered as one category for the analysis of the data.

agents. Excluded were those agents who directly or indirectly had contributed to the development of the Telplan System. Regional supervisors, extension specialists, admimistrative and program staff were considered to be directly and indirectly involved with the development and operation of the system and therefore were excluded from the population. The total number of agents in the population sample (including the pilot sample) were 283. Counties and the number of agents for each county can be found in Appendix G.

Collection of Data

In an effort to insure a high number of responses and also to inform the agents about the study, letters from the administration of the Cooperative Extension Service at Michigan State University (Appendix E) were mailed to 257 agents. Following that, an attitude scale and a background questionnaire with a cover letter were mailed to the county office headquarters for each agent.

A total of 213 responses (83 percent) from 257 agents were returned by the middle of September 1978. Of these 213 responses, 6 were eliminated from the analysis of the data for the following reasons:

a. One response was found to be from an agent who directly contributed in the writing of two programs for the Telplan System and therefore, the response considered (by the agent and the investigator) to be biased.
b. Four agents returned the blank instrument, writing back that they never used the system and were not

familiar with the System and the computers.

c. One instrument was returned indicating that the agent was no longer associated with the related county extension office.

For the analysis of the data, 224 cases, indicating 81 percent response rate were used. This number is the total of 207 useable returns and the 17 responses from the pilot sample. The breakdown of the return by employment categories is given in Table 3.2.

The Measurement Model

It was necessary to determine and exclude those items of the attitude scale which did not correlate significantly with other items and therefore were not reliable. This represents the error of measurement or unreliability, which results the measurement of theoretical variables to be imperfect. Here, theoretical variables or traits are defined as those variables that are measured by the observed variables or items. The measurement model described here was based on the idea of determining and clustering those items that measured the same underlying variable or trait.

As noted in the construction of the attitude scale, items were developed in such a way that the whole scale was to be formed from multiple indicators of the underlying theoretical concepts. These multiple indicators of the traits allowed for the statistical treatment and analysis of the data by employing a multi-variate analysis

technique known as cluster analysis. Cluster analysis, as noted by Hunter (1977), is an "oblique multiple groups factor analysis" and is a synthesis of the theories of factor analysis and reliability.* It is a technique which is most appropriate when measurement error and construct validity are of primary considerations. Tryon (1939) describes cluster analysis as the process of measuring underlying variables or traits by constructing unidimensional clusters. A "unidimensional" cluster as noted by Hunter (1977) is a cluster which measures exactly the same theoretical variables. In other words, it is a "perfect" cluster. A unidimensional cluster is a cluster that satisfies three tests or criteria: (1) homogeneity of content for the items; (2) internal consistency, meaning the items should reasonably correlate with each other; and (3) parallelism, or external consistency for the items.

The test of homogeneity of content for a cluster is the evaluation of how well the meanings of the items relate to each other. The items in a cluster should not be interpreted ambiguously. In other words, the items should have similar meanings. The homogeneity test, though is not a statistical one, it is indirectly related to statistics. Hunter and Gerbring (1979) argue that if the sample correlations are the main basis for inclusion of items in a

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*"The essence of oblique multiple groups factor analysis is to extract a single factor from each group or cluster of items. The analysis is 'oblique', since the clusters are not forced to be uncorrelated." (Hunter, 1978).

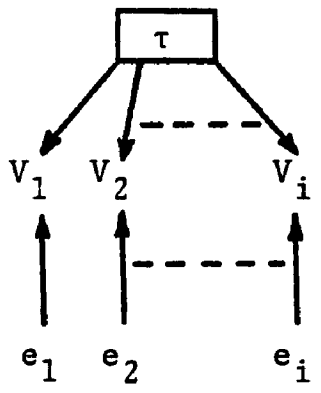
cluster, then the problem of sampling error (especially for studies with less than "200" subjects), would result in a different cluster in case the study were to be redone.

The test for internal consistency is based on the "flatness" of the inter-cluster correlations (Hunter, 1977). In fact, this is a check for the criterion of "unit rank" for the correlation matrix set by Spearman (1904). A brief description of internal consistency and the flatness of the inter-cluster correlations will be given here. For a detailed discussion of unidimensionality and test for internal and external consistency, the reader is referred to Hunter (1977) and Hunter and Gerbring (1979).

Let's assume that the variables in a cluster measure the same underlying trait τ and let $e_1, e_2, \ldots, e_i$ denote the error of measurement for the corresponding cluster variables $V_1, V_2, \ldots, V_i$, then the causal relations can be written in the forms of equations such as:

$$V_1 = \tau + e_1,\ V_2 = \tau + e_2, \ldots,\ V_i = \tau + e_i \qquad (3.4)$$

where i indicates the number of variables in the cluster. These relations can be illustrated by the following path diagram:



Considering the Spearman's condition for the "unit rank" correlation matrix and the "product rule for internal consistency" of the theorems of reliability theory, the inter-item correlations for the variables in a cluster can be shown as:

$$r_{V_iV_j} = r_{V_i\tau} \cdot r_{V_j\tau} \tag{3.5}$$

In equation 3.5 when i = j, then:

$$r_{V_iV_i} = r^2_{V_i\tau} \tag{3.6}$$

Equation 3.6 shows that the correlation between V_i and itself is not equal to 1.00 which is supposed to be. However, this indicates the "communality" for variable V_i and therefore, in a Spearman matrix of unit rank the communality of a variable V_i is in fact its reliability.

Hunter (1977) states that for practical purposes, there is a simpler test than Spearman's test for a unit rank correlation matrix. If in a cluster all the variables have the same amount of error of measurement, then the inter-item correlations of the cluster variables are "flat", i.e.

$$r_{V_iV_j} = r_{VV} \tag{3.7}$$

where r_{VV} is a number which indicates the correlation between any two variables in the cluster.

When communalities are used in a cluster analysis, then there is another test for internal consistency. This test

is based on the criterion that the correlation between a cluster and its own true score is greater than the cluster correlations with any other cluster true scores.

The test for parallelism is a check for the similarity coefficient of the variables in a cluster with other variables outside that cluster. In particular, let variables $V_1, V_2, \ldots V_i$ in a cluster all measure the same underlying trait. In addition, if to within sampling error they all have equal quality as measures of that trait, i.e.

$$r_{V_1\tau} = r_{V_2\tau} = \ldots = r_{V_i\tau} \tag{3.8}$$

where i is the number of items in the cluster, then the criteria for parallelism or external consistency requires that for any other variables such as X outside the cluster we should have:

$$r_{V_1X} = r_{V_2X} = \ldots = r_{V_iX} \tag{3.9}$$

to within sampling error.

The external consistency test is usually applied to traits rather than to the variables, since the reliability of a variable is lower than the underlying trait that it measures.

The aforementioned three tests are the means for determining the unidimensionality of a cluster and therefore deleting the "weak" variables (or items) from that cluster before the final analysis of the data.

After the unidimensional clusters are formed, the reliability of the clusters sums, i.e. Cronbach's (1951) coefficient alpha, can be obtained through cluster analysis. This coefficient alpha is in fact the index of measurement error in a cluster score. The higher the value of alpha (the closer to 1.00), the more reliable the measurement of the traits. A full discussion of reliability theory and factor analysis, communalities and cluster analysis can be found in Nunnaly (1967), Gorsuch (1974), and Hunter (1977).

Once the measurement model is constructed, and necessary revisions are made, the fit of the data to the model can be evaluated and if the fit is satisfactory, then the parameters and estimators of the model can be interpreted.

Based on the aforementioned discussion, the measurement model for the cluster analysis of the data was constructed. Figure 3.1 shows the algorithm (in a flow chart method), which was used for the model, and its subsequent procedures.

The A Priori and the A Posteriori Cluster Analysis

In order to determine whether the 58 items of the attitude scale form distinct clusters and in each cluster the items inter-correlate with one another, the a priori cluster analysis was used. Two different routines were used to perform this analysis. (1) Hunter and Cohen's (1969) PACKAGE, and (2) Tryon and Bailey's (1970) BC TRY. This latter routine was mostly used for graphical purposes

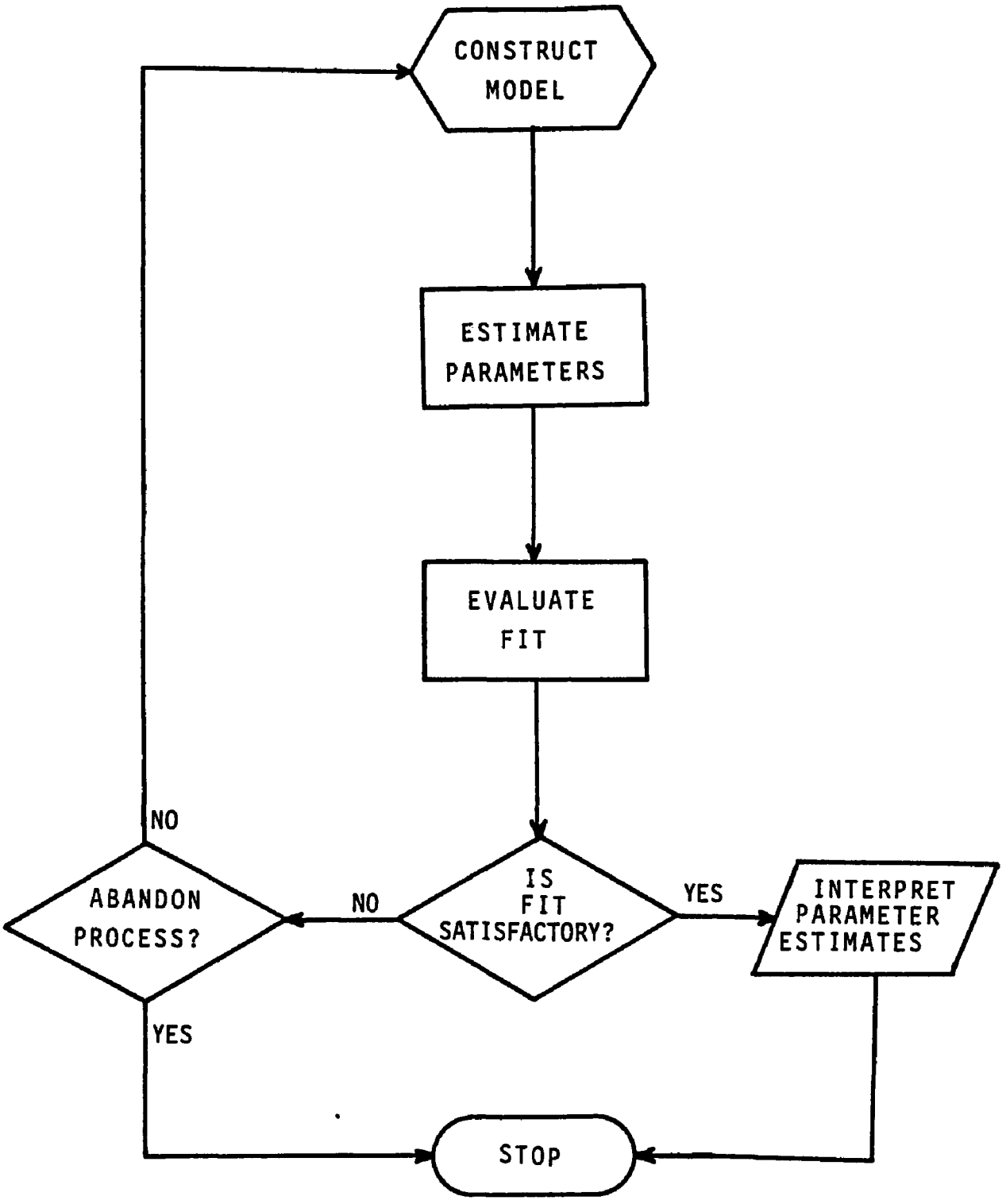


Figure 3.1. The Model Building Process.

of the clusters. Almost all the cluster analysis of the data was done by employing the PACKAGE.

The first step for the a priori cluster analysis was to let the PACKAGE form the distinct clusters from the items. This was done through an "oblique multiple groups" factor analysis with communalities in the diagonals. The routine (in the PACKAGE) for this factor analysis breaks down when the factor loadings fall below 1.00. As a result of this analysis two clusters from the items concerning attitudes toward computers, and five clusters from the item related to the Telplan System were formed. The a priori analysis did not delete the items which had low inter-correlation in the cluster. Nor, the content and external consistency of the items of the cluster were taken into consideration. Therefore, the a priori cluster analysis did not produce a basis for the analysis of the data.

Following the a priori analysis, the a posteriori analysis was undertaken. Here, as described earlier, the three criteria of homogeniety of the content for the items in a cluster, their internal and external consistency were applied for formation of the clusters. As a result of some 20 reanalysis the a posteriori clusters were formed. During this process, the items of the a priori clusters were moved from one cluster to another. Long clusters (clusters with many items) were broken into sub-clusters in order to accomodate all of the three criteria. The items that did not satisfy all three criteria were placed in residual

clusters. The residual cluster for statements as related to computers contained 8 items, and 10 items from the Telplan section of the attitude scale formed another residual cluster. Thus, 40 items from the original scale by forming 9 clusters, structured the a posteriori analysis of the data and produced a great deal of evidence in testing the hypotheses related to the agents' attitudes toward computers and the Telplan System. Out of these 9 clusters, 3 were formed from the items in the general computer statements, and 6 clusters from the items in the Telplan section. Factor inter-correlations and loading matrix (showing internal consistency), and similarity coefficient matrix (showing external consistency), for the 9 clusters and 2 residual clusters can be found in Appendix (B). Table 3.3 provides the distribution of the items into 11 clusters forming the a posteriori analysis. Table 3.4 represents the inter-correlations and loading matrix for the a posteriori clusters. The a posteriori cluster correlations (corrected for attenuation) are shown in Table 3.5. The clusters' names with a description of each cluster are provided in Table 3.5. The descriptions are based on the content of the items forming each cluster. The numbers 501-509 are the numbers assigned to the clusters by the PACKAGE System for cluster analysis. These numbers will continue to be the same for the corresponding clusters throughout the text and the appendices. The a posteriori cluster correlations (corrected for attenuation) are shown in Table 3.6. The

Table 3.3. The A Posteriori 11 Clusters Formed from the A Priori Clusters and Distribution of Items in those 11 Clusters (501-511).*

	Computer Clusters and Residual				The Telplan System Clusters and Residual						
	501	502	503	510	504	505	506	507	508	509	511
501	5										
502		3									
503			2								
504					7						
505						4					
506							2				
507								8			
508									6		
509										3	
510				8							
511											10
Total (58)	Computer Items (18)				The Teleplan System Items (40)						

*The numbers 501-511 are the "number labels" for the clusters formed from the cluster analysis using Hunter and Cohen's (1969) PACKAGE.

reliability of each cluster as determined by the Crombach's (1951) Coefficient Alpha are presented in Table 3.7. Tables providing the means and standard deviations of the 58 items of the attitude scale with number of cases for each item (i.e. excluding missing data for that item), the initial 58x58 correlation matrix, factors obtained from the FACTOR

Table 3.4. Inter-Correlations and Loading Matrix (with Communality in the Diagonal) for the 9 A Posteriori Clusters.

	9	11	10	6	8	2	5	3	13	15	22	42	19	21	31	55	34	40	37	33	38	44	57	24	56	28	29	36	39	23
9	31	24	21	33	30	-6	-1	-3	1	-11	-5	-18	-13	-13	-15	-19	-15	-21	-25	-16	-9	-20	-8	-2	-1	5	12	1	4	-2
11	24	28	41	21	19	-2	14	-5	-1	-11	-8	-13	-15	-10	-12	-6	-15	-15	-5	-11	-5	-13	-9	9	7	8	11	4	-6	4
10	21	41	22	15	18	-9	-2	-5	-6	-16	-7	-8	-19	-13	-9	-12	-4	-4	-11	-8	-7	-13	-13	2	3	1	9	-6	-14	9
6	33	21	15	22	26	-14	5	-1	-9	-6	-13	-16	-13	-16	-6	-9	-7	-7	-15	-1	-6	-20	-14	-12	3	4	-1	-3	-9	-5
8	30	19	18	26	21	7	-3	-4	-2	-11	-9	-22	-7	-8	-7	-18	-10	-9	-11	-12	-18	-20	-13	-4	-3	4	1	4	0	8
2	-6	-2	-9	-14	7	28	27	19	-3	17	7	1	11	3	10	-15	-8	6	10	8	13	14	-1	0	-16	0	-7	-1	-7	-8
5	-1	14	-2	5	-3	27	25	18	2	3	10	0	8	8	15	1	2	-1	13	16	13	8	6	-1	-17	-8	2	-19	-15	-8
3	-3	-5	-5	-1	-4	19	18	15	17	14	14	9	4	-5	14	10	2	7	8	3	7	9	-6	-23	-19	-15	-23	-16	-7	-7
13	1	-1	-6	-9	-2	-3	2	17	39	35	9	13	16	10	17	22	2	-1	13	7	11	-3	-2	-13	-11	-12	-21	-4	-4	-4
15	-11	-11	-16	-6	-11	17	3	14	35	39	15	22	21	2	25	14	6	12	-1	13	12	11	-3	-10	-6	-6	-20	-7	4	-10
22	-5	-8	-7	-13	-9	7	10	14	9	15	46	41	47	28	47	29	29	25	17	17	21	28	18	7	-7	-1	-7	-3	7	6
42	-18	-13	-8	-16	-22	1	0	9	13	22	41	45	36	37	32	46	26	37	19	14	21	38	30	-4	-6	-6	-23	-5	-2	-5
19	-13	-15	-19	-13	-7	11	8	4	16	21	47	36	44	40	34	25	34	31	24	33	19	22	20	12	-8	-3	-4	6	18	5
21	-13	-10	-13	-16	-8	3	8	-5	10	2	28	37	40	26	16	19	33	30	24	17	16	30	24	14	-6	4	-9	8	7	15
31	-15	-12	-9	-6	-7	10	15	14	17	25	47	32	34	16	26	26	20	26	27	25	15	29	10	2	-6	-2	-15	-14	-23	1
55	-19	-6	-12	-9	-18	-15	1	10	22	14	29	46	25	19	26	21	13	24	30	23	19	25	27	-7	3	-5	-27	-22	-20	-3
34	-15	-15	-4	-7	-10	-8	2	2	2	6	29	26	34	33	20	13	20	29	14	28	6	32	28	18	7	6	15	12	8	20
40	-21	-15	-4	-7	-9	6	-1	7	-1	12	25	37	31	30	26	24	29	39	34	37	34	32	24	3	-4	-3	-19	3	3	0
37	-25	-5	-11	-15	-11	10	13	8	13	-1	17	19	24	24	27	30	14	34	34	35	30	30	18	-4	-20	-19	-17	-23	-25	-5
33	-16	-11	-8	-1	-12	8	16	3	7	13	17	14	33	17	25	23	28	37	35	33	27	19	8	5	-7	-3	-6	-11	-11	-1
38	-9	-5	-7	-6	-18	13	13	7	11	12	21	21	19	16	15	19	6	34	30	27	27	23	17	10	-3	-1	-15	4	3	1
44	-20	-13	-13	-20	-20	14	8	9	-3	11	28	38	22	30	29	25	32	32	30	19	23	47	44	1	-13	-2	-6	-2	0	5
57	-8	-9	-13	-14	-13	-1	6	-6	-2	-3	18	30	20	24	10	27	28	24	18	8	17	44	47	11	-4	-11	-1	0	0	-6
24	-2	9	2	-12	-4	0	-1	-23	-13	-10	7	-4	12	14	2	-7	18	3	-4	5	10	1	11	34	26	23	32	28	23	37
56	-1	7	3	3	-3	-16	-17	-19	-11	-6	-7	-6	-8	-6	-6	3	7	-4	-20	-7	-3	-13	-4	26	26	36	24	21	22	14
28	5	8	1	4	4	0	-8	-15	-12	-6	-1	-6	-3	4	-2	-5	6	-3	-19	-3	-1	-2	-11	23	36	23	26	13	15	17
29	12	11	9	-1	1	-7	2	-23	-21	-20	-7	-23	-4	-9	-15	-27	15	-19	-17	-6	-15	-6	-1	32	24	26	21	23	16	16
36	1	4	-6	-3	4	-1	-19	-16	-4	-7	-3	-5	6	8	-14	-22	12	3	-23	-11	4	-2	0	28	21	13	23	20	33	18
39	4	-6	-14	-9	0	-7	-15	-7	-4	4	7	-2	18	7	-23	-20	8	3	-25	-11	3	0	0	23	22	15	16	33	20	24
23	-2	4	9	-5	8	-8	-8	-7	-4	-10	6	-5	5	15	1	-3	20	0	-5	-1	1	5	-6	37	14	17	16	18	24	19
27	-11	17	8	-5	14	0	-6	-2	-10	-7	-14	-15	-2	-2	-18	-11	11	2	-16	-15	-6	4	2	16	22	28	14	14	15	19
46	-16	-14	-18	-17	-6	9	-13	0	7	4	26	22	18	25	10	8	22	34	7	11	20	25	14	15	7	-1	-1	23	19	14
41	3	-7	-14	-4	0	8	-11	-5	1	7	20	19	32	21	3	-2	11	27	5	18	14	12	17	16	-4	2	5	17	32	5
43	-7	-16	-17	-13	-11	15	-7	-10	-7	-3	26	32	29	26	1	11	13	19	-6	1	14	16	19	23	9	10	3	25	31	1
25	2	-14	-27	-13	-6	7	-6	-11	4	7	16	10	18	18	1	8	9	15	2	21	15	8	8	32	3	2	4	15	13	-3
54	5	-9	-10	-7	-5	-2	-18	1	-4	7	12	23	6	8	0	16	11	18	-4	17	10	15	12	9	2	-2	-2	7	12	-6
49	-10	-10	-12	-2	-8	3	-5	10	8	6	21	22	29	27	19	26	24	33	18	13	21	23	20	0	6	1	-6	1	-1	11
51	-4	-11	-19	-1	-1	4	-1	11	27	13	20	24	18	16	26	10	25	12	5	16	2	9	21	4	-2	7	-3	9	7	3
50	-10	-16	-16	-16	-7	4	-8	3	10	16	22	21	12	15	21	12	22	10	-3	12	0	15	14	1	0	1	-8	4	9	11
52	-7	-10	-24	-10	-10	0	-5	12	18	15	36	35	29	25	36	11	30	24	9	20	14	29	17	2	-14	3	-13	14	7	5
501	56	53	47	47	46	-10	5	-8	-7	-22	-16	-31	-27	-24	-20	-25	-20	-23	-27	-19	-18	-35	-23	-3	3	9	13	0	-10	6
502	-6	5	-11	-8	0	53	50	37	12	24	22	7	17	5	28	-3	-3	9	22	20	24	22	-1	-17	-38	-17	-21	-26	-21	-16
503	-8	-9	-18	-13	-10	12	4	25	61	61	20	29	31	10	34	29	7	9	9	16	19	6	-4	-19	-14	-15	-34	-9	0	-11
504	-25	-20	-18	-20	-21	2	11	13	22	27	68	67	66	51	51	46	44	52	39	40	30	52	40	11	-6	-2	-18	-5	-1	10
505	-31	-16	-13	-13	-22	16	18	11	13	15	35	40	47	38	41	42	33	63	58	57	52	45	29	6	-15	-11	-25	-12	-13	-2
506	-21	-16	-20	-25	-24	9	11	3	-4	6	34	50	32	40	29	39	44	42	35	20	30	67	67	9	-13	-10	-6	-1	0	-1
507	2	14	3	-7	6	-11	-19	-30	-21	-17	-3	-18	7	8	-20	-24	26	-4	-34	-13	-2	-3	-3	58	51	48	46	45	45	44
508	-7	-21	-30	-17	-11	12	-18	-5	3	9	37	39	40	38	10	21	27	44	7	25	28	30	28	29	7	4	1	26	32	7
509	-10	-18	-29	-13	-9	4	-7	13	27	21	38	39	29	27	40	16	38	22	6	23	8	26	26	3	-8	5	-12	13	11	9

Table 3.4. Continued.

	27	46	41	43	25	54	49	51	50	52	501	502	503	504	505	506	507	508	509
9	-11	-16	3	-7	2	5	-10	-4	-10	-7	56	-6	-8	-25	-31	-21	2	-7	-10
11	17	-14	-7	-16	-14	-9	-10	-11	-16	-10	53	5	-9	-20	-16	-16	14	-21	-18
10	8	-18	-14	-17	-27	-10	-12	-19	-16	-24	47	-11	-18	-18	-13	-20	3	-30	-29
6	-5	-17	-4	-13	-13	-7	-2	-1	-16	-10	47	-8	-13	-20	-13	-25	-7	-17	-13
8	14	-6	0	-11	-6	-5	-8	-1	-7	-10	46	0	-10	-21	-22	-24	6	-11	-9
2	0	9	8	15	7	-2	3	4	4	0	-10	53	12	2	16	9	-11	12	4
5	-6	-13	-11	-7	-6	-18	-5	-1	-8	-5	5	50	4	11	18	11	-19	-18	-7
3	-2	0	-5	-10	-11	1	10	11	3	12	-8	37	25	13	11	3	-30	-5	13
13	-10	7	1	-7	4	-4	8	27	10	18	-7	12	61	22	13	-4	-21	3	27
15	-7	4	7	-3	7	7	6	13	16	15	-22	24	61	27	15	6	-17	9	21
22	-14	26	20	26	16	12	21	20	22	36	-16	22	20	68	35	34	-3	37	38
42	-15	22	19	32	10	23	22	24	21	35	-31	7	29	67	40	50	-18	39	39
19	-2	18	32	29	18	6	29	18	12	29	-27	17	31	66	47	32	7	40	29
21	-2	25	21	26	18	8	27	16	15	25	-24	5	10	51	38	40	8	38	27
31	-18	10	3	1	1	0	19	26	21	36	-20	28	34	51	41	29	-20	10	40
55	-11	8	-2	11	8	16	26	10	12	11	-25	-3	29	46	42	39	-24	21	16
34	11	22	11	13	9	11	24	25	22	30	-20	-3	7	44	33	44	26	27	38
40	2	34	27	19	15	18	33	12	10	24	-23	9	9	52	63	42	-4	44	22
37	-16	7	5	-6	2	-4	18	5	-3	9	-27	22	9	39	58	35	-34	7	6
33	-15	11	18	1	21	17	13	16	12	20	-19	20	16	40	57	20	-13	25	23
38	-6	20	14	14	15	10	21	2	0	14	-18	24	19	30	52	30	-2	28	8
44	4	25	12	16	8	15	23	9	15	29	-35	22	6	52	45	67	-3	30	26
57	2	14	17	19	8	12	20	21	14	17	-23	-1	-4	40	29	67	-3	28	26
24	16	15	16	23	32	9	0	4	1	2	-3	-17	-19	11	6	9	58	29	3
56	22	7	-4	9	3	2	6	-2	0	-14	3	-38	-14	-6	-15	-13	51	7	-8
28	28	-1	2	10	2	-2	1	7	1	3	9	-17	-15	-2	-11	-10	48	4	5
29	14	-1	5	3	4	-2	-6	-3	-8	-13	13	-21	-34	-18	-25	-6	46	1	-12
36	14	23	17	25	15	7	1	9	4	14	0	-26	-9	-5	-12	-1	45	26	13
39	15	19	32	31	13	12	-1	7	9	7	-10	-21	0	-1	-13	0	45	32	11
23	19	14	5	1	-3	-6	11	3	11	5	6	-16	-11	10	-2	-1	44	7	9
27	14	7	-2	0	-6	-16	-3	3	2	0	9	-6	-14	-13	-15	4	38	-6	3
46	7	47	44	38	39	24	34	9	11	22	-29	-3	9	33	31	29	22	69	20
41	-2	44	46	42	38	32	22	6	7	18	-9	-6	6	27	28	22	19	68	15
43	0	38	42	36	41	28	13	9	8	18	-25	-2	-8	35	12	26	27	60	17
25	-6	39	38	41	35	25	17	4	5	23	-23	-8	9	21	23	12	16	59	16
54	-16	24	32	28	25	17	9	2	3	7	-11	-14	2	19	18	20	1	41	6
49	-3	34	22	13	17	9	10	11	19	25	-17	6	11	43	37	32	2	32	27
51	3	9	6	9	4	2	11	56	49	49	-14	10	32	36	15	22	8	13	75
50	2	11	7	8	5	3	19	49	43	41	-26	0	21	32	8	21	5	16	65
52	0	22	18	18	23	7	25	49	41	43	-24	5	27	51	29	35	1	34	65
501	9	-29	-9	-25	-23	-11	-17	-14	-26	-24	100	-8	-24	-42	-38	-43	7	-35	-32
502	-6	-3	-6	-2	-8	-14	6	10	0	5	-8	100	30	19	32	16	-43	-8	7
503	-14	9	6	-8	9	2	11	32	21	27	-24	30	100	41	23	2	-31	9	40
504	-13	33	27	35	21	19	43	36	32	51	-42	19	41	100	70	68	-6	54	58
505	-15	31	28	12	23	18	37	15	8	29	-38	32	23	70	100	55	-23	45	26
506	4	29	22	26	12	20	32	22	21	35	-43	16	2	68	55	100	-4	43	38
507	38	22	19	27	16	1	2	8	5	1	7	-43	-31	-6	-23	-4	100	27	7
508	-6	69	68	60	59	41	32	13	16	34	-35	-8	9	54	45	43	27	100	31
509	3	20	15	17	16	6	27	75	65	65	-32	7	40	58	26	38	7	31	100

Table 3.5. The A Posteriori Clusters Names and Description of the Content for Each Cluster

501 ANSWER:	Implies that computers by providing quick answers, aid the agents to solve their client's problems.
502 INFALLIBILITY:	Refers to the perfection of computers and that the computers provide correct answers to most problems.
503 ACCESS:	Implies that easier communications with the computers will be possible and helpful for extension work if computer terminals are provided for all agents' offices.
504 PROBLEM-SOLVING:	Refers to the potential of the Telplan System for problem solving and that the System should be used by the agents more often, because it provides for the agents to be more successful in their extension work.
505 QUALITY:	Implies that the Telplan System is a means of quality for agricultural continuing education and improvement of services to the extension clientele.
506 FEELINGS:	Implies that the Telplan System provides for the agents to have more positive attitudes toward computers and the System.
507 LIMITATIONS:	Implies that the Telplan System is limited in scope as related to the needs of the extension clientele. It further suggest that because of inapplicability and complexity of the programs of the System and that the System does not provide appropriate solutions in most situations, therefore, the agents and their clients have difficulty in using the System for problem solving.
508 FEAR/THREAT:	Refers to the agents' distrust of the Telplan System because the System not only limits the agents' personalized extension work with their clients, but often threatens the agents' jobs.

Table 3.5. Continued.

509	INFORMATION AND TRAINING:	Implies that there is a need for additional information and training for the agents as related to the Telplan System, perhaps through continuing training, in order that they become more acquainted with the System and be able to work with it.

Routine of the PACKAGE program, and the a priori inter-correlation and loading matrix with the corresponding clusters can be found in Appendix B.

An examination of the Table 3.6 shows that clusters (504) "problem-solving", (505) "quality" are highly correlated with one another (r = .70 and .68 respectively). This raised the question that whether these two clusters were to form one cluster in the first place. Also, some items which were designed to serve as parts of the "computer section items" and were dispatched to the "residual" (510) cluster, correlated significantly with the clusters of the Telplan items. One of these items (#16) correlated (r = .50, see Appendix B) with cluster (508) "fear/threat" and another item (#12 with r = .39) correlated with cluster (504).

In order to answer the above and find out the relationship of the computer items to the Telplan items, it was decided to study the structure of the a posteriori clusters. To accomplish this, two second order cluster analysis were performed. One for the Telplan System items only, and

Table 3.6. The A Posteriori Clusters Correlations (Corrected for Attenuation).

	501	502	503	504	505	506	507	508	509
501	100								
502	-8	100							
503	-24	30	100						
504	-42	19	41	100					
505	-38	32	23	70	100				
506	-43	16	2	68	55	100			
507	7	-43	-31	-6	-23	-4	100		
508	-35	-8	9	54	45	43	27	100	
509	-32	7	40	58	26	38	7	31	100

Table 3.7. Standard Score Coefficient Alphas for the A Posteriori Clusters. 501-509.

Cluster No.	Cluster Name	Alpha
501	Answer	.62
502	Infallibility	.45
503	Access	.52
504	Problem-Solving	.76
505	Quality	.66
506	Feelings	.61
507	Limitations	.69
508	Fear/Threat	.72
509	Information and Training	.72

one for a combination of both computers and Telplan System items (including residuals items). Using the FACTOR Routine of the PACKAGE program, the matrix of inter-correlations of the Telplan clusters (504-509), and the computer-Telplan 11 clusters (501-511) were factor analyzed. The Routine assigned each cluster (now acting as a variable) to a new cluster (second order), according to its highest factor loading. Again, the Routine broke down when the factor loadings fell below 1.00. The Routine then performed the inter-correlation matrix of the new clusters. In this process if the highest factor loading of a variable (old cluster) was negative, its direction was reversed by the reflecting procedure of the Routine. A few reanalyses particularly for the 11 clusters were performed to accommodate the established criteria previously referred to, and deleted those non-contributing original variables.

As a result of the second order cluster analysis, two new clusters from the nine old clusters (501-509) were formed. Table 3.8 represents these clusters (denoted by 601 and 602), their make ups, and reliabilities (coefficient alphas). The Telplan clusters (504-509) did not generate any new clusters, however, the 11 a posteriori clusters (501-511) formed new second order clusters. Tables providing these clusters, their varimax factors, and matrix inter-correlations can be found in Appendix B. More will be said about these in a later chapter.

TABLE 3.8. The Second Order Cluster Formed from the Nine A Posteriori Clusters.

Cluster 601	Cluster 602
504 Problem-Solving	507 Limitations*
506 Feelings	502 Infallibility
505 Quality	503 Access
508 Fear/Threat	
501 Answer*	
509 Information and Training	
Coefficient Alpha = .84	Coefficient Alpha = .61

*Clusters 501 and 507 are "reflected" for inclusion in clusters 601 and 602 respectively. Therefore their content and names should be interpreted reversibly.

Reliability Analysis

The data were also treated and analyzed using SPSS Subprogram RELIABILITY developed by Specht (1976). This subprogram computes the coefficients of reliability for

multiple-item scales, performs analysis of variance and a number of other statistics. It provides a means for assessing "how reliable a sum or weighted sum across variables is as an estimate of a case's true score". Here, again the measurement error is of primary consideration. A brief discussion of this error of measurement was already presented in a previous section of "internal inconsistency".

Specht's (1976) subprogram estimation of reliability is based on the following assumptions given by Guttman (1945)

1. Reliability is defined as the variation over an indefinitely large number of independent repeated trials of errors of measurement over an infinite population of objects for each item being measured.
2. The observed values of an individual on an item are experimentally independent of the observed values of any other individual on that or any item.
3. The observed values of an individual on an item are experimentally independent of the observed value for that individual on any other item.
4. The variances of the observed scores on each item and the covariances of the observed scores between items exist in the population.

The criterion for the formation of multiple-item scales is that the items in each scale "logically" relate to each other. Therefore, by grouping the items according to their contents and after some 15 reanalyses, 9 scales were formed. These scales corresponded to the 9 clusters generated by the cluster analysis. Again, 18 items in all were placed in residual scales--8 items from the computer statements and 10 items from the Telplan section of the attitude scale. The "standardized item Alphas", showing the reliability of the scales were equivalent to the value of the coefficient alphas calculated by the cluster analysis procedure. The scales, corrected item total correlations, alphas, scales variances and means are presented in Appendix C. Since the Subprogram Reliability cannot compute coefficient alphas for scales with less than 3 items, a value of 99.0 is printed in place of the item's corresponding value of alpha.

Zero-order correlation analysis and multiple regression analysis were used to measure and explain the relationships between the nine attitude clusters and the independent variables: (1) age, (2) level of formal education, (3) length of employment, (4) previous experiences with computers and the Telplan System, (5) frequency of usage, (6) number of programs of the Telplan used, and (7) position held with the Extension Services. Also, a priori and a posteriori contrasts tests (Schefee's post-hoc test) were used to

examine and explain the relationships of the specific levels of the independent variable to the attitude clusters. Chapter four includes a description of the regression model used for the analysis of the data.

Summary

Two instruments were constructed to measure and examine the relationships between the dependent variable attitude of the extension agents toward computers and the Telplan System and several independent variables.

A Likert-type attitude scale and a background questionnaire were developed. After a review by 4 judges, a total of 58 items out of 74 statements were retained in the attitude scale and its face validity was established. The instruments were then pretested among several extension agents. They were then sent to the Michigan Cooperative Extension Agents. The data collected from 224 agents were subjected to statistical treatments and prepared for analysis and interpretation.

A measurement model was constructed to treat and remove the error of measurement or unreliability. The model was based on and developed within the context of a multiple indicators approach called cluster analysis.

The items of the attitude scale were subjected to the a priori cluster analysis which was followed by the a posteriori cluster analysis. This later analysis generated 9 clusters under the unidimensionality criteria of the mea-

surement model. The clusters were then given specific names and their reliabilities (coefficient alphas) were determined.

The clusters were then treated as variables and subjected to a second order cluster analysis to examine their relationships. Two new clusters were formed.

The attitude instrument and the data were also analyzed using the Reliability Analysis. This procedure formed 9 multiple-item scales which corresponded to the 9 clusters. The Reliability Analysis, also, performed analysis of variance.

Zero-order correlation analysis and multiple regression analysis were also used to analyze the data and test the hypotheses as related to the relationships between the attitudes and the demographic data.

CHAPTER IV

PRESENTATION AND ANALYSIS OF THE DATA

In this chapter the data gathered from the responses of 224 extension agents and analysis of the data are presented. The data collected were the agents' responses to the two instruments developed for the study. These two instruments included a 58 item attitude scale and a background questionnaire. There were six research hypotheses formulated by the researcher to examine the relationships between several independent variables and the dependent variable attitude. The rejection or acceptance of these research hypotheses were dependent on whether the statistical hypothesis of each was rejected or accepted. The nine clusters formed by the cluster analysis constituted the dependent variables and the selected personal characteristics of the agents formed the independent variables. Age, length of employment, level of formal education, experience with computers and the Telplan System, frequency of usage, rate of usage of the programs, and position held with the Extension Service formed the selected agents biographic data.

In the development of the background questionnaire, one of the independent variables, age, was grouped according to its numerical value. Frequency of usage of the system and

rate of usage of the programs were sorted according to categorical distribution. These were in accordance with the numerical and categorical distributions described by Freund (1960). One variable, length of employment, was sorted according to its quantitative description (month of employment). Items as related to experiences with computers and the Telplan System were categorized into positive and negative responses for the analysis of the data. Tables 4-1 to 4-7 present the frequency distributions of the independent variables.

As shown in Table 4-1, for the 224 extension agents, the mean age was in the 35-44 year category. Over one-half (50.8%) of the respondents were 40 years of age and over, while only 20% were under 30 years of age.

Out of 224 agents, nearly 60% had earned Master's degrees. Eighty-three agents (37.1%) had Bachelor's degrees. The distribution indicates that about 97% of the respondents had at least a Bachelor's degree. Four agents had Doctoral degrees, while only one respondent had less than a four year formal college education (Table 4.2).

Table 4-3 presents the distribution of the length of employment for the agents. The range of the distribution was from less than 1 month to 396 months (33 years). The mean years of employment was about 10.4. Exactly 50% of the agents had served the Extension Service for a minimum of 8 years. One-third had a minimum of 16.5 years and 10 agents had a minimum of 28 years of service with the Extension Service.

TABLE 4.1. Distribution of Age by Age Categories

CATEGORY(Years)	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
Under 25	1.	17	7.6	7.6	7.6
26 to 29	2.	28	12.5	12.6	20.2
30 to 34	3.	39	17.4	17.5	37.7
35 to 39	4.	26	11.6	11.7	49.3
40 to 44	5.	28	12.5	12.6	61.9
45 to 49	6.	24	10.7	10.8	72.6
50 to 54	7.	31	13.8	13.9	86.5
55 or Over	8.	30	13.4	13.5	100.0
	BLANK	1	.4	MISSING	
	TOTAL	224	100.0	100.0	

TABLE 4.2. Ditribution of Level of Formal Education

CATEGORY	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
1-2 Yrs of College	2.	1	.4	.4	.4
Bachelor's Degree	3.	83	37.1	37.1	37.5
Master's Degree	4.	134	59.8	59.8	97.3
Doctoral Degree	5.	4	1.8	1.8	99.1
Other	6.	2	.9	.9	100.0
	TOTAL	224	100.0	100.0	

TABLE 4.3. Distribution of Length of Employment by Months

CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
0	2	.9	.9	.9
1.	3	1.3	1.4	2.3
2.	1	.4	.5	2.7
3.	2	.9	.9	3.6
6.	6	2.7	2.7	6.3
7.	5	2.2	2.3	8.6
8.	1	.4	.5	9.0
12.	8	3.6	3.6	12.6
13.	1	.4	.5	13.1
15.	1	.4	.5	13.5
16.	1	.4	.5	14.0
18.	5	2.2	2.3	16.2
21.	1	.4	.5	16.7
24.	16	7.1	7.2	23.9
30.	1	.4	.5	24.3
36.	6	2.7	2.7	27.0
42.	2	.9	.9	27.9
48.	5	2.2	2.3	30.2
52.	1	.4	.5	30.6
54.	2	.9	.9	31.5
60.	12	5.4	5.4	36.9
66.	3	1.3	1.4	38.3
72.	10	4.5	4.5	42.8
78.	4	1.8	1.8	44.6
84.	5	2.2	2.3	46.8
96.	7	3.1	3.2	50.0
102.	1	.4	.5	50.5
108.	6	2.7	2.7	53.2
120.	10	4.5	4.5	57.7
132.	10	4.5	4.5	62.2
138.	1	.4	.5	62.6
144.	8	3.6	3.6	66.2
156.	4	1.8	1.8	68.0
163.	1	.4	.5	68.5
168.	2	.9	.9	69.4
180.	8	3.6	3.6	73.0
192.	4	1.8	1.8	74.8
198.	1	.4	.5	75.2
204.	2	.9	.9	76.1
216.	5	2.2	2.3	78.4
228.	3	1.3	1.4	79.7
240.	6	2.7	2.7	82.4
252.	4	1.8	1.8	84.2
256.	1	.4	.5	84.7
264.	10	4.5	4.5	89.2
276.	6	2.7	2.7	91.9
288.	3	1.3	1.4	93.2
300.	3	1.3	1.4	94.6
324.	2	.9	.9	95.5
336.	4	1.8	1.8	97.3
348.	4	1.8	1.8	99.1
360.	1	.4	.5	99.5
396.	1	.4	.5	100.0
BLANK	2	.9	MISSING	
TOTAL	224	100.0	100.0	

Nearly 90% of the 224 Michigan Extension agents, as shown in Table 4-4, were distributed in four categories of employment positions. These were: (1) County Extension Directors (63); (2) Agricultural (Extension, Marketing, Field Crop, Food and Nutrition) Agents (31); (3) Home Economics Extension Agents (50); and (4) 4-H Youth Extension Agents (48).

The frequency of usage of the Telplan System ranged from a daily usage to less than ten times a year for the agents. A search of the responses revealed that a number of agents indicated that they had never used the system, and therefore, no programs of the system was used by those agents. These responses created a need for a category which indicated that the system was never used by some agents. Also, one category for 'no program used' was included in the item related to rate of usage of the system's programs.

A fairly high number of the agents (19) did not respond to the question of the frequency of usage of the system (Table 4-5). These agents, as the search of the responses showed, were mostly among the categories of 4-H youth agents and/or home economics agents. Excluding the blank responses, Table 4-5 shows that over 54% of the agents had used the system up to ten times a year. The system was used one to three times weekly by 4% of the agents, while nearly 16% used the system up to 3 times a month. Although the Telplan System was used by 3 agents on a daily basis, over 16 percent never used the system.

TABLE 4.4. Extension Employment Positions by Position Categories

CATEGORY Y	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
County Extension Director	1.	63	28.1	28.6	28.6
Agricultural Ext; Marketing, Field Crop, Food and Nutrition Agents	2.	31	13.8	14.1	42.7
Home Economics Extension Agents	3.	50	22.3	22.7	65.5
4-H Youth Extension Agents	4.	48	21.4	21.8	87.3
Horticultural Extension Agents	5.	4	1.8	1.8	89.1
District Farm Management, Resource Development, Forestry & Marine Agents, and Extension Leaders	6.	11	4.9	5.0	94.1
District Marketing Consumer Marketing Information,Public Policy and Public Affairs Agents	7.	6	2.7	2.7	96.8
Extension Dairy Agents	8.	2	.9	.9	97.7
Multi-County & Regional Agents	9.	4	1.8	1.8	99.5
Extension Livestock Agents	10.	1	.4	.5	-100.0
	BLANK	4	1.8	MISSING	
	TOTAL	224	100.0	100.0	

TABLE 4.5. Ditribution of the Freqeuncy of Usage of the Telplan System

CATEGORY	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
Almost Daily	1.	3	1.3	1.5	1.5
1 to 3 Times/Week	2.	9	4.0	4.4	5.9
1 to 3 Times/Month	3.	35	15.6	17.1	22.9
< 10 Times/Year	4.	122	54.5	59.5	82.4
Never	5.	36	16.1	17.6	100.0
	BLANK	19	8.5	MISSING	
	TOTAL	224	100.0	100.0	

TABLE 4.6. Distribution of the Number of Programs Used

CATEGORY	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
None	0	39	17.4	19.6	19.6
1 Program Only	1.	37	16.5	18.6	38.2
1 to 5 Programs	2.	91	40.6	45.7	83.9
> 5 Programs	3.	32	14.3	16.1	100.0
	BLANK	25	11.2	MISSING	
	TOTAL	224	100.0	100.0	

Nearly 41% of the agents (91) used 1 to 5 program of the Telplan System (Table 4-6). This percentage does not show the adjusted frequency distribution of the responses for this item, since, again a high number of agents (25) did not repond to this question. While 39 agents (17.4%) did not use any of the programs, over 14% used more than 5 programs, and 37 respondents (16.5%) used one of the programs only. From the optional item of the background questionnaire, it was revealed that the one program that was used more frequently and by a higher number of the agents was program number 31 of the system named Least-Cost Dairy Ration.

Positive and negative responses to 8 items related to the agents previous experiences with computers and the Telplan System are presented in Table 4-7. For each item 0 and 1 indicate a negative and a positive answer respectively.

Nearly three-fourths (74.1%) of all agents had never written a computer program (EXP1). Only 9 agents (4%) had extensive training with computers and computer programming (EXP3). Although 41 agents (18.4%) had had computer related courses (EXP2), a higher percentage (23.7%) had regularly read articles and books as related to computer (EXP6). Over 77% of the agents had never had access to any computer before they began using the Telplan System EXP4). A fairly large number of the agents indicated that their only training with the computers had been on how to use the Telplan System (EXP5). While 23 agents (10.3%) had their own personal microcomputer or personal electronic calculators as interpreted by

TABLE 4.7. Distributions of Experiences with Computers and the Telplan System by Categories (EXP1 to EXP8)

CATEGORY	CODE	ABSOLUTE FREQ	RELATIVE FREQ (PCT)	ADJUSTED FREQ (PCT)	CUM FREQ (PCT)
Experience Number ONE (EXP1)	0	58	25.9	25.9	25.9
	1.	166	74.1	74.1	100.0
Experience Number TWO (EXP2)	0	182	81.3	81.6	81.6
	1.	41	18.3	18.4	100.0
	BLANK	1	.4	MISSING	
Experience Number THREE (EXP3)	0	215	96.0	96.0	96.0
	1.	9	4.0	4.0	100.0
Experience Number FOUR (EXP4)	0	173	77.2	77.6	77.6
	1.	50	22.3	22.4	100.0
	BLANK	1	.4	MISSING	
Experience Number FIVE (EXP5)	0	127	56.7	56.7	56.7
	1.	97	43.3	43.3	100.0
Experience Number SIX (EXP6)	0	171	76.3	76.3	76.3
	1.	53	23.7	23.7	100.0
Experience Number SEVEN (EXP7)	0	167	74.6	74.9	74.9
	1.	56	25.0	25.1	100.0
	BLANK	1	.4	MISSING	
Experience Number EIGHT (EXP8)	0	201	89.7	89.7	89.7
	1.	23	10.3	10.3	100.0
	TOTAL	224	100.0	100.0	

some of the agents (EXP8), a higher percentage (25.1%) had worked with computers through remote terminals only (EXP7).

Analysis of the Attitude Clusters

As described in Chapter III, using cluster analysis and reliability analysis, the 58 items of the attitude scale formed 11 clusters or scales*. Of these 11 clusters, 3 clusters from the computer items and 6 clusters from the Telplan System items were reliable (with high Coefficient Alphas), and therefore, formed the attitude clusters (dependent variables). Scales 10 and 11 formed the "residual" clusters with very weak Coefficient Alphas. The items forming these two clusters neither were related to each other within the two scales, nor did they have high correlations to the items of the other 9 clusters. Attitude scales 10 and 11, therefore, were not included in the analysis of the data.

Before testing the hypotheses as related to the relationship between dependent variable attitude and the independent variables, it was necessary to study each attitude cluster and the linkage between them.

The intercorrelations of the 9 clusters (501-509) are reproduced here in Table 4.8. These correlations have been taken from Table 3.6 and reproduced here for the reader's convenience.

Cluster (504), Problem-Solving, has a high correlation (.70) with cluster (505), Quality, and (.68) with Feelings (506).

*The words "scale" and "cluster" are used interchangeably throughout the text.

TABLE 4.8. Inter-correlations Among the Attitude Clusters (501 to 509), Data of Table 3.6

CLUSTER		501	502	503	504	505	506	507	508	509
Answer	501	100								
Infallibility	502	-8	100							
Access	503	-24	30	100						
Problem-Solving	504	-42	19	41	100					
Quality	505	-38	32	23	70	100				
Feelings	506	-43	16	2	68	55	100			
Limitations	507	7	-43	-31	-6	-23	-4	100		
Fear/Threat	508	-40	-8	9	58	46	45	26	100	
Info. and Training	509	-32	7	40	58	26	38	7	33	100

The same cluster (504) also has a fairly high correlation with cluster (508), Fear/Threat, (.54), and cluster (509), Information and Training, (.58). In order to see the linkages between the items forming these clusters and the linkage among the clusters, the items of the attitude scale were analyzed utilizing a cluster analysis program called STRUCTR (Allard, 1978). Figure 4.1 presents the 6 Telplan System attitude clusters. The correlations computed are the absolute values of Pearson's-r coefficients. The broken line at the point .162 to .156 divides the diagram into distinct sections each containing a collection of clusters. Including item number 49 and dividing the diagram with a line at .096 to .091 into two distinct parts, we actually derive the second order clusters which were formed from the a posteriori cluster analysis (Chapter III). One second order cluster (601)(from the Telplan System attitude clusters) is a combination of clusters (504) Problem-Solving, (505) Quality, (506) Feelings,

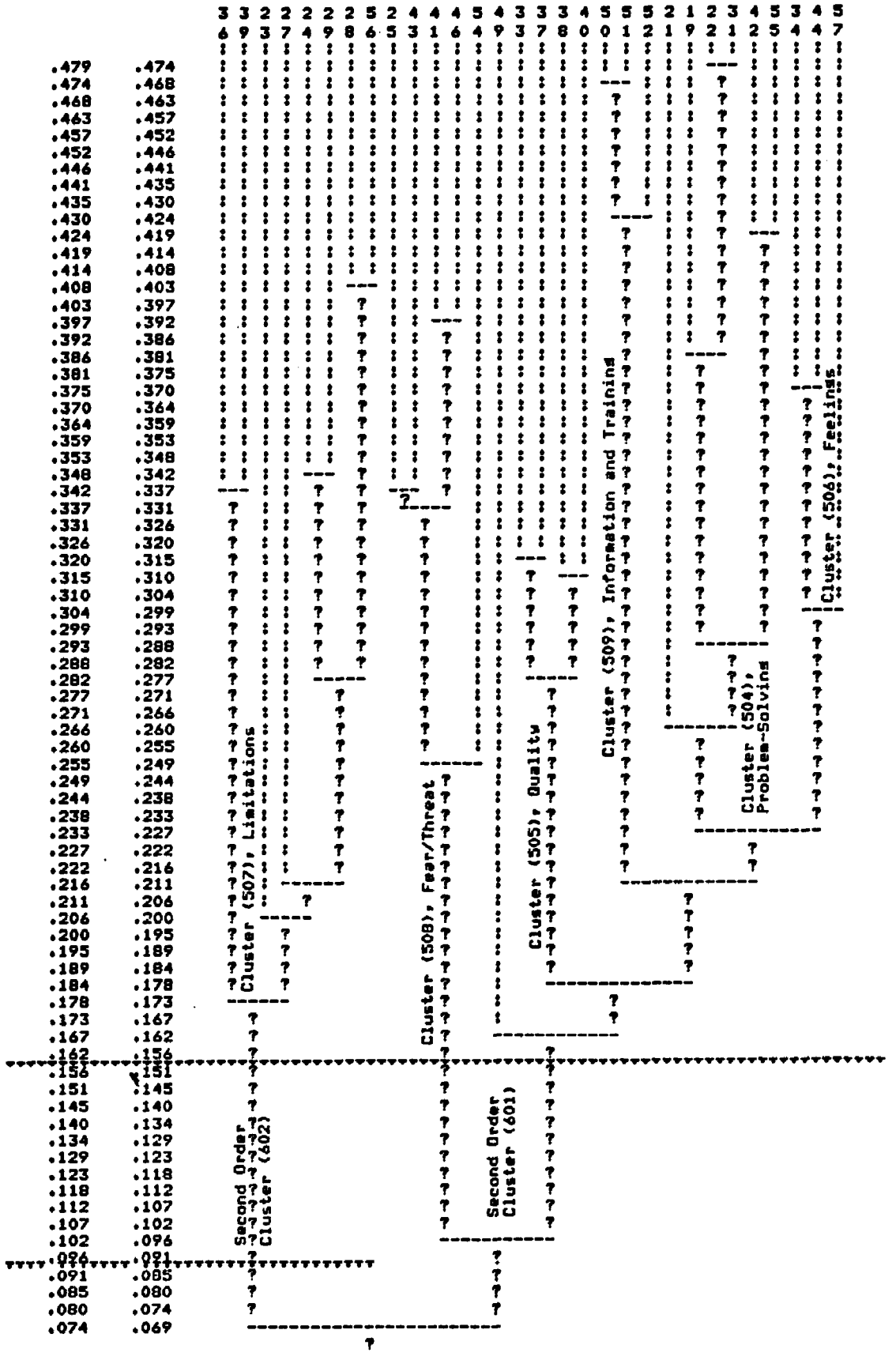


FIGURE 4.1. Linkages Among the Telplan System Attitude Clusters (504 to 509)

(508) Fear/Threat, and (509) Information and Training. The other second order cluster (602) is (507), Limitations. Therefore, the relationships of one attitude cluster to the independent variables and/or the relationships of a collection of clusters to the independent variables can be examined. Figures representing the clusters formed from the computer items, the Telplan System clusters and a posteriori 11 clusters in three different methods, can be found in Appendix D.

In order to determine the amount of variance in scores explained by each of the 9 clusters, a univariate F-test was computed. As shown in Table 4.9, the 9 clusters accounted for a total of 72.6 per cent of the variance. The computer attitude clusters (501-503) accounted for a small amount (13.6%) of variance and neither one were significant at the level of significance of .001 which was set for the test of hypotheses. Cluster (503), Access, with 6.7% of the total of variance tended to have a significance at the .03 level.

Among the 6 Telplan System attitude clusters, Problem-Solving (504) and Fear/Threat (508) accounted for well over half (37.9%) of the amount of variance for the 9 clusters. The related F-values for these two scales, 4.43 and 4.01 respectively, had a significance level of .00001. Cluster (506), Feelings, seemed to contribute fairly (7.6%) with a level of significance of nearly .01 to the total amount of variance. The remaining 3 clusters, (505) Quality, (507) Limitations, and (509) Information and Training accounted for 13.7 per cent of the total amount of variance and none had a significant F-value.

Table 4.9. Univariate F-test for the Computer Attitude Clusters (501-503) and the Telplan System Attitude Clusters (504-509).

Attitude Cluster		Multiple R	Multiple R^2	Adjusted R^2	F-value	Sig. of F
501	Answer	.297	.088	.025	1.283	.227
502	Infallibility	.326	.106	.044	1.580	.095
503	Access	.356	.127	.067	1.934	.029
504	Problem-Solving	.500	.240	.198	4.428	.00001
505	Quality	.298	.089	.026	1.298	.218
506	Feelings	.368	.136	.076	2.089	.017
507	Limitations	.347	.120	.060	1.824	.043
508	Fear/Threat	.481	.232	.179	4.013	.00001
509	Information and Training	.335	.112	.051	1.683	.068

D.F. = 13,173

Regression Model for Attitude Clusters and the Independent Variables

The intercorrelations of the attitude clusters and also of the independent variables caused the difficulty and complexity of explaining the relationships of the agent's attitudes and the selected personal characteristics. The difficulty arose when Pearson's-r coefficients were computed. If the correlations among the attitude clusters and among the independent variables were all zero, then the difficulty could have been avoided and therefore, it would have been possible to state without any ambiguity the proportion of variance in the attitude clusters accounted for by each of the independent variables. However, as explained in the previous discussion, linkages with high correlations existed among the attitude clusters. In addition, the independent variables in most behavioral research as Kerlinger and Pedhazur (1973) point out, are "usually correlated, sometimes substantially." These two authors by examining the two studies done by Cutright (1969) and Coleman et al. ("Equality of Educational Opportunity," 1966), discuss the effect of the intercorrelations of the independent variables and the subsequent difficulty of interpreting the results because of the high correlations among the independent variables.

The way out of this difficulty, as Kerlinger and Pedhazur suggest, is the control of variables and the use and computation of semipartial correlation to assist achieve control and explication of the variables. The method calls

for simply removing the variance of each variable after the computation for that variable in the squared multiple correlation formula is completed and second variable is to enter the formula for calculation of its variance.

Applying the method, for instance, to the attitude cluster (504) and the three independent variables, age, frequency of usage of the System (freq), the previous experiences with computers and the System (exp), for the squared multiple correlation formula, we have:

$$R^2_{(504).age,freq,exp} = r^2_{(504)age} + r^2_{(504)(freq.age)} + r^2_{(504)(exp.age,freq)} \qquad [4.1]$$

Formula 4.1 indicates that the independent variable age is the first to enter the computation and therefore, the first expression $r^2_{(504)age}$ is the variance shared by the dependent variable (504) and the independent variable age. The second expression $r^2_{(504)(freq.age)}$ is the squared "semipartial correlation" between the dependent variable (504) and frequency of usage (freq), partialed out the variance shared by (504) and age. In other words, the second term expresses the variance of (freq) and (504) without overlapping or duplicating the variance contributed by (504) and age. Finally, the third expression, $r^2_{(504)(exp.age,freq)}$, is the variance shared by (504) and (exp) while the variances shared by (504), age and (freq) are partialed out. Therefore, in the third term the influences of age and frequency of usage of the System are neutralized.

R^2 in formula 4.1, the regression equation, indicates the proportion of the total variance of the attitude cluster (504) that the independent variables age, (freq) and (exp) in the regression account for.

The multiple regression analysis used for analysis of the data was a regression model based on the aforementioned semipartial correlations. The semipartial correlation was central to the multiple regression analysis because it represented the correlation between one attitude cluster and one independent variable with the influence of other attitude clusters and independent variables removed from that independent variable. The F-test applied to the differences between the proportions of the total variances (R^2's) were "a test of the statistical significance of semipartial correlations."

Kerlinger and Pedhazur point out that though the calculation of R^2 is not dependent upon the order in which the independent variables enter the regression equation, however, if the amount of variance accounted for by the individual variables is of concern, the order of entry, then, makes a great difference. A variable that enters the equation second accounts for less percentage of the total regression variance than if it was to enter first. However, "if the researcher is interested only in the overall prediction success of his set of variables, then the order of entering variables does not matter."

In the multiple regression model used, the independent variables and the attitude clusters arbitrarily entered into the regression analysis. The independent variable, age followed by level of formal education, length of employment, past computer-Telplan System experiences, frequency of use, and number of programs used. The multiple regression analysis routine used set up statistical hypothesis for each independent variable, computed t-values and determined the significance of t. Tables 4.10 to 4.23 represent multiple regression analysis for each independent variable and all attitude clusters with a comparative picture of zero-order correlation analysis for the same independent and dependent variables.

Hypotheses Tested and Discussion of Findings

The seven hypotheses tested for the study were formulated in such a manner as to determine the relationships between the attitudes and several selected personal characteristics. Age, level of formal education, length of employment, past experiences with computers and the Telplan System, frequency of usage of the System, the number of Telplan programs used, and employment position held with the Extension Service were the independent variables. The formation of nine clusters from the items of the attitude scale divided the general dependent variable, attitude, into nine attitude clusters, each forming one dependent variable.

The hypotheses were in null form, stating that there was no relationship between the dependent variable (y) and

the independent variable (x). For simplicity, the dependent variable (y)--stated as "attitude clusters"--for each of the seven hypotheses included all of the attitude clusters. Therefore, for the following hypotheses, one through seven, each multivariate hypothesis can be stated and read as:

There was no relationships between the attitude cluster, Answer,--or Infallibility, or Access, or Problem-Solving, or Quality, or Feelings, or Limitations, or Fear/Threat, or Information and Training--and the independent variables: age, etc. The Tables 4.10 to 4.23 show the tests of hypotheses of each of the attitude clusters and each of the independent variables.

Hypothesis One

Multiple regression analysis and zero-order correlation analysis were used to determine the relationships between the nine attitude clusters and agent's age. Specifically, it was hypothesized that there were no relationships between the attitude clusters and age. (i.e., $H:\beta=0$, in the case of multivariate analysis and $H:r=0$ for zero-order correlation analysis). This hypothesis was not rejected at the .001 level of significance. Thus, we can conclude that there were no statistically significant linear relationships between the nine clusters and age at the .001 significance level. As shown in Table 4.10 for zero-order correlation analysis, cluster (507), Limitations, has a fairly high negative correlation with age at the .002 level of significance. Also, scale (504), Problem-Solving, indicates a negative correlation with age significant at the .007.

Table 4.10. Zero-Order Correlation and Multiple Regression Analysis for Computer Attitude Clusters (501-503) and the Telplan System Attitude Clusters (504-509) with Age.

Attitude Cluster		Zero-Order Corr. Analysis		Multiple Regression Analysis			
		r	Sig. of r	B	β	t-value	Sig. of t
501	Answer	.055	.208	-.116	-.105	-.836	.404
502	Infallibility	-.087	.099	-.219	-.214	-1.725	.086
503	Access	-.009	.449	-.005	-.007	-.055	.956
504	Problem-Solving	-.170	.007	.016	.011	.097	.922
505	Quality	-.083	.116	-.120	-.141	-1.128	.261
506	Feelings	-.134	.026	-.088	-.158	-1.298	.196
507	Limitations	-.200	.002	-.149	-.090	-.731	.466
508	Fear/Threat	-.083	.114	-.087	-.069	-.602	.548
509	Information and Training	-.111	.052	-.006	-.009	-.073	.942

However, as the multiple regression analysis removed from the regression equation the contribution of other clusters as well as other independent variables, Problem-Solving potential of computers and the Telplan System, and their Limitations showed no significant relationships with age. Overall, both analysis methods indicated that there was a tendency for the younger Extension agents to have more favorable attitudes toward computers and the System. The correlation coefficient r for Problem-Solving and Limitations in the zero-order correlation analysis were -.17 and -.20 respectively; meaning that these two clusters accounted for 37% of the total variation. On the other hand, in the multiple regression analysis the clusters that contributed most to the variance were (502) Infallibility, with 4.6 percent, (505) Quality, with 2 percent, (506) with 2.5 percent. As mentioned earlier, age and the attitude clusters did not have statistically significant relationships at the .001 level, therefore, age did not seem to be a predictor of the agents' attitudes toward computers and the Telplan Systems.

Hypothesis Two

For hypothesis two, the relationship between attitude and the level of formal education was of concern. It was hypothesized, specifically, that there was no relationship between the agents' level of formal education and their attitudes toward computers and the Telplan System. Here again, both zero-order correlation analysis and multiple regression analysis were used to determine if there were

statistically significant relationships between the attitude clusters and the level of formal education. The hypothesis was not rejected for either of the analysis at the .001 level of significance. Clusters (502), Infallibility, and (507), Limitations, with coefficients r of .18 and -.18 respectively (in the zero-order correlation analysis) were significant at the .003 and .005 levels (Table 4.11). The positive correlation between level of formal education and Infallibility indicated that the agents with higher level of formal education had a tendency to feel that computers provided correct answers to problems. In the multiple regression analysis this cluster had a semipartial correlation coefficient of .20 with a t-value that was significant at the .01 level; meaning that 20% of the total variation for this computer attitude cluster was explained by the regression. Limitations, (507), however, in the multiple regression analysis did not show a significant relationship (as compared to the .005 level) with the level of education.

For cluster (507), Limitations, the levels of formal education were contrasted against each other utilizing Scheffe's post hoc test. The only category which indicated a significance level (at the .04) was when the agents holding bachelors degrees were compared to those having masters degrees. The indication was that the agents holding lower academic degree (bachelors) had more favorable attitude toward the Telplan System as far as its limitations were concerned.

Table 4.11. Zero-Order Correlation and Multiple Regression Analysis for Computer Attitude Clusters (501-503) and the Telplan System Attitude Clusters (504-509) with the Level of Formal Education.

Attitude Cluster		Zero-Order Corr. Analysis		Multiple Regression Analysis			
		r	Sig. of r	B	β	t-value	Sig. of t
501	Answer	.158	.010	.161	.038	.461	.645
502	Infallibility	.183	.003	.767	.204	2.491	.014
503	Access	.047	.241	.294	.105	1.294	.197
504	Problem-Solving	-.102	.068	-.112	-.020	-.266	.790
505	Quality	-.062	.186	-.233	-.072	-.870	.386
506	Feelings	-.082	.117	-.088	-.042	-.517	.607
*507	Limitations	-.176	.005	-.669	-.106	-1.301	.195
508	Fear/Threat	-.064	.177	.158	.033	.435	.664
509	Information and Training	-.054	.215	-.255	-.099	-1.216	.226

*A priori and A Posteriori Contrast Test for Formal Education (Six Levels), and Limitations.

	T-Value	T-Prob.	In Favor of	D.F.
B.S. to M.S.	2.03	.044	B.S.	4 - 205

One interesting finding was that for both analysis the Telplan System cluster attitudes (except for, 508) had negative correlations with the level of formal education; thus meaning that there was a tendency for the agents with lower level of formal education to have a more favorable attitude toward the System. For the computer attitude cluster, on the other hand, both of the analysis determined that the agents with higher level of formal education had a tendency to feel less favorably toward computers. The total contribution of the computer attitude clusters to the variance was 5.4 percent. The contribution for the Telplan attitude clusters was only 3.9 percent which ranged from 0.0 percent for Problem-Solving to 1.1 percent for (507), Limitations.

Hypothesis Three

Zero-order correlation analysis and multiple regression analysis were used to determine if there existed a relationship between attitude and the length of employment in the Extension Service. Specifically, it was hypothesized that there were no linear relationships between the attitude clusters and the length of employment (i.e. H:r = 0 and H:β = 0 for the two analysis, respectively). Table 4.12 shows that neither correlation coefficient r, nor the semi-partial correlation coefficient β were significant at the .001 level for any of the attitude clusters. Therefore, this hypothesis was not rejected at the .001 level of significance; meaning that there was no statistically sufficient linear relationship between the length of employment and the agents' attitudes toward computers and the Telplan System. Cluster

Table 4.12. Zero-Order Correlation and Multiple Regression Analysis for Computer Attitude Clusters (501-503) and the Telplan System Attitude Clusters (504-509) with the Length of Employment.

Attitude Cluster		Zero-Order Corr. Analysis		Multiple Regression Analysis			
		r	Sig. of r	B	β	t-value	Sig. of t
501	Answer	.131	.026	.005	.206	1.573	.118
502	Infallibility	-.035	.302	.0006	.026	.199	.843
503	Access	-.0005	.497	-.001	-.054	-.421	.674
504	Problem-Solving	-.195	.002	-.003	-.103	-.868	.387
505	Quality	-.040	.283	.002	.130	.996	.320
506	Feelings	-.089	.100	.001	.114	.898	.370
507	Limitations	-.201	.002	.00004	.001	.009	.993
508	Fear/Threat	-.040	.283	.002	.075	.627	.532
509	Information and Training	-.105	.063	-.0004	-.028	-.219	.827

(507), Limitations, with R = -.20 which was significant at .002 level in the first analysis showed a close to zero value for semipartial correlation coefficient in the multiple regression analysis. Thus, we can conclude that without overlapping or duplicating the variances contributed by the other attitude clusters and the other independent variables, zero percent of the total variance (for Limitations) was explained by the regression. Cluster (504), Problem Solving, contributed 1.1 percent to the variance while with a .002 level of significance had a correlation coefficient r = .19. This indicated that there was a tendency for the agents with lesser years of employment to have a more favorable attitude toward the potentials of Problem-Solving of the System. The first analysis showed, also, the same tendency for all of the Telplan System attitude clusters; meaning that the lesser the duration of employment the more favorable the attitudes toward the Telplan System. Overall, 9 percent was the contribution of the nine clusters to the total variance.

One interesting finding was that cluster (501), Answer, showed a positive relationship (without sufficient statistical significance) with both length of employment and the independent variable past experience number three. The linkage between these two independent variables became apparent when the content of the items forming scale (501) and the item for experience number three (Exp.3) were studied. Answer, cluster (501), formed from a combination of five computer attitude items, implied that computers by providing

quick answers, aided the agents in solving their client's problems. Past experience number three, on the other hand, requested that the agents give a positive response if they had extensive training with computers and computer programming. The positive relationships in both analysis (not statistically significant at the .001 level, Tables 4.12 and 4.15) indicated that the agents with more years of service in the Extension Service seemed to have more training with computers and computer programming. Those agents showed a tendency to feel that computers helped them in their extension work as far as "quick" responses and solutions to the needs and problems of their client were concerned.

Hypothesis Four

This hypothesis was formulated in a multivariate null form and stated in such a way to include sub-hypotheses for eight separate independent variables as related to past experiences with computers and the Telplan System. For the general hypothesis, specifically, it was hypothesized that there were no relationships between the attitude clusters and the agents' past experiences with computers and the Telplan System. Zero-order correlation analysis and multiple regression analysis for the eight past experiences (Exp.1 to Exp.8) determining the relationship of each experience with the attitude clusters are presented in Tables 4.13 to 4.20.

Past experience number one, requested the agents to indicate if they had ever written a computer program. The distribution of the responses showed that nearly 75 percent

Table 4.13. Zero-Order Correlation and Multiple Regression Analysis for Computer Attitude Clusters (501-503) and the Telplan System Attitude Clusters (504-509) with Previous Experience Number 1 (EXP1).

Attitude Cluster		Zero-Order Corr. Analysis		Multiple Regression Analysis			
		r	Sig. of r	B	β	t-value	Sig. of t
501	Answer	.040	.277	.627	.112	1.386	.168
502	Infallibility	-.074	.139	.067	.013	.161	.872
503	Access	.102	.065	.229	.062	.781	.436
504	Problem-Solving	.077	.132	.865	.117	1.592	.113
505	Quality	-.017	.402	-.108	-.025	-.310	.756
506	Feelings	.042	.270	.158	.056	.715	.476
507	Limitations	-.051	.232	-.929	-.111	-1.394	.165
508	Fear/Threat	-.056	.206	-.040	-.006	-.085	.932
509	Information and Training	.005	.468	.039	.011	.142	.887

Table 4.14. Zero-Order Correlation and Multiple Regression Analysis for Computer Attitude Clusters (501-503) and the Telplan System Attitude Clusters (504-509) with Previous Experience Number 2 (EXP2).

Attitude Cluster		Zero-Order Corr. Analysis		Multiple Regression Analysis			
		r	Sig. of r	B	β	t-value	Sig. of t
501	Answer	.051	.225	-.064	-.010	-.116	.908
502	Infallibility	.034	.278	-.558	-.095	-1.099	.273
503	Access	-.141	.018	-.539	-.128	-1.496	.136
504	Problem-Solving	.019	.391	-.347	-.041	-.521	.603
505	Quality	-.009	.446	-.581	-.119	-1.363	.174
506	Feelings	.080	.124	.317	.099	1.165	.246
507	Limitations	-.037	.297	-.919	-.097	-1.125	.262
508	Fear/Threat	-.030	.330	-.665	-.093	-1.154	.250
509	Information and Training	.000	.497	-.280	-.072	-.838	.403

of the agents had never written any programs. The hypothesis (4a) for (Exp.1) and the attitude clusters was not rejected, since no sufficient statistical linear relationships were found among these variables (Table 4.13).

Whether the agents had had computer programming courses was of concern in the past experience number two (Exp.2). Specifically it was hypothesized that there was no relationship between past exposure to computer programming courses and the attitude clusters (hypothesis 4b). This hypothesis was not rejected at .001 level of significance (Table 4.14); thus indicating that there was no statistically linear relationship (at .001) between Exp.2 and the agents' attitude toward computers and the Telplan System.

Answer, computer attitude cluster 501, as previously mentioned, was the only scale that indicated a relationship with Exp.3. Neither of the relationships, $r = .14$ and $\beta = .18$ (Table 4.15), however, were significant at the level of .001. The hypothesis 4c stating that there was no relationship between the past extensive training with computer programming (Exp.3) and the attitude clusters was not rejected at the .001 level of significance. Only 4 percent of the agents (respondents), marked positive responses for Exp.3, and as it was indicated earlier, those agents with longer length of employment with the Extension Service seemed to have more training with computers and computer programming.

Experiences numbers 4 and 5, (Exp.4 and Exp.5), dealt with the Telplan System. Exp.4 was concerned whether the

Table 4.15. Zero-Order Correlation and Multiple Regression Analysis for Computer Attitude Clusters (501-503) and the Telplan System Attitude Clusters (504-509) with Previous Experience Number 3 (EXP3).

Attitude Cluster		Zero-Order Corr. Analysis		Multiple Regression Analysis			
		r	Sig. of r	B	β	t-value	Sig. of t
501	Answer	.141	.018	2.227	.177	1.975	.050
502	Infallibility	.101	.067	.669	.058	.648	.518
*503	Access	-.115	.044	-1.229	-.147	-1.677	.095
504	Problem-Solving	-.065	.172	1.064	.064	.785	.433
505	Quality	-.019	.394	.148	.015	.170	.865
506	Feelings	-.053	.222	.275	.043	.498	.619
507	Limitations	-.027	.350	2.114	.112	1.273	.205
508	Fear/Threat	-.098	.077	.493	.035	.421	.674
509	Information and Training	.057	.204	1.253	.164	1.846	.066

*A Priori and A Posteriori Contrast Test for EXP3 (Two Levels), and Access.

	T-Value	T-Prob.	In Favor of	D.F.
Minimum Training to Maximum Training	1.71	.089	Min. Training	1 - 219

agents had access to and worked with computers before they began using the System. Inquiry was made through Exp.5 to find out if the only training with computers for the agents was limited to the use of the Telplan System. Hypotheses 4d and 4e, specifically stated that there was no relationship between Exp.4 or Exp.5 and the attitude scales. The hypothesis 4d for Exp.4 was not rejected for either of the analysis Table 4.16). However, for the zero-order correlation analysis, the hypothesis 4e (Exp.5) was rejected at the .001 as far as attitude clusters Problem-Solving, Feelings, Fear/Threat were concerned (Table 4.17). Clusters (507), Limitations, (509), Information and Training, showed relationships with Exp.5 which were significant at .02 level. Computer attitude cluster (502), Infallibility, also had relationship with Exp.5, but significant only at .05 level. Table 4.16, however, shows that the above clusters indicated no significant semipartial correlations with Exp.5 when multiple regression analysis was used. Thus, hypothesis 4e was not rejected and it was concluded that there was no statistically sufficient linear relationship between Exp.5 and the attitudes. The slope of regression equation for most of the clusters were slightly negatively sloping, suggesting that the more training with computers--as far as it was limited to the System--the less favorable attitudes toward the respective clusters. The negative correlations are quite visible and have higher values in the zero-order analysis for clusters (502) to (509).

Table 4.16. Zero-Order Correlation and Multiple Regression Analysis for Computer Attitude Clusters (501-503) and the Telplan System Attitude Clusters (504-509) with Previous Experience Number 4 (EXP4).

Attitude Cluster		Zero-Order Corr. Analysis		Multiple Regression Analysis			
		r	Sig. of r	B	β	t-value	Sig. of t
501	Answer	.058	.195	.171	.030	.328	.743
502	Infallibility	.133	.024	.200	.038	.419	.675
503	Access	-.050	.230	.201	.053	.596	.552
504	Problem-Solving	-.030	.329	.615	.082	.984	.327
505	Quality	.049	.237	.570	.131	1.426	.156
506	Feelings	-.013	.426	-.185	-.065	-.726	.469
507	Limitations	-.060	.195	-.114	-.013	-.148	.882
508	Fear/Threat	-.026	.354	.611	.095	1.131	.259
509	Information and Training	.012	.430	-.037	-.011	-.117	.907

Table 4.17. Zero-Order Correlation and Multiple Regression Analysis for Computer Attitude Clusters (501-503) and the Telplan System Attitude Clusters (504-509) with Previous Experience Number 5 (EXP5).

Attitude Cluster		Zero-Order Corr. Analysis		Multiple Regression Analysis			
		r	Sig. of r	B	β	t-value	Sig. of t
501	Answer	.071	.147	.263	.055	.550	.583
502	Infallibility	-.110	.051	-.780	-.177	-1.777	.077
503	Access	-.052	.222	-.255	-.080	-.818	.414
504	Problem-Solving	-.224	.001	-.063	-.010	-1.100	.912
505	Quality	-.021	.382	.469	.128	1.273	.205
506	Feelings	-.206	.001	-.214	-.089	-.912	.363
507	Limitations	-.140	.021	.192	.027	.272	.786
508	Fear/Threat	-.249	.001	.214	.040	.431	.667
509	Information and Training	-.139	.021	-.178	-.061	-.619	.536

For the remaining past experience numbers 6, 7 and 8, the hypotheses 4f, 4g and 4h were not rejected for either of the analysis (Tables 4.18, 4.19 and 4.20). Each hypothesis stated that, specifically, there was no relationship between Exp.6, Exp.7 or Exp.8 and the attitude clusters. By not rejecting the hypotheses, it was concluded that no significant relationship was found between Exp.6, Exp.7 or Exp.8 and the attitudes toward computers and the System. The only visible semipartial correlation coefficient was .16 with a t-value significant at a level approaching .03 (Exp.8 and cluster 509; Table 4.20). This suggested that having personal micro-computer (or programmable calculators as Exp.8 was interpreted by many agents) assisted the agents in their needs for more training and information as related to computers and the Telplan System. Exp.6 and Exp.7 showed negative semipartial correlations with most of the attitude clusters; meaning that there was a tendency for those of the agents who read more books and articles about computers, and those who worked with computers through terminals only, to have less of a variable attitude toward computers and the System.

Overall, the past experiences contributed very little to the total variance in attitude scores. The range was from zero percent for most of the clusters to a maximum of 3.1 percent for Exp.5 and cluster (502), Infallibility. Past experiences did not seem to be predictors of the agents' attitudes toward the System and computers.

Table 4.18. Zero-Order Correlation and Multiple Regression Analysis for Computer Attitude Clusters (501-503) and the Telplan System Attitude Clusters (504-509) with Previous Experience Number 6 (EXP6).

Attitude Cluster		Zero-Order Corr. Analysis		Multiple Regression Analysis			
		r	Sig. of r	B	β	t-value	Sig. of t
501	Answer	.075	.134	-.003	.011	.151	.880
502	Infallibility	-.031	.325	-.373	-.073	-.982	.327
503	Access	-.073	.139	-.152	-.042	-.565	.573
504	Problem-Solving	-.091	.093	-.644	-.088	-1.292	.198
505	Quality	-.154	.013	-.531	-.126	-1.665	.098
506	Feelings	-.042	.270	-.186	-.067	-.913	.362
507	Limitations	-.080	.123	-.776	-.094	-1.269	.206
508	Fear/Threat	.016	.407	.105	.017	.243	.808
509	Information and Training	-.008	.452	-.151	-.045	-.606	.545

Table 4.19. Zero-Order Correlation and Multiple Regression Analysis for Computer Attitude Clusters (501-503) and the Telplan System Attitude Clusters (504-509) with Previous Experience Number 7 (EXP7).

Attitude Cluster		Zero-Order Corr. Analysis		Multiple Regression Analysis			
		r	Sig. of r	B	β	t-value	Sig. of t
501	Answer	-.057	.198	-.177	-.032	-.422	.673
502	Infallibility	-.061	.182	-.006	-.001	-.015	.988
503	Access	-.004	.474	-.160	-.044	-.586	.558
504	Problem-Solving	.038	.292	.129	.018	.256	.798
505	Quality	-.039	.284	-.257	-.061	-.797	.427
506	Feelings	-.091	.094	-.277	-.101	-1.343	.181
507	Limitations	.063	.182	.319	.039	.516	.607
508	Fear/Threat	-.051	.228	-.568	-.092	-1.302	.195
509	Information and Training	.032	.322	-.039	-.012	-.154	.898

Table 4.20. Zero-Order Correlation and Multiple Regression Analysis for Computer Attitude Clusters (501-503) and the Telplan System Attitude Clusters (504-509) with Previous Experience Number 8 (EXP8).

Attitude Cluster		Zero-Order Corr. Analysis		Multiple Regression Analysis			
		r	Sig. of r	B	β	t-value	Sig. of t
501	Answer	-.063	.177	-1.012	-.134	-1.750	.082
502	Infallibility	-.051	.227	-.237	-.034	-.447	.655
503	Access	.052	.220	.677	.135	1.801	.073
504	Problem-Solving	.037	.297	1.257	.126	1.810	.072
505	Quality	-.012	.429	.352	.061	.792	.429
506	Feelings	.085	.109	.576	.152	2.033	.044
507	Limitations	-.086	.108	-.924	-.082	-1.085	.279
508	Fear/Threat	-.031	.324	.106	.012	.177	.860
509	Information and Training	.082	.114	.744	.162	2.140	.034

Hypothesis Five

The hypothesis was formulated to determine the relationship between frequency of usage of the Telplan System and the agents' attitudes. Specifically, it was hypothesized that there was no relationship between the frequency of usage and the attitude clusters (i.e. H:r = 0 and H:β = 0). This hypothesis was rejected at the .001 level for one computer attitude cluster and four Telplan System cluster for zero-order correlation analysis. When multiple regression analysis was used, the hypothesis was rejected for only two of the Telplan attitude clusters.

Computer attitude cluster (503), Access, implied that easier communications with the computers would be possible and more helpful if computer terminals were provided for all extension offices. The correlation coefficient, r, for this attitude cluster, was .24 with .001 level of significance (Table 4.21). As far as the zero-order correlation analysis was concerned, the rejection of the hypothesis meant that as the number of computer terminals for the agents' offices increased a higher frequency of usage of the Telplan System was realized. The hypothesis was not rejected for cluster (503), Access, when multiple regression analysis was used. The semipartial correlation coefficient, β, was .23, but with a t-value significant at nearly .01. Contribution to the total variance by Access and frequency of usage was 5.1 percent.

Table 4.21. Zero-Order Correlation and Multiple Regression Analysis for Computer Attitude Clusters (501-503) and the Telplan System Attitude Clusters (504-509) with Frequency of Use.

Attitude Cluster		Zero-Order Corr. Analysis		Multiple Regression Analysis			
		r	Sig. of r	B	β	t-value	Sig. of t
501	Answer	-.084	.118	-.164	-.054	-.591	.555
502	Infallibility	.023	.372	.149	.053	.587	.558
503	Access	.238	.001	.456	.227	2.531	.012
504	Problem-Solving	.410	.001	1.343	.335	4.029	.0001
505	Quality	.126	.038	.331	.142	1.552	.122
506	Feelings	.227	.001	.253	.166	1.863	.064
507	Limitations	-.048	.253	-.527	-.116	-1.289	.199
508	Fear/Threat	.416	.001	1.081	.316	3.752	.0002
509	Information and Training	.213	.001	.370	.200	2.215	.028

Two of the Telplan attitude clusters showed correlations significant at the .001 level for the first analysis, but did not indicate significant (at the .001 level) semi-partial correlations with (506), Feelings, and (509), Information and Training. The relationship of (509) to frequency of usage was significant at the .03 level when multiple regression analysis was used. This positive relationship indicated a tendency that there was a need for more information and training as related to the Telplan System. The hypotheses for these two clusters (506) and (509) in the second analysis were not rejected. The amount of variance which was explained by regression for both clusters was 6.7 percent.

Table 4.22 represents contrasts for the levels of frequency of use. A priori contrasts and a posteriori contrasts tests (Scheffe post hoc test) were used for each of the clusters, Access, Problem-Solving, Feelings, and Fear/Threat and frequency of use. The combination of the group using the System up to three times per week and the group with up to three times per month as compared to the group that never used the System had a significance level (.001). Thus, the finding showed that those agents that never used the System had more favorable attitudes toward the System as far as access was concerned.

For Problem-Solving, the significant T-values showed that the agents who used the System fewer times consistently had more favorable attitudes as compared to those who used

Table 4.22. A Priori and A Posteriori Contrasts Test for Frequency of Use (Five Levels), and the Clusters, Access, Problem-Solving, Feelings, and Fear/Threat.

Cluster		Almost Daily	1-3 Times /Week	1-3 Times /Month	Less Than 10/year	Never	T-Value	T-Prob.	In Favor of	D.F.
Access (503)	1	*			*		-1.86	.065	< 10/year	4 - 197
	2		*	*		*	-3.29	.001	Never	
Problem-Solving (504)	1	*			*		-2.62	.009	< 10/year	4 - 193
	2		*	*			-3.84	.000	1-3/month	
	3		*		*		-5.48	.000	< 10/year	
	4		*	*	**		-5.78	.000	< 10/year	
	5		*	*		*	-6.95	.000	Never	
Feelings (506)	1	*			*		-2.66	.009	< 10/year	4 - 195
	2		*	*		**	-2.92	.004	Never	
Fear/ Threat (508)	1		*	*	**		-3.55	.000	< 10/year	4 - 193
	2		*	*		**	-5.90	.000	Never	

Scheffe's Tests (α used).

Cluster	Access	Problem-Solving	Feelings	Fear/Threat
α	.006	.006	.001	.001

Also: * indicates one level is contrasted with another level or, a combination of levels are contrasted with **.

the System more often. This was also the indication for the cluster, Feelings, however, significant only at the .009 and .004 levels.

The groups of agents who never used the System or used the System less frequently (up to ten times per year) as compared to those who used the System from three times per month to three times per week showed the concern and fear that the System would threaten their job and/or personalized relationship with their clientele.

Hypothesis Six

The research hypothesis number six was concerned with the relationship between the rate of usage of the programs of the Telplan System and the agents' attitude. It was hypothesized, specifically, that there was no relationship between the number of programs used and the attitude clusters. The hypothesis was not rejected at the .001 level of significance (multiple regression analysis, Table 4.23). Thus, there was no statistically significant linear relationship between the two variables at the .001 level. However, clusters (507) and (508), showed relationships with the rate of usage of the programs which were significant at the .009 level. For these two scales, the hypothesis six was rejected at the .001 level as far as zero-order correlation analysis was concerned. The correlations between Limitations and the independent variable indicated that as the number of the programs used increased, the agents felt that the System became limited in scope as it related to the needs of the extension clientele. The complexity of many of the programs

Table 4.23. Zero-Order Correlation and Multiple Regression Analysis for Computer Attitude Clusters (501-503) and the Telplan System Attitude Clusters (504-509) with Number of Programs Used.

Attitude Cluster		Zero-Order Corr. Analysis		Multiple Regression Analysis			
		r	Sig. of r	B	β	t-value	Sig. of t
501	Answer	-.156	.010	.039	.016	.154	.878
502	Infallibility	-.091	.089	-.404	-.182	-1.741	.083
503	Access	.102	.065	-.073	-.046	-.445	.657
504	Problem-Solving	.376	.001	.594	.187	1.950	.053
505	Quality	.131	.028	.291	.157	1.493	.137
506	Feelings	.275	.001	.130	.107	1.044	.300
507	Limitations	.265	.001	.992	.275	2.657	.009
508	Fear/Threat	.436	.001	.697	.256	2.646	.009
509	Information and Training	.131	.027	.135	.092	.886	.377

and the lack of appropriate solutions to the problems were also increasingly felt by the agent. A search of the responses revealed that many of the comments made by the agents were related to programs of the System. A brief compilation and discussion of the comments can be found in the next Section. There seemed, also, to be a tendency for the agents to feel their personal communications were more threatened as the programs of the System were increasingly used. Contributions to the total variance as accounted for clusters (508) and (509) and the independent variable, number of programs used were 7.6% and 6.5% respectively.

The other Telplan attitude clusters that showed sizable correlations with the rate of usage were: Problem-Solving with r = 37.6 significant at the .001 level; Quality, and Information and Training each with r = 13.1 significant at the .03 level. Multiple correlation analysis indicated no statistically significant relationships for these clusters at the .001 level. For one computer attitude cluster (502), the slope of the regression equations were slightly negative suggesting that as the use of the number of programs was increased, the agents felt less favorably toward computers in providing correct answers to the problems. The rate of usage of the programs contributed the second highest amount to the total variance after frequency of use. The amount of variance contributed as related to all of the attitude clusters was 25.5 percent.

Table 4.24. A Priori and A Posteriori Contrasts Tests for Number of Programs Used (Four Levels), and the Clusters, Problem-Solving, Feelings, Limitations, and Fear/Threat.

Cluster		More Than 5 Progs.	1 - 5 Progs.	1 Prog.	None	T-Value	T-Prob.	In Favor of	D.F.	Scheffe's Test α Used
Problem-Solving (504)	1	*	*			-2.59	.010	1-5 Progs.	3 - 208	α = .001
	2	*		*		-3.44	.001	1 Prog.		
	3	*	*	**	**	-5.20	.000	1 & None		
	4	*			*	-5.59	.000	None		
Feelings (506)	1	*	*	**	**	-3.23	.001	1 & None	3 -209	α = .001
	2	*			*	-4.02	.000	None		
Limitations (507)	1	*	*	**	**	-3.32	.001	1 & None	3 -206	α = .002
	2	*			*	-2.97	.003	None		
Fear/Threat (508)	1	*	*			-2.73	.007	1-5 Progs.	3 - 209	α = .001
	2	*		*		-3.35	.001	1 Prog.		
	3	*	*	**	**	-5.86	.000	1 & None		
	4	*			*	-6.68	.000	None		

Four of the clusters which showed significant relationships (zero-order analysis) with the variable, number of programs used, were subjected to a priori contrasts and a posteriori contrasts tests (Scheffe post hoc test)(Table 4.24). The break-down and comparison of groups showed significant T-values in favor of those agents who used none or fewer number of the programs. This finding was consistent for all four clusters, Problem-Solving, Feelings, Limitations, and Fear/Threat.

The findings particularly for Limitations indicated that the agents who used none or fewer programs of the System did so, for, mostly, the complexity or the lack of applicability of the programs to their area of service. This was especially true for the frequent users as compared to those who used none or only one program of the Telplan System.

Hypothesis Seven

For hypothesis seven, it was specifically stated that there were no relationships between the attitude clusters and the employment position. Since the levels of this independent variable position were rather nominal (as opposed to other independent variables which had ordinal levels), it was subjected separately to analysis of variance. The analysis was done while the other independent variables, as well as the dependent variables, were controlled. Table 4.25 represents the various tests for employment position and the attitude clusters.

Table 4.25. Zero-order Correlation Analysis, Univariate F-Tests, and Multivariate Tests of Significance for Attitude Clusters and Employment Position.

Attitude Cluster	Zero-Order Corr. Analysis		Univariate F-Tests with (4 - 167) D.F.	
	r	Sig. of r	F-Value	Sig. of F
501 Answer	-.171	.006	2.537	.042
502 Infallibility	.056	.207	1.401	.236
503 Access	.032	.321	.442	.778
504 Problem-Solving	.240	.001	2.514	.043
505 Quality	-.009	.451	.396	.811
506 Feelings	-.215	.001	.760	.553
507 Limitations	.208	.001	3.212	.014
508 Fear/Threat	.310	.001	3.508	.009
509 Information and Training	.126	.034	3.068	.018

Multivariate Tests of Significance

Tests Name	Significance of F
Pillais	.009
Hotellings	.006
Wilks	.008

For zero-order correlation analysis, four clusters, Problem-Solving, Feelings, Limitations, and Fear/Threat indicated significant relationships (at the .001) with position. However, multivariate test of significance for three different tests did not indicate significance levels at the .001. The subsequent univariate F-tests, thus, were not significant at the .001 level for any of the clusters and position. The only cluster which had a sizable F-value was Fear/Threat, however, significant only at the .009 level. The hypothesis, therefore, was not rejected at the .001 level of significance; meaning that there was no statistically sufficient linear relationship between the employment position and the agents' attitudes toward computers and the Telplan System.

In order to find out how the attitudes of the agents as far as their positions with the Extension Service were concerned, the position levels were subjected to a priori, a posteriori contrasts tests and the Scheffe's post hoc test. The clusters of interests were, Answer from the computer clusters and Problem-Solving, Limitations, Fear/Threat, and Information and Training from the Telplan clusters. These clusters indicated significant relationships with the position in the zero-order correlation analysis (four at the .001 level), and in the univariate F-tests (none at the .001 level).

For attitude cluster, Answer, as shown in Table 4.26, counties extension directors, agricultural agents, and other agents who used the Telplan most indicated more favorable

Table 4.26. A Priori and A Posteriori Contrasts Tests for Employment Position (Five Levels), and the Clusters Answer, Problem-Solving, Limitations, Fear/Threat, and Information and Training.

Cluster		CED	AEA, HEA, DFMA, EDA, MCRA, ELA	EHE	4-HA	DMA DCMA	T-Value	T-Prob.	In Favor of	D.F.	Scheffe's Test α Used
Answer (501)	1	*	*	**	**		3.70	.000	CED, & AEA, HEA, DFMA, EDA, MCRA, ELA	4 - 211	α = .04
	2		*	**	**		2.75	.006	AEA, HEA, DFMA, EDA, MCRA, ELA		
	3	*		**	**		3.39	.001	CED		
Problem-Solving (504)	1	*	*	**	**		-5.75	.000	EHE & 4-HA	4 - 203	α = .04
	2		*	**	**		-5.84	.000	EHE & 4-HA		
	3	*		**	**		-3.40	.000	EHE & 4-HA		
	4		*		*		-4.66	.000	4-HA		
	5		*	*			-5.31	.000	EHE		
Limitations (507)	1	*	*	**	**		-3.94	.000	EHE & 4-HA	4 - 201	α = .01
	2	*		**	**		-3.59	.000	EHE & 4-HA		
	3		*	**	**		-3.00	.003	EHE & 4-HA		
	4			*	*	**	3.07	.002	EHE & 4-HA		
	5		*		*		-3.59	.000	4-HA		

Continued on next page

Table 4.26. Continued

Cluster		CED	AEA, HEA, DFMA, EDA, MCRA, ELA	EHE	4-HA	DMA DCMA	T-Value	T-Prob.	In Favor of	D.F.	Scheffe's Test α Used
Fear/Threat (508)	1	*	*	**	**		-5.37	.000	EHE & 4-HA	4 - 203	α = .009
	2		*	**	**		-4.36	.000	EHE & 4-HA		
	3		*		*		-4.80	.000	4-HA		
	4		*	*			-2.62	.009	EHE		
	5	*		**	**		-4.61	.000	EHE & 4-HA		
Information and Training (509)	1	*	*	**	**		-3.45	.001	EHE & 4-HA	4 -207	α = .02
	2		*	**	**		-3.49	.001	EHE & 4-HA		
	3		*		*		-2.95	.003	4-HA		
	4		*	*			-3.03	.003	EHE		
	5			*	*	**	2.189	.030	EHE & 4-HA		

CED--County Extension Directors, AEA--Agricultural Extension Agents, HEA--Horticultural Extension Agents, DFMA--District Farm Management Agents, EDA--Extension Dairy Agents, MCRA--Multi-County & Regional Agents, ELA--Ext. Livestock Agents, EHE--Extension Home Economist, 4-HA--4-H Youth Agents, DMA--District Market Agents, DCMA--District Consumer Market Agents.

*indicated one level is contrasted with another level or, a combination of levels are constrated with ** or a combination of **.

attitudes. The α used for Scheffe's test for Answer and position was .04. For all other clusters the tests were exclusively in favor of extension home economists and 4-H agents (as applied); meaning that (with the exception of Fear/Threat) other agents had more disfavorable attitudes. The value of α for Scheffe's tests for these clusters and position ranged from .009 for Fear/Threat to .04 for Problem-Solving.

The findings showed that though employment position did not become a predictor of attitudes, at the .001 level of significance, however, at the levels of nearly .04, counties extension directors, agricultural agents, extension dairy agents, district farm, multi-counties, and extension livestock agents perceived and felt that: (1) the Telplan System was limited in scope as far as the applicability of the programs were concerned, and (2) the Telplan was not significantly helpful in problem-solving. On the other hand, extension home economists and 4-H youth agents indicated: (1) a distrust for the Telplan and feared that the use of the System might threaten their jobs, and (2) a need for additional information about and training with the Telplan System.

Analysis of the Findings from Optional Items

In the background questionnaire, one optional section including two items (Appendix A) was designated to gather information related to the specific programs of the Telplan System in frequent and minimum use by the Extension agents. A total of 118 respondents (52% of 224 agents) completed this section by denoting the specific programs they used either frequently and the ones that they used at least once. Also, included in this section most respondents had comments related to various aspects of the System and/or the computer and in general computerized services in Extension. The comments had a variation from personal satisfaction with the whole System and the computerized Extension programs to personal frustration as related to the problems involved with the System.

Table 4.27 presents a compilation of the responses for the programs which were in frequent usage by the agents. Program number 31 titled Least-Cost Dairy Ration was used more frequently than any other program of the System. It seemed that this program was highly applicable in the field and had a high popularity among the agents' clientele. This finding was in agreement with the results of studies done by Schoonaert (1973) and Hutjens et al. (1972) as related to field applicability of the program number 31. The program was used mostly by agricultural Extension agents and county Extension directors and almost all district farm management agents.

As shown in Table 4.27 the four most frequent used programs were almost exclusively utilized by the field staff extending mostly farm educational services. However, the programsrelated to family living (e.g. 49 and 60) were used most frequently by Extension home economist.

Also, Extension home economist were mostly the agents who used the programs 60 and 68 at least once (Table 4.28). These two programs seemed to be highly applicable to family living education. Least-Cost Dairy Ration program (No. 31), again indicated a high number of first time usage. A comparison of Table 4.27 and 4.28 showed that a total of seven programs of the System (programs numbered 07, 15, 30, 39, 59, 62, and 71) were never used by the agents who responded to the optional items.

The Tables 4.27 and 4.28 indicate that a very limited number of programs (nearly 14%) were used either frequently or at least once. Ironically, almost all those programs which were used on a frequent basis were used at least once by a number of other agents. It seemed that most programs were used by a few agents once, however, their continued usage did not materialize.

The agents' comments revealed a variety of reasons for utilizing or not using the System. Applicability of the programs seemed to be the most visible and/or significant factor. Agricultural agents (AEA) tended to be more supportive of the programs in use. However, Extension home economists (EHE) and 4-H youth agents (4-HYA) indicated

Table 2.27. Usage of the Telplan Programs (Frequent Use).

Program Number	Program Title	Used Freq. by (No. of Agents)	Users
31	Least-Cost Dairy Ration	42	AEA(18), CED(15), DRMA(5), O(5)
36	Financial Long-Range Whole-Farm Budgeting	16	AEA(5), R&DA(5) CED(3), O(3)
05	Income Tax Management Analysis	14	CED(4), AEA(3), R&DA(3), O(4)
03	Capital Investment Model	12	CED(3), AEA(3) A&DFMA(3), O(3)
49	Family Financial Analysis	10	EHE(4), O(6)
60	Dollar Watch	8	EHE(6), O(2)
44,70	*	7	**
52,65	*	5	**
12	Swine Ration Formulation	4	**
02,18,22,46,54 55,56,63,68	*	3	**
16,28,32,54,64	*	2	**
01,06,13,14,20,21 26,37,40,47,48,57	*	1	**

AEA--Agricultural Extension Agent, CED--County Extension Director, DFMA--District Farm Management Agent, R&DA--Regional & Dairy Agents, A&DFMA--Area & DFMA, EHE--Extension Home Economist, O--Others.

*See Appendix A for the title of these programs.
**Varying user(s) for different programs.

Table 4.28. Usage of the Telplan Programs (Once Only)

Program Number	Program Title	Used Once by (No. of Agents)	User(s)
60	Dollar Watch	23	EHE (Almost Exclusively)
68	In The Bank or Up The Chimney	17	EHE (Mostly), O
36	Financial Long-Range Whole-Farm Budgeting	14	AEA, CED, O
05,63	*	12	EHE, CED, AEA, O
03	Capital Investment Model	11	AEA, CED, O
31	Least-Cost Dairy Ration	10	AEA, CED, O
46	Michigan Dairy Farm Planner	8	DFMA, DA, AEA, CED
44,70	*	7	**
01,02,34,52	*	6	**
18,32,38,47,65	*	5	**
25,28,49	*	4	**
11,12,14,19,20 23,26,27,29,42	*	3	**
04,06,08,09,10,16, 21,27,41,53,55	*	2	**
17,22,35,43,48,50, 51,54,58,69,72,73	*	1	**
07,13,15,30,39,40, 56,57,59,62,64,71	*	0	--

EHE--Extension Home Economist, AEA--Agricultural Extension Agent, CED--County Extension Director, DFMA--District Farm Management Agent, DA--Dairy Agent, O--Others

*See Appendix A for the title of these programs.
**Varying user(s) for different programs.

frustration for lack of programs and relevancy of the existing programs to their areas of services.

The following are typical comments with reference to applicability of the programs:

> "Have reviewed the programs available and find them to be reasonable and appropriate for conduction of extension programs." (County extension director, CED)
>
> "...Some programs are not practical or useful and some are very practical and very useful." (AEA)
>
> "Agents should demand more relevant programs." (EHE)
>
> "The programs for families are not all that useful." (EHE)
>
> "It is not used in 4-H and working with people. We need programs written on how to solve people problems not just dollar problems." (4-HYA)
>
> "Feel computers can be of great value to extend technical information that can be provided to clientele if programs are designed for audience needs." (EHE)

Training, (especially in-service training) was another factor which was widely commented upon by many of the respondents. The following comments reflects the desire and/or expressed need for training in the part of some of the agents:

> "Would like to have in-service training in computers and use more programs in the youth area." (4-HYA)
>
> "I need more intensive training and practice in filling out input forms and also using the computer terminals." (AEA)
>
> "I have not used the computer because I feel I need more training." (EHE)
>
> "In-service training is needed." (Public Policy Agent)

As the above indicate, the need for training by a variety of agents, including agriculture Extension agents.

A few respondents experienced difficulties and problems in accessing and working with the computer and the Telplan System:

> "It (the System) needs to be more responsive more quickly." (EHE)
>
> "Every CES should have a terminal to retrieve information and to aid in communication." (4-HYA)
>
> "... a very important facet of Telplan use: It takes time to get ready to run and then adjust and rerun." (District agent)
>
> "It takes a planned, concerted effort to learn how to use Telplan efficiently." (AEA)

Many agents expressed an important point that might explain some of the underlying reasons for limited usage of many programs of the System. Presenting the System to, informing and involving the clientele, as well as the agents were major concerns for those respondents. The following are typical comments:

> "Farmers are not sold enough on the programs to come in and ask you to run them--you must seek them out." (CED)
>
> "Extension staff needs to be more aware of total programs designed for Telplan System. EHE's are beginning to be involved--have little knowledge of Telplan outside of their own area of programming." (EHE)
>
> "I have used the computer programs in family spending etc. with the ELE program--I don't know if this is part of the Telplan System or not." (CED)

> "To be most effective, Telplan must have persons assigned to promote it with agents and clients. Someone is urgently needed to update materials and be available to assist during problem times."

As indicated in the preceding comments and suggestions by the respondents, the agents were generally concerned about the applicability of programs of the System to the field problems, more training in using the System, having easy access to the computers, and promoting the System among the Extension staff as well as their clientele.

Considering the comments as written by the respondents on one hand, and the attitude clusters derived from the cluster analysis of the attitude scale on the other hand, the representation of the agents' concerns could be found in those clusters.

Summary

Seven null hypotheses were tested to find the relationship between the Extension agents' attitude and a number of demographic variables with respect to computers and the Telplan System.

The hypotheses were stated in the following general form:

There were no relationships between the attitude clusters and the independent variables age, level of formal education, length of employment, past experiences with computers and the Telplan System, frequency of usage, number of programs used, and employment position.

All of the hypotheses were tested at the .001 level of significance. The findings showed that:

Age, level of formal education, length of employment, position, and past experiences with computers and the Telplan System did not seem to be predictors of the agents' attitudes toward computers and the Telplan System.

As far as clusters, Problem-Solving and Fear/Threat were concerned, frequency of usage of the Telplan System showed a significant relationship with the attitudes.

The number of programs used tended to have a significant relationship with the two attitude clusters, Limitations and Fear/Threat.

It was found further that only a limited number of the programs of the System were used by the responding agents. It was revealed that the important factors for using or not using the System were generally: usefulness of the programs in the field, additional information about the programs and training with the System.

CHAPTER V

SUMMARY AND CONCLUSIONS

The purpose of this study was to investigate the attitudes of Extension agents toward computers and computerized planning and consulting programs (specifically the Telplan System). More specifically, the study aimed to examine, with respect to computers and the Telplan System, the relationship between the dependent variable, attitude, and the independent variables: age, level of formal education, length of employment, previous experiences with computers and the Telplan, frequency of usage, number of programs used, and position held in the Extension Service.

To accomplish the above objective two instruments were developed. These were an attitude scale and a background questionnaire.

The face validity of the Likert-type attitude scale of 60 items was first established and then along with the background questionnaire it was pretested among 10% of the population of the study. The necessary revisions were made and as the result a 58 item attitude scale and the background questionnaire were then distributed to all field Extension agents in the state of Michigan. A total of 224, (81%), of the returned instruments were considered for the analysis of the data.

The attitude scale was then subjected to a priori and a posteriori cluster analysis to determine and cluster those items that measured the same underlying variable or trait and subsequently establish reliability, (coefficient α), for each cluster. The process aimed to construct unidimensional clusters satisfying three tests or criteria: (1) homogeneity of content for items; (2) internal consistency; and (3) parallelism, or external consistency for the items.

The cluster analysis of the attitude scale resulted in the formation of nine clusters. Eighteen items from the original scale did not satisfy the unidimensionality criterion and therefore were included in the residual clusters. The nine clusters of forty items formed the attitude clusters, three of which consisted of the items as related to attitudes toward computers, and the remaining six clusters were related to the Telplan items. The clusters were then logically named and included in the analysis of the data for hypothesis testing.

Seven null hypotheses were tested in an attempt to answer questions relative to the purpose of the study. The hypotheses, in a general null form, stated that there were no relationships between the attitude clusters and the selected personal characteristics of the agents. All of the hypotheses were tested at the .001 level of significance utilizing zero-order correlation analysis, multiple regression analysis and a number of other statistical procedures. The findings were also reported at the significance levels greater than the

.001 level. The a priori and a posteriori contrasts tests, and Scheffe's post hoc test were used to determine the relationships between the levels of each independent variable and the related attitude cluster in the analysis.

Summary of Findings

The second order cluster analysis revealed that high positive correlation existed between the Telplan attitude cluster Problem-Solving and four other clusters: Quality, Feelings, Fear/Threat, and Information and Training. The Two Telplan attitude clusters Problem-Solving and Fear/Threat accounted for well over half of the amount of variance which was contributed by all of the nine clusters.

The following are hypotheses and related findings:

1. Hypothesis one stated that there was no relationship between age and the attitude clusters. This hypothesis was not rejected at the .001 level of significance! Thus, age did not become a predictor of the agent's attitudes toward computers and the Telplan System. The findings indicated that there was a tendency for the younger agents to have more favorable attitudes toward computers and the Telplan.

2. Hypothesis two stated that there was no relationship between the attitude clusters and the level of formal education. The hypothesis was not rejected at the .001 level of significance. There was a tendency for the agents with higher level of formal education to feel less favorably toward computers and the Telplan. Contrasts tests confirmed

this finding (at the .04 level) for agents having Bachelor's degrees as compared to those having Master's degrees.

3. It was hypothesized that there was no relationship between the length of employment and the attitude clusters. This hypothesis was not rejected at the .001 level. Therefore, the years of employment with the Extension Service did not indicate it to be a predictor of attitudes toward computers and the Telplan System.

4. The multivariate hypothesis four included eight univariate sub-hypotheses for eight separate independent variables as related to the previous experiences with computers and the Telplan. The multivariate form stated that there were no relationships between the attitude clusters and the past experiences with computers and the Telplan System. The sub-hypotheses were not rejected at the .001 level.

5. Hypothesis five stated that there was no relationship between frequency of usage of the Telplan System and the attitude clusters. This hypothesis was rejected for the Telplan clusters Problem-Solving and Fear/Threat. It was not rejected for the other attitude clusters at the .001 level.

The contrasts tests indicated that the less frequent usage of the Telplan, the less the agents perceived the System to be successful for problem solving. Also the less frequent usage of the Telplan the more fear and/or threat the users felt created by the System to their Extension work and job.

The relationship of computer attitude cluster to the frequency of use indicated that the frequency of usage was related to whether communication with and access to the computers were easily provided for the agents.

6. It was stated that there were no relationships between the attitude clusters and the independent variable number of programs used. This hypothesis was not rejected at the .001 level of significance. However, the hypothesis was rejected for the two Telplan attitude clusters, Limitations and Fear/Threat, at the .009 level. Findings further indicated that for these two clusters, Problem-Solving and Feelings, the relationship was significant and in favor of those agents that used none or fewer number of programs.

7. Hypothesis seven stated that there was no relationship between employment position and the attitude clusters. The hypothesis was not rejected at the .001 level. Thus, position did not indicate it to be a predictor of attitudes toward computers and the Telplan System. The relationship for Fear/Threat was significant at the .009 level.

Findings as related to different employment positions (at the greater levels of significance than the .001 level) indicated that: (1) for the computer attitude cluster Answer, county extension directors, agricultural, dairy, district farm management, horticultural, and regional agents had more favorable attitudes, (2) for the Telplan clusters Problem-Solving, Feelings, and Limitations extension home economist and 4-H youth agents had more favorable attitudes,

and (3) for Fear/Threat, extension home economists and 4-H youth agents had more disfavorable attitudes.

The findings as related to specific programs of the Telplan and their frequency of usage indicated that only a limited number of programs (14%) were used by the agents. Those programs were found to be highly applicable to the field. The agents, also, indicated need for more training, easier access to the computer, and the promotion of the Telplan among the agents as well as the clientele.

Conclusions

Within the delimitations of the study, the following conclusions can be noted:

1. Of the nine clusters, one from the computer clusters, Access, and five from the Telplan clusters: Problem-Solving, Feelings, Limitations, Fear/Threat, and Information and Training accounted for nearly 90% of the variance contributed.

2. The independent variables, age, level of formal education, length of employment, position in the Extension Service, previous experiences with computers and the Telplan had no significant relationships to the attitudes of the agents toward computers and computerized forward planning and consulting programs (The Telplan System). However, at a lower level of significance ($.001 \leq \alpha \leq .05$) the following can be concluded:

a. Extension agents holding a higher level of academic

degree (master's as compared to bachelor's) tended to feel that the Telplan was not useful in the field.

b. Extension home economists and 4-H youth agents were in need of continuing training and showed a distrust for the Telplan and feared that the usage of the Telplan System might threaten their jobs. On the other hand, the agents involved primarily in farm services felt that most programs of the Telplan were not applicable to the agricultural problems with which the agents dealt.

c. The agents with longer length of employment tended to have more training with computers. However, they had a more disfavorable attitude toward the accessibility of the Telplan System.

3. Frequency of usage of the Telplan was a predictor of the agents' attitudes toward the Problem-Solving potentials of the Telplan and Fear/Threat attitude cluster. The agents who used the System more frequently had less favorable attitudes toward the Telplan as a result of a lack of successful usage in Extension work. Also, the less frequent usage of the Telplan the more distrust the agents felt toward the System. The result of this distrust manifested itself as a fear/threat factor to personalized Extension work and consequently the agents feared that they might be replaced by computers.

4. The number of programs used was not an indicator of either favorable or unfavorable attitudes toward computers and the Telplan. However, at the level of $.001 < \alpha \leq .05$ this independent variable became a predictor of the agents' attitudes toward three of the Telplan clusters-- Problem-Solving, Limitations, and Fear/Threat. In particular, complexity and lack of applicability of most of the programs were the cause for using none of the programs or fewer of the programs offered by the Telplan System.

5. The major factors for using a program were its usefulness in and its applicability to the real field problems. Program number 31, Least-Cost Dairy Ration was used more frequently than any other programs of the Telplan System. Extension home economist and 4-H youth agents found the Telplan to be greatly related to educational services in agriculture but less to 4-H and family-living Extension.

Discussion and Implications of the Study

The Telplan attitude clusters showing significant relationships with most of the independent variables were: Problem-Solving, Limitations, Fear/Threat and to a lesser extent Information and Training. These relationships were also confirmed by and concluded from the agents' stated concerns and comments. The only computer attitude clusters which indicated a near significant relationship with some of the independent variables and which were also drawn from the agents' comments, were Answer and Access.

Based on this study, the Extension agents can be divided into two major categories:

1. The agents whose primary Extension functions are related to agricultural education (marketing, farm management, dairy, livestock, etc.). This group consists mostly of agricultural Extension agents, district and regional agents and county extension directors.

2. The agents in family living areas and 4-H Programs, Home economic Extension and 4-H Youth agents comprise the second group.

The two groups share the following commonalities and differences (Figure 5.1):

a. Both groups (with group two more strongly than group one) feel that most programs of the Telplan System are not related to the needs of the Extension agents and their clientle; most programs are not useful in the field; and they are complex and difficult to use (Limitations).

b. While the agents in group one perceive that computers by providing quick answers aid the agents in their Extension work, feel that since there is a shortage of computer terminals (hard copy and/or touch tone) in the Extension offices the computer aids have not been of satisfactory help (Access). Group two, on the other hand, differs with group one in this respect.

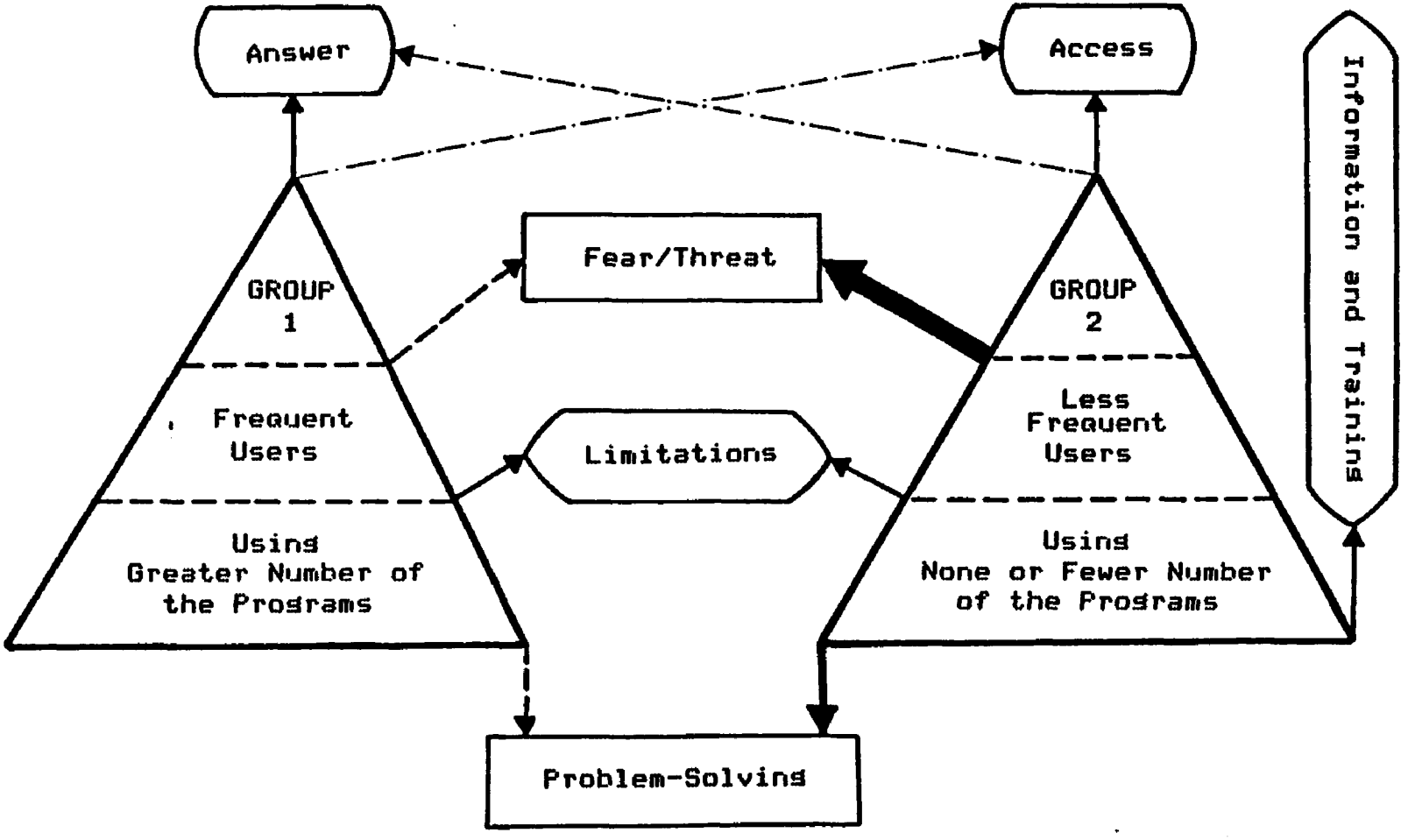


Figure 5.1. Extension Agents in Two Groups and Linkages to Six Attitude Clusters.

c. Although the agents in group two view the Telplan as a potent forward planning and consulting system in problem solving areas, they feel strongly threatened by the Telplan and fear the System might limit their personalized Extension work with their clients. However, group one, indicates opposite views and perceptions.

d. Group two indicates the need for receiving additional information and continuing training as related to the Telplan System.

The general consensus among most of the Extension agents, in terms of the limitations of the Telplan, implies that:

-Most programs of the Telplan System need to be revised to become less complex and more useful in the field.

-The development of new programs needs to be based on their applicability to the needs of the Extension agents and their clientele.

-Greater interaction is needed between the field agents and the Extension staff in developing and operating the Telplan System.

The latter point is drawn from a general view among many of the agents who feel they are "left out" of the development of the Telplan, although in fact they believe they are the primary users of the System. The following is a typical comment by a county extension director:

> "There apparently is far greater value placed on the use of computers and specific Telplans (programs) by MSU based staff than is really practical in the day

> to day Extension operations of an Extension office in the County! Some Telplans (programs) are very interesting and practical for occasional use. Clientele don't call up requesting for Telplans (programs)."

Or a district farm management agent, a frequent user of the Telplan wrote:

> "I am concerned about your survey... . People solve problems--the computer is a tool--Telplan has weaknesses. We need programs that you did not expose them--easy to use in the field and with depth--good programs in the Telplan are: 36, 52, 65, 70, 55, program 3 could be."

The feeling of being "left out" is viewed differently by the two previously established groups. For group one it meant not being included in the process of developing the programs of the Telplan and as a result they feel there are less useful programs for their needs. One district agent wrote:

> "Most of the programs currently available to all Extension agents are not that applicable to the clientele I deal most directly with so use only two or three that are especially designed for Food Marketing. Those, however, are frequently used for special programs and events. We need more programs in the CMI (Consumer Marketing Information) and are working on some."

Group two feels they are "left out" because there are no or very few programs in the Telplan related to their area of Extension work. The following is a typical comment by a 4-H Youth Agent:

> "I have never used the Telplan programs with 4-H clientele. There are no programs written for my area of work, we deal more with human relations, management, supervision and organization of adults..."

The lack of interaction between the agents and the specialists developing the Telplan System indicates urgent need for communication among the field agents and the MSU based staff,

and in particular, the development of more programs as related to 4-H and family-living Extension areas.

This study has indicated the need for additional information and training for the agents especially for those in group two. A comment by one county Extension director explains some of the training areas:

> "I feel very positive about the use of Telplan and like programs. The field staff, however, must fully understand the input forms and the computer output. Computer data must be evaluated with a personal touch with the farm and/or family situation in mind. Wrong information can be interpreted from the computer output if field staff and specialists don't fully understand the program. There are still hardware problems. We should computerize some of the day to day questions which effects agents schedules, i.e. herbicide residues, metric equivalent, area measurements, weights measures, moisture discounts (wt.), etc..."

The study has shown also that the lack of information about the Telplan extends to the Extension clientele. This suggests a need for promotion of the programs among the agents as well as their clients.

This study did not demonstrate the relationships (if any) between the clusters Information/Training and Fear/Threat or other attitude clusters.

The lack of easy access to the computer and the Telplan System implies the need for equipping the Extension offices with more computer terminals.

Recommendations

Finally, on the basis of the results, the following recommendations are made:

1. It is strongly recommended that path models for the attitude clusters and the independent variables be constructed to study the causal relationships among the variables. The path models should be based on the technique and the theory of path analysis. Excellent discussion of path analysis can be found in Wright (1921,1934,1954), Alvin and Hauser (1975), and Duncan (1975).

2. In revising the programs and/or developing new programs for the Telplan System, usefulness and applicability of the programs to the real field problems should be taken into consideration by the administrators and specialists of the Cooperative Extension Service.

3. Continuing training programs as related to computers and the Telplan System should be developed for the agents, particularly for the Extension home economists and the 4-H youth agents. A path analysis may reveal the linkage (if any) between the clusters Fear/Threat and Information and Training. This linkage (if any), especially for the aforementioned agents, demands further study.

4. Costs and benefits of using computers and the computerized forward planning and consulting programs (specifically the Telplan System) versus the traditional method of problem solving should be investigated.

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APPENDICES

APPENDIX A

ATTITUDE SCALE AND BACKGROUND QUESTIONNAIRE

ATTITUDE SCALE

The statements of the attitude scale have been prepared so that you can indicate your feelings about computers and the Telplan System.

There are 58 items about computers and the Telplan System. Please indicate the extent to which you agree or disagree with the statements, by making a check mark on the dots under the symbols to the right of each item.

The symbols used are:

SA - if you Strongly Agree with the statement.

A - if you Agree with the statement but not strongly so.

N - if you are undecided or Neutral about the statement.

D - if you Disagree with the statement but not strongly so.

SD - if you Strongly Disagree with the statement.

Sample	SA	A	N	D	SD
1. Most grapes are sweet.	✓	.	.	.	.
2. Most grapes do not have seeds.	.	.	.	✓	.

If you have any questions please contact me either by mail or call me collect at (517) 332-4148.

Sincerely Yours,

Mehdi Ghods
P.O. Box 428
E. Lansing, MI 48823
OR
Physics Department
Michigan State University
East Lansing, MI 48824

A. Attitudes Toward Computers:

	SA	A	N	D	SD
1. Computers do not generate much useful information.	.	.	.	.	.
2. Computers almost always give correct answers.	.	.	.	.	.
3. Computers have the potential to answer most of your questions.	.	.	.	.	.
4. Computers often make mistakes.	.	.	.	.	.
5. It is difficult to disagree with solutions generated by computers.	.	.	.	.	.
6. Computers usually answer questions quickly.	.	.	.	.	.
7. Computers often give confusing answers.	.	.	.	.	.
8. It is difficult to obtain answers from computers.	.	.	.	.	.
9. Computers have improved the lives of people.	.	.	.	.	.
10. Computers should not be used in solving agricultural problems.	.	.	.	.	.
11. Extension agents should discourage the use of computers within their extension offices.	.	.	.	.	.
12. I prefer to solve my clients' problems by computers rather than by conventional methods.	.	.	.	.	.
13. My job performance would improve if I had easier access to the computers at the University of Michigan.	.	.	.	.	.
14. Computers are fascinating.	.	.	.	.	.
15. In the interest of better communication with computers, all County Extension Offices should be equipped with printing terminals.	.	.	.	.	.
16. The active role of agents in problem solving for their clientele will diminish as the computer gradually takes over their duties.	.	.	.	.	.
17. A basic understanding of computer hardware often helps a person to become a skilled computer programmer. (computer hardware refers to the physical units making up a computer system)	.	.	.	.	.
18. Computer software developments as related to extension work have not been as advanced and sophisticated as the development of computer hardware. (computer software refers to all "programs" which can be used on a particular computer system)	.	.	.	.	.

B. Attitudes Toward the Telplan System:

	SA	A	N	D	SD
19. Extension agents should use the Telplan System for problem solving.	.	.	.	.	.
20. The Telplan System only makes mistakes when the wrong information is fed into it.	.	.	.	.	.
21. Problem solving with the Telplan System has been successful.	.	.	.	.	.
22. Agents should take the opportunity to use as many of the programs of the Telplan System as they can.	.	.	.	.	.
23. The Telplan System does not give appropriate answers in all cases.	.	.	.	.	.
24. The Telplan System does not offer suitable programs for all of my clients' problems.	.	.	.	.	.
25. Agents'roles are threatened by the usage of the Telplan System.	.	.	.	.	.
26. The introduction of more programs in the Telplan System would require higher skill levels in many extension jobs.	.	.	.	.	.
27. Some of the programs that are within the Telplan System are too complex and too time consuming to use in extension work.	.	.	.	.	.
28. Some of the programs in the Telplan System deal with unimportant matters.	.	.	.	.	.
29. The Telplan System lacks the capability of assisting the agents with many of their client's needs.	.	.	.	.	.
30. Increased usage of the Telplan System has meant the agents and farmers keep more accurate records.	.	.	.	.	.
31. Researchers and extension specialists should press harder to increase the adoption of the Telplan System among the agents.	.	.	.	.	.
32. The Telplan System as it exists now is of little help to small farmers.	.	.	.	.	.
33. Using the Telplan System in classrooms or extension training will raise the quality of agricutural education.	.	.	.	.	.
34. Some of the agents and their clients do not appreciate the potentials of the Telplan System.	.	.	.	.	.
35. The programs in the Telplan System require more information about people's private lives than is necessary.	.	.	.	.	.

	SA	A	N	D	SD
36. Because of the Telplan System I rarely have trouble in helping my clients solve their problems.	.	.	.	.	.
37. The increased usage of the Telplan System has helped to raise the farmers' standard of living.	.	.	.	.	.
38. The Telplan System will help improve the services available to the community.	.	.	.	.	.
39. The increased use of the Telplan System has provided for more leisure time for my clientele.	.	.	.	.	.
40. The expanded usage of the Telplan System increases the quality of education for extension clientele in Michigan.	.	.	.	.	.
41. Using the Telplan System detracts from an agent's ability to establish a personalized relationship with clients.	.	.	.	.	.
42. I am very enthusiastic about the Telplan System because I find it very useful in solving my clients' problems.	.	.	.	.	.
43. Because of the Telplan System, too much information about agents and their clientele is available to outsiders.	.	.	.	.	.
44. The Telplan System has improved my attitudes toward computers.	.	.	.	.	.
45. The Telplan System does more reliable problem solving than agents.	.	.	.	.	.
46. The Telplan System will eventually put most of the agents out of work.	.	.	.	.	.
47. The Telplan System has become an everyday necessity for extension work.	.	.	.	.	.
48. The Telplan System is appropriate only for crucial decision making in problem solving.	.	.	.	.	.
49. The Telplan System assists the agents to become more competent in their extension work.	.	.	.	.	.
50. All agents should know something about the Telplan System whether or not they use it.	.	.	.	.	.
51. There should be more training provided to agents on the use of the computer and the Telplan System.	.	.	.	.	.

	SA	A	N	D	SD
52. Agents should constantly learn more about the Telplan System in order to be able to work with it.	.	.	.	.	.
53. The increased usage of the Telplan System would actually increase employment in the field of extension.	.	.	.	.	.
54. Agents must have a great deal of training with computers in order to be able to work with the Telplan System.	.	.	.	.	.
55. Since the County Extension Office began using the Telplan System, I work more efficiently.	.	.	.	.	.
56. Some of the programs of the Telplan System are not applicable to real world problems.	.	.	.	.	.
57. My attitude toward the Telplan System is more favorable than it was before I began working with it.	.	.	.	.	.
58. In order to understand more about the Telplan System, agents should pursue additional college course work.	.	.	.	.	.

PLEASE COMPLETE THE NEXT QUESTIONNAIRE ALSO

BACKGROUND QUESTIONNAIRE

In order to interpret the data as related to the attitude survey, the following information would be of direct value. Please respond to all of the questions by either filling in the blank, or by a check mark in the appropriate box. All responses will be treated confidentially.

1. What is your age group?

a. ( ) under 25
b. ( ) 26-29
c. ( ) 30-34
d. ( ) 35-39
e. ( ) 40-44
f. ( ) 45-49
g. ( ) 50-54
h. ( ) 55 or over

2. What is the highest level of formal education you have attained?

a. ( ) High School
b. ( ) 1-2 years of college
c. ( ) Bachelor's degree
d. ( ) Master's degree
e. ( ) Doctoral degree
f. ( ) other (please specify) _____

3. How long have you been employed by the Michigan Extension Service?

_____

4. What is your position with the County Extension Office?

_____

5. Experience with computers and the Telplan System: (please check all applicable statement)

a. ( ) I have never written a computer program.
b. ( ) I have had computer programming courses.
c. ( ) I have extensive training with computers and computer programming.
d. ( ) I have had access to a computer before I began using the Telplan System.
e. ( ) My only training with computers has been on how to use the Telplan System.
f. ( ) I have read articles and books on computers.
g. ( ) I have worked with computers only through terminals, but I have never seen a computer.
h. ( ) I have my own personal micro-computer.

i. I have used the Telplan System:

1. ( ) almost daily
2. ( ) one to three times weekly
3. ( ) one to three times monthly
4. ( ) less than ten times a year

j. I have used the programs of the Telplan System at the rate of:

1. ( ) one program only
2. ( ) one to five programs
3. ( ) more than five programs

OPTIONAL:

Please specify the program numbers of the Telplan System that you

1. frequently use:

_____

2. have used (at least once):

_____

_____

THANK YOU

Your Coments and/or suggestions would be greatly appreciated.

APPENDIX B

TABLES OF CLUSTER ANALYSIS FROM PACKAGE

Table B.1. Factor Inter-Correlations and Loading Matrix (Internal Consistency) for the A Posteriori Cluster Analysis (2 Residual Clusters Included).

COMMUNALITY IN THE DIAGONAL

	9	11	10	6	8	2	5	3	13	18	22	42	19	21	31	55	34	40	37	33	38	44	57	24	56	28	29	36	39	23
9	31	24	21	33	30	-6	-1	-3	1	-11	-5	-18	-13	-13	-15	-19	-15	-21	-25	-16	-9	-20	-8	-2	-1	5	12	1	4	-2
11	24	28	41	21	19	-2	14	-5	-1	-11	-8	-13	-15	-10	-12	-6	-15	-15	-5	-11	-5	-13	-9	9	7	8	11	4	-4	4
10	21	41	22	15	18	-9	-2	-5	-4	-16	-7	-8	-19	-13	-9	-12	-4	-4	-11	-8	-7	-13	-13	2	3	1	9	-6	-14	9
6	33	21	15	22	26	-14	5	-1	-9	-6	-13	-14	-13	-14	-6	-9	-7	-7	-15	-1	-6	-20	-14	-12	3	4	-1	-3	-9	-5
8	30	19	18	26	21	7	-3	-4	-2	-11	-9	-22	-7	-8	-7	-18	-10	-9	-11	-12	-18	-20	-13	-4	-3	4	1	4	0	8
2	-4	-2	-9	-14	7	28	27	19	-3	17	7	1	11	3	10	-15	-8	6	10	8	13	14	-1	0	-16	0	-7	-1	-7	-8
5	-1	14	-2	5	-3	27	25	18	2	3	10	0	8	8	15	1	2	-1	13	16	13	8	4	-1	-17	-8	2	-19	-15	-8
3	-3	-5	-5	-1	-4	19	18	15	17	14	14	9	4	-5	14	10	2	7	8	3	7	9	-6	-23	-19	-15	-23	-16	-7	-7
13	1	-1	-6	-9	-2	-3	2	17	39	35	9	13	16	10	17	22	2	-1	13	7	11	-3	-2	-13	-11	-12	-21	-4	-4	-4
15	-11	-11	-14	-6	-11	17	3	14	35	39	15	22	21	2	25	14	6	12	-1	13	12	11	-3	-10	-6	-6	-20	-7	4	-10
22	-5	-8	-7	-13	-9	7	10	14	9	15	46	41	47	28	47	29	29	25	17	17	21	28	18	7	-7	-1	-7	-3	7	6
42	-18	-13	-8	-16	-22	1	0	9	13	22	41	45	36	37	32	44	24	37	19	14	21	38	30	-4	-6	-6	-23	-5	-2	-5
19	-13	-15	-19	-13	-7	11	8	4	16	21	47	36	44	40	34	25	34	31	24	33	19	22	20	12	-8	-3	-4	6	18	5
21	-13	-10	-13	-16	-8	3	6	-5	10	2	28	37	40	26	16	19	33	30	24	17	16	30	24	14	-6	4	-9	8	7	15
31	-15	-12	-9	-6	-7	10	15	14	17	25	47	32	34	16	26	26	20	26	27	25	15	29	10	2	-6	-2	-15	-14	-23	1
55	-19	-6	-12	-9	-18	-15	1	10	22	14	29	46	25	19	26	21	13	24	30	23	19	25	27	-7	3	-5	-27	-22	-20	-3
34	-15	-15	-4	-7	-10	-8	2	2	2	6	29	26	34	33	20	13	20	29	14	28	6	32	28	18	7	6	15	12	8	20
40	-21	-15	-6	-7	-9	6	-1	7	-1	12	25	37	31	30	26	24	29	39	34	37	34	32	24	3	-4	-3	-19	3	3	0
37	-25	-5	-11	-15	-11	10	13	8	13	-1	17	19	24	24	27	30	14	34	34	35	30	30	18	-4	-20	-19	-17	-23	-25	-5
33	-14	-11	-8	-1	-12	8	14	3	7	13	17	14	33	17	25	23	28	37	35	33	27	19	8	5	-7	-3	-6	-11	-11	-1
38	-9	-5	-7	-6	-18	13	13	7	11	12	21	21	19	16	15	19	6	34	30	27	27	23	17	10	-3	-1	-15	6	3	1
44	-20	-13	-13	-20	-20	14	8	9	-3	11	28	38	22	30	29	25	32	32	30	19	23	47	44	1	-13	-2	-6	-2	0	5
57	-8	-9	-13	-14	-13	-1	6	-6	-2	-3	18	30	20	24	10	27	28	24	18	8	17	44	47	11	-4	-11	-1	0	0	-6
24	-2	9	2	-12	-4	0	-1	-23	-13	-10	7	-4	12	14	2	-7	18	3	-4	5	10	1	11	34	26	23	32	28	23	37
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Continued on next page

Table B.1. Continued.

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7	20	-5	-2	-7	-17	-5	-4	4	-1	-8	-1	13	2	-2	-12	0	9	-7	-14	-5	-6	-8	0	3	-12	-3	-9	7	11	-16	-7	-20	-18	-15	14	-12	-2	3	-21
1	8	-2	-4	-11	-6	-5	-14	-18	-20	-20	1	15	8	-7	-9	9	0	-16	-3	-7	-12	-5	-18	-9	-5	-6	-16	-1	29	-14	-23	-28	-31	-10	13	-13	-28	2	-36
12	-15	0	-9	11	-4	10	0	15	-6	6	8	2	5	-1	8	-7	-16	0	6	10	22	30	22	-2	3	14	5	-1	-16	25	26	39	26	25	-29	3	7	-1	47
30	-10	14	6	1	18	7	10	15	13	20	9	2	0	11	15	-16	-3	6	18	22	2	13	1	10	9	16	-10	18	-17	25	10	31	42	27	-8	17	23	18	42
20	1	8	3	16	11	4	8	2	13	19	-4	-13	-3	15	20	-5	-7	10	22	13	0	11	13	7	-7	9	11	5	-21	24	14	23	18	18	-5	15	17	10	34
35	3	27	16	44	20	14	18	7	7	13	-4	-13	-14	-10	-4	-6	-12	22	2	0	11	9	24	4	7	-1	22	-1	-26	-14	-13	40	7	33	21	42	13	-32	34
47	-16	5	1	-2	-1	-4	16	12	15	14	6	-9	6	12	13	-8	-5	30	13	11	9	11	7	11	15	14	-13	-1	-16	29	26	33	25	25	-34	5	20	34	33
32	-22	6	2	10	11	10	0	-1	-5	6	-15	-15	-11	10	8	0	-18	22	1	13	24	7	7	5	4	8	6	-15	-23	3	12	24	24	26	-21	12	0	-14	26
53	-1	0	3	-5	-8	-19	13	12	10	13	4	2	2	4	5	3	-9	-2	10	7	4	11	5	6	9	0	-11	17	-3	23	20	9	19	12	-9	-4	17	8	25
48	-21	20	24	12	8	11	11	6	9	10	2	5	-10	12	8	-12	-5	3	9	-7	7	15	4	9	4	3	4	8	-2	-5	12	10	25	2	-13	26	12	2	24
45	-2	8	7	12	3	3	-5	0	-9	0	7	-18	0	4	1	-3	-6	16	16	9	-1	14	8	0	3	2	-9	-5	-10	14	10	23	21	16	-17	8	-4	0	15
58	-5	11	6	20	7	24	1	-4	0	-1	-5	-8	-14	-12	-1	-9	-16	5	-10	11	22	-13	6	-11	4	-9	0	-14	-4	-5	6	2	-7	-8	22	21	-3	-46	-7
24	13	-7	-16	-5	0	-26	12	13	9	18	13	19	18	11	4	7	-1	-1	18	5	-1	-1	-15	17	8	-5	-14	0	9	16	-3	11	7	6	10	-13	20	54	6
501	9	-29	-9	-25	-23	-11	-17	-14	-26	-24	9	26	29	-9	-37	11	29	-16	-17	-21	-26	-16	-23	-3	-2	-10	-4	9	100	-8	-24	-42	-38	-43	7	-35	-32	33	-49
502	-4	-3	-4	-2	-8	-14	6	10	0	5	2	-18	4	4	39	-16	-16	25	25	24	-14	29	3	23	-5	14	-5	16	-8	100	30	19	32	16	-43	-8	7	18	48
503	-14	9	6	-8	9	2	11	32	21	27	-1	-10	-15	22	44	-7	-23	24	10	16	-13	26	12	20	12	10	6	-3	-24	30	100	41	23	2	-31	9	40	29	41
504	-13	33	27	35	21	19	43	36	32	51	2	-5	-14	3	27	-20	-28	39	31	23	40	33	24	9	10	23	2	11	-42	19	41	100	70	68	-6	54	58	3	87
505	-15	31	28	12	23	18	37	15	8	29	-10	-8	-14	8	18	-18	-31	26	42	18	7	25	24	19	25	21	-7	7	-38	32	23	70	100	55	-23	45	26	-23	77
506	4	29	22	26	12	20	32	22	21	35	-11	-7	-8	2	25	-15	-10	25	27	18	33	25	26	12	2	16	-8	6	-43	16	2	68	55	100	-4	43	38	0	67
507	38	22	19	27	16	1	2	8	5	1	20	-3	2	-5	-11	14	13	-29	-8	-5	21	-34	-21	-9	-13	-17	22	10	7	-43	-31	-6	-23	-4	100	27	7	1	-23
508	-6	69	48	40	59	41	32	13	14	34	1	-29	-50	-8	15	-12	-13	3	17	15	42	5	12	-4	24	8	21	-13	-35	-8	9	54	45	43	27	100	31	-73	55
509	3	20	15	17	16	6	27	75	45	45	2	6	-10	5	14	-2	-28	7	23	17	13	20	0	17	12	-4	-3	20	-32	7	40	58	24	38	7	31	100	-4	49
510	14	-39	-49	-42	-50	-30	-10	22	-14	-17	42	39	28	14	3	3	2	-1	18	10	-32	34	-14	8	2	0	-46	54	33	18	29	3	-23	8	1	-73	-4	100	15
511	-26	39	22	44	30	11	36	27	24	48	4	-21	-11	25	30	-21	-36	47	42	36	34	33	24	25	24	15	-7	6	-49	48	41	87	77	67	-23	55	49	15	100

Table B.2. Similarity Coefficients Matrix (External Consistency) for the A Posteriori Cluster Analysis (2 Residual Clusters Included).

THE DIAGONAL VALUE USED IN THIS ANALYSIS WAS .40

SQUARED R--MATRIX

	9	11	10	4	8	2	5	3	13	15	22	42	19	21	31	35	34	40	37	33	38	44	37	24	56	28	29	36	39	23
9	100	80	71	88	82	-43	-22	-41	-42	-59	-48	-74	-72	-71	-68	-73	-67	-75	-74	-69	-69	-81	-71	-3	24	24	47	15	2	4
11	80	100	90	74	78	-39	1	-27	-41	-59	-44	-71	-67	-67	-55	-66	-58	-68	-55	-62	-63	-67	-64	-2	23	28	52	-4	-21	19
10	71	90	100	75	79	-51	-5	-24	-43	-41	-47	-72	-71	-72	-54	-63	-60	-69	-51	-63	-71	-68	-65	-13	19	21	50	-14	-31	21
4	88	74	75	100	76	-45	-12	-30	-40	-59	-68	-70	-71	-71	-61	-63	-68	-68	-60	-58	-62	-78	-70	-20	16	16	33	-4	-19	-6
8	82	78	79	76	100	-41	-20	-29	-37	-57	-66	-78	-69	-75	-60	-78	-61	-72	-70	-70	-76	-78	-72	-5	21	29	52	5	-8	21
2	-43	-39	-51	-45	-41	100	69	55	38	60	48	46	48	44	53	35	27	48	53	53	60	52	34	-15	-52	-36	-48	-27	-13	-34
5	-22	1	-5	-12	-20	69	100	63	32	40	29	25	27	19	50	28	10	23	37	41	34	35	18	-36	-64	-45	-41	-44	-40	-36
3	-41	-27	-24	-30	-29	55	63	100	73	72	47	49	41	20	70	52	20	38	43	51	39	44	28	-43	-79	-63	-70	-66	-57	-38
13	-42	-41	-43	-40	-37	38	32	73	100	85	58	59	58	41	72	62	36	45	56	55	46	46	33	-39	-55	-48	-68	-38	-27	-21
15	-59	-59	-61	-59	-57	60	40	72	85	100	69	71	68	55	79	67	48	59	62	67	61	63	43	-27	-49	-41	-68	-32	-14	-28
22	-48	-64	-67	-68	-66	48	29	47	58	69	100	93	95	90	88	82	85	90	74	85	81	90	83	16	-31	-20	-49	-2	9	6
42	-74	-71	-72	-70	-70	46	25	49	59	71	93	100	91	91	85	92	81	90	79	84	83	92	88	2	-35	-29	-60	-10	3	-11
19	-72	-67	-71	-71	-69	48	27	41	58	68	95	91	100	92	85	81	88	92	75	87	84	90	83	22	-24	-15	-44	5	15	11
21	-71	-67	-72	-71	-75	44	19	28	41	55	90	91	92	100	74	82	89	92	72	82	84	90	89	29	-16	-8	-38	15	24	11
31	-68	-53	-54	-61	-60	53	50	70	72	79	88	85	85	74	100	81	71	79	84	84	71	81	70	-13	-51	-30	-50	-36	-27	-9
35	-73	-64	-63	-63	-78	35	28	52	62	67	82	92	81	82	81	100	69	84	85	82	81	85	81	-14	-41	-41	-70	-28	-16	-23
34	-67	-58	-60	-68	-61	27	10	20	34	48	85	81	88	89	73	69	100	84	58	74	67	84	84	43	1	12	-15	24	30	37
40	-75	-68	-69	-68	-72	48	23	38	45	59	90	90	92	92	79	84	84	100	81	91	91	92	87	17	-26	-23	-50	0	9	1
37	-74	-55	-51	-60	-70	53	57	43	54	62	74	79	75	72	84	85	58	81	100	86	80	83	74	-23	-60	-57	-68	-47	-40	-28
33	-69	-62	-63	-58	-70	53	41	51	55	67	85	84	87	82	86	82	74	91	86	100	88	84	74	4	-42	-32	-56	-19	-12	-11
38	-69	-63	-71	-63	-76	60	34	39	46	61	81	83	84	84	71	81	67	91	80	88	100	84	76	40	-33	-30	-60	-5	6	-15
44	-81	-67	-68	-78	-78	52	35	46	46	63	90	92	90	90	83	85	86	92	83	84	84	100	92	11	-34	-26	-48	-10	9	-2
57	-71	-64	-65	-70	-72	34	18	28	33	43	83	88	83	89	70	81	84	87	74	74	76	92	100	20	-22	-18	-37	4	12	4
24	-3	-2	-13	-20	-5	-15	-36	-43	-39	-27	16	2	22	29	-13	-14	43	17	-23	4	10	11	20	100	71	73	62	79	75	71
56	24	23	19	14	21	-52	-64	-79	-55	-69	-31	-35	-24	-16	-51	-41	1	-26	-60	-42	-33	-34	-22	71	100	88	75	75	66	63
28	24	28	21	16	29	-36	-45	-43	-48	-41	-20	-29	-15	-8	-38	-41	12	-23	-57	-35	-30	-26	-18	73	88	100	77	72	64	72
29	47	52	50	33	52	-48	-41	-70	-48	-48	-69	-60	-64	-38	-58	-70	-15	-50	-68	-56	-60	-68	-37	62	75	77	100	56	62	65
36	15	-4	-14	-4	5	-27	-64	-66	-38	-32	-2	-10	5	15	-34	-28	24	0	-47	-19	-5	-10	4	79	75	72	56	100	92	62
39	2	-21	-31	-19	-8	-13	-60	-57	-27	-14	9	3	15	24	-27	-14	30	9	-40	-12	6	0	12	75	66	64	62	92	100	53
23	4	19	21	-6	21	-34	-34	-38	-21	-28	6	-11	11	11	-9	-23	37	1	-28	-11	-15	-2	4	71	63	72	65	62	53	100
27	29	44	41	19	32	-36	-34	-52	-50	-54	-40	-51	-36	-32	-47	-60	-6	-39	-60	-53	-58	-37	-28	51	68	74	75	54	43	69
46	-59	-69	-76	-67	-64	36	-16	4	24	42	74	73	80	86	47	60	76	82	65	66	77	72	74	49	7	7	-22	45	54	18
41	-39	-59	-68	-51	-68	32	-20	-10	15	30	66	61	70	75	33	46	64	73	31	56	69	50	62	52	11	8	-15	51	60	16
43	-46	-63	-75	-57	-61	31	-18	-13	7	27	65	64	69	80	31	50	66	70	30	51	68	62	68	52	18	18	-15	54	64	13
25	-47	-65	-70	-58	-61	36	-16	-9	18	36	64	62	70	75	36	49	62	70	35	58	70	58	61	58	12	8	-17	47	57	8
54	-40	-63	-66	-48	-56	17	-24	-6	13	33	61	63	60	67	29	56	54	67	32	52	64	56	62	35	5	-2	-27	36	48	-4
49	-71	-69	-70	-66	-68	40	15	36	50	59	90	88	91	91	78	81	87	94	72	85	84	88	83	22	-19	-14	-44	9	17	14
51	-52	-52	-57	-54	-45	30	14	47	67	66	78	72	76	68	79	60	78	84	49	65	51	68	64	9	-22	-6	-33	6	10	20
50	-61	-69	-71	-62	-58	31	2	36	58	62	77	74	74	72	71	62	76	68	66	64	66	69	68	15	-14	-5	-38	16	23	17
52	-65	-69	-74	-65	-66	42	14	41	60	67	90	87	89	87	81	76	85	85	64	80	75	83	80	16	-23	-14	-46	12	20	10
18	19	31	30	11	32	-2	7	-8	-4	-3	-5	-19	1	-10	6	-33	14	-17	-20	-7	-31	-12	-20	33	26	44	59	14	5	48
4	45	62	75	53	57	-59	-7	2	-9	-38	-41	-47	-48	-54	-21	-34	-32	-49	-29	-39	-41	-46	-41	-23	2	5	28	-25	-41	27
16	52	73	80	63	59	-32	21	-2	-29	-42	-57	-58	-61	-64	-31	-51	-49	-63	-36	-52	-65	-53	-54	-30	2	10	33	-33	-47	4
17	-42	-24	-22	-35	-35	41	39	49	56	64	30	32	34	21	56	33	24	27	47	42	28	36	14	-26	-31	-27	-29	-37	-35	-14
14	-74	-65	-67	-74	-70	68	48	66	69	87	74	74	75	66	81	71	60	69	72	74	69	78	60	-11	-48	-42	-60	-30	-13	-17
7	53	51	57	48	72	-54	-48	-38	-38	-60	-67	-70	-65	-64	-64	-66	-49	-66	-67	-74	-73	-69	-60	-2	39	38	50	21	13	31
1	73	74	78	64	74	-54	-34	-56	-68	-79	-81	-84	-82	-75	-81	-82	-67	-78	-76	-82	-79	-78	-67	12	40	34	68	17	4	23
12	-62	-53	-53	-52	-67	50	55	68	65	71	75	85	72	69	80	88	53	69	83	73	71	77	67	-32	-59	-51	-73	-47	-35	-39
30	-70	-52	-55	-63	-64	59	50	57	53	67	82	80	82	77	90	75	74	84	83	90	77	87	73	3	-41	-29	-46	-25	-20	-7
20	-73	-62	-66	-74	-69	71	45	54	52	78	78	79	78	75	77	68	66	75	69	74	72	83	67	-2	-36	-22	-50	-16	0	-13
35	-55	-63	-68	-59	-66	14	-18	-8	10	23	68	73	71	83	37	62	75	71	39	51	63	69	77	47	19	17	-14	44	52	20
47	-63	-51	-45	-52	-56	56	55	79	72	77	73	78	68	59	88	78	51	67	82	73	61	75	61	-40	-68	-55	-70	-57	-47	-33
32	-68	-66	-66	-64	-79	40	24	39	48	56	66	79	65	68	58	83	47	69	76	64	76	74	70	-19	-42	-48	-69	-25	-10	-39
53	-46	-29	-30	-35	-38	52	55	68	67	57	52	52	55	48	70	52	44	52	69	61	52	56	45	-30	-54	-43	-51	-38	-36	-8
48	-39	-46	-46	-34	-52	28	4	37	52	52	60	65	63	60	56	61	49	68	57	70	66	56	49	-2	-33	-34	-46	0	2	-9
43	-59	-50	-50	-53	-54	50	47	48	43	50	65	70	65	61	68	67	46	69	76	69	65	71	60	-19	-49	-44	-54	-37	-20	-43
28	5	-26	-38	-5	-21	-4	-39	-42	-18	-3	7	8	10	20	-27	-1	12	9	-31	-4	19	-2	4	45	47	39	9	65	73	13
26	-11	21	24	-5	11	6	38	34	24	11	22	8	22	13	41	4	34	11	22	22	-4	21	14	4	-12	11	17	-16	-29	45
501	88	89	90	87	89	-51	-16	-34	-48	-67	-78	-85	-81	-83	-69	-79	-73	-82	-71	-75	-79	-84	-29	-10	25	26	55	-1	-16	13
502	-46	-32	-33	-37	-41	81	85	83	61	71	51	53	49	41	72	53	27	48	73	61	54	56	37	-46	-75	-59	-64	-62	-52	-44
503	-57	-56	-54	-55	-53	54	41	76	91	94	70	71	68	54	82	70	47	59	66	68	59	62	43	-33	-56	-47	-71	-38	-23	-23
504	-75	-69	-71	-72	-75	68	28	48	59	70	94	95	94	93	88	89	88	92	80	88	85	93	87	11	-31	-23	-52	-5	6	0
505	-75	-67	-69	-68	-77	56	39	51	56	68	89	91	89	88	85	88	75	94	90	94	92	92	83	1	-42	-38	-61	-17	-8	-14
506	-79	-68	-69	-76	-77	66	27	41	66	58	90	92	90	92	80	85	86	92	81	83	82	96	94	15	-28	-22	-66	-4	6	1
507	24	18	14	8	25	-40	-29	-73	-52	-48	-17	-29	-12	-3	-43	-66	15	-17	-37	-34	-28	-23	-10	83	86	87	80	87	78	77
508	-57	-70	-78	-63	-66	35	-11	1	23	41	75	75	79	86	47	62	74	81	66	66	78	72	74	66	5	5	-26	43	53	12
509	-66	-67	-70	-65	-61	38	13	43	63	69	86	83	86	81	81	72	83	78	59	74	67	79	75	15	-21	-10	-42	10	17	14
510	20	47	52	28	32	-7	36	29	15	0	-31	-24	-24	-33	11	-16	-17	-32	-1	-16	-37	-19	-30	-33	-17	-8	10	-47	-36	6
511	-77	-69	-71	-73	-75	86	38	86	62	73	92	93	92	86	88	86	79	91	83	88	89	92	83	3	-62	-32	-59	-16	-4	-10

COLUMN SUMS OF SQUARES OF INPUT R-MATRIX

1.693	1.624	2.033	1.402
1.639	1.276	1.188	1.286
1.571	1.996	3.327	4.863
3.767	3.359	3.289	3.143
2.698	3.532	3.013	2.548
2.246	3.726	2.461	1.849
1.448	1.163	1.846	1.644
1.767	1.202	1.225	3.303
2.626	3.427	2.553	1.552
2.258	2.426	2.104	3.533
.845	1.360	1.591	.712
1.983	.977	1.661	2.116
1.971	1.341	2.453	2.160
1.482	.851	.963	.910
1.172	1.169	4.490	3.076
3.548	8.663	4.681	5.764
3.697	6.565	4.642	4.644
9.320			

Continued on next page

Table B.2. Continued.

	27	46	41	43	25	54	49	51	50	52	18	4	14	17	14	7	1	12	30	20	35	47	32	53	48	45	58	26	S01	S02	S03	S04	S05	S06	S07	S08	S09	S10	S11
9	29	-59	-39	-46	-47	-40	-71	-52	-61	-65	19	45	52	-42	-76	53	73	-62	-70	-73	-55	-63	-48	-46	-39	-59	5	-11	88	-46	-57	-75	-75	-79	24	-57	-64	20	-77
11	44	-69	-59	-63	-65	-63	-69	-52	-69	-69	31	62	73	-24	-65	51	76	-53	-52	-62	-63	-51	-66	-29	-46	-50	-26	21	89	-32	-56	-69	-67	-68	18	-70	-67	47	-69
10	41	-76	-68	-75	-78	-66	-70	-57	-71	-74	30	75	80	-22	-67	57	78	-53	-55	-66	-68	-45	-66	-30	-46	-50	-38	24	90	-33	-56	-71	-69	-69	14	-78	-70	52	-71
4	19	-67	-51	-57	-58	-48	-66	-54	-62	-65	11	53	63	-35	-76	48	64	-52	-62	-74	-59	-52	-64	-35	-34	-53	-5	-5	87	-37	-55	-72	-68	-74	8	-63	-65	28	-73
8	52	-64	-48	-61	-61	-56	-68	-45	-58	-66	32	57	59	-25	-70	72	76	-67	-66	-69	-66	-56	-79	-38	-52	-54	-21	11	89	-41	-53	-75	-77	-77	25	-66	-61	32	-75
2	-34	36	32	31	36	17	40	30	31	42	-2	-59	-32	41	68	-54	-54	50	59	71	14	56	40	52	28	58	-4	6	-51	81	54	48	56	44	-40	35	38	-7	56
5	-36	-14	-20	-18	-16	-24	15	14	2	14	7	-7	21	39	48	-48	-34	55	50	45	-18	55	26	55	4	47	-39	38	-16	85	41	28	39	27	-59	-11	13	36	38
3	-52	4	-10	-13	-9	-6	36	47	34	41	-8	2	-2	49	64	-38	-56	68	57	54	-8	79	39	68	37	48	-42	34	-34	83	74	48	51	41	-77	1	43	29	54
13	-50	24	15	7	18	13	50	47	58	40	-4	-9	-29	56	69	-38	-68	65	53	52	10	72	48	67	52	43	-18	24	-48	61	91	59	54	44	-52	23	63	15	62
15	-54	42	30	27	36	33	59	66	62	67	-3	-38	-42	64	87	-60	-79	71	67	78	23	77	56	57	52	58	-3	11	-67	71	94	70	68	58	-68	41	69	0	73
22	-40	74	66	65	64	61	90	78	77	90	-5	-61	-57	38	74	-67	-81	75	82	78	68	73	66	52	60	65	7	22	-78	51	70	94	89	90	-17	75	86	-21	92
42	-51	73	61	66	62	63	88	72	74	87	-19	-47	-58	32	74	-70	-84	85	80	79	73	78	79	52	65	70	8	8	-85	53	71	95	91	92	-29	75	83	-24	93
19	-34	80	70	69	70	60	91	76	74	89	1	-48	-61	34	75	-65	-82	72	82	78	71	68	65	55	63	65	10	22	-81	49	68	94	89	90	-12	79	86	-24	92
21	-32	86	75	80	75	67	91	68	72	87	-10	-54	-64	21	66	-64	-75	69	77	75	83	59	68	48	60	61	20	13	-83	41	54	93	88	92	-3	86	81	-33	86
31	-47	47	33	31	36	29	78	79	71	81	4	-21	-31	56	81	-64	-81	80	90	77	37	88	58	70	54	68	-27	41	-69	72	92	88	85	80	-43	47	81	11	88
55	-60	60	46	50	49	56	81	60	62	74	-33	-34	-51	33	71	-64	-82	88	75	68	62	78	83	52	61	67	-1	4	-79	53	70	89	88	85	-44	62	72	-16	84
34	-6	76	64	66	62	54	87	78	76	85	14	-32	-49	24	60	-49	-67	53	74	66	75	51	47	44	49	46	12	34	-73	27	47	88	75	86	15	74	83	-17	79
40	-39	82	73	70	70	67	94	84	88	85	-17	-49	-63	27	69	-66	-78	69	84	75	71	67	69	52	68	69	9	11	-82	48	59	92	94	92	-17	81	78	-32	91
37	-60	45	31	30	35	32	72	49	44	64	-20	-29	-36	47	72	-67	-76	83	83	69	39	82	76	69	57	76	-31	22	-71	73	66	80	90	81	-57	66	59	-1	83
33	-53	66	56	51	58	52	85	65	64	80	-7	-39	-52	42	74	-74	-82	73	90	74	51	73	64	61	70	69	-4	22	-75	61	68	88	94	83	-34	66	74	-16	88
38	-50	77	69	68	70	64	84	51	56	75	-31	-61	-65	28	69	-73	-79	71	77	72	63	61	76	52	66	65	19	-4	-79	54	59	85	92	82	-28	78	67	-37	85
44	-37	72	58	62	58	56	88	68	69	83	-12	-66	-53	36	78	-69	-78	77	87	83	69	75	74	56	86	71	-2	21	-84	56	62	93	92	96	-23	72	79	-19	92
57	-28	74	62	68	61	62	85	64	68	80	-20	-41	-54	14	60	-60	-67	67	73	67	77	61	70	45	69	60	4	14	-79	37	45	87	83	94	-10	74	75	-30	83
24	51	49	52	52	50	35	22	9	15	14	33	-23	-30	-26	-11	-2	12	-32	3	-2	47	-40	-19	-30	-2	-19	45	4	-10	-44	-33	11	1	15	83	46	15	-33	3
56	68	7	11	18	12	5	-19	-22	-14	-23	26	2	2	-31	-48	39	60	-59	-41	-36	19	-68	-42	-54	-33	-49	47	-12	25	-75	-56	-31	-42	-28	86	5	-21	-17	-42
28	74	7	8	18	8	-2	-14	-4	-5	-14	44	5	10	-27	-42	38	34	-51	-29	-22	17	-55	-48	-43	-36	-44	39	11	26	-59	-47	-23	-38	-22	87	5	-10	-9	-32
29	75	-22	-15	-15	-17	-27	-44	-33	-38	-46	59	28	33	-29	-60	50	68	-73	-46	-50	-14	-70	-69	-51	-46	-54	9	17	55	-66	-71	-52	-61	-44	80	-26	-42	10	-59
36	54	45	51	54	47	36	9	6	16	12	14	-25	-33	-37	-30	21	17	-47	-25	-16	44	-57	-25	-38	0	-37	65	-16	-1	-62	-38	-5	-17	-4	87	43	10	-47	-16
39	43	54	40	44	57	48	17	10	23	20	5	-41	-47	-35	-13	13	4	-35	-20	0	52	-47	-10	-36	2	-28	73	-29	-16	-52	-23	6	-8	6	78	53	17	-54	-4
23	49	18	16	13	8	-4	14	20	17	10	48	27	4	-14	-17	31	23	-39	-7	-13	20	-33	-39	-8	-9	-43	13	45	13	-44	-25	0	-14	1	77	12	14	6	-10
27	100	-18	-18	-15	-24	-35	-30	-17	-18	-32	35	29	32	-28	-45	44	57	-66	-43	-37	-13	-61	-44	-33	-57	-51	5	24	43	-54	-56	-42	-53	-37	76	-24	-26	15	-48
46	-18	100	94	91	92	83	84	52	64	76	-11	-68	-86	7	52	-50	-68	38	57	58	84	32	53	22	62	44	44	-14	-77	13	37	76	72	75	20	95	69	-59	70
41	-18	94	100	90	92	85	73	41	53	65	-12	-68	-84	-6	37	-45	-67	27	44	44	77	18	43	10	69	37	52	-25	-63	3	26	64	61	62	25	93	58	-65	58
43	-15	91	90	100	90	83	70	41	54	66	-18	-75	-80	-11	35	-67	-52	34	41	51	90	18	53	4	46	36	61	-28	-70	1	22	45	60	67	28	93	58	-67	58
25	-24	92	92	90	100	83	71	41	55	66	-12	-74	-89	5	43	-54	-54	30	48	51	76	19	48	8	57	38	54	-27	-71	7	30	65	62	63	22	93	58	-66	59
54	-35	83	85	83	83	100	63	31	45	55	-31	-61	-83	-17	34	-52	-49	37	37	41	75	22	57	-11	56	39	59	-47	-64	-1	27	60	57	60	11	84	48	-72	56
49	-30	84	73	70	71	63	100	72	78	89	-10	-42	-66	28	70	-59	-77	62	79	70	74	63	61	56	69	53	12	20	-80	40	61	91	88	89	-8	83	84	-29	88
51	-17	52	41	41	41	31	72	100	90	89	13	-15	-35	38	62	-37	-72	54	68	62	47	63	34	60	47	36	-5	45	-61	39	70	77	63	69	-7	51	91	1	73
50	-18	64	53	54	55	45	78	90	100	92	-6	-27	-50	31	65	-39	-72	47	63	64	56	53	39	52	48	29	12	24	-72	32	65	77	65	71	-2	64	93	-12	70
52	-32	76	65	66	66	55	89	89	92	100	-7	-39	-58	34	69	-55	-81	63	78	73	67	64	56	57	62	50	11	24	-79	43	69	90	82	84	-9	76	94	-19	85
18	35	-11	-12	-18	-12	-31	-10	13	-6	-7	100	20	29	32	-4	12	19	-22	8	-4	-19	-2	-47	3	-8	-7	-26	52	27	-2	-3	-8	-18	-14	36	-17	0	42	-11
4	29	-68	-66	-75	-74	-61	-62	-15	-27	-39	20	100	72	-8	-63	53	51	-34	-30	-54	-59	-22	-54	-5	-29	-49	-53	48	64	-24	-26	-44	-48	-46	-1	-69	-32	65	-48
16	32	-86	-84	-80	-89	-83	-64	-35	-50	-58	29	72	100	0	-48	66	55	-30	-38	-47	-68	-24	-56	-8	-56	-36	-50	40	73	-8	-38	-58	-58	-57	-7	-84	-51	74	-57
17	-28	7	-6	-11	5	-17	28	38	31	34	32	-8	0	100	59	-31	-46	39	53	52	-11	54	28	56	31	39	-41	41	-35	57	61	36	38	27	-36	4	37	42	41
14	-45	52	37	35	43	34	70	62	65	69	-4	-43	-48	59	100	-64	-74	71	77	83	35	74	60	62	46	61	-7	18	-78	71	81	76	77	72	-42	49	70	2	80
7	64	-50	-45	-47	-54	-52	-59	-37	-39	-55	12	53	66	-31	-64	100	67	-64	-72	-66	-44	-62	-65	-34	-56	-62	-12	0	65	-57	-55	-68	-74	-67	36	-55	-49	38	-74
1	57	-60	-47	-52	-54	-49	-77	-72	-72	-81	19	51	55	-45	-76	67	100	-78	-73	-77	-54	-74	-74	-60	-69	-61	-11	-9	83	-61	-80	-84	-83	-77	39	-62	-78	26	-85
12	-66	38	27	34	30	37	62	54	67	63	-22	-34	-30	39	71	-66	-78	100	71	69	45	86	80	56	49	75	-10	10	-67	71	73	78	79	74	-60	62	60	2	81
30	-63	57	44	41	48	37	79	68	63	78	8	-30	-38	53	77	-72	-73	71	100	81	43	79	57	65	61	71	-22	40	-71	67	67	85	87	83	-33	56	74	0	88
20	-37	58	44	51	51	41	70	62	64	73	-4	-54	-67	52	83	-66	-77	69	81	100	49	72	64	55	63	66	3	20	-78	69	72	88	78	78	-28	58	70	-16	84
35	-13	84	77	90	76	75	74	67	66	67	-19	-59	-68	-11	35	-64	-64	43	43	49	100	27	59	11	63	37	51	-14	-71	-2	22	70	62	74	23	85	62	-56	64
47	-61	32	18	18	19	22	63	63	53	64	-2	-22	-24	56	76	-62	-74	86	79	72	27	100	64	68	54	72	-36	29	-62	78	81	75	76	71	-64	32	63	13	82
32	-64	53	63	53	48	37	61	34	39	36	-47	-54	-56	28	60	-65	-78	80	57	64	59	64	100	38	51	67	13	-21	-77	47	58	71	75	73	-46	58	49	-34	77
53	-33	22	10	4	8	-11	56	60	52	57	3	-5	-8	56	62	-34	-60	54	65	55	11	68	38	100	45	42	-41	55	-62	69	64	58	61	52	-46	19	58	29	62
48	-57	62	59	66	57	56	69	67	68	62	-8	-29	-56	31	66	-56	-59	69	61	63	63	56	51	45	100	60	9	5	-53	33	56	65	67	57	-24	60	56	-30	66
45	-51	66	57	56	58	59	53	56	59	50	-7	-69	-56	39	61	-62	-61	75	71	66	57	72	67	62	60	100	-17	1	-61	66	56	66	73	67	-68	65	65	-8	74
58	5	66	52	61	56	59	12	-5	12	11	-26	-53	-50	-61	-7	-12	-11	-10	-22	3	51	-36	13	-61	9	-17	100	-57	-20	-37	-14	5	-1	2	63	49	7	-64	22
26	26	-14	-25	-28	-27	-47	20	65	24	26	52	68	60	61	18	0	-9	10	60	20	-14	29	-21	55	5	1	-57	100	8	29	21	20	13	18	2	-20	30	57	22
S01	63	-77	-63	-70	-71	-64	-80	-61	-72	-79	27	64	73	-35	-78	65	83	-67	-71	-70	-71	-62	-77	-62	-53	-61	-20	8	100	-64	-63	-84	-82	-84	20	-77	-75	39	-84
S02	-54	13	3	1	7	-1	60	39	32	63	-2	-24	-8	57	71	-57	-61	71	67	69	-2	78	67	69	33	64	-37	29	-64	100	71	54	62	69	-68	13	62	22	61
S03	-56	37	26	22	30	27	61	70	65	69	-3	-26	-38	61	81	-55	-80	73	67	72	22	81	58	64	56	56	-14	21	-63	71	100	70	68	59	-53	37	70	4	74
S04	-62	76	64	65	65	60	91	77	77	90	-8	-64	-58	36	76	-68	-84	78	85	80	70	75	71	58	65	66	5	20	-84	54	70	100	92	93	-21	76	86	-20	93
S05	-53	72	61	60	62	57	88	63	65	82	-10	-68	-58	38	77	-74	-83	79	87	78	62	76	75	61	67	73	-1	13	-82	62	68	92	100	90	-35	72	76	-21	92
S06	-37	75	62	67	63	60	89	69	71	84	-14	-66	-57	27	72	-67	-77	74	83	78	74	71	73	52	57	67	2	18	-84	49	59	93	90	100	-18	75	80	-26	91
S07	76	20	25	28	22	11	-8	-7	-2	-9	36	-1	-7	-36	-42	36	39	-60	-33	-28	25	-66	-66	-46	-24	-68	43	2	20	-68	-53	-21	-35	-18	100	17	-8	-24	-32
S08	-24	95	93	93	93	86	83	51	66	76	-17	-69	-86	4	69	-55	-62	62	86	58	85	32	58	19	60	65	69	-20	-77	13	37	76	72	75	17	100	68	-60	70
S09	-26	69	58	58	58	68	86	91	93	96	0	-32	-51	37	70	-69	-78	60	74	70	62	63	69	58	66	65	7	38	-75	62	70	86	76	80	-8	68	100	-11	81
S10	15	-59	-65	-67	-66	-72	-29	1	-12	-19	62	65	74	62	2	30	26	2	0	-14	-56	13	-36	29	-30	-8	-66	57	39	22	6	-20	-21	-26	-24	-60	-11	100	-23
S11	-68	70	58	58	59	56	88	73	70	85	-11	-68	-57	61	88	-74	-85	81	88	84	66	82	77	62	66	74	2	22	-86	61	74	93	92	91	-32	70	81	-23	100

Table B.3. Second Order Cluster Analysis of the Clusters Formed from the A Posteriori Cluster Analysis. Inter-Correlations Matrix and Similarity Coefficient Matrix.

FACTOR INTERCORRELATIONS AND LOADING MATRIX

COMMUNALITY IN THE DIAGONAL

	504	506	505	508	501	509	507	502	503	601	602
504	86	68	70	58	42	58	6	19	41	93	37
506	68	56	55	45	43	38	4	16	2	75	13
505	70	55	48	46	38	26	23	32	23	69	44
508	58	45	46	42	40	33	-26	-8	9	65	-14
501	42	43	38	40	30	32	7	8	24	55	22
509	58	38	26	33	32	27	-7	7	40	52	22
507	6	4	23	-26	7	-7	43	43	31	2	66
502	19	16	32	-8	8	7	43	41	30	18	64
503	41	2	23	9	24	40	31	30	23	34	47
601	93	75	69	65	55	52	2	18	34	100	30
602	37	13	44	-14	22	22	66	64	47	30	100

STANDARD SCORE COEFFICIENT ALPHAS
84. 61.

THE DIAGONAL VALUE USED IN THIS ANALYSIS WAS .40

SQUARED R--MATRIX

	504	506	505	508	501	509	507	502	503	601	602
504	100	93	93	87	98	93	31	59	77	91	62
506	93	100	94	93	96	92	18	48	71	93	56
505	93	94	100	81	96	93	43	69	83	93	71
508	87	93	81	100	90	89	-9	20	50	88	31
501	98	96	96	90	100	96	28	56	78	95	61
509	93	92	93	89	96	100	25	52	80	94	58
507	31	18	43	-9	28	25	100	94	69	26	83
502	59	48	69	20	56	52	94	100	85	54	92
503	77	71	83	50	78	80	69	85	100	74	89
601	91	93	93	88	95	94	26	54	74	100	59
602	62	56	71	31	61	58	83	92	89	59	100

COLUMN SUMS OF SQUARES OF INPUT R-MATRIX

3.164 2.074 2.267 1.709 1.341 1.407

1.014 1.058 1.118 3.302 1.789

APPENDIX C

TABLES OF CLUSTER ANALYSIS FROM SPSS RELIABILITY PROGRAM

Table C.1. Scales (Clusters) formed from Reliability Analysis with Mean, Standard Deviation for each Variable, Scales Means, Variances, Correlations, and Alphas.

**********RELIABILITY ANALYSIS FOR SCALE (ATCOMP1)**********

1. V9
2. V11
3. V10
4. V6
5. V8

		MEANS	STD DEV	CASES
1.	V9	4.03061	.89390	196.0
2.	V11	4.54592	.75985	196.0
3.	V10	4.53061	.68991	196.0
4.	V6	4.38776	.71083	196.0
5.	V8	3.79082	.80519	196.0

ITEM-TOTAL STATISTICS

	SCALE MEAN IF ITEM DELETED	SCALE VARIANCE IF ITEM DELETED	CORRECTED ITEM-TOTAL CORRELATION	SQUARED MULTIPLE CORRELATION	ALPHA IF ITEM DELETED
V9	17.25510	3.85254	.38426	.16504	.56952
V11	16.73980	4.17297	.40254	.24971	.55734
V10	16.75510	4.33972	.41201	.25076	.55601
V6	16.89796	4.36902	.37882	.16140	.57016
V8	17.49490	4.27177	.32446	.11091	.59743

A VALUE OF 99.0 IS PRINTED IF A COEFFICIENT CANNOT BE COMPUTED

RELIABILITY COEFFICIENTS 5 ITEMS

ALPHA = .62375 STANDARDIZED ITEM ALPHA = .62873

Continued on next page

Table C.1. Continued.

**********RELIABILITY ANALYSIS FOR SCALE (ATCOMP2)**********

1. V2
2. V5
3. V3

		MEANS	STD DEV	CASES
1.	V2	2.40816	.96436	196.0
2.	V5	3.28061	.99116	196.0
3.	V3	2.86735	1.18657	196.0

ITEM-TOTAL STATISTICS

	SCALE MEAN IF ITEM DELETED	SCALE VARIANCE IF ITEM DELETED	CORRECTED ITEM-TOTAL CORRELATION	SQUARED MULTIPLE CORRELATION	ALPHA IF ITEM DELETED
V2	6.14796	2.83441	.35112	.13098	.31334
V5	5.27551	2.87755	.31064	.11262	.37505
V3	5.68878	2.51290	.26148	.07020	.47795

A VALUE OF 99.0 IS PRINTED IF A COEFFICIENT CANNOT BE COMPUTED

RELIABILITY COEFFICIENTS 3 ITEMS

ALPHA = .48451 STANDARDIZED ITEM ALPHA = .49496

**********RELIABILITY ANALYSIS FOR SCALE (ATCOMP3)**********

1. V13
2. V15

		MEANS	STD DEV	CASES
1.	V13	2.65816	.91174	196.0
2.	V15	2.23469	1.01072	196.0

Table C.1. Continued.

ITEM-TOTAL STATISTICS	SCALE MEAN IF ITEM DELETED	SCALE VARIANCE IF ITEM DELETED	CORRECTED ITEM-TOTAL CORRELATION	SQUARED MULTIPLE CORRELATION	ALPHA IF ITEM DELETED
V13	2.23469	1.02156	.34350	.11799	99.00000
V15	2.65816	.83127	.34350	.11799	99.00000

A VALUE OF 99.0 IS PRINTED IF A COEFFICIENT CANNOT BE COMPUTED

RELIABILITY COEFFICIENTS 2 ITEMS

ALPHA = .50933 STANDARDIZED ITEM ALPHA = .51135

**********RELIABILITY ANALYSIS FOR SCALE (ATTELP1)**********

1. V22
2. V42
3. V19
4. V21
5. V31
6. V55
7. V34

		MEANS	STD DEV	CASES
1.	V22	2.18367	.64604	196.0
2.	V42	2.76020	.79656	196.0
3.	V19	2.28571	.70165	196.0
4.	V21	2.17347	.61645	196.0
5.	V31	2.58673	.83367	196.0
6.	V55	3.04592	.61011	196.0
7.	V34	2.17857	.65925	196.0

Continued on next page

Table C.1. Continued.

ITEM-TOTAL STATISTICS	SCALE MEAN IF ITEM DELETED	SCALE VARIANCE IF ITEM DELETED	CORRECTED ITEM-TOTAL CORRELATION	SQUARED MULTIPLE CORRELATION	ALPHA IF ITEM DELETED
V22	15.03061	7.45547	.58985	.39279	.71573
V42	14.45408	6.99788	.55084	.35582	.72130
V19	14.92857	7.24615	.58647	.39427	.71416
V21	15.04082	8.01884	.44540	.26991	.74417
V31	14.62755	7.25031	.44738	.27569	.74798
V55	14.16837	8.14074	.41386	.23864	.74985
V34	15.03571	8.08590	.38230	.18670	.75605

A VALUE OF 99.0 IS PRINTED IF A COEFFICIENT CANNOT BE COMPUTED

RELIABILITY COEFFICIENTS 7 ITEMS

ALPHA = .76511 STANDARDIZED ITEM ALPHA = .76716

**********RELIABILITY ANALYSIS FOR SCALE (ATTELP2)**********

1. V40
2. V37
3. V33
4. V38

		MEANS	STD DEV	CASES
1.	V40	2.26531	.68014	196.0
2.	V37	2.76531	.69135	196.0
3.	V33	2.33673	.62337	196.0
4.	V38	2.31633	.61764	196.0

Continued on next page

Table C.1. Continued.

ITEM-TOTAL STATISTICS	SCALE MEAN IF ITEM DELETED	SCALE VARIANCE IF ITEM DELETED	CORRECTED ITEM-TOTAL CORRELATION	SQUARED MULTIPLE CORRELATION	ALPHA IF ITEM DELETED
V40	7.41837	1.96766	.49046	.24171	.54859
V37	6.91837	2.04458	.42665	.18266	.59567
V33	7.34694	2.19696	.42238	.18358	.59737
V38	7.36735	2.23359	.40680	.16877	.60739

A VALUE OF 99.0 IS PRINTED IF A COEFFICIENT CANNOT BE COMPUTED

RELIABILITY COEFFICIENTS 4 ITEMS

ALPHA = .65574 STANDARDIZED ITEM ALPHA = .65561

*********RELIABILITY ANALYSIS FOR SCALE (ATTELP3)*********

1. V44
2. V57

	MEANS	STD DEV	CASES
1. V44	2.58163	.71502	196.0
2. V57	2.61735	.69541	196.0

ITEM-TOTAL STATISTICS	SCALE MEAN IF ITEM DELETED	SCALE VARIANCE IF ITEM DELETED	CORRECTED ITEM-TOTAL CORRELATION	SQUARED MULTIPLE CORRELATION	ALPHA IF ITEM DELETED
V44	2.61735	.48359	.41896	.17553	99.00000
V57	2.58163	.51125	.41896	.17553	99.00000

A VALUE OF 99.0 IS PRINTED IF A COEFFICIENT CANNOT BE COMPUTED

Table C.1. Continued.

RELIABILITY COEFFICIENTS 2 ITEMS

ALPHA = .59036 STANDARDIZED ITEM ALPHA = .59052

**********RELIABILITY ANALYSIS FOR SCALE (ATTELP4)**********

1. V24
2. V56
3. V28
4. V29
5. V36
6. V39
7. V23
8. V27

		MEANS	STD DEV	CASES
1.	V24	2.12245	.76815	196.0
2.	V56	2.80102	.78851	196.0
3.	V28	2.88265	.77889	196.0
4.	V29	2.87245	1.01226	196.0
5.	V36	2.36735	.76309	196.0
6.	V39	2.62755	.68617	196.0
7.	V23	2.38776	.73216	196.0
8.	V27	2.87245	.84067	196.0

ITEM-TOTAL STATISTICS

	SCALE MEAN IF ITEM DELETED	SCALE VARIANCE IF ITEM DELETED	CORRECTED ITEM-TOTAL CORRELATION	SQUARED MULTIPLE CORRELATION	ALPHA IF ITEM DELETED
V24	18.81122	9.89751	.47859	.29655	.63045
V56	18.13265	10.12590	.40912	.20745	.64620
V28	18.05102	10.31533	.37550	.19856	.65405
V29	18.06122	9.41162	.38069	.18010	.65665
V36	18.56633	10.26737	.39896	.28156	.64889
V39	18.30612	10.74683	.35188	.25419	.65989
V23	18.54592	10.72096	.32197	.17502	.66576
V27	18.06122	10.45777	.30093	.11499	.67220

A VALUE OF 99.0 IS PRINTED IF A COEFFICIENT CANNOT BE COMPUTED

Table C.1. Continued.

RELIABILITY COEFFICIENTS 8 ITEMS

ALPHA = .68404 STANDARDIZED ITEM ALPHA = .68815

**********RELIABILITY ANALYSIS FOR SCALE (ATTELP5)**********

1. V46
2. V41
3. V43
4. V25
5. V54
6. V49

		MEANS	STD DEV	CASES
1.	V46	1.58673	.67757	196.0
2.	V41	2.05612	.70304	196.0
3.	V43	2.31633	.83632	196.0
4.	V25	1.70408	.72620	196.0
5.	V54	2.42347	.82851	196.0
6.	V49	2.09184	.56544	196.0

ITEM-TOTAL STATISTICS

	SCALE MEAN IF ITEM DELETED	SCALE VARIANCE IF ITEM DELETED	CORRECTED ITEM-TOTAL CORRELATION	SQUARED MULTIPLE CORRELATION	ALPHA IF ITEM DELETED
V46	10.59184	5.43255	.56156	.34395	.62248
V41	10.12245	5.45160	.52376	.28939	.63274
V43	9.86224	5.16554	.47360	.24835	.64820
V25	10.47449	5.58396	.45280	.22296	.65478
V54	9.75510	5.71408	.31934	.11210	.70313
V49	10.08673	6.50013	.29326	.13217	.69874

A VALUE OF 99.0 IS PRINTED IF A COEFFICIENT CANNOT BE COMPUTED

RELIABILITY COEFFICIENTS 6 ITEMS

ALPHA = .70119 STANDARDIZED ITEM ALPHA = .70490

Continued on next page

Table C.1. Continued.

**********RELIABILITY ANALYSIS FOR SCALE (ATTELP6)**********

1. V51
2. V50
3. V52

		MEANS	STD DEV	CASES
1.	V51	1.95918	.67053	196.0
2.	V50	1.90306	.57805	196.0
3.	V52	2.01531	.58596	196.0

ITEM-TOTAL STATISTICS

	SCALE MEAN IF ITEM DELETED	SCALE VARIANCE IF ITEM DELETED	CORRECTED ITEM-TOTAL CORRELATION	SQUARED MULTIPLE CORRELATION	ALPHA IF ITEM DELETED
V51	3.91837	.95740	.57330	.32868	.58472
V50	3.97449	1.17370	.52011	.27250	.64879
V52	3.86224	1.15529	.52448	.27728	.64319

A VALUE OF 99.0 IS PRINTED IF A COEFFICIENT CANNOT BE COMPUTED

RELIABILITY COEFFICIENTS 3 ITEMS

ALPHA = .71703 STANDARDIZED ITEM ALPHA = .71793

APPENDIX D

CLUSTERS FORMED FROM:

STRUCTR AND BC TRY

(FIGURES)

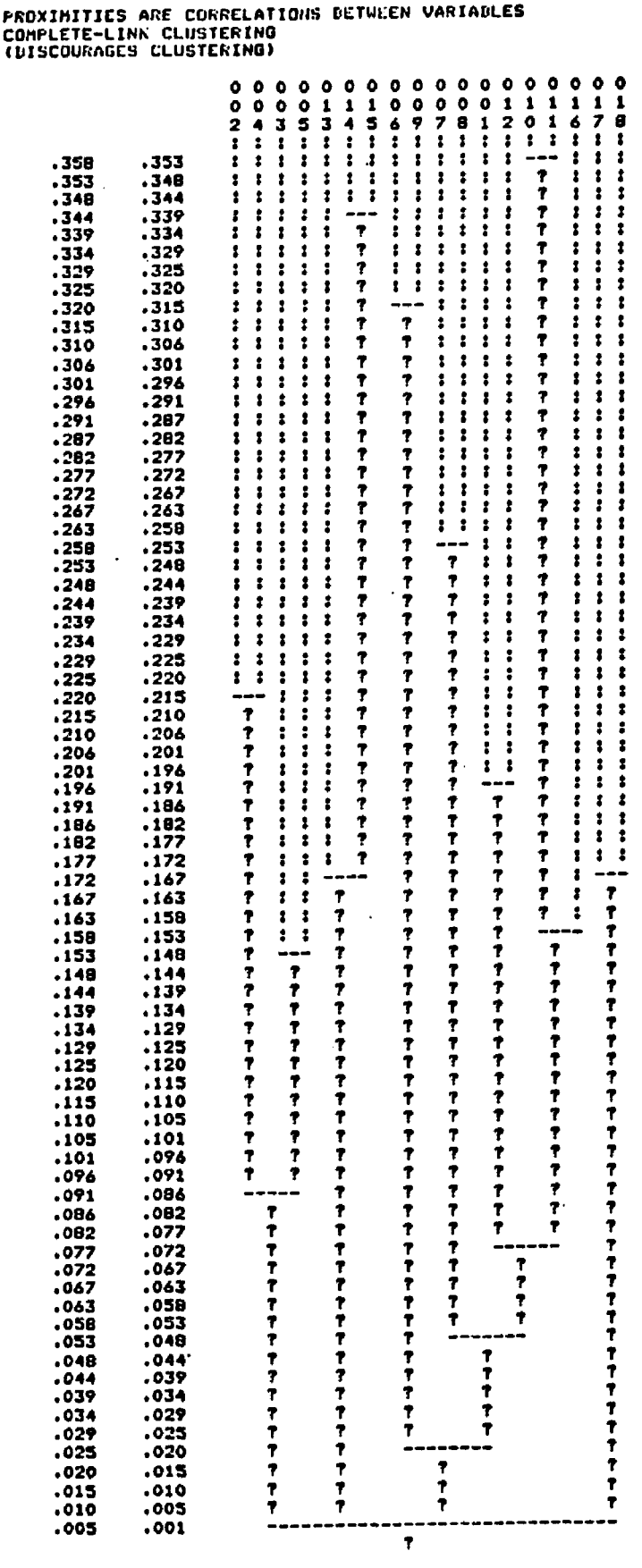


Figure D.1. Clusters Formed from the Computer Items (STRUCTR Used) Complete-Link, Single-Link, and UPGMA.

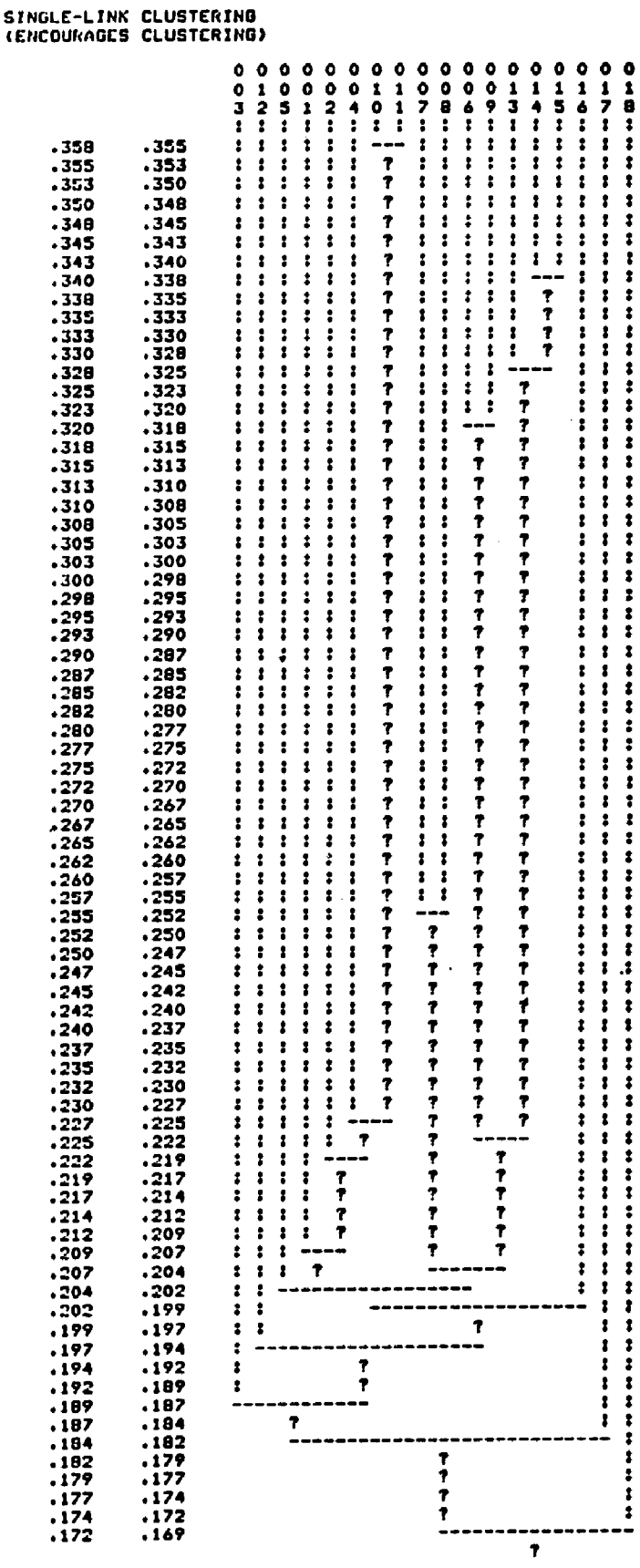


Figure D.1. Continued.

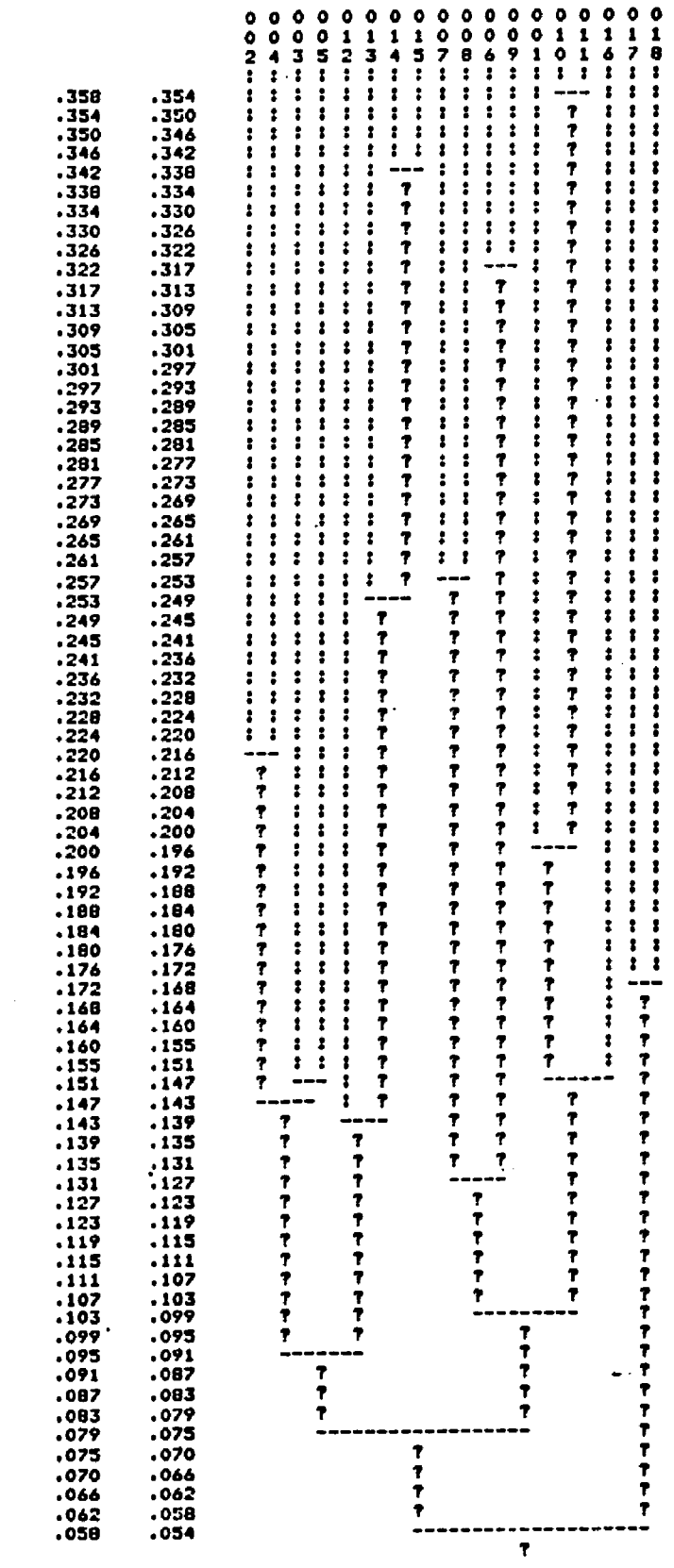


Figure D.1. Continued.

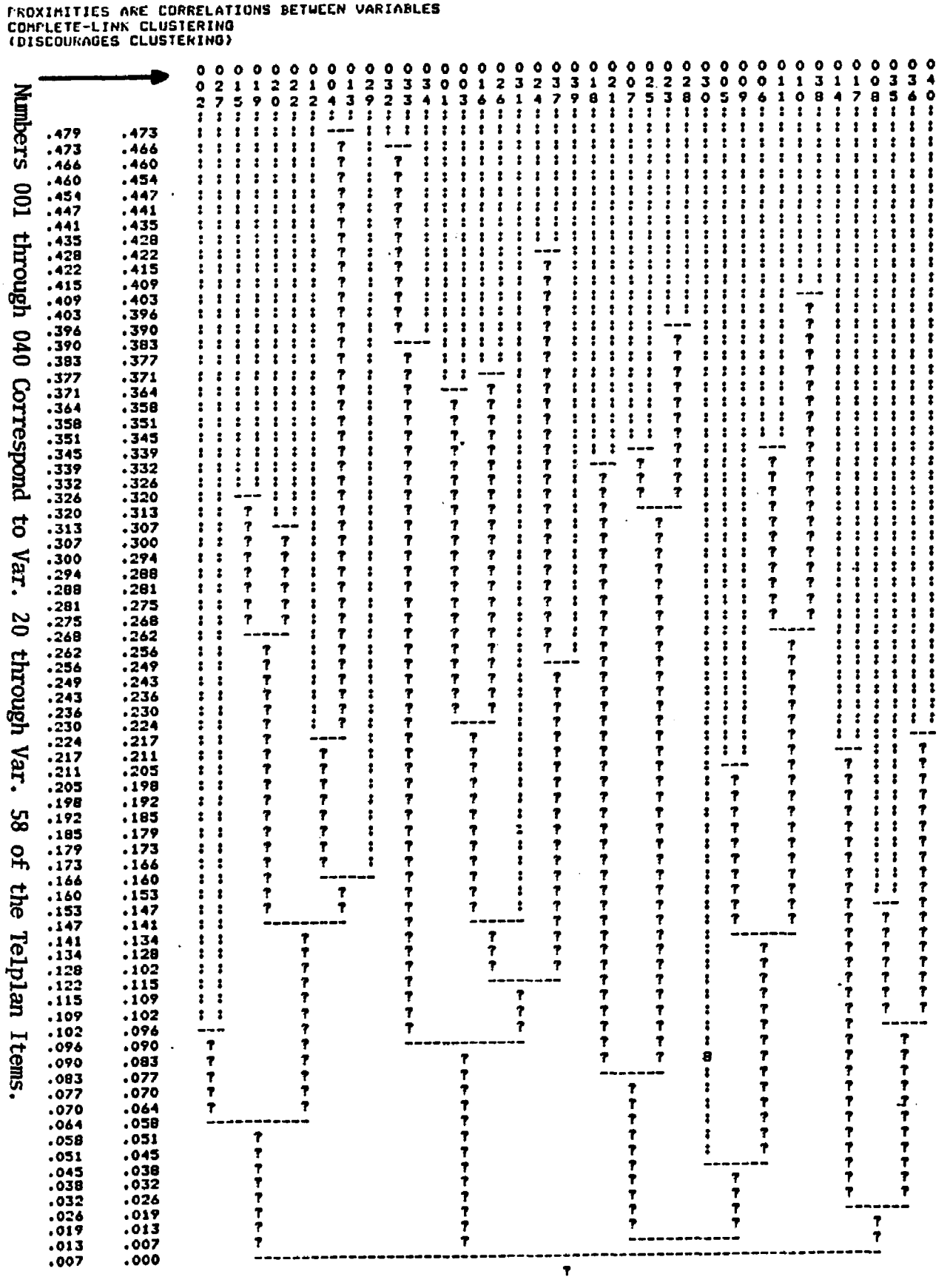


Figure D.2. Clusters Formed from the Telplan Items (STRUCTR Used) Complete-Link, Single-Link, and UPGMA.

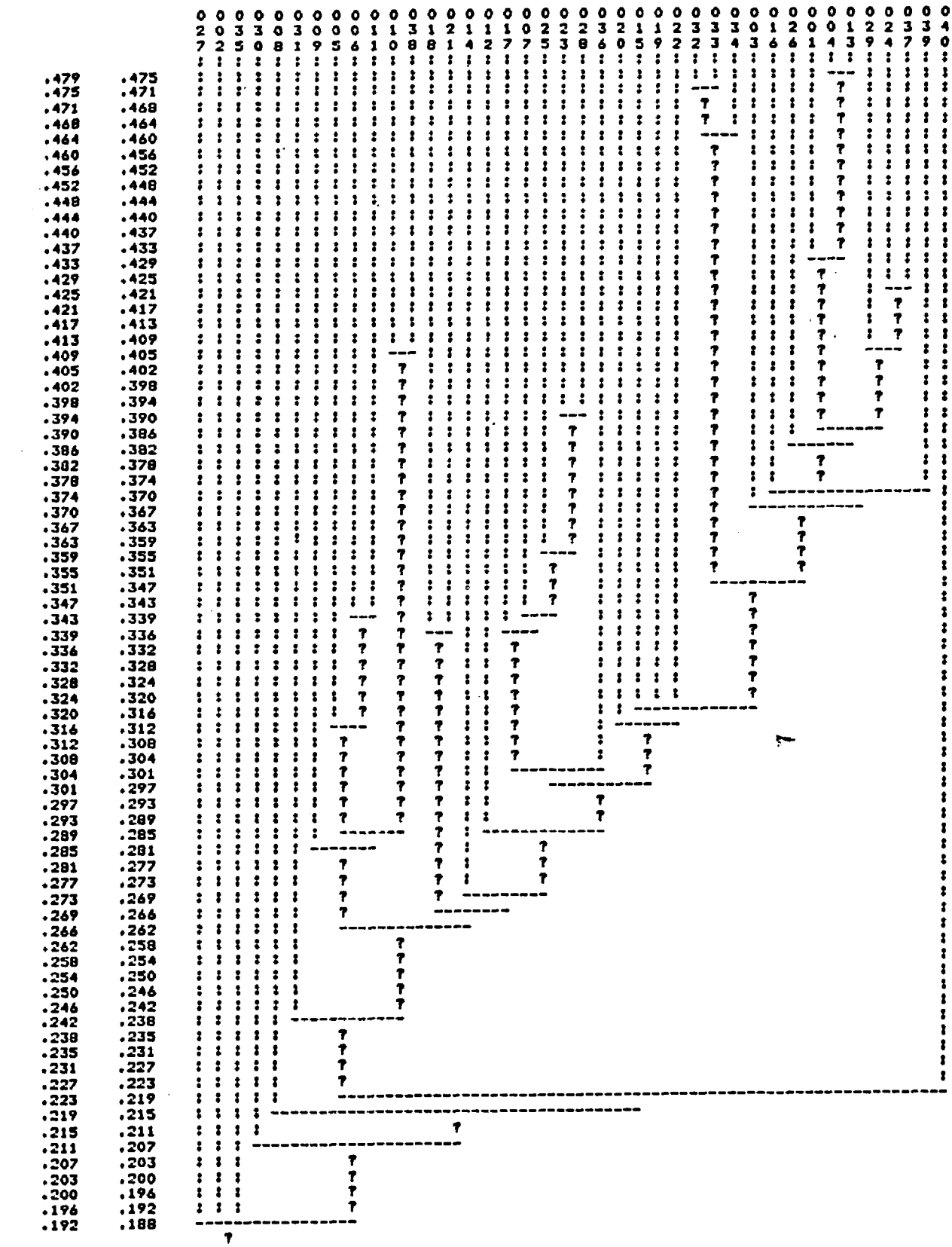


Figure D.2. Continued.

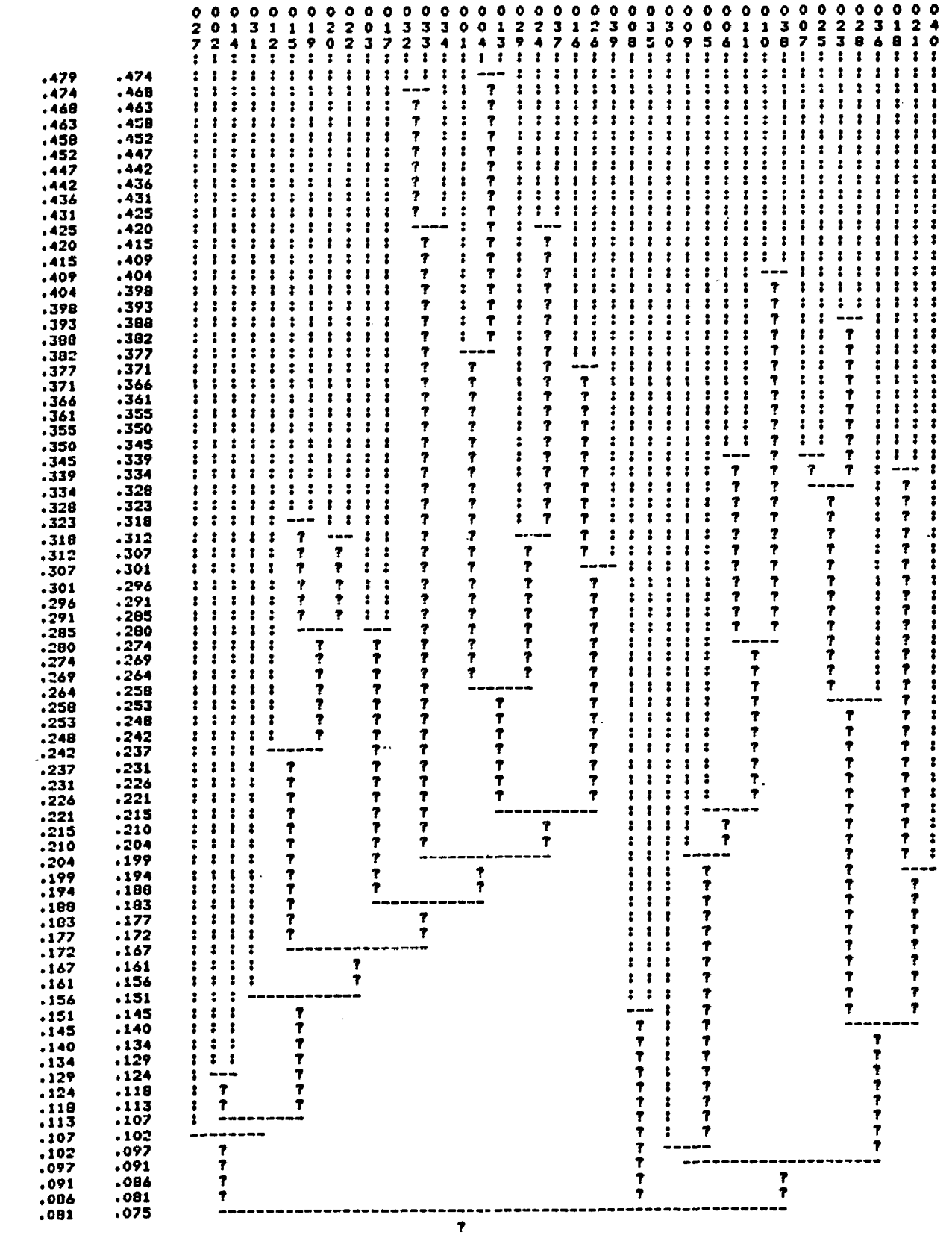
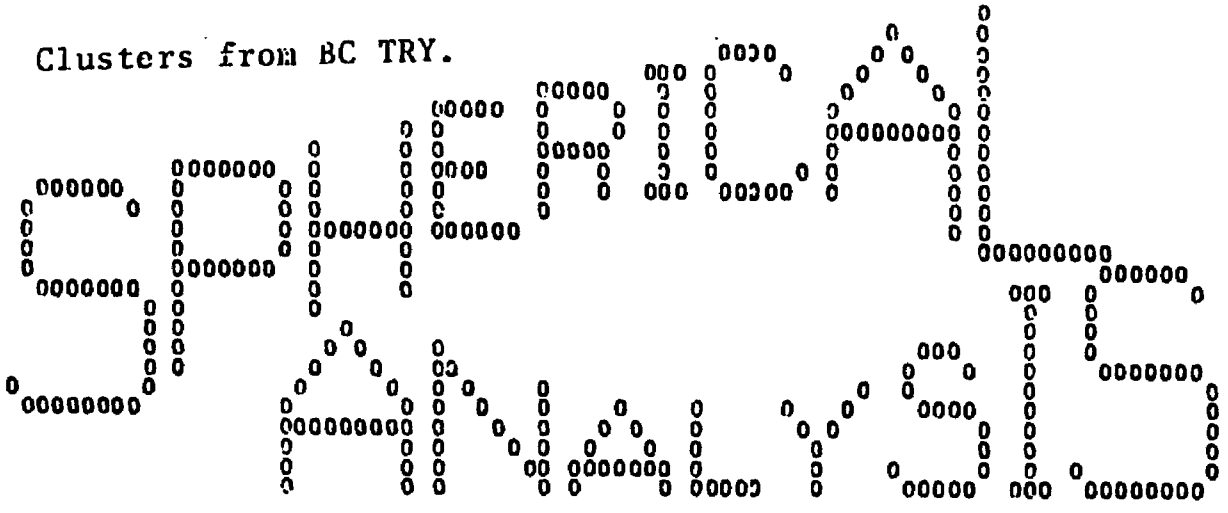


Figure D.2. Continued.



PROBLEM-EMPRICAL CLUSTER ANALISIS OF COMPUTERS AND TELPLAN DATA

THE PROGRAM SELECTS SUCCESSIVE SUBSPACES WHICH ACCOUNT FOR THE MAXIMUM TOTAL RESIDUAL COMMUNALITY AMONG THE VARIABLES. A SUBSPACE IS A PART OF THE TOTAL 9 DIMENSIONAL SPACE.

IN THIS PROBLEM, THE PROGRAM ONLY SELECTS 3 DIMENSIONAL SUBSPACES.

SPHERES ARE PRINTED FOR THE 3 DIMENSIONAL SUBSPACES. EACH OF THESE PICTURES INCLUDES PLOTTING OF ONLY THOSE VARIABLES WHICH HAVE AT LEAST 80 PERCENT OF THEIR COMMUNALITY IN THE SUBSPACES. IN THE SPHERES THE CO-ORDINATE LINES FORMED WITH + SIGNS ARE ARBITRARY AND SHOULD BE IGNORED. THE POINTS, DENOTED X, Y, AND Z, ARE THE XY, XZ, AND YZ PLANES. ALL VARIABLES ARE PLOTTED USING THEIR AUGMENTED CO-ORDINATES. THE LOCI OF THESE VARIABLES ARE DENOTED BY ZEROES.

CONTROL OPTIONS USED IN THIS RUN.

THE MODE OF SELECTION ((1) BY SPAN, (2)BY ANALYST, (3)BOTH)	1
THE SOURCE OF FACTOR COEFFICIENTS ((1)UFACT1, (2)RFACT1)	1
NSTART - THE LOWEST DESIRED DIMENSIONALITY OF A SUBSPACE -	3
NFIN - THE HIGHEST DESIRED DIMENSIONALITY OF A SUBSPACE -	3
MINEW - THE MINIMAL NUMBER OF NEW VARIABLES INCLUDED IN A SUBSPACE-	3
CLOPR - LOWEST PERCENTAGE OF COMMUNALITY OF A VARIABLE IN A SUBSPACE -	.80
MINCOM - LOWEST BOUND OF COMMUNALITY OF A VARIABLE IN A SUBSPACE AS MARKED IN SPOTTER -	.10
RIGID ROTATION - (0) ON ALL PLOTTED POINTS, (1) ON DIMENSION DEFINERS ONLYS -	-0

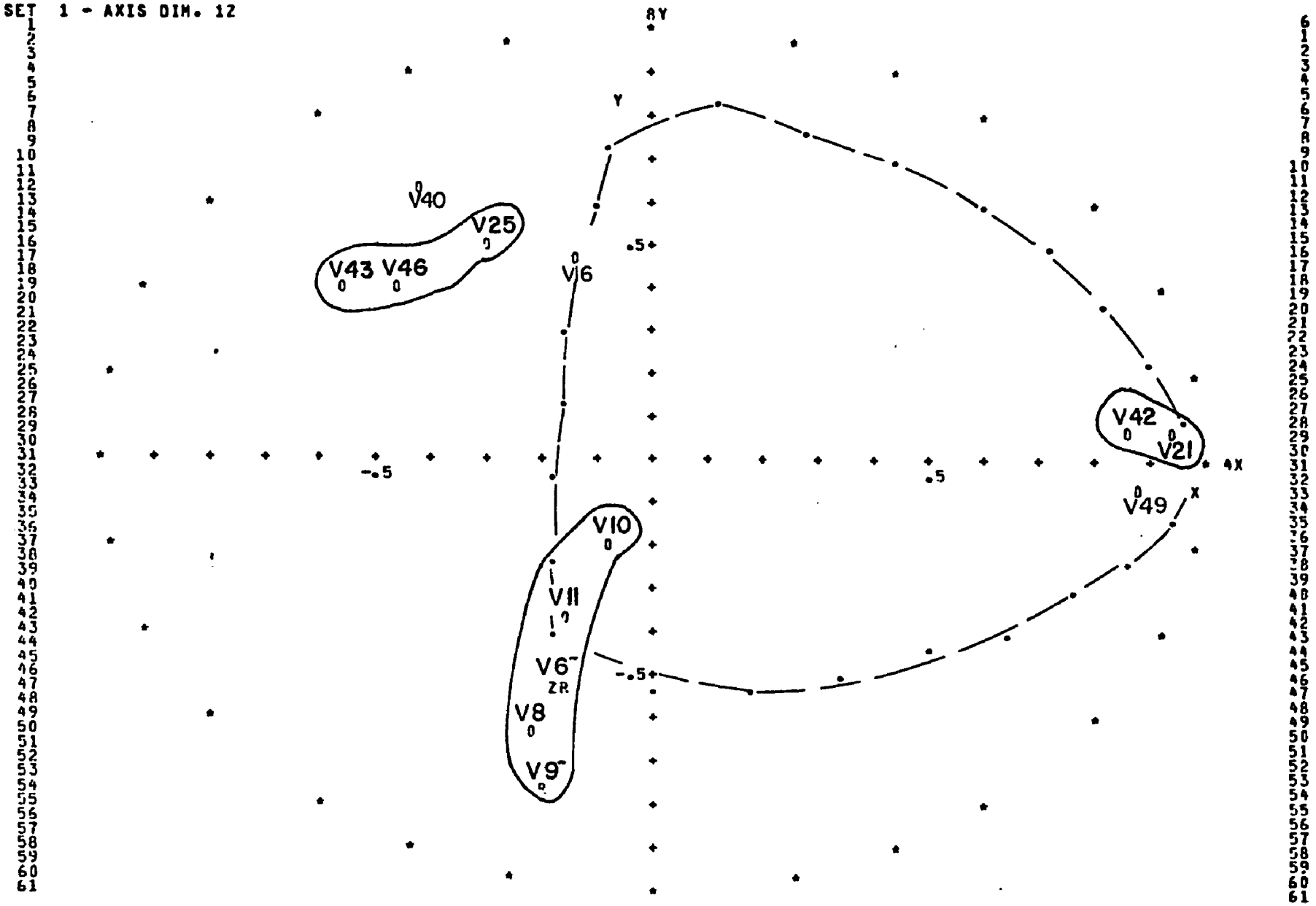


Figure D.3. Clusters Formed from BC TRY.

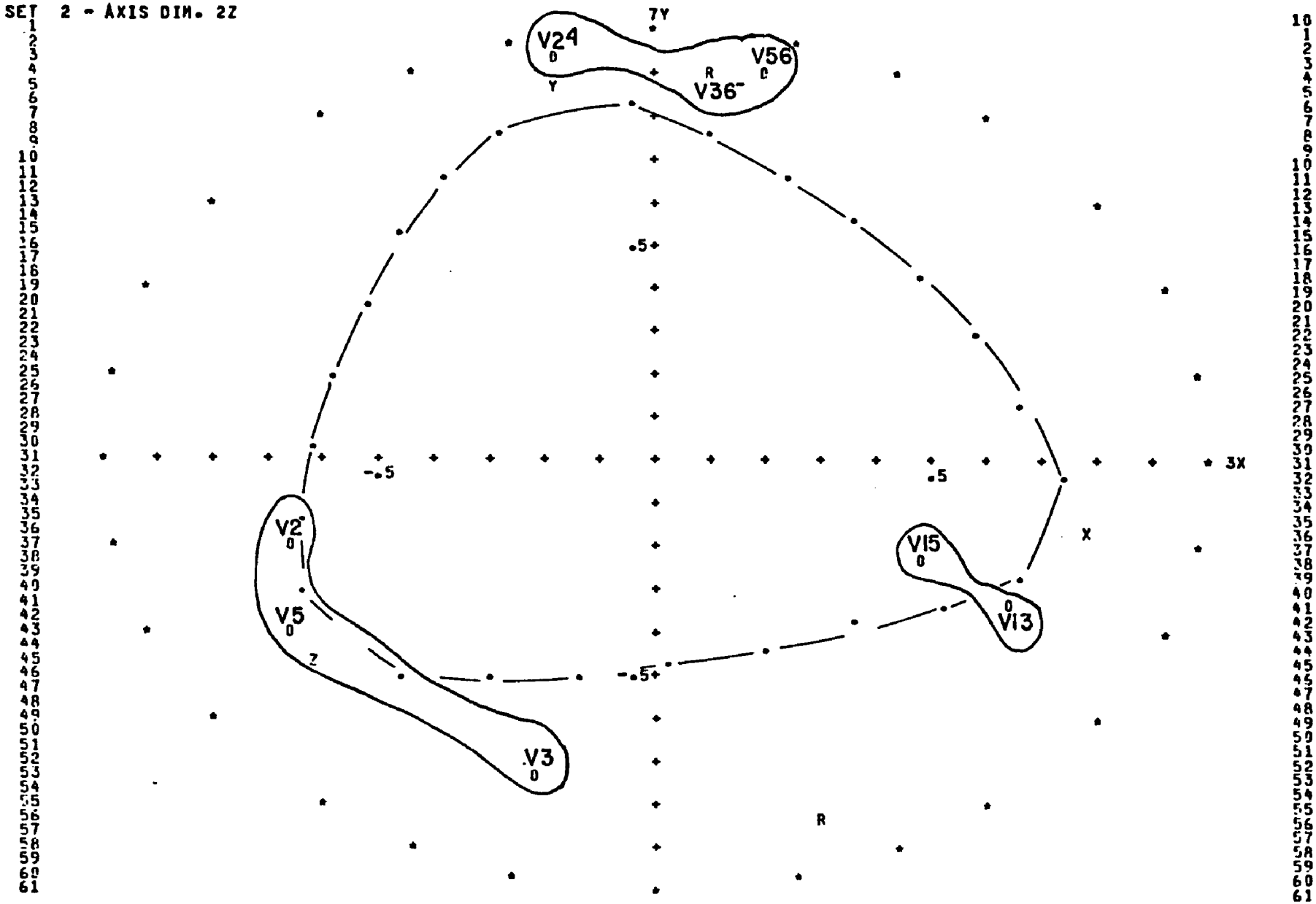


Figure D.3. Continued.

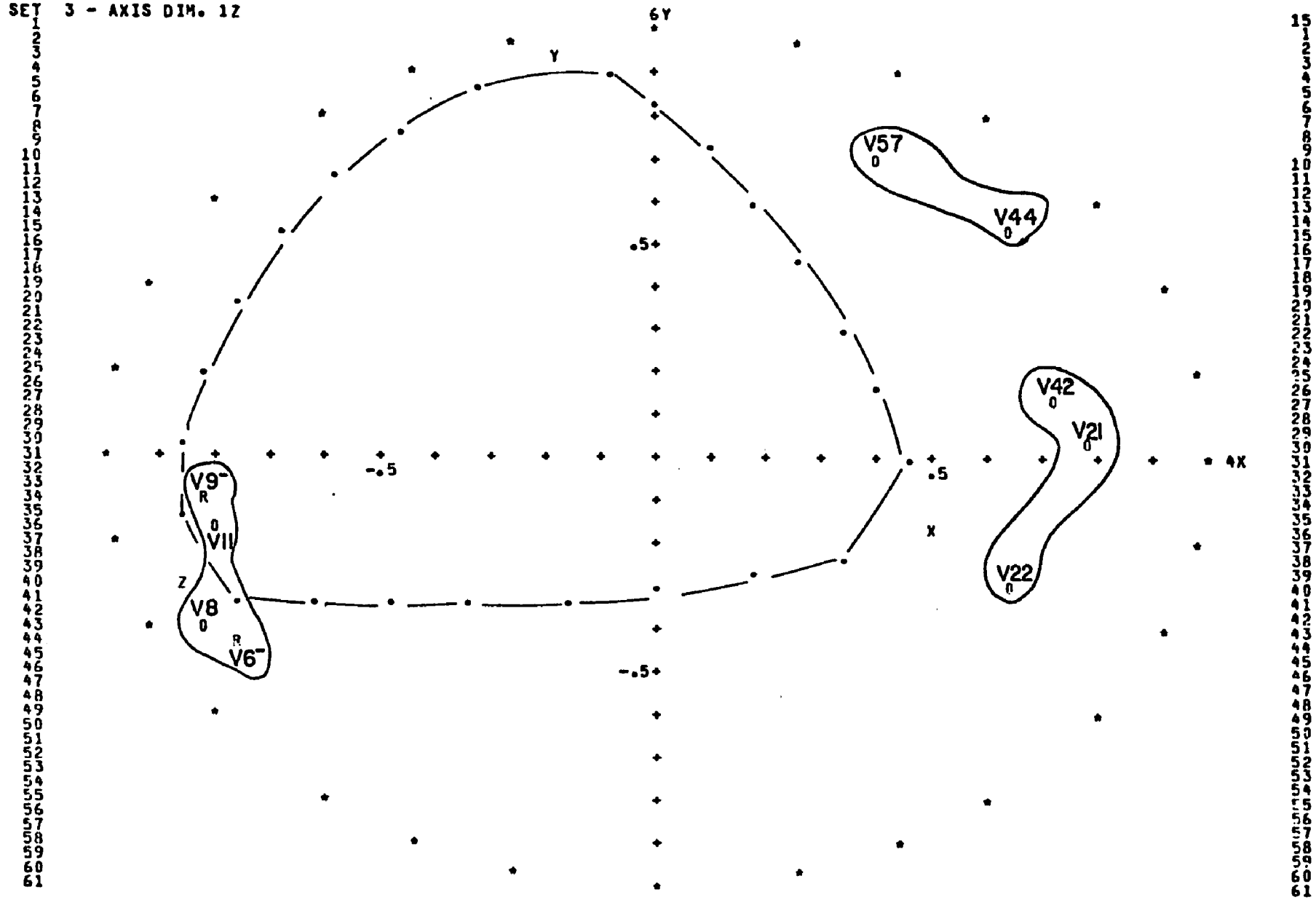


Figure D.3. Continued.

APPENDIX E

LETTERS TO EXTENSION AGENTS

COOPERATIVE EXTENSION SERVICE
MICHIGAN STATE UNIVERSITY and
U.S. DEPARTMENT OF AGRICULTURE COOPERATING

OFFICE OF THE DIRECTOR

EAST LANSING • MICHIGAN • 48824

July 13, 1978

Dear Colleague:

"If you want to get something done, ask a busy person." As Extension workers we get more than our share of surveys. However, we do try to screen them the best we can and this one seems especially deserving.

You will soon be receiving a background questionnaire and attitude scale from Mr. Mehdi Ghods who is studying our Telplan Computer System. He is anxious for you to respond because the information can be of considerable importance. Equally significant is the fact that the results can be extremely useful to us as we think about future Extension computer programs.

I know how committed your time is, but Mr. Ghods indicates the time required to complete the questionnaire is from five minutes to a maximum of twenty minutes. I urge you to complete the form as soon as you can work it into your busy schedules. Thank you for your cooperation.

Very truly yours,

Fred J. Peabody
Associate Director, Administration

FJP:dc

MICHIGAN STATE UNIVERSITY EAST LANSING · MICHIGAN 48824

CONTINUING EDUCATION SERVICE · OFFICE OF THE DIRECTOR · KELLOGG CENTER

July 24, 1978

Recently, you received a letter from Mr. Fred J. Peabody regarding a doctoral study now underway by Mr. Mehdi Ghods. As the doctoral committee chairman for Mr. Ghods, I wish to formally introduce him to you and to urge your cooperation with him in this study. Mehdi is a native of Iran with Bachelors and Masters Degrees in Physics from Tehran University and a Master of Science in Computer Science and a Masters in Continuing Education from Michigan State University. He has now completed all of his course work for his Ph.D in Continuing Education and Administration and Higher Education with an excellent academic record and upon satisfactory completion of his research will return to his home country.

In searching for a research topic which would tend to have high practical value in his country, the Telplan Computer System now in use within the Cooperative Extension Service became of greatest interest to him. In addition, we realize that the study will be of significant value to the Cooperative Extension Service at Michigan State University.

His method of gathering information has been pre-tested to the extent that it gathers the basic necessary information with a minimum of time effort on your part. I appreciate your willingness to assist in this study and want to assure you that Mehdi will treat all responses in strict confidence and will also provide results of the study to the Cooperative Extension Service.

Thank you for your cooperation.

Sincerely,

Floyd G. Parker

Floyd G. Parker, Associate Director
Continuing Education Service and
Professor, Education and Continuing Education

FGP/cg

APPENDIX F

SYSTEM DESIGN AND FLOWCHART OF A STATEWIDE ADULT BASIC EDUCATION (ABE) COMPUTERIZED SYSTEM

Table F.1. System Design of a Statewide ABE Computerized Data Collection, Analysis, and Retrieval System (Paeschke, 1976).

I. CONCEPTION

1. Goal Setting - establish goals of federal, state, and local agencies for project.

II. RESEARCH

1. Gather reporting forms and reporting requirements of federal agency, state agency, local agency, and individual learning sites.
2. Research similar systems in industrial and educational setting.
3. Determine information sought for reporting purposes.
4. Determine time requirements for reporting.
5. Research most cost effective approach to data analyis and report writing.

III. DECISION

1. Decide on most cost effective computer system for data analysis and retrieval requirements.

IV. DESIGN

1. Design computer configuration for data analysis and retrieval.
2. Design personnel and staffing requirements necessary for implementation of the application.
3. Design system flow including data collection procedures, report generation, and report dissemination procedures.

V. DECISION

1. Decide on adequacy of design.
2. Decide on suitable computer facility with appropriate hardware and software for computer application. (Most likely this decision will be based on competitive bidding.)

VI. DEVELOPMENT

1. Develop data gathering instruments.
2. Develop collection procedures for instruments.
3. Develop dissemination procedures.
4. Develop computer documentation.

VII. TESTING

1. Computer program debugging.
2. Field Test instruments at selected sites.
3. Field Test data collection procedures at selected sites.
4. Field Test reports and dissemination procedures at selected sites.
5. Obtain feedback from local, state, and federal agencies.

VIII. IMPLEMENTATION

1. Implement data collection, analysis, and retrieval system for all sites.
2. Implement staff development needed to maintain the system.

IX. EVALUATION

1. Evaluate system design.
2. Evaluate system implementation.
3. Evaluate report collection and generation.

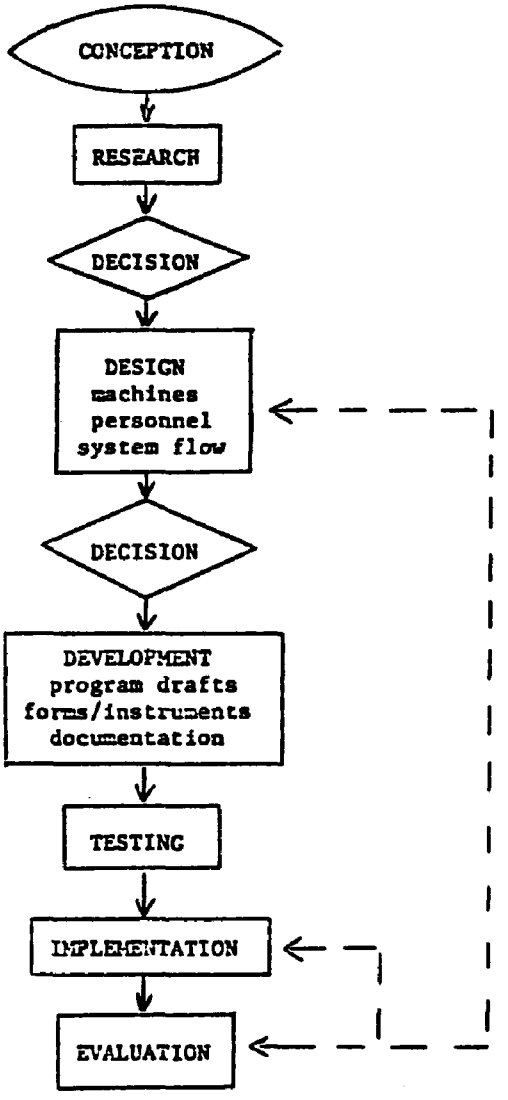


Figure F.1. Flowchart Showing a Computerized Data Collection, Analysis, and Retrieval System (Paeschke, 1976).

APPENDIX G

MICHIGAN COUNTIES AND STATES USING THE TELPLAN SYSTEM AND M.S.U. INDEX OF TELPLAN PROGRAMS

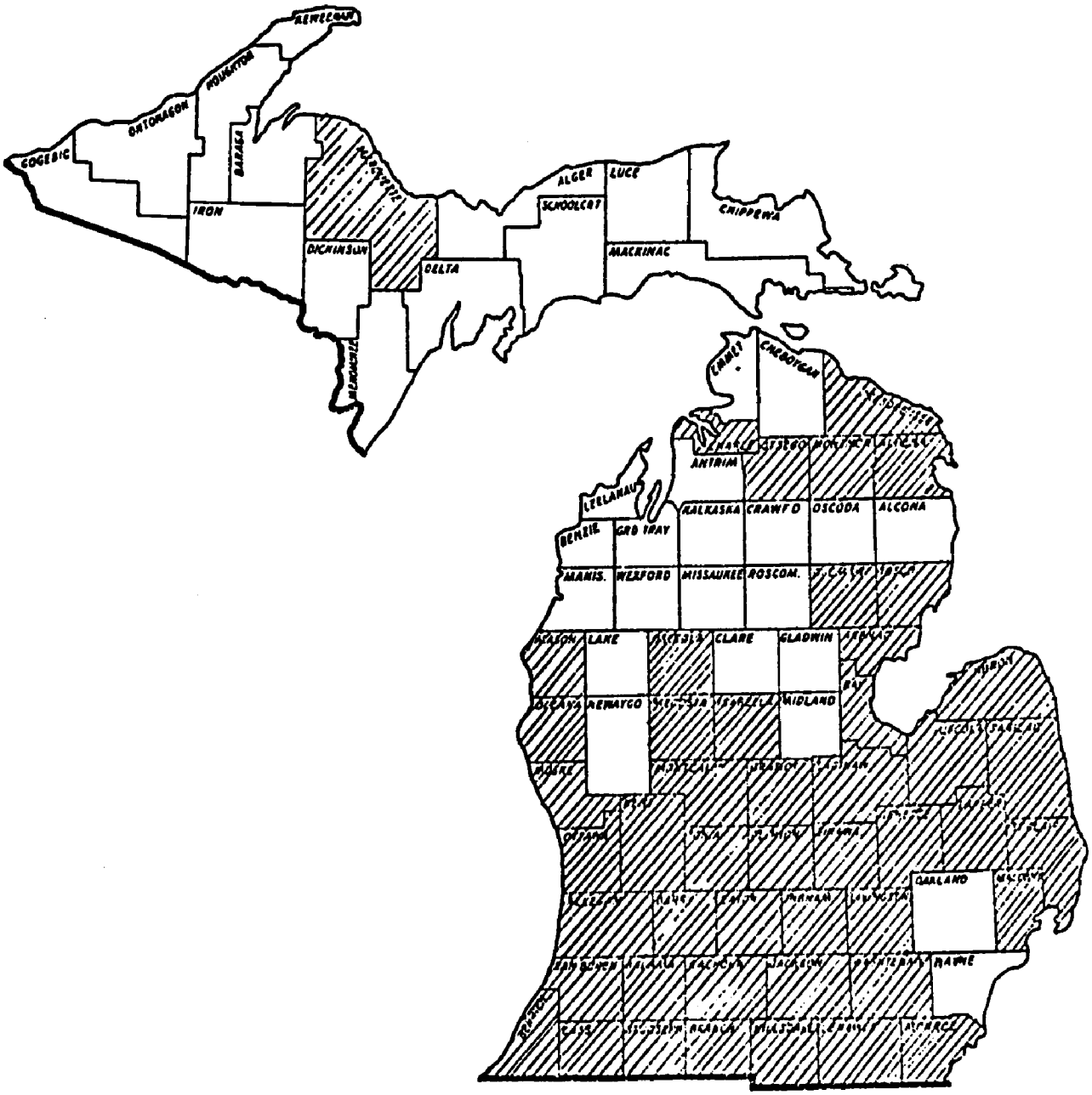


Figure G.1. Michigan Counties with Computer Terminals (1978 Data).

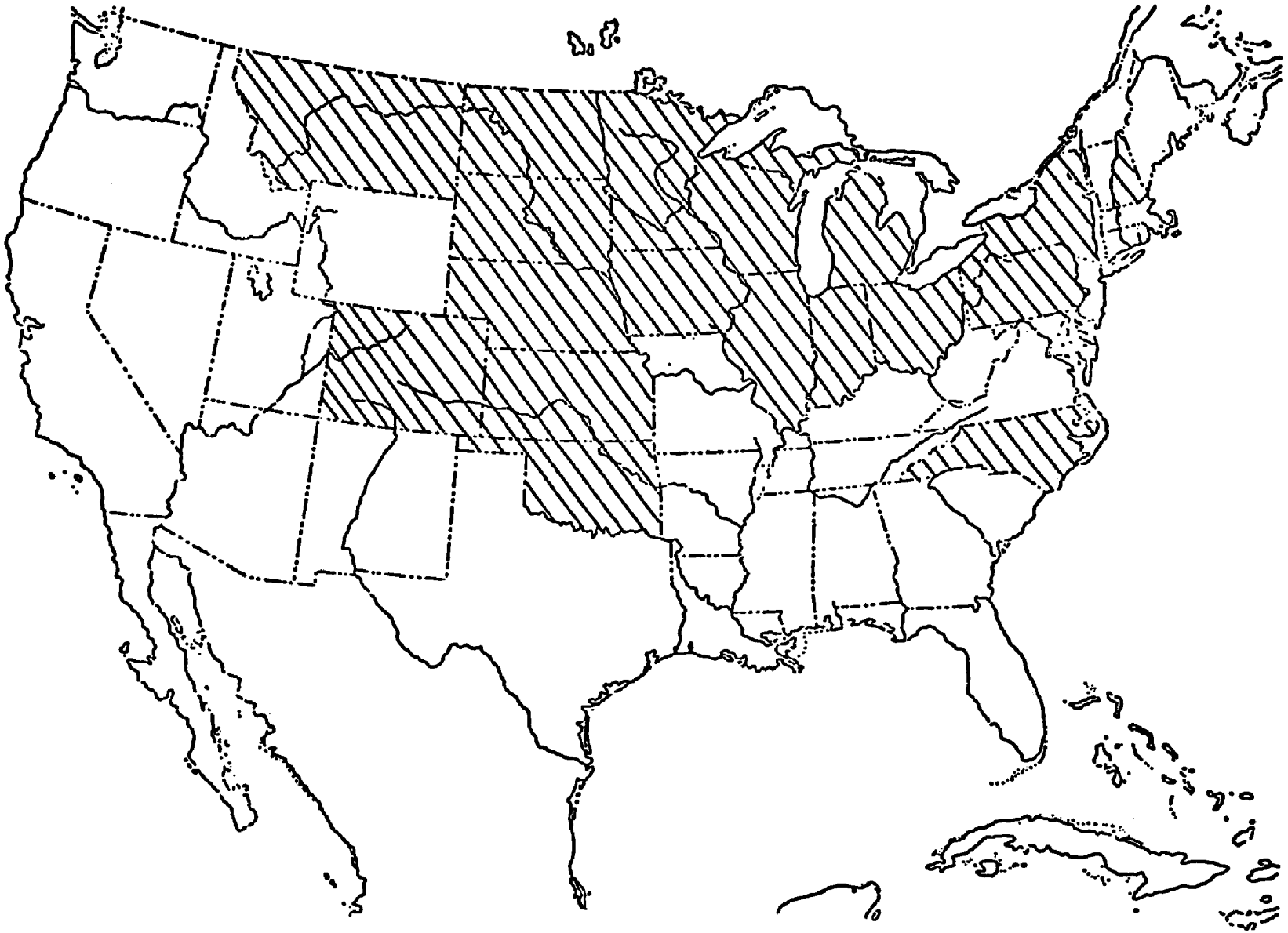


Figure G.2. States Using the Telplan System (1978 Data).

0:201
(Rev. 5-1-77)

Table G.1. MSU Index of Telplan Programs*.

PROGRAM NO.	FORM NO.	PROGRAM TITLE	PROGRAM IS USED TO:	USER MANUAL PAGES AND LAST DATE OF REVISION	OUTPUT OPTIONS**
01	0	Compound Interest Model	compute the future value of a sum of money using the compound interest formula or to discount future money streams.		PH,HCR,HCS
02	1	Investment Planning For New Dairy Systems Dairy Systems Analysis	determine the total investment capital, feed storage capacities, acreage and labor required on a new or expanded dairy farm.	02:1 TO 02:13 Nov. 10, 1975	PH,HCR
03	3	Capital Investment Model	evaluate the investment of capital to reduce or eliminate costs including custom hire and leasing, or to generate new income.	03:1 TO 03:13 Jan. 15, 1972	PH,HCS
04	0	Air-Blast Sprayer Calibration	compute discharge rate from one side of an air-blast sprayer.	(Input form self-expl.)	PH,HCS
05	7	Income Tax Management Analysis	compute an estimate of the current year's income tax, next year's tax and the appropriate tax strategy to be used in making year-end tax management decisions.	05:1 TO 05:10 Nov. 20, 1976	PH,HCR,HCS
06	0	Apple Scab Spraying+	determine degree of infection expected and spray chemical to use.	(Input form self-expl.)	PH,HCS
07	0	Spray Compatibility+	determine spray chemical compatibility and tolerances if used together.	(Input form self-expl.)	PH,HCS
08	0	Weed Sprayer Calibration	compute nozzle spacing and gallons per acre applied with specified settings.	(Input form self-expl.)	PH,HCS
09	0	Plant Disease Identification	identify several plant diseases derived from entering symptoms.		PH,HCS
10	0	Soybean Herbicide Recommendation+	select a soybean herbicide program based on weeds present, soil type, crop history, etc.	(Input form self-expl.)	PH,HCS
11	0	General Linear Programming	solve various least-cost or profit maximization problems after setting up budgets.	(Input form self-expl.)	PH,HCS
12	1	Swine Ration Formulation	formulate the least-cost combination of feed ingredients that meet the nutrient requirements for growing and finishing rations.	12:1 TO 12:08 Jan. 20, 1973	PH,HCR,HCS

*Prepared by Stephen B. Harsh, Department of Agricultural Economics, Michigan State University.

**PH = Voice output, touch-tone input.
HCR = Hard-copy terminal input and output with description of output.
HCS = Hard-copy terminal input and output with shorten output.

+Used primarily for demonstration purposes.

PROGRAM NO.	FORM NO.	PROGRAM TITLE	PROGRAM IS USED TO:	USER MANUAL PAGES AND LAST DATE OF REVISION	OUTPUT OPTIONS**
14	1	Fertilizer Recommendations	compute amounts of N, P, K, lime and magnesium required from given soil test results.	14:1 TO 14:08 Jan. 2, 1973	PH,HCS
15	1	Poultry And Game Bird Ration Formulation	evaluate the nutrient content of an existing ration or to formulate a balanced, least-cost ration for specific birds given feeds available, their prices, and special restrictions.	(Rough Draft Exists) June 15, 1977	PH,HCS
16	0	Corn Herbicide Recommendations+	select a corn herbicide program based on weeds present, soil type, crop history, etc.	(Input form self-expl.)	PH,HCS
17	0	Beef-Price Forecasting Model	forecast future expected prices of beef cattle.	(Input form self-expl.)	PH,HCR,HCS
18	2	Corn-Bean Enterprise Planning Guide	determine the best corn and soybean production systems and enterprise mix.	(See Program 18, Form 1 Manual)	PH,HCR,HCS
19	0	Labor Estimator	estimate total farm labor requirements given size and kinds of crop and livestock enterprises.	(Input form self-expl.)	PH,HCS
20	0	Livestock Feeding Planning Guide	compare profits from alternative feeding programs	20:1 TO 20:07 Feb. 15, 1971	PH,HCS
21	1	Livestock Farm Planning Guide	determine the most profitable fed beef, corn grain and corn silage enterprise mix given expected prices, yields, production costs, machinery performance, field time and tillable land available.	(See Manuals For Programs 22, Form 0 And 26, Form 1)	PH,HCS
22	0	Corn Enterprise Planning Guide	determine the best corn production system including machinery complement and hybrid selection.	22:1 TO 22:24 Dec. 20, 1971	PH,HCS
23	0	Dairy Cow Cost/ Return Model	evaluate the economics of selected dairy cows, given the associated milk production factors and costs.		PH,HCS
24	1	Swine Finishing Planning Guide	compute profits under alternative feeding programs.		PH,HCS
25	0	Best Depreciation Method	select the best depreciation method considering one's tax bracket and other uses for capital.		PH,HCS
26	1	Best Ration And Feeder Type Selection Model	determine the most profitable type of ration to feed and type of feeder to buy, given feed supplies, purchase and sale options and feedlot capacity.	26:1 TO 26:21 Sept. 1, 1972	PH,HCS

**See Page 0:201.

+See Page 0:201.

PROGRAM NO.	FORM NO.	PROGRAM TITLE	PROGRAM IS USED TO:	USER MANUAL PAGES AND LAST DATE OF REVISION	OUTPUT OPTIONS**
27	0	Corporation Program+	compare annual taxes paid by farm business for various organizational structures.	27:1 TO 27:06 Jan. 1, 1971	PH,HCS
28	1	Survivor's Income Protection	project additional survivor's income needs for the family in case a wage earner prematurely passes away.	28:1 TO 28:06 Jan., 1977	PH,HCR,HCS
29	2	Intergeneration Transfer Cost Estimator+	identify specific costs of transferring an estate from one generation to the next and to illustrate how much these costs can be reduced by estate planning.		PH,HCR,HCS
30	0	Beef Cow Planning Guide	compute profits under alternative feeding systems, calving rate and calf weights.		PH,HCS
31	2	Least-Cost Dairy Ration	formulate and evaluate the least-cost combination of available feed ingredients that meet the nutrient requirements of milking cows, dry cows, and dairy heifers.	(See Manual for Program 31, Form 1 & Supplemental Feed Sheet For Form 2)	PH,HCR,HCS
32	0	Amortized Loan Calculator	calculate the total interest paid and annual interest rate on an amortized loan.	32:1 TO 32:07 Mar. 1, 1972	PH,HCS
33	0	Wet Corn Buying Guide	compute the effective equivalent price of U.S. #2 corn from wet corn.	33:1 TO 33:08 Mar. 1, 1972	PH,HCS
34	1	Machinery Replacement Program	determine the optimum time to replace machinery and the associated cost.	34:1 TO 34:15 May 15, 1971	PH,HCS
35	0	Loan Refinance And Evaluation Model	decide whether to refinance an existing loan, or to compare costs of two different loan plans.	35:1 TO 35:06 Jan. 15, 1971	PH,HCS
36	0	Financial Long-Range Whole-Farm Budgeting	compare alternative long-range plans for a complete farm business. The primary comparisons relate to the financial consequences associated with each plan.	36:1 TO 36:18 Jan. 1, 1974	PH,HCR,HCS
37	0	General Least-Cost Rations+	formulate general least-cost rations, the user must specify the nutrients of each the feeds to be considered and the ration requirements.	37:1 TO 37:16 Feb. 15, 1972	PH,HCS
38	1	Silo Capacity/Cost Analysis	determine size of tower or bunk silos needed to meet silage and/or high moisture corn storage requirements for dairy and beef animals.	38:1 TO 38:15 Apr. 1, 1972	PH,HCS

**See Page 0:201.

+See Page 0:201.

PROGRAM NO.	FORM NO.	PROGRAM TITLE	PROGRAM IS USED TO:	USER MANUAL PAGES AND LAST DATE OF REVISION	OUTPUT OPTIONS**
39	0	Income Possibilities For Crops And Livestock	provide a basis for estimating specific returns from a farm business including crop and livestock.	39:1 TO 39:06 Sept. 1, 1971	PH,HCS
40	0	Beef Expansion Cost Model	determine costs, investments, annual costs and debt repayment for a particular beef feeding system.	40:1 TO 40:05 Nov. 1 1971	PH,HCS
41	0	Impact Of Corn: Soybean Mix	determine the impact on returns to machinery, improvements, and land of (1) allocation of tillable acreage between corn and soybeans, and (2) nitrogen allocation.	41:1 TO 41:16 Feb., 1974	PH,HCR,HCS
42	0	Dairy Pedigree Evaluation Model	obtain an objective measure of an animal's breeding merit based on the animal's own performance and on that of its offspring and ancestors.	42:1 TO 42:12 June 1, 1971	PH,HCS
43	0	Machine Cost Calculator	compute ownership and operating costs for various types of equipment.	43:1 TO 43:07 Feb. 1, 1975	PH,HCR,HCS
44	1	Beef Ration Formulation	formulate the least-cost combination of feed ingredients that meet the nutrient requirements of growing and finishing beef feeders.	44:1 TO 44:59 Dec. 1, 1975	PH,HCS
45	0	Heating And Ventilation Requirements For Cattle Shelters	compute heating and ventilation requirements to control moisture and to maintain a minimum temperature in cattle shelters.	45:1 TO 45:08 June, 1973	PH,HCS
46	3	Michigan Dairy Farm Planner	compute an annual whole farm budget resulting in management income, the feed balance made up of corn equivalents, hay equivalents, and pounds of crude protein and a labor balance given livestock numbers and acreages of specific crops for a dairy farm.	46:1 TO 46:14 Jan. 25, 1977	PH,HCR,HCS
47	2	Calcium For Consumers	compute weekly Recommended Dietary Allowances (R.D.A.) for calcium intake, and weekly cost savings in reducing overconsumption or cost increases in making up calcium deficits. Computation is based on the needs for one person for one week.	47:1 TO 47:07	PH,HCR,HCS

**See Page 0:201.

PROGRAM NO.	FORM NO.	PROGRAM TITLE	PROGRAM IS USED TO:	USER MANUAL PAGES AND LAST DATE OF REVISION	OUTPUT OPTIONS**
48	0	Protein For Consumers	calculate the recommended and actual consumption of protein for one day, given a person's daily consumption of protein, age, and sex. Results are stated in terms of percentage of the U.S. Recommended Daily Allowances (U.S. RDA).	48:1 TO 48:04 June 10, 1974	PH,HCR,HCS
49	1	Family Financial Planning	calculate a monthly cash balance given family income by source and time period and cash outflow by month. Individual monthly details and change in net worth for the year are given.		PH,HCR,HCS
52	0	Monthly Dairy Herd Growth	project a farm's monthly livestock inventory, given current inventories, planned purchases, cull rates, calving interval, and heifer freshening age. Output options are livestock numbers, gross income, feed required and manure generated in any specified 12 month period.	52:1 TO 52:28 Nov. 1, 1975	HCR
53	0	Impact Of Nitrogen On Corn Yields And Profits	determine the rate of nitrogen fertilizer which maximizes net returns per acre or to determine the expected yield from a specified rate of nitrogen fertilizer. Expected yields and added returns to the last 10 lbs of nitrogen are given for 10 and 20 pounds on each side of the most profitable rate OR the specified rate.	53:1 TO 53:09 Feb. 1, 1974	PH,HCR,HCS
54	0	Life-Cycle Management Of Swine	develop schedules for breeding, farrowing, nursing, weaning, feeding and marketing swine.		HCR
55	0	Feeder Enterprise Planning Guide	compare the profitability and break-even prices for alternative feeder types, feeding systems, and marketing systems. A comparative analysis of alternative systems can be carried out by doing a base analysis followed by subsequent adjusted analyses.	55:1 TO 55:11 Feb. 15, 1973	PH,HCR,HCS
56	1	Simulation Of Feedlot Performance Of Growing And Finishing Cattle.	calculate the expected payweight daily gain, feed conversion, and feed disappearance given ration sequence, feedor type, feeder condition, and environment.	56:1 TO 56:18 Feb. 1, 1977	HCR
57	0	Feedsheet Calculation For Beef Rations	calculate the percentage composition and scale readings on an as-fed basis for alternative feed truck load sizes.	57:1 TO 57:05 June 1, 1977	HCR

**See Page 0:201.

PROGRAM NO.	FORM NO.	PROGRAM TITLE	PROGRAM IS USED TO:	USER MANUAL PAGES AND LAST DATE OF REVISION	OUTPUT OPTIONS**
58	0	Batch And Crossflow Corn Dryers	assist in understanding how the cost per bushel for drying high moisture shelled corn is affected by changing the operating conditions of the drying equipment.	58:1 TO 58:38 Mar. 15, 1976	PH,HCR
60	0	Dollar Watch	compute an estimate of a monthly budget by family size, income and whether or not a family has a car payment. To compare that budget in dollars and percents with a "typical" budget for urban families of similar size and income based on Bureau of Labor Statistics figures and University of Michigan Consumer Finance studies and farm families on income to the Farm-Operator Family Living Expenditures. The aim is to encourage families to begin thinking about how their money is being spent, not to offer a specific plan.	60:1 TO 60:13	PH,HCR,HCS
62	1	Optimum Furniture Cutting Program	determine which grade(s) of lumber are least expensive in meeting the needs of the rough mill cutting bill.		HCR
63	1	Taking Charge Of Your Food Dollar	design a personalized spending plan for food for your family, based on the number of persons in your household, the number of meals they usually eat at home each week, and individual nutritional needs.	63:1 TO 63:14 Nov., 1976	HCR
64	0	Data Expansion Program	expand on the input section of TELPLAN programs that are designed for and need a larger input section than the basic program allows. NOTE: Should be used only by more experienced TELPLAN user's.		PH,HCR,HCS
65	0	Dairy Farm Linear Programming	compute the most profitable dairy herd size, amount of purchased feeds, and crop combinations given available land, labor plus any special restrictions set by the user.	65:1 TO 65:48 Sept. 15, 1976	HCR
68	0	In The Bank Or Up The Chimney	help you figure out what it might cost to add these energy-savers to your house, how much each might save on heating costs, and how long it would take to pay off your initial investment.		HCR
69	0	Dairy Health And Breeding Management	decide what specific animals should be bred, receive health treatments or require special management attention, given a herd of dairy cows. Designed for daily use out of a farm milk house office.		HCR
70	0	Horse Ration Formulation	formulate the least-cost combination of feed ingredients that meet the nutrient requirements of growing and finishing horses.		HCR
71	0	Should I Participate In The Food And Agriculture Act of 1977?	evaluate the return to "fixed" factors of participating vs not participating in the wheat and corn "price support" program.	(Input form self-expl.)	PH,HCR

**See Page 0:201.