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COMPUTER INNOVATION IN SOCIAL SERVICES

by

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THE UNIVERSITY OF CALGARY

FACULTY OF GRADUATE STUDIES

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies for acceptance, a thesis entitled, "Computer Innovation in Social Service Organizations" submitted by Roderick Rode in partial fulfillment of the requirements for the degree of Master of Social Welfare.


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ABSTRACT

A survey of randomly selected non-government social service organizations was undertaken in order to identify organizational characteristics that distinguish agencies which innovate by purchasing computers and to describe the extent to which organizations own and use computers. Thirty-two percent (32%) of organizations currently own one or more computers, 9% have decided to purchase a computer, 33% are investigating computer ownership, 17% have never considered computer purchase, and 9% have decided not to buy. Sixty-five percent (65%) of owners own only one computer.

There is almost no reported resistance to computer ownership by agency staff, clients, funders, board members, or directors. There is also no evidence that staff opinions about computers affect organizations' decisions to purchase. The degree to which staff are knowledgeable about computers, total agency budget, and the availability of outside computer expertise together account for 46% of the variance in innovation among agencies.

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CHAPTER ONE

MICROCOMPUTERS IN THE HUMAN SERVICES

The microcomputer is arguably one of the most important innovations to appear in the first half of this decade. Many are touting it and other advances in computing technology as the advent of an information revolution that will have as much impact on humanity as did the agricultural and industrial revolutions (Toffler, 1981; Schoech, 1982). Almost every magazine stand and bookstore offers literature describing how computers can, have and will alter the ways in which we gather and process information.

One consequence of the advent of the microcomputer is that it is now possible for small businesses to purchase their own computers (Taylor, 1981). Enthusiasm has been generated in the social service sector about the potential of computers to help social workers in the areas of word processing, statistical analysis, sorting and retrieving data, testing clients, and training counsellors (Pyle, 1984; Schwartz, 1984; Flynn, 1985; Romanczyk, 1986). There is interest in using computers to support clinical decisions in the mental health field (Carlson, 1985). Software is available to help social workers compile client social histories (Gingerich, 1985). Social service agencies are also interested in computers for their potential to help meet the demands of funders for increased accountability. Accountability includes generating and disseminating information about programs, measuring outcomes of service, evaluating results of service, accounting for funds, and monitoring and reporting on unit costs. These tasks require access to

and manipulation of large amounts of data, and are thus facilitated by the use of computers (Schoech, 1982).

Not all social service agencies have purchased computers. As with any invention, some organizations are quicker to innovate than others (Rogers and Shoemaker, 1971). When innovation or other organizational change is attempted, it does not always succeed: for example, California failed in its attempt to implement a centralized computer social welfare information system (Dery, 1971).

This study was concerned with factors that characterize innovative organizations. A survey was undertaken of social service organizations in Calgary, Alberta. The goals of the study were to identify factors which are related to the readiness of organizations to innovate and to generate information about the extent of computer ownership and use by social service organizations. The findings could be of practical value to managers seeking to increase the innovativeness of their agencies.

CHAPTER TWO

OVERVIEW OF THE STUDY OF INNOVATION

Motivation for Studying Innovation

In the context of this study, innovation is a procedure or technology that is new to an individual person or organization. Some individuals are quicker than others to adopt innovations. The study of innovation is concerned with identifying traits that distinguish early adopters of innovations from those that are slow to innovate or that might never adopt the innovation.

Studies of individuals have found normal frequency distributions of the percentage of members of a social system that adopt an innovation each year (Rogers and Shoemaker, 1971). Furthermore, it is possible to categorize adopters according to their place on the normal curve. Innovators (the earliest adopters) comprise 2.5 percent of the population. They have been observed to be venturesome and cosmopolitan. Early adopters, 13.5 percent of the population, are more integrated into the social system than innovators. They are opinion leaders whose views are highly respected by other potential adopters. The early majority, 34 percent of the population, are deliberate in their decisions, and rarely hold positions of leadership. Late majority individuals (34%) are skeptical and cautious. Laggards, 16 percent of the population, tend to be suspicious of innovations and to make decisions based upon tradition (Rogers, 1962; Bohlen, Coughenour, Lionberger, Moe, and Rogers, 1968; Rogers and Shoemaker, 1971; Feller and Menzel, 1978; Turnbull and Meenaghan, 1980).

Rogers and Shoemaker (1971) note that the place of innovators on the adoption curve is over two standard deviations below the mean time to adoption of an innovation after its introduction. Early adopters are between one and two standard deviation units below the mean. Laggards are one unit above the mean. No distinctions have emerged among laggards that would justify a category that is over two standard deviations above the mean.

Organizations have also been the subject of studies of innovativeness (Human Interaction Research Institute (HIRI), 1976). A manager who is thinking of introducing computers to his or her organization will be concerned with how receptive the organization is to innovation. From a manager's point of view, the study of innovation is worthwhile if it leads to an understanding of how organizational factors can be manipulated to increase the organization's receptivity to the adoption of computers.

From a broader perspective, the applied study of innovation can be viewed as an attempt to discover ways to decrease the time it takes for an innovation to be adopted by most organizations within an industry. Assuming an innovation to be beneficial, the overall goal of an industry would be to accelerate the rate of innovation, thus changing the shape of the adoption curve from a normal curve to one with a steeper peak. Although it is not necessarily disadvantageous to be a laggard (laggards might avoid and learn from the mistakes of earlier adopters), there is the widely-held idea that most organizations would benefit from earlier adoption of new technologies. This is an underlying assumption of this study.

Definitions

Innovation: The use of a procedure or technology that is new to an organization. In this study, "computer ownership" is the innovation interest.

Daft and Becker (1978) point out that some authors reserve the term "innovation" for those cases in which an organization is the first within an industry to use a new procedure or technology. Organizations which adopt the technology later are not considered innovators. However, most authors prefer the less restrictive definition used in this paper. It might be more illuminating to study innovativeness as a process involving a set of organizations rather than as an event affecting one.

Adoption: The decision by an organization to innovate.

Diffusion: The spread of an innovation among organizations within an industry.

Implementation: The continued use of an innovation by an organization.

Adoption and implementation are points on a continuum (Glaser, Abelson, and Garrison, 1983).

Research on Organizational Innovation

The literature contains many studies that attempt to describe factors which distinguish early from late adopters of innovations. The literature is large, diverse and difficult to summarize. Rogers and Schoemaker (1971) counted (6,811 generalizations derived from diffusion research. Davis and Salasin (1980) estimated that there were over 20,000 relevant citations. They note wryly that, "turning to the change

literature for useful help is like having one's thirst quenched by a fire hose" (p. 395).

The diversity of the literature is illustrated by the work of Rogers and Schoemaker (1971) who categorized seven major research traditions in the study of diffusion of innovations.

Tradition	Typical Innovations Studied
1. Anthropology	Technological ideas (steel ax, the horse, water-boiling, etc.)
2. Early sociology	City manager government, postage stamps, ham radios
3. Rural sociology	Agricultural technology (weed sprays, hybrid seed, fertilizers); health care ideas (vaccinations)
4. Education	Kindergartens, driver training, modern math, programmed instruction
5. Medical sociology	Drugs, vaccinations, family planning, family planning methods
6. Communication	News events, agricultural innovations
7. Marketing	New products (e.g., coffee brand)

Organizing the Literature to Make it Manageable

The Human Interaction Research Institute (1976) describes the study of the diffusion of innovations (or knowledge utilization) as a field that is concerned with:

- (a) developing insights on the part of both knowledge producers and knowledge users into the underlying processes of knowledge development, dissemination and implementation;
- (b) identifying factors that account for speed in adaptation or adoption following the development stage; and
- (c) generating strategies or measures for enhancing appropriate and timely utilization.

The literature will be reviewed under these three headings. This study is concerned mainly with the second topic, factors which affect the ability and willingness of organizations to purchase computers. The literature bearing on this issue will, therefore, be examined in greater detail than that subsumed by the other headings.

CHAPTER THREE

HOW ORGANIZATIONS LEARN ABOUT POTENTIALLY USEFUL INNOVATIONS

The effort to solve an organizational problem can lead to the discovery of a potentially useful innovation. Organizations that learn about innovations while searching for solutions to a problem have been described as "problem-driven" (Glaser et al., 1983).

Knowledge of an innovation can also be introduced to an organization in the absence of a search for the solution to a problem. Awareness might be the result of efforts of the producer of the innovation to disseminate information, or information about the innovation might be obtained from reports in the media, from contact with users of the innovation, from technical journals, conferences, or exhibitions. Discovery of the innovation might lead an organization to consider its implementation. This process of innovation is described by Glaser et al. (1983) as "knowledge-driven."

A manager might want to maximize the chances that information about potentially useful innovations will reach the organization, thereby increasing the organization's prospects for knowledge-driven innovation. This issue can be considered both from the perspective of the producer of an innovation and from a manager's perspective.

The Producer's Perspective

The tactics used by producers of innovations to persuade potential users to adopt them vary from disseminating information about an

innovation (e.g., writing a research report) to actively attempting to persuade potential users to purchase a product.

Disseminating Information

Disseminating information about a product does not in itself guarantee that the product will be adopted (Glaser et al., 1983). For example, Kozma (1978) selected influential professors to develop and implement classroom teaching techniques involving the innovative use of existing technologies. He found that although innovative professors contacted their peers, thereby increasing their peers' awareness of the innovations available, relatively few new classroom techniques were adopted by other professors.

Glaser et al. (1983) elaborate upon this point in their comprehensive review of the literature.

The publication of research findings does not necessarily result in widespread absorption of these findings by practitioners. It is estimated that half the articles in "core" scientific journals are each read by no more than 200 persons, although distribution of preprints and reprints augments this total exposure (Garvey and Griffith, 1964). Monographs, like books, usually attract the more academic reader and have a limited distribution. Thus, the potential for dissemination of new knowledge through the professional literature appears limited because of the small size of the audience in proportion to the actual number of practitioners in the given field (p. 312).

McNeece, DiNitto and Johnson (1983) found that evaluative research data are seldom used in program decisions by directors of community mental health centres. Rather, the availability of funding was the most important factor influencing program change.

King (1981) argues that although scholars thrive on abstract ideas presented in print, film or video is a better medium to disseminate ideas to practitioners. Innovators should, therefore, adopt an active marketing strategy instead of a passive publication strategy. Kiresuk, Davis and Lund (1980) express the opinion that some researchers are reluctant to involve themselves in the turmoil that would result from actively facilitating the practical utilization of their findings by practitioners. Other researchers might be concerned that their findings will be used inappropriately. The authors maintain that, "For these and other reasons, some researchers not only do not stimulate the use of their findings, but sometimes attempt to retard, or at least moderate, the dissemination process" (p. 297).

Personal Contact

Some form of personal contact is a more promising technique for producers of innovations.

The use of agents to inform potential users of innovations and to persuade them to adopt innovations is more effective than merely disseminating information about innovations. After reviewing the literature, Rogers and Shoemaker (1971) report that, "earlier knowers of an innovation have greater change agent contact than later knowers" (p. 349). And, "earlier adopters of innovations have more change agent contact than later adopters" (p. 371).

The authors also report that although the use of mass media by producers will increase knowledge of innovations, personal contact is more effective in persuading potential users to adopt the innovation. This generalization is supported by the results of a study conducted by

Rogers, Daley, and Wu (1982). They discovered that home computer users were influenced by mass media when deciding whether or not to purchase a computer, but were more influenced by interpersonal channels of communication when choosing the brand of computer that they purchased.

Glaser et al. (1983) conclude from a review of the literature that interpersonal communication is the most important factor in creating interest in new ideas. This can include informal interaction or interaction at conferences, workshops, demonstrations, and trade fairs. Once a potential user becomes interested in the innovation, other sources of information about the innovation are used.

From the perspective of the producer of innovations, the most effective strategy to make potential users aware of an innovation is to use a variety of interpersonal communication methods.

The Manager's Perspective

The preceding findings indicate that a manager can maximize the chances that information about innovations will come into the organization by encouraging staff to attend workshops, seminars, demonstrations, and other events where they will make contact with people who have knowledge of innovations. Many organizations have staff who informally serve as the communication link between the agency's staff and external sources of information (Tushman, 1977). These staff are known as gatekeepers. From a review of the literature and his own study, Tushman concludes that, ". . . staff who fulfill the boundary role (gatekeepers) should be recognized, encouraged and supported by management in order to set the stage for innovation" (p. 604). A

manager could identify the agency's natural gatekeepers, those with a high degree of contact with outside sources of information, and encourage them to bring information about innovations into the organization.

Research has been done regarding the personal traits of early knowers of potential innovations. From their review of the literature, Rogers and Shoemaker (1971) conclude that early knowers have more education than late knowers, have higher social status, have a higher level of social participation, and are more cosmopolitan than later knowers. Earlier knowers also have greater exposure to mass media and to interpersonal sources of communication than later knowers. The implication of these findings is that an organization employing people with "early knower" traits will learn about innovations sooner than other organizations, especially if managers encourage them to perform a gatekeeper role.

There is some evidence that innovation is facilitated in organizations whose staff are encouraged to discuss and examine innovative ideas. These organizations tend to have clear, appropriate, and achievable goals which are understood and adhered to by most employees. At the same time, each employee has a relatively large amount of latitude in the performance of his or her tasks (HIRI, 1976).

Knowledge of Computers

It is assumed that all managers of social service agencies are aware of the existence of computers and that most managers have at least a general understanding of the potential benefits of computers. Therefore, in the case of computer ownership, it is unlikely that early knowledge of computers is an important predictor of innovation.

Consequently, no further consideration of the literature dealing with how organizations become aware of innovations will be presented. The more relevant question, and the one that is the main subject of this study, is "What factors distinguish innovative from non-innovative organizations?"

CHAPTER FOUR

FACTORS AFFECTING AN ORGANIZATION'S READINESS TO INNOVATE

A decision in favor of the adoption of an innovation will depend largely upon the extent to which an organization is ready to accept innovation. Many factors thought to be related to organizational innovativeness have been studied. These include the personal characteristics of organizational decision makers, the ability of an organization to afford an innovation, the degree to which the philosophy and values of the staff in an organization are compatible with the proposed change, the extent to which agency personnel perceive that the benefits of change outweigh the costs, and the extent to which personnel resist the innovation in question (HIRI, 1976; Glaser et al., 1983). The greater the presence of factors which facilitate innovation, and the fewer the presence of inhibiting factors, the more likely it is that the organization will adopt an innovation (Kiresuk et al., 1980).

This question has been studied in relation to many types of organizations. These include social work agencies, schools, government organizations, business and industry, hospitals and mental health centers, and scientific organizations (HIRI, 1976).

Personal Characteristics of Innovators

Reference was made previously to studies which identify the traits of early knowers of innovations. Studies have also been conducted to identify personal characteristics of decision makers who display

innovative behavior. Kirton (1980) has developed an instrument, the Kirton Adoption-Innovation Inventory, to measure the innovative personality.

Rogers and Shoemaker (1971) carried out a comprehensive review of the literature on innovation. In comparison to less innovative individuals, innovators tend to be more intelligent, more cosmopolitan, more empathic, more commercially oriented, less dogmatic, better able to deal with abstractions, more open to change and risk-taking, more positive about the benefits of education, less fatalistic, more oriented toward achievement, and more modern in outlook.

Although the findings relating personal traits to innovation are based upon the study of individuals rather than organizations, it seems possible that there is a relationship between innovativeness and the number of innovative staff employed by an agency. A manager who is interested in increasing the overall innovativeness of the organization might adopt a long-term policy of hiring people who possess the characteristics of innovators. However, there was no attempt to measure the personal traits of agency employees in the present study. There are two reasons for this. First, the scope of the study precluded such measurement. Secondly, measures of staff opinions about computers and knowledge of computers were included in the study. It will be shown that measures of opinions and knowledge of staff about a prospective innovation have been found to be related to organizational innovativeness. These measures are likely to be correlated with measures of personal traits related to innovativeness.

Categorizing Variables Related to Innovativeness

The diversity of variables studied has retarded the development of a commonly accepted theory of organizational readiness to innovate. Roessner (1980) makes this point.

There is no shortage of variables influencing the innovative behavior of individuals and organizations and thus the extent and rate of diffusion of innovations. . . . The literature thus lacks parsimony; the list of influential variables is unmanageably large whether one's intent is to integrate them into theory or to design a major study that would reduce the list. . . . A second problem is model specification--determining which are the key variables and which are surrogates for, or covariates of, others . . . (p. 196).

Several attempts have been made to address the difficulty noted by Roessner by classifying these variables. Glaser (1973) contends that there are four factors which bear upon the utilization of an innovation by an organization.

1. Characteristics of the innovation in question.

Glaser developed the acronym CORRECT in reference to seven traits of innovative ideas that have been found to be related to adoption. These are (a) *credibility* (sound evidence supporting the viability of the innovation or advocacy for the innovation by respected persons); (b) *observability* of the operation of the innovation by potential users; (c) *relevance* of the innovation to the solution to problems experienced by potential users; (d) *relative advantage* to existing techniques; (e) *ease* with which the innovation can be understood and adopted; (f) *compatibility* of the innovation with potential users' philosophy, values, and procedures; (g) *trialability*

(degree to which it is possible to adopt the innovation one step at a time, and abandon it if unsuitable).

2. Characteristics of the potential users.

Innovation utilization is enhanced by a leadership style that encourages openness to change.

3. Dissemination of knowledge about the innovation.

Innovation is facilitated if potential users are in personal contact with consultants or experts in the use of the innovation.

4. Context factors.

Innovation is facilitated if pressures are placed upon potential users from people outside the organization to innovate. Pressure to innovate might also be generated internally if staff are dissatisfied with some aspect of the organization's operation.

The AVICTORY model of innovative behavior is mentioned frequently in the literature. AVICTORY is an acronym for eight groups of variables identified through research on innovation (Davis, 1978; Davis and Salasin, 1980). The eight components are ability, values, idea, circumstances, timing, obligation, resistances, and yield.

AVICTORY is a model rather than a specific set of variables. Several variables can be subsumed under each AVICTORY category. A researcher can use the model as a guideline to select variables that are reasonable to include in a particular study.

For example, Giannetti, Johnson, James, and Williams (1978) used the AVICTORY model to devise a measure of the readiness of community health centers in the United States to accept automated data processing applications. The authors chose fourteen variables which were subsumed in the eight AVICTORY categories in the following way.

Ability.

- (a) Willingness and ability to commit resources to automated data processing (ADP) applications;
- (b) present availability and skill level of manpower to plan and implement ADP applications and knowledge of ADP methods by those concerned.

Values.

- (c) Attitudes of personnel toward ADP;
- (d) organization's history of support for change;
- (e) traits of staff or administrators thought to bear on acceptance of ADP applications;
- (f) work, supervisory and interpersonal relations;
- (g) personnel policies of the organization which are related to innovativeness.

Idea.

- (h) Availability and use of procedures and channels for recording and communicating information.

Circumstances.

- (i) Aspects of the organization relating to procedures, job duties, requirements and expectations;
- (j) quality of the relationship between the center and those it serves and works with.

Timing.

- (k) Timing of ADP application to coincide or coordinate with other program or organizational activities.

Obligation.

- (l) Felt need to take action to change.

Resistance.

(m) Perceived negative consequences of computer technology.

Yield.

(n) Perceived reward of adopting ADP applications.

The AVICTORY categories will be described in more detail below and illustrated with relevant studies. This is a convenient way to summarize the literature and to introduce the description of variables chosen for this study.

Ability.

Ability has two components. The first is the availability of funds for innovation or the ability of the organization to raise funds. The second is the availability of expertise in the use of an innovation.

A survey of U.S. Community Mental Health centers revealed that computer use is positively related to the ability to commit resources to computer applications (Giannetti et al., 1978). Perry and Kraemer (1980) confirmed the importance of slack resources in predicting innovation among chief executives in local government. McNeece et al. (1983) found that the factor most likely to induce directors of community mental health centers to make changes is the availability of funds.

Researchers have hypothesized that an organization's size and the extent to which it enjoys slack resources are measures of its ability to innovate. Young, Hougland, and Shepard (1980) studied the innovativeness of banks in using computers and introducing credit cards. They discovered that organizational size is the factor most strongly related to innovativeness.

Musmann (1982) studied factors related to the innovativeness of libraries. He found that organizational size, the presence of professionally-oriented staff and the level of funding were positively related to innovation. Formal decision-making processes and centralized decision-making structure were negatively related to innovation.

Some studies have found little or no relationship between innovation and organization size. Delbecq and Pierce (1978) discovered that the size of medical organizations had no effect on their adoption of innovations. Feller and Menzel (1978) concluded that for municipal government in the United States, the cost of an innovation alone is not a primary determinant. The authors studied forty-three technological innovations in urban fire fighting, solid waste collection and disposal, traffic control and air pollution control. They found that adoption was generally not related to the cost of innovations.

In addition to financial capability, ability includes the availability of expertise to implement an innovation. Both internal and external expertise are important (HIRI, 1976). Expertise can be obtained from outside the organization. The rate of adoption of an innovation is related to the extent to which an organization receives support from other organizations that have already adopted the innovation (Rothman, 1974). It is expected that innovative directors have access to people outside the organization with computer expertise in addition to employing staff with expertise.

Values.

Adoption is positively related to the compatibility between an innovation and the "potential user's previously established values, norms,

procedures, and facilities" (Glaser et al., 1973, p. 31). Rogers and Shoemaker (1971) generalize from a review of studies that the compatibility of a new idea, as perceived by members of a social system, is positively related to its rate of adoption.

It might be hypothesized that social service practitioners have a philosophical bias against computers. In describing the introduction of a computer to a hospital setting, Sherman (1981) expresses the opinion that, "The precise, mechanistic, numerical world of computers conflicts with clinicians' humanistic values. Therefore, we should design for peaceful coexistence" (p. 446).

On the other hand, the author's experience is that people who use computers in the human services do not perceive themselves as mechanistic or anti-humanistic. It is probable that a practitioner will abandon any preconceived misapprehensions about the dehumanizing effects of computers as he or she becomes familiar with computers. However, it is the perception of computers held by people prior to the decision whether to adopt that matters in considering factors related to innovation. It is reasonable to argue that practitioners' value judgements about computers will affect the decision to adopt.

Idea.

The AVICTORY category "idea" (described by some authors as "information") refers to the nature of the innovation in question. The characteristics of an innovative idea as perceived by those considering change will affect the adoptability of the innovation. A number of authors have noted that the complexity of innovations and the degree of

difficulty involved in implementing innovations are related to the rate at which they are adopted (HIRI, 1976).

Adoption is facilitated if the idea in question can be implemented one step at a time and can be abandoned if it does not work out--the so-called "trialability" of the idea. The characteristics of adaptability (the flexibility of the innovation) and observability (the extent to which the innovation's products can be observed) are related to adoption. Adoption is also positively related to the ease with which an innovation can be put into operation or translated to different settings (Rogers and Shoemaker, 1971; Glaser, 1973; Glaser et al., 1983).

Ostlund (1974) discovered that the perceived relative advantage of new household products for buyers and their compatibility with buyers' existing habits were positively related to innovation. Perceived product complexity and the perceived risk involved in using the product were negatively related. These perceptions of product characteristics were better predictors of buying behavior than the personal characteristics of the buyers.

Alland and Wolf (1977) questioned educators about their adoption of innovations. They discovered that the complexity of innovations was negatively related to adoption whereas the extent to which the innovation was perceived to be "trialable" was positively related to adoption.

It is probable that staff who are knowledgeable about computers will perceive them to be less complex and easier to adopt than staff who have less knowledge. In this way, knowledge is a measure of the perception held by staff of the adoptability of computers.

Circumstances and timing.

Innovation is facilitated if circumstances and timing are favorable for adoption. An example of a favorable circumstance for computerization would be if the organization were in the process of revising its information systems.

Davis (1978) illustrates circumstances and timing by describing the reaction of a commissioner of public welfare to people who were proposing to implement an aftercare program for patients discharged from mental hospitals.

"In your (demonstration) project, your workers had their offices in the city, very close to the hospital, and the locations of the patients after discharge were also fairly close. There aren't many parts of the state where things are that convenient. Will the plan be feasible?" The *circumstances*, the commissioner was pointing out, likely would work against the success of the change.

"The counties aren't going to volunteer to use their scarce resources for added service unless legislative budget adjustments are made. The state legislature hasn't met. How will I bridge things throughout the rest of the biennium?" *Timing* had just been given consideration (p. 654).

Obligation.

Innovation is more likely to occur if staff, clients, board members or other significant actors put pressure on the organization to innovate. Stolz (1981) points out that an organization is likely to perceive that it has an obligation to change when faced with a pressing management problem. Glaser (1973) notes that adoption is positively related to the extent to which sound evidence of the innovation's value exists or to which it is espoused by respected persons.

McNeece et al. (1983) found that after the availability of funding, the three next important inducements to change for mental health center directors are data on client need for a new service, client demand for the service and community pressure to provide the service.

If change takes place in the absence of a perceived obligation to innovate by a key person or group, implementation of the innovation might be less successful than desired. Johnson, Williams, Giannetti, Klingler, and Nakashima (1978) observed that a unit of a hospital to which a computerized assessment procedure had been introduced had not accepted the procedure as fully as other units. A retrospective study of the organization's readiness to innovate revealed that the unit scored poorly on the AVICTORY category of obligation.

Resistance.

There are several potential sources of resistance to innovations in organizations. Some staff might perceive that an innovation will result in a loss of power or prestige. Hasenfeld (1980) thinks that change modifies "resource-allocation roles in the organization, resulting in shifts of power among units" (p. 508).

Hammer and Hile (1985) reviewed the literature on resistance to automation by professionals in mental health. They conclude that clinicians might resist computers because they perceive that computerized tasks require a different style of working than that which is required to build helpful relationships with their clients. Resistance also develops when clinicians are not involved in decisions to computerize and when the time and effort required to computerize is considerable.

Perry and Kraemer (1980) speculate that computer innovations frequently involve individuals or organizational subunits in making claims against the current distribution of resources (salaries, new equipment, information, or control of resources). Computers might set up strong resistances because they threaten to decrease some people's share of resources.

Musmann (1982) (quoting Katherine Burke) classifies innovations according to the degree of change required by individuals or organizations.

0. No change
1. Behavior change
2. Rule change
3. Power change
4. Values/goals change (revolutionary)

The greater the change within the organization which the innovation promises to create, the greater are the resistances that will be created.

After reviewing relevant studies, Sampson (1983) concludes that staff resistance is a major barrier to the adoption of computer applications. The main reasons for resistance are limited staff participation in the design of computer systems and the lack of a planned strategy for change by administrators.

Resistance to innovation is not necessarily negative. Feller (1982) notes that resistance might arise from an accurate assessment that a preferred innovation would not benefit the organization.

The expressed resistances of key actors to the idea of adopting computers is expected to be inversely related to an organization's adoption of computers. The greater the degree of resistance to change

which is present in an organization, the more effort a manager will have to put into devising and implementing tactics to overcome resistance.

Yield.

The rate of adoption of an innovation is related to people's perceptions of its advantages relative to other innovations or to the status-quo. Innovations perceived to be more advantageous will be adopted more frequently than those perceived as less advantageous (Glaser, 1973; Rogers and Shoemaker, 1971; Rothman, 1974).

An innovation with the potential to solve a persistent problem that concerns many people is more likely to be considered for adoption than one that is not related to a general problem or that benefits only a small number of people (Glaser, 1973). A crisis situation might emphasize the relative advantage of an innovation (Rothman, 1974).

It is likely that the more dissatisfied administrators are with agency operations that could be improved with computerization, such as reports of service statistics, the stronger are their perceptions that computers have an advantage over existing techniques.

Assessing Readiness to Change

A manager might implement change in an organization without realizing that inhibiting factors override facilitating factors. Or a manager might realize that inhibiting factors predominate, but impose change regardless. If change is imposed in an organization that is not ready to innovate, the innovation is less likely to endure and to be used effectively than if factors had been favorable toward innovation at the point of implementation (Glaser, 1981).

A manager who proceeds to introduce change in an organization that is not ready to change runs the risk that the innovation will not be used successfully and will not be durable (Johnson et al., 1978; Glaser, 1981; Glaser et al., 1983). A prudent manager will first assess the organization's readiness to change. If assessment reveals that conditions are not favorable for change, measures should be taken to make the organization receptive to innovation prior to any attempt to implement change (Davis and Salasin, 1980; Schoech, Schkade and Mayers, 1981).

CHAPTER FIVE

STRATEGIES FOR IMPLEMENTING CHANGE

The third general topic addressed by the literature on innovation is that of developing strategies and implementing tactics to effect change. The assumption which underlies interest in this topic is that the successful introduction of change depends largely upon the use of tactics that overcome resistances to innovation. The durability of the innovation will depend partly upon how well the change strategy decreases resistances to change and increases the chances of acceptance (Glaser, 1973; Byrnes and Johnson, 1981).

Because resistance is a natural part of the change process (Byrnes and Johnson, 1981), it is necessary for administrators to plan, even in organizations where conditions are favorable for change. Curtis (1983) argues for the importance of developing explicit plans for change that are based upon proven strategies.

. . . everyone has plans whether formally established or not . . . the plans differ in quality, not in whether they exist or not. The characteristics of poor . . . plans are that they are implicit and vague. . . . Good planning attempts to apply well-tested problem-solving techniques to a business (p.2).

The Importance of Staff Participation

The tactic of having personnel participate in change decisions has been studied frequently. Nurick (1982) compared staff who participated in an organizational change process with those who did not. He concludes that participants experienced greater psychological benefits in the

form of increased influence over work-related decisions and improved attitudes. The implication of Nurick's finding is that staff participation decreases resistance. This interpretation is supported by Rogers and Shoemaker (1971) who, after reviewing four studies, conclude that an individual is more likely to accept innovation if he or she has participated in the decision to innovate.

Van de Ven (1980) compared an innovation strategy, the Program Planning Model (PPM), with conventional strategies in creating child care programs. Van de Ven defines the conventional approach as a process that is undertaken by an elite group of decision makers or a centralized planning unit. Problems and their solutions are identified by the planners with little or no participation by citizens or other parties. The decision makers submit a proposed solution to policy makers or funders. The proposal is often attacked by groups that might have competing interests. Proposals tend to be implemented without evaluation.

The PPM begins with the establishment of a planning policy board made up of representatives of constituencies that have an interest in the problem being addressed. Staff planners report to the board. In the study reported, planners obtained data about the need for child care programs by asking questions of citizens and prospective clients. The results were reviewed by the planning policy board, by the participants in the survey, and by other relevant interest groups. Alternative solutions to the problems identified in the survey were developed. The alternatives were reviewed by the board and then distributed to participants and interest groups for comment. A program proposal was then developed. Workshops were conducted in the community, and

modifications were made to the proposal after feedback was received from workshop participants.

The next phase of the process is to implement the proposed program on a pilot basis. Adjustments are made after an evaluation of the pilot program. The final version of the program is then implemented.

After comparing child care programs implemented with conventional strategies with those implemented by the PPM, Van de Ven concludes that implementation success increases with the use of the PPM.

Other Change Strategies

Byrnes and Johnson (1981) refer to three general strategies for change which were articulated by Kotler: power (seeking compliance through reward and punishment); persuasion (convincing others that change is in the best interest of all involved); re-educative strategy (altering people's beliefs and/or values). A manager will likely use all three strategies in implementing a change.

Glaser et al. (1983) present a more comprehensive range of change strategies that a manager can use. These include the use of coercion and power (unilateral goal-setting); the presentation of data or information about difficulties in the organization that might induce staff to support change; the use of rewards and punishments as incentive to change; the use of reasoned arguments to persuade employees to accept change; and attempts to change employees' attitudes, values, or skills in ways that will incline them to support change.

Summary of the Literature Review

Reference has been made to literature that examines how organizations become aware of innovations, that examines variables which are related to an organization's readiness to implement change, and that examines strategies that managers use to introduce change.

An administrator can increase the organization's awareness of potentially useful innovations by ensuring that personnel are designated to learn and report about innovations. A sound strategy is to encourage staff, especially the organization's gatekeepers, to participate in conferences, workshops, demonstrations, and other events where they will come into contact with people who have knowledge of innovations. A manager can facilitate internal discussion and acceptance of potential changes by creating a climate wherein employees are encouraged to examine innovative ideas.

Administrators are advised to assess their organizations' readiness to innovate and, if necessary, to take measures to increase the ability and readiness of the organization to accept change. However, no commonly accepted theory of organizational innovativeness has emerged, even though many variables have been studied. Managers are faced with the task of deciding which variables are most important to consider. In the present study, the AVICTORY model of innovation is used as a guideline to choose variables that are likely to bear upon the decision whether or not to purchase a computer.

Resistance normally accompanies change. The literature advises administrators to implement tactics that will minimize resistance, thereby increasing the chances of successful adoption. It is effective to include

staff in the decision to innovate and in decisions surrounding the implementation of innovations.

The present study is concerned with identifying variables that are related to organizational readiness to innovate. Computer ownership is the innovation in question.

CHAPTER SIX

DESCRIPTION OF STUDY VARIABLES

Measuring Innovativeness

One way to measure innovativeness is to count the number of innovations that an organization has adopted. Darley and Beniger (1981) counted the number of energy-saving devices adopted by homeowners. Kozma (1978) counted the number of innovative classroom teaching techniques used by university faculty members. Leonard-Barton (1984) counted the number of new products and methods used by dentists. Perry and Danziger (1980) examined how many of ten computer applications were used by local governments. In each of these examples, innovativeness is considered to be a function of the number of innovations adopted.

This approach is problematic when studying only one innovation. In the present study, organizations that own one or more computers would be considered innovative. Those that do not own a computer would all be considered non-innovative. There would be no way to distinguish organizations that are close to making a decision to purchase from those that have never considered purchasing a computer. Both would be considered "not innovative" even though the agency that is closer to purchase is clearly more innovative than the one that has not considered purchase.

A more promising approach is to classify organizations according to how close they are to making a decision to adopt an innovation. For example, Delbecq and Pierce (1978) devised a list of potential innovations

for medical clinics. They then asked respondents to indicate the status of each innovation within the organization. The range included "under formal discussion within the agency," "formally proposed to agency decision makers," "adopted by the agency," and "implemented." Innovativeness is defined as a function of the stage an innovation(s) has reached in the process used by the agency to decide whether or not to introduce a change. The advantage of this approach is that it allows agencies to be compared on the basis of the stage each has reached in relation to the most innovative status, computer ownership. Put another way, it measures agencies' relative positions on the adoption curve.

Degree of Innovation Scale

It is assumed that the agencies studied could be distinguished in the following manner.

1. The agency already owns a computer(s).
2. A decision has been made to purchase a computer(s).
3. Computer ownership has been or is being actively investigated.
4. Informal discussions were held about purchasing a computer.
5. The agency has never considered purchasing a computer.

Two types of organizations do not fall within this continuum. These are agencies where:

1. A decision was made not to purchase a computer after discussion and/or investigation was undertaken.
2. A computer purchase was made but the agency decided to give it up.

Decision to not purchase.

It can be argued that, for some agencies, the costs of computer ownership outweigh the benefits. In this case, it is rational to not computerize. The decision would not reflect unreadiness to innovate. These agencies might have characteristics similar to organizations that have purchased computers.

Other organizations, however, might well benefit from computers but decide not to computerize. In this case, the decision is indicative of a lack of readiness to change. It is beyond the limits of this study to evaluate the decisions of agencies that have decided against computer ownership. It is not possible to determine where these organizations should be placed on the innovation scale. These agencies will, therefore, be treated separately when data are analyzed.

Discontinued use of computers.

The other problematic case is the organization that decides to give up computer ownership. This could indicate that when the decision was made to adopt, the organization was not really ready to innovate. The readiness to innovate of such organizations could be anywhere between that of agencies that have decided to purchase and the readiness to innovate of those that have held informal discussions. Because there is no satisfactory way of determining exactly what innovation score to assign to such organizations, this group will also be treated separately in the analysis. It is expected that only a small number of agencies will have discontinued use of computers.

Measurement of the dependent variable.

Indicators were developed to measure whether an organization has reached a given stage of ownership. Each indicator was in the form of a statement that could be answered either "true" or "false" by agency directors. Agencies were considered to have reached a given stage if directors responded positively to one or more statements considered indicative of a stage of innovation. The indicator statements and scale score for each stage are presented below.

1. Computer owner: the organization owns one or more computers (score 5).
2. Decided to buy: a definite decision has been made to purchase a computer, even though it might not yet be known exactly what kind to buy (score 4).
3. Formal investigation state (one or more of the following statements is true): someone has been assigned to learn more about computers; books, articles or magazines about computers were obtained and reviewed; someone representing the agency visited a computer store; experts about computers were consulted; someone representing the agency attended a course or workshop to acquire information related to a purchase decision (score 3).
4. Informal investigation state (one or more of the following statements is true): informal discussions were held among staff about the possibility of purchasing a computer(s); informal discussions were held with funding sources or board members . . . ; time was allocated at meetings to discuss . . . (score 2).
5. Purchase has never been considered (score 1).

6. Decided not to buy: a decision was made not to purchase a computer (scale not applicable).
7. Gave up: the organization used to own at least one computer, but decided to give it up (scale not applicable).

It was anticipated that with the exclusion of organizations that have decided not to buy and agencies that have given up computers, the preceding classification will produce a Guttman scale. If the innovation scale is a Guttman scale, scores corresponding to each agency's place on the scale can be assigned. The highest score (5) would be assigned to agencies that own computers.

This procedure would not distinguish among owners according to the length of time of computer ownership. If organizations have had equal exposure and equal access to computer technology, earlier purchasers can be considered to be more innovative than later purchasers. Earlier purchasers will thus be placed in a separate category and assigned the score of 6.

Earlier purchasers are agencies that have owned one or more computers for at least eighteen months. The choice of eighteen months was originally made with reference to the author's personal experience that organizations require this much time to learn enough about their software and hardware to begin using it effectively. The choice of eighteen months is also supported by the study of Miles, Fullan, and Taylor (1978), who found it took about that long after adoption to institutionalize innovative organizational development programs in schools. Further support for this decision is derived from the categorization of adopters described in Chapter Two. In the present study, 15.3 percent of the respondents analyzed have owned computers for eighteen months

or more. This is almost equal to the combined proportion (16%) of innovators and early adopters on the innovation curve. To the extent that the adoption curve for individuals can be applied to organizations, the choice of eighteen months distinguishes agencies that are one standard deviation below the mean.

Although the choice of eighteen months seems supportable in light of the preceding findings, it must be acknowledged that the issue of how to distinguish among early and later adopters is not addressed conclusively in the literature. Therefore, analysis of results will be undertaken both with all owners as an undifferentiated category and also with earlier purchasers distinguished from more recent owners.

Agencies' positions on the scale were determined by a telephone interview of directors. In addition to designating the indicator statements true or false, directors were asked about the age of their organizations, how many computers the agency owns, how long the organization has owned a computer, how many computers the agency uses, how long computers have been used, and how many staff are employed by the organization.

Organizational Readiness to Innovate

An attempt was made to find good measures of variables indicative of organizational readiness to innovate. Two normalized measures were discovered that measure opinions and knowledge about computers. Six other variable measures were developed for the study. Each consisted of statements that, if true, would indicate that a factor related to innovativeness is present in the organization. It was assumed that

agency directors would know whether the statements were true. Finally, agency budget was included as a variable.

The variables chosen for the study are suggested by the AVICTORY model but do not follow the model rigidly. No attempt was made to develop measures for two of the AVICTORY factors, "circumstances" and "timing." Assessing circumstances and factors related to timing which affect innovativeness would require a detailed knowledge of an agency's current situation and history: it would not have been feasible to devise measures of these factors. Furthermore, it is argued that the more readily measured variables of obligation and resistance are probably highly correlated with circumstances and timing. Obligation and resistance consisted of statements that directors have heard from key actors in favor of or against computerization. It is likely that circumstances and timing factors which bear upon innovation would have a substantial influence upon the opinions of key actors about the advisability of purchasing computers.

Independent Variables

Financial ability.

Unlike profit-seeking businesses, social service agencies are restricted in their ability to borrow funds for computerization. Most social service organizations are incorporated as non-profit societies: many are restricted by their bylaws from borrowing. The requirement that non-profit agencies produce balanced budgets at the end of the fiscal year also restricts borrowing. Rather than borrow money, social service agencies must raise funds for computers from their normal sources or from special fund raising activities.

Three statements about an organization's ability to raise funds for computers were presented to directors, who were asked to check true statements. The statements are:

- (a) "Your agency could raise at least \$5,000 not provided for in the existing budget through a special fund-raising activity or grant";
- (b) "You have been told by a funder(s) that money would be given to you to purchase a computer"; and
- (c) "At least \$5,000 could be made available in the existing budget to purchase a computer."

A score equal to the sum of true statements was assigned. Financial ability was expected to be positively related to innovativeness.

Agency budget.

It has been noted that the results of studies regarding the relationship between agency size and innovativeness are inconsistent. Agency budget is included as a variable because of the possibility that it is associated with computer ownership.

Outside expertise.

Directors were presented with three statements. These are:

- (a) "You know someone with an organization which owns a computer from whom you do receive advice about computers";
- (b) "Money is available or could be made available in the existing budget to hire a consultant to give advice about computers"; and
- (c) "You know of a person with expertise about computers who would give advice free-of-charge."

A score equal to the sum of true statements was assigned. Access to outside expertise was expected to be positively related to innovativeness.

Internal expertise.

Directors were presented with four statements. These were:

- (a) "You know that at least one of your staff is an experienced computer user";
- (b) "You consider yourself an experienced computer user";
- (c) "You know that at least one of your staff has a computer at home";
and
- (d) "You have a computer at home."

A score equal to the number of true statements was assigned. Internal expertise was expected to be positively related to innovativeness.

Obligation

Directors were asked if either (a) clients, (b) board members, (c) staff members, or (d) funders have said that the organization should own a computer. A fifth statement asked if the director was in favor of the agency purchasing a computer. A score equal to the sum of true statements was assigned. For agencies with only one staff where the director answered "true" to the statement about his or her own attitude about computers, 1 was added to the score. This was to compensate for the fact that one-person organizations could never score 1 for the statement about staff members. Obligation was expected to be positively related to innovativeness.

Resistance.

Directors were asked if either (a) clients, (b) board members, (c) staff members, or (d) funders have said that the organization should not own a computer. A fifth statement asked if the director was opposed to the agency purchasing a computer. A score equal to the sum of true statements was assigned. For agencies with only one staff where the director answered "true" to the statement about his or her own attitude about computers, 1 was added to the score. This was to compensate for the fact that one-person organizations could never score 1 for the statement about staff members. Resistance was expected to be negatively related to innovativeness.

Dissatisfaction with agency operations.

Directors were asked to indicate whether they were currently dissatisfied with the cost, the accuracy, the timeliness or the comprehensiveness of five agency operations. These were (a) reports of service statistics, (b) accounting, (c) mailing, (d) budgets, and (e) typed reports and correspondence. These are operations that could be expected to improve with the use of computers. It is likely that a high level of dissatisfaction by a director is indicative of a perception that computerization could yield benefits. A variable score equal to the number of operations checked by directors was assigned. Dissatisfaction was expected to be positively related to innovativeness.

Opinions about computers.

The "Opinions About Computers" questionnaire was a twenty-five item scale developed in a previous study to measure attitudes toward

computers. It asks respondents their level of agreement or disagreement with twenty statements about the advantages and disadvantages of computers. The scale has satisfactory construct, criterion, and discriminant validity. The Cronbach's alpha reliability coefficient is .81. The scale was normalized on a group of 227 subjects who were heterogenous with respect to gender, age, education, and occupation. Directors were asked to distribute the questionnaire to their staff. It was expected that a favorable staff attitude toward computers is positively related to innovativeness.

Knowledge about computers.

The "Knowledge About Computers" questionnaire, a twenty-item, multiple-choice questionnaire, was developed in a previous study to measure knowledge about computers. The scale has satisfactory construct, criterion, discriminant, and factorial validity. The Cronbach's alpha reliability coefficient is .83. This scale was normalized on the same group of subjects as the "Opinions About Computers" scale. Directors were asked to distribute the questionnaire to their staff. It was expected that knowledge of computers by staff is positively related to innovativeness.

The Questionnaires

The preceding measurements were contained in a questionnaire mailed to directors. The questionnaires presented to directors of agencies that already owned a computer were slightly different from the statements described in the previous section in that directors were asked to indicate the truth of the statements as they applied to the agency

prior to the purchase of its first computer rather than currently. The owners' and non-owners' questionnaires are in Appendix C.

Another difference between the two questionnaires is that directors of owner agencies were asked if they had been employed by the organization at the time that it purchased its first computer. Because microcomputers have been widely available for only about five years, directors who were employed by their organizations at the time of the agency's first computer purchase would be able to answer the questionnaire reliably. Directors who were not employed by their agencies at the time of first purchase could not be expected to answer reliably. Their responses were excluded from the analysis.

Possible Effects of Ownership on Responses

The experience of computer ownership might affect opinions and knowledge of computers. This possibility could best be tested in the context of a longitudinal study. In such a study, questionnaires would be administered initially to non-owners. As some organizations purchased and began to use computers, the questionnaires would be readministered periodically to all agencies. If it were found that opinions and knowledge scores had changed in owner agencies to a greater extent than in non-owner agencies, it might be argued that ownership affects these variables.

Opinions.

If ownership affects opinions about computers, the opinions scores of staff in organizations whose directors are dissatisfied with the results of computer ownership would likely be lower than those of agencies

whose directors are satisfied with computer ownership. Two items attempted to measure directors' satisfaction with computers. The first is a duplicate question of the dissatisfaction measure, reworded to ask the director if he/she is currently dissatisfied with agency products. The second is a five-item scale which asks the director to rate the results of computerization. If the opinion scores of organizations are related to satisfaction scores, it might be argued that ownership has an effect on this variable. If there is no relationship, more confidence can be placed in the proposition that there is no effect of ownership on staff opinions.

Knowledge.

It was expected that the knowledge scores of staff from owner agencies would be higher as a result of computer ownership regardless of whether the organization's experience has been positive or negative. Length of ownership was correlated with knowledge scores. A positive correlation would be consistent with the argument that ownership affects knowledge.

CHAPTER SEVEN

THE STUDY

Data Analysis

The Guttman Scale program of the Statistical Package for the Social Sciences (SPSS) was used to test the hypothesis that agencies proceed through the decision-making stages of the scale of innovation. After excluding agencies that decided not to buy computers or that gave up computers, a coefficient of reproducibility of over .98 and a minimum marginal reproducibility of .66 was found (for a 32 percent improvement). This result confirms that agencies proceed through the designated stages and supports the decision to define innovativeness in terms of organizations' relative positions on the innovation curve.

The variables of financial ability, outside expertise, internal expertise, obligation, resistance, and dissatisfaction with agency operations were devised for the present study. Each variable score is the sum of a set of statements marked "true" by directors. These measures are an ordinal scale. Although it cannot be claimed that the distance between scale intervals is constant, the higher an agency's score, the greater the presence of the factor in the agency. For example, an organization that could raise \$5,000 through a special fund-raising activity or grant and has also been told by a funder that money would be given to purchase a computer has more fund-raising options and thus more ability to purchase than an agency that has only one of these options. This way of assigning scores to ordinal variables is referred to by Allen (1976) as Likert or summative scaling.

Multiple regression is well-suited to describe the relationship between innovativeness and organizational factors. Although one of the general assumptions for application of multiple regression analysis is that data are interval scale, multiple regression with ordinal and even nominal scale data is widely practiced and defended (Labovitz, 1971; Allen, 1976).

Labovitz (1971) supports the use of interval techniques with ordinal data.

Empirical evidence supports the treatment of ordinal variables *as if* they conform to interval scales (Labovitz, 1967). Although some small error may accompany the treatment of ordinal variables as interval, this is offset by the use of more powerful, more sensitive, better developed, and more clearly interpretable statistics. . . (p. 515).

Perhaps the most important reason for treating an ordinal variable as if it conforms to an interval scale lies in the opportunity it provides for applying well-developed and interpretable multivariate techniques. Although partials can be applied to ordinal measures, e.g., partial *tau*, partial *gamma*, or partial *rho*-these are often difficult to interpret (p. 522).

Achen (1982) notes that, ". . . if the researcher sets up the problem correctly, regression will tend to the right answer under any reasonable practical circumstances, even if a great many of the classical postulates are violated" (p. 29). Additional support for the use of multiple regression comes from Bohrnstedt and Carter (1971), who investigated the effects of violating the assumptions of regression analysis. They make the following observations regarding the assumptions of normality and homoskedasticity.

There has been more research done on the effects of nonnormality on robustness than on any violated assumption. In particular, it has been shown by

Bartlett (1935), Boneau (1960), Gayen (1949), and Srivastava (1958) that the population distributions of the disturbance term have little effect on obtained t values in repeated samples, given a sufficiently large sample size (p. 123).

. . . several investigations have been done to show the effect of nonhomogeneity of variances on the F -distribution (Norton, 1952; Cochran, 1947; Godard and Lindquist, 1940), and the results are similar to those reported above for nonnormality. That is, the number of significant F -tests and their magnitude are likely to be virtually unaffected unless heterogeneity among the variances is marked (p. 124).

The data were examined for gross violations of the common assumptions. Marked heteroskedasticity can be detected through the analysis of residuals (Lewis-Beck, 1980). The linearity of the independent variables can be tested by examining scattergrams of the bivariate regressions of each variable with the dependent variable (Achen, 1982).

Multicollinearity can be detected by regressing each independent variable on all other independent variables and examining the R^2 's from the equations produced. An R^2 near 1.0 indicates that a variable might have to be removed from the equation in order to reduce the degree of multicollinearity to an acceptable level (Lewis-Beck, 1980).

The Sample

A list of Calgary organizations was obtained from the computerized data base of the Alberta Social Resources Inventory. The computer inventory largely duplicates a printed directory, the Community Services Directory of Calgary. Some organizations that were listed in the Directory but not in the data base were added to the inventory to form a list of 237 agencies. A random sample of 125 organizations was selected.

To be eligible for inclusion in the survey, organizations met the following criteria.

1. Organizations were non-government social service agencies in Calgary. Agencies were not part of a government department, not managerially accountable to a government department or ministry, not a unit of a hospital, and not managerially accountable to a hospital department. Units of a large bureaucracy would be subject to different constraints and would have some advantages over small organizations. It would be inappropriate to compare the innovativeness of large public organizations with small non-governmental agencies. The scope of this study precluded investigating both types of organizations.
2. Organizations had a least one paid employee.
3. Organizations provided regular service to the general public or to people with special needs on either a non-profit or a for-profit basis.
4. If the organization selected was a branch office of a larger agency, it was eligible only if the director or office head had the autonomy to initiate funding applications for computers, to introduce computers to the organization, and to decide how the agency should use computers.

Eligible organizations were asked to participate in a two-part survey, described below. In cases where an agency's eligibility for inclusion could not be established by examining its description in the Directory, eligibility was determined in a conversation with the agency director.

The Survey

The first part of the survey consisted of a telephone interview of directors. The purpose of the interview was to administer the degree of innovation questionnaire and to collect information about the extent of computer ownership and computer use. Directors were asked to participate in the second part of the survey by returning mailed questionnaires and by distributing the opinions and knowledge questionnaires to staff.

Frey (1983) reports that an introductory letter to a telephone survey can decrease refusal rates and increase the quality of data obtained. A letter was therefore mailed to directors of the selected agencies explaining the study and announcing that they would be telephoned to participate in a two-part survey. Refer to Appendix B for the introductory letter.

Directors who agreed to participate in the second part of the survey were mailed the questionnaire entitled "Survey for Directors: Agency Information." Depending upon their agency's status as determined in the telephone interview, directors received a questionnaire either for owners or for non-owners. The questionnaire for directors is in Appendix C. Directors also received a package of Opinions and Knowledge questionnaires to distribute to staff, and were asked to complete the Opinions and Knowledge questionnaires themselves. These questionnaires are in Appendix D.

All but twelve directors agreed to accept questionnaires for each of their agency's employees. In three cases, directors said that the reason for not accepting questionnaires for all staff is that it would be prohibitively expensive to have every employee complete the questionnaires. These directors agreed to distribute a sample of questionnaires

randomly. In the other cases, directors explained that most agency staff work entirely outside the office whereas the organization used or would use computers only in the office. According to these directors, the opinions of staff and their knowledge of computers would be irrelevant to the decision to purchase computers.

CHAPTER EIGHT

RESPONSE

Response to the Telephone Survey

Shortly after the start of the telephone survey, it became apparent that an unexpectedly large number of the 125 randomly selected agencies were not eligible for inclusion in the survey. Some organizations were defunct, others employed no staff, and others were non-autonomous units. The organizations that did not employ staff were societies formed by people with special interests and self-help or support groups (e.g., parents who meet to support one another in caring for their handicapped children).

To increase the chances of achieving an adequate response rate, a second sample of 60 organizations was drawn. The size of the second sample was based on an estimate of the maximum number of organizations that could be surveyed in the time allotted for the study.

Of the 185 organizations selected, 65 (35%) were not eligible; 120 organizations were eligible. Eight directors refused to participate in either part of the study. Two directors refused to participate in the second part after completing the telephone interview. No contact could be made with the directors of 14 agencies (8%) despite repeated attempts.

The response of the 120 eligible directors for the telephone survey is summarized below.

Table 1 Directors' Responses to Telephone Survey

Response	No.	Percent
Agreed to participate in both parts of the study	96	80
Refused to participate in either part	8	7
Agreed to participate only in the first part	2	2
No contact could be made with the director	14	12
Total	120	101

Note: Total percentages in this and subsequent tables may not equal 100 due to rounding errors.

Response to the Mailed Questionnaires

Directors' questionnaires.

Ninety-six (96) directors agreed to participate in both parts of the survey. Of these, 73 returned the questionnaire for directors. This is a response rate of 76% of directors who received questionnaires, and 61% of all eligible agencies (120) in the sample.

In three cases, no Opinions and Knowledge questionnaires were returned despite the fact that the director's questionnaire was returned. Two of these agencies employ a total of three staff. The other employs only the director.

At least one Opinions and Knowledge questionnaire was received from the staff of eight organizations whose directors failed to return their questionnaires.

Table 2

Return of Directors' Questionnaire by Receipt of
at Least One Opinions and Knowledge Questionnaire

Opinions and Knowledge questionnaire	Director's questionnaire was:		
	Returned	Not Returned	Total
At least one was returned	70 (73%)	8 (8%)	78 (81%)
None were returned	3 (3%)	15 (16%)	18 (19%)
Total	73 (76%)	23 (24%)	96 (100%)

Agencies from which a directors' questionnaire was received were eligible for further analysis by multiple regression.

Opinions and Knowledge questionnaires.

Opinions and Knowledge questionnaires were mailed to 1181 employees, including directors. A total of 454 questionnaires were returned for an overall response of 38%. When only agencies from which a directors' questionnaire was received are considered, the average response rate from staff to the Opinions and Knowledge questionnaire is 56%.

Table 3
Response Rate to Opinions and Knowledge
Questionnaires

No. of Questionnaires	No. of Agencies	No. of Agencies from which at least one questionnaire was returned	No. of agencies whose director returned a questionnaire	Average response rate from staff of agencies from which a directors' ques- tionnaire was received
1	8	5	6	100%
2 - 5	33	26	24	60%
6 - 10	24	19	19	56%
11 - 20	14	12	9	48%
21 - 30	8	8	7	50%
31 - 40	3	3	3	24%
Over 40	6	5	5	37%
Total	96	78	73	

The response of directors to the telephone survey and questionnaire indicates that there is a high level of interest among directors in questions about computerization (most directors asked for and received a summary of results). The return of 56% of Opinions and Knowledge questionnaires from staff of agencies whose directors returned their questionnaires is understandable in view of the fact that directors were entrusted with the distribution of questionnaires and that only one request for participation was made to staff. It leaves undetermined, however, the representativeness of the respondent sample.

The average response rate from staff decreases as agency size increases. One interpretation of this result is that directors of smaller agencies had more personal contact with their employees when distributing questionnaires than did directors of larger agencies. There are at least two possible reasons why this might have occurred. First, a personal request from the director might have instilled a greater sense

of obligation to comply with the request. Secondly, discussion of the questionnaires between directors and staff might have generated enthusiasm for the project. The latter interpretation suggests that discussions about computers might have included proportionally more staff in smaller agencies. To the extent that staff participation facilitates innovation (Nurick, 1982; Van de Ven, 1980), smaller agencies have an advantage in innovativeness over larger agencies.

The respondent sample is biased in favour of smaller organizations. Consequently, correlations relating to opinions and knowledge about computers that are influenced by organizational size may be correspondingly weakened.

The mean and standard deviation of scores of study subjects were compared with those of the norming group for both the Opinion Questionnaire and Knowledge Questionnaire. There was no significant difference in the mean scores on the Knowledge Questionnaire ($X = 12.066$ for norming group vs. $X = 12.146$ for study subjects). The standard deviation was significantly greater for the norming group ($sd = 6.800$) than for the study subjects ($sd = 4.306$), possibly because of the greater occupational and educational homogeneity of the study subjects. There were no significant differences in either mean scores or standard deviation between study subjects ($X = 74.143$, $sd = 11.571$) and the norming group ($X = 73.951$, $sd = 11.320$) on the Opinion Questionnaire.

CHAPTER NINE

DESCRIPTION OF AGENCIES

Degree of Innovation

The degree of innovation of the respondents to the telephone survey is presented in the left column of Table 4. Thirty-one agencies (32%) own at least one computer. Seventeen of these organizations (18%) have been owners for 18 months or more. Nine percent (9%) have decided to purchase a computer. Thirty-three percent (33%) are in either the formal or the informal investigation stage, 17% have never considered computer ownership; and 9% have decided not to buy. One agency gave up its computer. The reason given for this decision is that the organization could not afford to maintain the computer. The agency hopes to purchase another computer as soon as possible.

Questionnaires were returned by 73 directors. The innovation pattern of this group of agencies is similar to that of the sample of respondents to the telephone interview (Table A-1). The agencies that either decided not to purchase computers or have given up computers were excluded from multiple regression analysis. In addition, six agencies whose directors were not employed by the organization at the time of computer purchase were excluded, leaving 59 cases for analysis by multiple regression. Five of the six agencies that were excluded because their directors were not employed by the organization at the time of computerization are early owners.

The innovation pattern of agencies eligible for multiple regression analysis is presented in the right hand column of Table 4.

Table 4 Degree of Innovation

	All Agencies Telephoned	Eligible for Multiple Regression Analysis
Early owners (18 mos. plus)	17 (18%)	9 (15%)
Later owners	14 (14%)	10 (17%)
Decided to buy	9 (9%)	7 (12%)
Formal investigation	18 (19%)	15 (25%)
Informal investigation	13 (14%)	9 (15%)
Never considered	16 (17%)	9 (15%)
Decided not to buy	8 (9%)	N/A
Gave up	1 (1%)	N/A
	<u>96 (101%)</u>	<u>59 (100%)</u>

Number of Staff Employed

Table A-2 categorizes the number of staff employed by the sampled agencies. More than 50% of the organizations have ten or fewer employees. Eight percent (8%) employ only one person; 14 employ 40 people or more.

Budget Size

Only 53 of the 73 directors who returned their questionnaires revealed the size of the agency's budget. Forty-eight (81%) of the 59 questionnaires eligible for multiple regression include the agency budget. Refer to Table A-3.

Budget Source

Directors were asked to reveal the approximate percentage of the agency budget obtained from each of the following sources: (a) United Way; (b) Family and Community Support Services (FCSS); (c) government contracts or grants; (d) foundations, client fees, fund-raising; (e) non-government contracts or grants. The results for agencies eligible for regression analysis ($N = 59$) are presented in Table 5.

Table 5 Percentage of Agency Budget Obtained from
Various Sources - Agencies
Eligible for Regression Analysis

Source	Mean Percentage	
	Owners	Non-owners
United Way	7.3	12.7
FCSS	3.5	24.3
Government contracts or grants	59.3	27.6
Foundations, fees, fund-raising	29.5	26.6
Non-government contracts or grants	0.4	8.1

Computer owners receive most of their funding from two sources: (1) government contracts or grants; and (b) foundations, client fees, fund-raising.

Age of Organizations

Seventy (70) organizations whose directors returned questionnaires (96%) were in existence before 1980. Three agencies (4%) were established between 1980 and 1983. No agencies came into being after January 1, 1985. It is assumed, therefore, that the sampled organizations have all had substantial access and exposure to computer technology.

Number of Computers Owned

Twenty agencies that own computers (65%) own only one computer. Twenty-nine (95%) own three or fewer computers. The distribution of the sample that was eligible for regression analysis is identical to that of the entire sample (refer to Table A-4). The small number of computers owned suggests that computers are being purchased mainly for administrative functions.

Table 6 Number of Computers Owned

No. of Computers	No. of Agencies	Percent
1	20	65
2	3	10
3	6	20
5	1	3
8	1	3
	31	100

Length of Computer Ownership

Three agencies (10%) have owned a computer for less than six months. Eleven (35%) have been owners for between six and twelve months, two (6%) for 18 months, four (13%) for two years, and eleven organizations (37%) have owned at least one computer for three years or more.

Early owners comprise 17.7% of the sample of agencies telephoned, and 16.9% of the sample eligible for regression analysis. This result is consistent with the proposition that early owners represent the combined categories of innovators and early adopters (16%) as identified by Rogers and Shoemaker (1971). Refer to Table A-5.

Number of Computers Used

Although only 31 agencies (32%) are computer owners, 59 (61%) are computer users. That is, 28 of the sampled agencies (29%) use computers that they do not own; 37 (39%) neither own nor use computers. Refer to Tables A-6 and A-7.

Of the 28 non-owning agencies that use computers, 22 (79%) use only one computer. This suggests that agency line staff do not have extensive access to computers. Refer to Tables A-8 and A-9.

Computer Use

Computers are used for word processing by 80% of owners, but only by 19% of non-owners. Non-owners are interested mainly in accounting functions. Several directors of non-owning agencies volunteered the information that they subscribe to computerized payroll services.

Only two agencies, both computer owners, use computers to help make decisions about clients. Client records are computerized in 40% of owner agencies, but in only 14% of non-owning agencies. Owners of computers seem to be more likely to use computers for client-related functions than non-owners.

Table 7 summarizes directors' responses regarding computer use. Refer to Tables A-10, A-11, and A-12 for a complete description.

Table 7 Uses for Computers by Respondents
to the Questionnaire

Function	Use computers for this function					
	All Users		Owners		Non-Owners	
	N	%	N	%	N	%
Accounting functions	25	54	14	56	11	52
Word processing	24	52	20	80	4	19
Mailing lists	20	43	16	64	4	19
Statistical analysis	14	30	9	36	5	24
Keep client records	13	28	10	40	3	14
Other ^a	11	24	7	28	4	19
Budget planning	7	15	6	24	1	5
Help make decisions about clients	2	4	2	8	0	0

^aOther uses: fund-raising; computer-assisted instruction;
library data base; literature searches

Length of Computer Use

Fifty percent (50%) of owners have been using computers for three years or longer. Thirty percent (30%) of non-owning users have been users for three or more years. Refer to Tables A-13 and A-14.

CHAPTER TEN

FACTORS RELATED TO INNOVATION

Number of Eligible Agencies

Fourteen (14) agencies were excluded from the multiple regression analysis. These are (a) agencies that decided not to purchase computers ($N = 7$), (b) agencies that gave up computer ownership ($N = 1$), and (c) agencies whose directors were not employed by the organization at time of computer purchase ($N = 6$). The exclusion of these questionnaires left 59 cases for analysis.

Assumptions Regarding the Data

A plot of residuals reveals no obvious heteroskedasticity for any of the variables. The pattern of residuals forms a straight band with approximately half the points above and half below the mean.

With one exception, scattergrams of the bivariate regressions of each variable produce no evidence of nonlinearity. Points form a broad band of even width around the regression lines. In the case of agency budget, however, the plot is slightly "j" shaped, indicating some curvilinearity. Examination of the data revealed that this curvilinearity is probably caused by the presence of one or two outliers that represent agencies with very large budgets. A logarithmic transformation of agency budget corrects the problem. The scattergram of the transformed budget variable appears linear.

Each independent variable was regressed on all other independent variables to detect the presence of multicollinearity. An R^2 near 1.0

indicates that a variable might have to be removed from the equation in order to reduce the degree of multicollinearity to an acceptable level (Lewis-Beck, 1980). The highest resulting R^2 is .45; the lowest, .14. This level of multicollinearity is not high enough to be problematic.

Review of Variables in the Analysis

Nine variables were analyzed for their contribution to the variance in organizational innovativeness as measured by the innovation scale. These were ability to raise money for a computer (financial ability), agency budget, outside computer expertise, internal computer expertise, perceived obligation to purchase a computer, resistance to purchasing a computer, dissatisfaction with agency operations, staff opinions about computers, and staff knowledge about computers. These variables are suggested by the AVICTORY model of innovation. However, two of the AVICTORY model variables, circumstances and timing, were not included because of the impracticality of obtaining measures.

Variables were analyzed using the forward stepwise multiple regression procedure of the SPSS program with mean substitution for missing values. Independent variables were allowed to enter and remain in the equation if the F ratio computed in a test of significance of the variable's regression coefficient produced a probability less than or equal to 10% ($p = .1$). Stepwise inclusion will produce the best prediction equation as efficiently as possible (Kim and Kohout, 1975).

Exclusion of resistance.

Almost no resistance was reported by the directors of the organizations that were eligible for regression analysis ($M = .17$, $SD = .38$). No

organization scored higher than 1. Slightly more resistance was noted among organizations that have decided not to purchase computers ($M = .57$, $SD = 1.09$). However, the increased variance within this group is due solely to two agencies with scores of 3. No other agency that decided against purchase scored higher than 1. Resistance was, therefore, eliminated from the multiple regression.

There are two explanations for the lack of resistance.

1. There is not much resistance to computers among the staff of the sampled agencies.
2. Staff are resistant to computers, but do not communicate that resistance to directors.

A survey of professional social workers in Canada (Nutter, Gripton and Murphy, 1986) lends support to the first interpretation. Respondents expressed a high degree of agreement with the statement that "computers will soon make it very easy to get useful information from most social work information systems." If it is assumed that social workers place a high value on having access to information systems, it would appear that social workers look forward to computerization, or at least are not resistant.

Regression Results

Multiple regression analysis produces an equation of the form $Y = a + b_1X_1 + b_2X_2 + \dots + b_kX_k$. The independent variables are represented by X_1 ; a is a constant, and Y is the predicted value of the dependent variable for given values of X . The symbol b_1 represents the regression coefficient for the variable X_1 . The regression coefficient is

the average change in Y that is associated with a unit change in X (Lewis-Beck, 1980).

Results are presented both with unstandardized regression coefficients and with standardized regression coefficients. Unstandardized coefficients are in the original units of the independent variables. Standardized coefficients (beta weights) are based upon standardized X and Y values. They have the advantage of revealing the amount of change in standard deviation units that would be expected with a change of one standard deviation unit in the independent variable (Kim and Kohout, 1975). Regression coefficients have practical implications for observers interested in understanding which independent variables might be manipulated in order to have the maximum impact on the dependent variable (Achen, 1982). This interest is based upon the supposition that Y is partly caused by the independent variables. Multiple regression analysis only describes a relationship among variables: it does not, by itself, reveal the cause of the relationship.

Other output will be reported. The multiple correlation coefficient, R (which can vary between 0 and 1), measures the strength of the relationship between the dependent variable and the independent variables. The square of R , R^2 , is a measure of the amount of variance in the dependent variable that is accounted for by the independent variables. An R^2 of 1 would indicate that all the variance in the dependent variable is explained by the independent variables. In practice, an R^2 of 1 is seldom approached: for example, the average amount of variance accounted for in 36 studies of innovation using multiple regression analysis is 43 percent (Rogers and Shoemaker, 1971).

Adjusted R^2 is a more conservative estimate of variance, especially with small samples (Kim and Kohout, 1975). The standard error (SE) is the standard deviation of actual Y values from the Y values predicted by the regression equation. The larger the SE , the poorer the predictive power of the equation.

Finally, p (the probability that the multiple correlation is 0 in the population from which the sample is drawn) will be reported, along with the F value upon which p is based (Kim and Kohout, 1975).

Budget

Eleven directors did not reveal their agency's budgets. Examination of the data reveals that nine of these agencies (82%) have ten or fewer employees. In the larger sample of agencies, 55% have ten or fewer employees. It is probable that the mean budget of these eleven agencies is lower than the sample mean. The substitution of the mean for missing budget information in the SPSS procedure might introduce bias in the regression. It was therefore decided to perform regressions both with and without the transformed budget variable.

A regression was also performed using the pairwise deletion of missing data option of the SPSS procedure. In pairwise deletion, budget is simply not considered in the computation for cases in which it is missing. The results with pairwise deletion were almost identical to those with mean substitution. Because all variables are used in the calculations when mean substitution is used, the regressions with mean substitution will be reported.

Regression with budget included.

When the transformed budget variable is included in the regression, budget, knowledge, and outside expertise enter the equation as statistically significant variables.

$R = .68$, $R^2 = .46$, adjusted $R^2 = .43$, $SE = 1.26$, $F = 15.45$, $p < .0001$.

The regression equation with unstandardized coefficients is:

$Y = -5.61 + 1.19 \text{ budget} + .14 \text{ knowledge} + .49 \text{ outside expertise}$.

With standardized coefficients, the equation is:

$Y = -5.61 + .44 \text{ budget} + .36 \text{ knowledge} + .24 \text{ outside expertise}$.

Regression with budget not included.

When budget is excluded, obligation, knowledge, and outside expertise enter the equation as statistically significant variables.

$R = .57$, $R^2 = .32$, adjusted $R^2 = .29$, $SE = 1.4$, $F = 8.77$, $p = .0001$.

The regression equation with unstandardized coefficients is:

$Y = 0.58 + .27 \text{ obligation} + .13 \text{ knowledge} + .47 \text{ outside expertise}$.

With standardized coefficients, the equation is:

$Y = 0.58 + .25 \text{ obligation} + .33 \text{ knowledge} + .23 \text{ outside expertise}$.

More variance is accounted for when budget is included in the regression. The standard error is also less. The regression coefficients for knowledge and outside expertise are similar to those produced by the first equation.

Regression with owners excluded.

When owners are excluded from the regression, knowledge, budget, and outside expertise disappear. Only obligation remains in the equation.

$R = .85$, $R^2 = .72$, adjusted $R^2 = .72$, $SE = .55$, $F = 89.95$, $p < .0001$.

The equation with unstandardized coefficients is:

$$Y = 1.29 + .52 \text{ obligation.}$$

The equation with standardized coefficients is:

$$Y = 1.33 + .85 \text{ obligation.}$$

The amount of variance accounted for by the independent variables is 72% as opposed to 43% with owners and budget included. The standard error is reduced from 1.26 to .55. The relatively large regression coefficient of .85 indicates that an increase of one standard deviation unit in obligation is associated with an increase of almost one unit of innovation.

Knowledge and internal expertise are close to inclusion, with significance levels of .12 and .15 respectively. This suggests the possibility that agencies develop a sense of obligation to computerize as they investigate computer ownership, and that knowledge and expertise develop at a later stage. If knowledge is not an important factor prior to adoption, staff are probably not participating widely in the decision to innovate. If obligation is one cause of innovation, as seems reasonable to assume from the literature, change agents in organizations that are near the bottom of the innovation scale might be advised to develop strategies to increase the perceived obligation to computerize of board members, staff, funders, clients, and directors.

Regression with owners in one category.

When owners are not distinguished by length of ownership, but rather are all assigned the highest innovation score of 5, budget, knowledge, and outside expertise remain in the equation.

$R = .68$, $R^2 = .47$, adjusted $R^2 = .44$, $SE = 1.09$, $F = 16.15$, $p < .0001$.

The equation with unstandardized coefficients is:

$Y = -4.45 + .99 \text{ budget} + .12 \text{ knowledge} + .49 \text{ outside expertise}$.

The equation with standardized coefficients is:

$Y = -4.45 + .42 \text{ budget} + .37 \text{ knowledge} + .28 \text{ outside expertise}$.

This result is very similar to that obtained in the first regression, where early owners are distinguished. The R^2 , adjusted R^2 , and regression coefficients are almost identical. The standard error is reduced from 1.26 to 1.09, which makes this equation slightly better for predictive purposes. However, the difference is slight. Distinguishing early from later owners does not greatly increase the usefulness of the equation as a descriptor of innovation.

Comments Regarding Variables

Length of ownership and knowledge.

The Pearson product moment correlation coefficient between knowledge and length of ownership is weak ($R = .24$, $R^2 = .06$, $p = .08$). It would appear safe to conclude that for this sample of organizations, knowledge of computers among staff is one factor which characterizes innovative agencies, and not merely a function of the experience of ownership.

One explanation for the weak correlation between knowledge and length of ownership is that the majority of staff have not had enough exposure to computers to become knowledgeable. This might be because (a) most agencies that own computers have purchased only one computer (Table A-4), (b) computers are a relatively new phenomenon among

social service agencies (Table A-5), and (c) computers are used mainly for functions that would not normally involve non-management personnel (Table A-11).

Relationship between dissatisfaction with operations and knowledge.

The variable "dissatisfaction with agency operations" is a measure of directors' dissatisfaction before computer purchase. Owners were also asked to rate their current level of dissatisfaction. Current dissatisfaction scores were subtracted from dissatisfaction scores that apply to the time before computer purchase. The resulting score is a measure of owners' change in dissatisfaction with operations after the acquisition of a computer (the higher the score, the greater the decrease in dissatisfaction). There is a negative correlation between this change in dissatisfaction rating and knowledge ($R = -.49$, $R^2 = .24$, $p = .01$). It appears that the more knowledgeable a staff is about computers, the less there is a decrease in the director's dissatisfaction with changes in agency operations after computerization. This suggests that a more knowledgeable staff is less easily pleased with the results of computerization than a less knowledgeable staff and that this dissatisfaction is communicated to and influences the level of dissatisfaction of the director.

Internal expertise.

There is a moderate negative correlation between directors' computer ownership rating and internal expertise ($R = -.39$, $R^2 = .15$, $p = .06$). This suggests that the director of a staff group with more exper-

tise has higher expectations of computerization, and is, therefore, harder to satisfy. This relationship is consistent with that noted between knowledge and difference in dissatisfaction.

Outside expertise.

There is a negative correlation between outside expertise and length of ownership ($R = -.45$, $R^2 = .2$, $p = .05$). Not surprisingly, earlier innovators had less outside expertise to draw upon than later purchasers of computers.

Financial ability and budget.

During the telephone interviews, several directors commented that the major barrier to purchasing computers is funding. The opinion of these directors is consistent with the assumption that social service agencies have been experiencing financial difficulties in recent years. From this perspective, it is surprising that financial ability does not appear in the regression equations.

It might be assumed that budget is prominent as a predictor of computer ownership because organizations with larger budgets are better able to afford computers. However, financial ability is only weakly correlated with budget ($R = .3$, $R^2 = .09$). This suggests that agencies with larger budgets do not have a great advantage over smaller agencies in raising funds for computers. An alternative explanation is that agencies with larger budgets are more likely to have knowledgeable staff and access to outside expertise, both facilitating factors in computerization, than smaller agencies. However, this explanation is not

strongly supported by the correlation between budget and knowledge (.21) and budget and outside expertise (.11).

Opinions about computers.

The failure of the opinions variable to appear in the equations is consistent with the finding that almost no resistance to computerization is being reported to directors. There is no evidence that staff have negative opinions about computers which affect organizations' decisions to purchase.

There is no correlation between opinion scores and directors' expressed satisfaction with the results of computerization nor with directors' dissatisfaction with agency products. If people's opinions about computers are affected by the experience of ownership, it is expected that opinion scores would be correlated with these measures. As in the case of knowledge, the limited amount of exposure that staff appear to have had to their agencies' computers might account for the lack of an effect.

CHAPTER ELEVEN

SUMMARY

A survey of non-government social service organizations was undertaken in order to identify organizational characteristics that distinguish agencies which innovate by purchasing computers and to describe the extent to which organizations own and use computers. Although many studies have been reported that relate organizational variables to innovation, no commonly accepted theory of organizational innovativeness has emerged. However, several classifications of variables that are related to innovativeness have been made. One of these classifications, the AVICTORY model of innovation, was used as a guideline to choose variables that are likely to influence the decision by agencies whether or not to purchase computers.

Nine variables were chosen, one of which was agency budget. It was not possible within the constraints of the study to develop normalized measures for the remaining variables. Two normalized scales were found to measure staff opinions and knowledge of computers. The remaining measures were summative scales developed for the study.

A total of 120 organizations were randomly selected for the survey. Of the 106 agency directors that could be contacted by telephone, 96 (91%) responded to the telephone survey and agreed to accept questionnaires. Seventy-three of these directors (76%) returned their questionnaires. This response indicates that there

is a high level of interest among directors in questions about computerization. The opinions and knowledge questionnaires were returned by 56% of the staff of organizations whose directors returned a questionnaire. This does not necessarily indicate that there is less interest in computers among staff than among directors. The higher response rate of directors is probably due in part to the greater encouragement given to directors to respond. Directors were sent two letters, surveyed by telephone, and given the opportunity to receive a summary of results, whereas the only contact between staff and the author was a letter that was distributed to staff by directors.

Computer Ownership and Use

Thirty-two percent (32%) of the responding organizations owned one or more computers, and fourteen agencies, or 45% of the owners had made their first computer purchase less than 18 months ago. Nine agencies (9%) had decided to purchase a computer. Eighteen (19%) were in the formal investigation stage of innovation, thirteen (14%) in the informal investigation stage, sixteen (17%) had never considered computer purchase, eight (9%) had decided not to buy, and one organization had given up its computer.

Sixty-five percent (65%) of owners owned only one computer. This suggests that computers were not widely accessible to line staff. Although only 31 agencies were computer owners, 59 were computer users. Of the non-owning agencies that used computers, 79% used only one computer. This result is consistent with the

suggestion that line staff do not have extensive access to computers.

Word processing, mailing lists, and accounting were the most popular uses of computers for owners. Accounting was the most popular use of non-owners. Only 40% of owners kept client records on computer; 8% used computers to help make decisions about clients. Three non-owners used computers to keep client records but none used them to help make decisions about clients. It appears that computers are being used mainly for administrative functions by both owners and non-owners and are used very little for client-oriented functions in non-owning agencies.

Factors Related to Innovation

There is almost no reported resistance to computer ownership by agency staff, clients, funders, board members, or directors. There is also no evidence that staff opinions about computers affect organizations' decisions to purchase. This suggests that managers or others interested in facilitating innovation will not have to devote much effort to overcome employees' indifference or negative attitudes toward computers. Conversely, it might be useful for agency administrations to encourage favorable staff opinions toward computers.

Three variables, knowledge, budget, and outside expertise, account for 46% of the variance (43% adjusted R^2) in innovation among agencies. This is in line with the average amount of variance, 43%, accounted for by independent variables in 36 studies of

innovation using multiple regression analysis (Rogers and Shoemaker, 1971).

The presence of budget in the equation might at first be interpreted as evidence that larger organizations are better able to afford computers. However, financial ability does not appear in the equation: it does not seem that agencies with larger budgets have an advantage over smaller agencies in raising funds for computers. An alternative explanation is that budget is an indicator of other facilitating factors.

The results suggest that innovation can be facilitated by helping staff to acquire knowledge about computers and by obtaining outside computer expertise.

When owners are excluded from the regression, obligation accounts for 72% of the variance in innovation. The regression coefficient is .85. This suggests that agencies might first develop an obligation to computerize and acquire knowledge and outside expertise later. Change agents who are concerned with organizations at a lower level of innovation might be advised to first develop strategies that will increase the perception of agency board, staff, funders, clients, and directors that the organization is obligated to computerize. In view of the findings reported in the literature to the effect that participation in decision-making will increase participants' acceptance of a proposed change, a question raised by this study is whether organizations with a higher level of obligation to computerize have developed this sense of obligation through a participatory process.

Internal expertise does not appear in the equation. This supports the interpretation that staff do not have access to, or experience with, their agencies' computers, although they might be knowledgeable and are not resistant to computers.

There is evidence from this study that knowledge and internal computer expertise are negatively related to satisfaction with the results of computerization. This might be due to higher initial expectations for computerization by knowledgeable and expert staff, emphasis on management uses, and the inaccessibility of computers to staff. The question raised by this result is whether internal expertise is a factor in determining how computer uses will develop in agencies and how extensively computers will be used by staff. Agencies with internal expertise and knowledgeable staff might be quicker to develop client-oriented uses and to acquire additional computers for staff.

Questions for Further Research

Several questions for further research have been raised by this study. One question has to do with the relationship between agency budget and innovation. Although budget is a predictor of innovation, its prominence in the regression equations does not appear to be because agencies with larger budgets have an advantage over smaller organizations in raising funds for computers. Budget might be an indicator of other factors that facilitate innovation.

Agencies that have owned computers for 18 months or more comprise 17% of the sample eligible for regression analysis. This

percentage is almost the same as that represented by the combined categories of innovators and early adopters (16%) as identified by Rogers and Shoemaker (1971) in their analysis of innovation by individual persons. A future study might examine the similarity of the innovation curves of agencies and individuals.

This study did not examine the processes undertaken by organizations that have considered computer ownership. A future study might test the prediction, based upon the literature reviewed, that innovativeness is positively related to the amount of staff participation in the decision-making process. A study might also test the prediction suggested by the regression results that organizations first develop an obligation to computerize and acquire knowledge and outside expertise later.

Knowledge and internal expertise are negatively related to satisfaction with the results of computerization. This suggests that directors of agencies with knowledgeable staff groups and with internal computer expertise have unmet expectations of computerization. Further study is needed to discern reasons for these relationships.

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APPENDIX A

TABLES

APPENDIX A

TABLES

Table A-1

Degree of Innovation

	All Agencies Telephoned	Directors Who Returned Questionnaires	Eligible For Regression Analysis
Owner 1.5 years plus	17 (18%)	14 (19%)	9 (15%)
Owner less than 1.5 years	14 (14%)	11 (15%)	10 (17%)
Decided to buy	9 (9%)	7 (10%)	7 (12%)
Formal investigation	18 (19%)	15 (21%)	15 (25%)
Informal investigation	13 (14%)	9 (12%)	9 (15%)
Never considered	16 (17%)	9 (12%)	9 (15%)
Decided not to buy	8 (9%)	7 (10%)	N/A
Gave up	1 (1%)	1 (1%)	N/A
	96 (101%)	73 (100%)	59 (100%)

Note: Total percentages in this and subsequent tables may not equal 100 due to rounding errors.

Table A-2

Number of Staff Employed

Number of Staff	All Agencies Responding by Telephone	Agencies Whose Directors Returned Questionnaires	Eligible for Regression Analysis
1	8 (8%)	5 (7%)	5 (9%)
2 - 5	24 (25%)	18 (25%)	16 (27%)
6 - 10	23 (24%)	18 (25%)	11 (19%)
11 - 20	12 (13%)	8 (11%)	5 (9%)
21 - 30	10 (10%)	8 (11%)	6 (10%)
31 - 40	6 (6%)	5 (7%)	5 (9%)
over 40	13 (14%)	11 (15%)	11 (19%)
	96 (100%)	73 (101%)	59 (102%)

Table A-3

Budget Size

Total Budget	Number of Agencies	Regression
less than \$50,000	4 (5%)	4 (7%)
50,001 - 100,000	6 (8%)	7 (12%)
100,001 - 500,000	16 (22%)	12 (20%)
500,001 - 1,000,000	10 (14%)	9 (15%)
1,000,000 - 1,500,000	8 (11%)	7 (12%)
1,500,001 - 2,000,000	2 (3%)	2 (3%)
2,000,001 - 4,000,000	4 (5%)	4 (7%)
over 4,000,000	3 (4%)	3 (5%)
unknown	20 (27%)	11 (19%)
	73 (99%)	59 (100%)
Mean	1,016,310	1,040,943

Table A-4

Number of Computers Owned

Computers	All Agencies		Multiple Regression	
	Agencies	Percent	Agencies	Percent
0	65	68	40	68
1	20	21	12	20
2	3	3	1	2
3	6	6	4	7
5	1	1	1	2
8	1	1	1	2
	96	100	59	101

Table A-5

Time Computer Owned

Number of Years Owned	All Agencies		Multiple Regression	
Non-Owners	65	(68%)	40	(68%)
Less than 6 months	3	(3%)	4	(7%)
0.5	5	(5%)	4	(7%)
1.0	6	(6%)	1	(2%)
1.5	2	(2%)	2	(3%)
2.0	4	(4%)	2	(3%)
3.0	4	(4%)	2	(3%)
4.0	2	(2%)	2	(3%)
4.5	1	(1%)	1	(2%)
5.0	3	(3%)	1	(2%)
6.0	1	(1%)	-	-
	96	(99%)	59	(100%)

Table A-6 Ownership by Computer Use - Telephone Survey

	Users	Non-Users	Total
Owners	31 (32%)	0 (0%)	31 (32%)
Non-Owners	28 (29%)	37 (39%)	65 (68%)
	59 (61%)	37 (39%)	96 (100%)

Table A-7 Ownership by Computer Use -
Mailed Questionnaire

	Users	Non-Users	Total
Owners	25 (34%)	0 (0%)	25 (34%)
Non-Owners	21 (29%)	27 (37%)	48 (66%)
	46 (63%)	27 (37%)	73 (100%)

Table A-8 Number of Computers Used - All Agencies

Non-Users Included			Users Only		
Computers	Agencies	Percent	Computers	Agencies	Percent
0	37	38	N/A	N/A	N/A
1	37	38	1	37	63
2	11	11	2	11	19
3	4	4	3	4	7
4	5	5	4	5	8
6	1	1	6	1	2
9	1	1	9	1	2
	96	98%		59	101%

Table A-9 Number of Computers Used by Ownership

Non-Owners			Owners		
Computers	Agencies	Percent	Computers	Agencies	Percent
0	37	56	N/A	N/A	N/A
1	22	33	1	15	48
2	3	5	2	8	26
3	3	5	3	1	3
			4	5	16
			6	1	3
			9	1	3
	65	99%		31	99%

Table A-10 Computer Use - All Respondents

Function	Use computers for this function					
	Yes		No		Unknown	
	%	N	%	N	%	N
Accounting functions	54	25	28	13	17	8
Word processing	52	24	30	14	17	8
Mailing lists	43	20	39	18	17	8
Statistical analysis	30	14	52	24	17	8
Keep client records	28	13	54	25	17	8
Other ^a	24	11	59	27	17	8
Budget planning	15	7	67	31	17	8
Help make decisions about clients	4	2	78	36	17	8

^aOther uses: fundraising; computer assisted instruction; library data base; literature searches

Table A-11 Computer Use - Owners Only

Function	Use computers for this function					
	Yes		No		Unknown	
	%	N	%	N	%	N
Word processing	80	20	12	3	8	2
Mailing lists	64	16	28	7	8	2
Accounting functions	56	14	36	9	8	2
Keep client records	40	10	52	13	8	2
Statistical analysis	36	9	56	14	8	2
Other ^a	28	7	64	16	8	2
Budget planning	24	6	68	17	8	2
Help make decisions about clients	8	2	84	21	8	2

^aOther uses: fundraising; computer assisted instruction; library data base; literature searches.

Table A-12 Computer Use - Non-Owners Only

Function	Use computers for this function					
	Yes		No		Unknown	
	%	N	%	N	%	N
Accounting functions	52	11	11	4	29	6
Statistical analysis	24	5	48	10	29	6
Word processing	19	4	52	11	29	6
Mailing lists	19	4	52	11	29	6
Other ^a	19	4	52	11	29	6
Keep client records	14	3	57	12	29	6
Budget planning	5	1	67	17	29	6
Help make decisions about clients	0	0	71	15	29	6

^aOther uses: fundraising; computer assisted instruction; library data base; literature searches

Table A-13 Time Computers Used

No. of Years	Non-Users Included		Users Only	
	Number	Percent	Number	Percent
0	37	39	N/A	N/A
<6 months	3	3	3	5
0.5	6	6	6	10
1.0	10	10	10	17
1.5	2	2	2	3
2.0	11	11	11	18
2.5	1	1	1	2
3.0	9	9	9	15
4.0	1	1	1	2
5.0	4	4	4	7
6.0	2	2	2	3
7.0	2	2	2	3
8.0	1	1	1	2
10.0	1	1	1	2
12.0	1	1	1	2
14.0	1	1	1	2
15.0	1	1	1	2
20.0	1	1	1	2
Missing	2	2	2	3
	96	99%	59	102%

Table A-14 Time of Computer Use by Ownership

No. of Years	Non-Owners		Owners	
	Number	Percent	Number	Percent
<6 months	1	4	2	6
0.5	1	4	5	16
1.0	7	24	3	10
1.5	0	0	2	6
2.0	8	29	3	10
2.5	1	4	0	0
3.0	3	10	6	19
4.0	0	0	1	3
5.0	1	4	3	10
6.0	0	0	2	6
7.0	1	4	1	3
8.0	1	4	0	0
10.0	1	4	0	0
12.0	1	4	0	0
14.0	0	0	1	3
15.0	0	0	1	3
20.0	0	0	1	3
Missing	2	7	0	0
	28	102%	31	98%

APPENDIX B

INTRODUCTORY LETTER TO DIRECTORS



THE
UNIVERSITY
OF CALGARY

2500 University Drive N.W., Calgary, Alberta, Canada T2N 1N4

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Faculty of SOCIAL WELFARE

Telephone (403) 284-5943

1985-05-01

Dear Agency Director:

Advances in computer technology and reduced costs have made it feasible for social service agencies to purchase computers. But deciding whether or not to computerize can be difficult. Those who advocate computers point to the potential benefits of more effective and more efficient service to clients. Others argue, however, that it is difficult and costly to realize these benefits, and that it can be a mistake to computerize too quickly. It would be useful to know where social service organizations stand on this issue. How many have purchased or considered purchasing a computer? How many have decided against using computers, at least for the present? What distinguishes agencies that own, plan to own, or have no present interest in owning a computer? What has been the experience of those who do use computers? What do staff think about computers?

I am conducting a two-part survey of social service organizations in Calgary in order to answer these questions. It will be the basis for my M.S.W. thesis in the Faculty of Social Welfare. The first part of the survey will be conducted by telephone. The second part will be by mailed questionnaire.

Your organization has been randomly selected from a list of Calgary social service agencies. I will telephone you in the next two weeks to ask you whether your organization owns or is considering purchase of a computer. The telephone call will take less than ten minutes, and your participation is entirely voluntary.


If you agree, I will mail you a short questionnaire about factors which directors might consider in deciding whether or not to computerize. I will also ask you if you would be willing to have your staff participate in the second part of the survey. If you agree I would send you a package of questionnaires to be distributed to your staff. It asks about their opinions and understanding of computers, and their views on what the effects would be (or have been) from introducing computers to your agency. A self-addressed envelope will accompany each questionnaire so that it can be returned to me without anyone knowing whether a staff member has chosen to participate. Participation by agency staff is voluntary and their responses

will be anonymous.

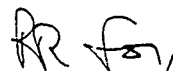
The questionnaire will be coded to identify the organization from which it is being returned in order to determine whether there are differences in the responses of staff from different agencies. Please read the attached memo which specifies the procedures that will be used to ensure voluntary participation and the confidentiality and anonymity of yourself, your staff and your organization.

Thank you for your consideration. I look forward to talking with you in the near future.

Sincerely,

A handwritten signature in dark ink, appearing to read "Rod Rode".

Rod Rode, Researcher
and

A handwritten signature in dark ink, appearing to read "James Gripton".

James Gripton, Professor
and Thesis Supervisor

TO: Agency Directors
FROM: Rod Rode, Researcher

Survey of Social Agencies

The following should be understood concerning participation in this survey and the confidentiality of information obtained.

1. Your participation in either phase of the study (telephone interview and permission for staff to receive a mailed questionnaire) is entirely voluntary. If you agree to distribute the questionnaires to your staff for Part II of the survey, the instructions accompanying the questionnaire would also give assurance of voluntary participation to staff.
2. Regarding the information that you provide in the telephone survey that identifies your organization, agency codes will be assigned by my thesis supervisor, Dr. James Gripton, as follows:
 - 2.1 I will submit to him the information provided by you in the telephone interview.
 - 2.2 He will assign a code number for your agency and code that report and the questionnaires to be sent to your staff with the same number. He will seal these questionnaires in the envelope in which they are to be mailed to you for distribution to your staff.
 - 2.3 When all staff questionnaires have been mailed, he will destroy the list of agencies and assigned codes. Thereafter it will not be possible to identify either person or agency from the data.
3. The data analysis and any reporting of findings will deal with groups of organizations or individuals. There will be no reporting of the data by individual organizations or persons. Staff responses to the questionnaires will not be reported to agency directors.
4. A summary of findings will be mailed to you if you wish. You will be able to indicate your desire to receive a summary by returning a letter which will be included with the mailed questionnaires. By returning this letter separately from the questionnaires, anonymity will be preserved.
5. The above information concerning procedures to ensure confidentiality and anonymity are included in the instructions accompanying the staff questionnaire.

APPENDIX C

QUESTIONNAIRE FOR DIRECTORS



THE
UNIVERSITY
OF CALGARY

2500 University Drive N.W., Calgary, Alberta, Canada T2N 1N4

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Faculty of SOCIAL WELFARE

Telephone (403) 284-5943

1985-05-15

Dear Agency Director:

A short while ago you answered questions over the telephone for a survey of where social service agencies in Calgary stand on the issue of computerization. You also agreed to accept questionnaires for yourself and your staff to consider.

Enclosed with this letter you will find one questionnaire entitled "Survey For Directors: Agency Information". There are also a number of questionnaires entitled "Opinions About Computers", each of which comes with an introductory letter and a return envelope. Finally, there is a signature and address card with a return envelope.

Please follow these instructions:

1. Complete and return the questionnaires entitled "Survey For Directors: Agency Information" and "Opinions About Computers" (a return envelope is provided).
2. Please sign and return the card, which serves as your record of informed consent to the study. If you wish to receive a summary of results, fill in the address to which the summary should be mailed.
3. Ask a member of your staff to distribute the "Opinions About Computers" questionnaires. You and each employee should complete the questionnaires anonymously. Each questionnaire includes a self-addressed envelope so that it can be returned to me without anyone knowing whether a staff member has chosen to participate.

Thank you very much for your cooperation. I look forward to summarizing the results of the survey and returning them to you as soon as possible.

Sincerely,

Rod Rode, Researcher

James Gripton, Professor
and Thesis Supervisor

Survey For Directors: Agency Information (Owners)

Were you employed by the organization when the agency purchased its first computer?

I. Factors Related to Purchasing Computers

1. Please check any of the following statements which describes an alternative which was available to your organization prior to the purchase of your first computer

... Your agency purchased its first computer with funds obtained by a special fund-raising activity or grant.

... You had been told by a funder(s) that money would be given to you to purchase a computer.

... Money for the purchase of a computer was available in the existing budget.

2. Please check any of the following statements which you know were true of your organization prior to the purchase of its first computer.

... Clients said that your organization should own a computer(s).

... You were in favor of the agency purchasing a computer(s).

... Board members said that your organization should own a computer(s).

... You told staff that you were in favor of the agency purchasing a computer(s).

... Staff members said that your organization should own a computer(s).

... Funders said that the organization should own a computer(s).

3. Please check any of the following statements which describes a way that you had available to you to receive advice prior to the purchase of the agency's first computer.

... You knew someone with an organization which owned a computer from whom you received advice about computers.

... Money was available or could have been made available in the existing budget to hire a consultant to give advice about computers.

... You knew of a person with expertise about computers who gave advice free of charge.

4. Please check any of the following statements which you know were true of your organization prior to the purchase of its first computer.

... You knew that at least one of your staff was an experienced computer user.

... You considered yourself an experienced computer user.

... You knew that at least one of your staff had a computer at home.

... You had a computer at home.

5. Please check any of the following agency products if you were dissatisfied with the cost, the accuracy, the timeliness or the comprehensiveness of producing the product prior to purchasing your first computer.

... Reports of service statistics

... Accounting (receivables, general ledger, billing payroll, cash receipts, financial statements)

... Mailings

... Budgets

... Typed reports and correspondence

6. Please check any of the following statements which you know to be true of your agency prior to the purchase of its first computer.

... Clients said that your organization should not own a computer(s).

... You were opposed to the agency purchasing a computer(s).

... Board members said that your organization should not own a computer(s).

... You told staff that you were opposed to the agency purchasing a computer(s).

... Staff members said that your organization should not own a computer(s).

... Funders said that the organization should not own a computer(s).

7. Please check any of the following agency products if you are currently dissatisfied with the cost, the accuracy, the timeliness or the comprehensiveness of producing the product.

... Reports of service statistics

... Accounting (receivables, general ledger, billing payroll, cash receipts, financial statements)

... Mailings

... Budgets

... Typed reports and correspondence

II. Agency Information

1. Please rate the following aspects of computer ownership using the following rating codes:

- 0 - Don't Know
- 1 - Results much worse than expected
- 2 - Results worse than
- 3 - Results as expected
- 4 - Results better than expected
- 5 - Results much better than expected

- . . Costs of hardware and software
- . . Amount of staff training required
- . . Computer(s) does the job it was purchased to do
- . . Staff acceptance of computer(s)
- . . Overall rating of decision to purchase a computer(s)

2. Budget - please complete the following chart.

Total Current Budget: \$

Source	Appr. Percentage of Budget
1. United Way
2. FCSS
3. Government contracts or grants
4. Foundations, client fees, fundraising
5. Non-government contracts or grants

2. If your agency uses one or more computers, please circle each function for which computers are used. Please note that this question asks about all computers used regardless of whether they are owned by your organization.

Computer Function

- 1 Word processing
- 2 Accounting functions (one or more of accounts receivable, general ledger, payroll, billing, cash receipts)
- 3 Budget planning
- 4 Mailing lists
- 5 Keep client records
- 6 Help make decisions about clients
- 7 Statistical analysis
- 8 Other (specify)

I. Factors Related to Purchasing Computers

1. Please check any of the following statements which describes an alternative currently available to your organization if you decided to purchase a computer.

... Your agency could raise at least \$5,000 not provided for in the existing budget through a special fund-raising activity or grant.

... You have been told by a funder(s) that money would be given to you to purchase a computer.

... At least \$5,000 could be made available in the existing budget to purchase a computer.

2. Please check any of the following statements which you know to be true.

... Clients have said that your organization should own a computer(s).

... You are in favor of the agency purchasing a computer(s).

... Board members have said that your organization should own a computer(s).

... You have told staff that you are in favor of the agency purchasing a computer(s).

... Staff members have said that your organization should own a computer(s).

... Funders have said that the organization should own a computer(s).

3. Please check any of the following statements which describes a way that you could now receive advice about computers.

... You know someone with an organization which owns a computer from whom you do receive or could receive advice about computers.

... Money is available or could be made available in the existing budget to hire a consultant to give advice about computers.

... You know of a person with expertise about computers who would give advice free of charge.

4. Please check any of the following statements which is currently true for your organization.

... You know that at least one of your staff is an experienced computer user.

... You consider yourself an experienced computer user.

... You know that at least one of your staff has a computer at home.

... You have a computer at home.

5. Please check any of the following agency products if you are currently dissatisfied with the cost, the accuracy, the timeliness or the comprehensiveness of producing the product.

... Reports of service statistics

... Accounting (receivables, general ledger, billing payroll, cash receipts, financial statements)

... Mailings

... Budgets

... Typed reports and correspondence

6. Please check any of the following statements which you know to be true.

... Clients have said that your organization should not own a computer(s).

... You are opposed to the agency purchasing a computer(s).

... Board members have said that your organization should not own a computer(s).

... You have told staff that you are opposed to the agency purchasing a computer(s).

... Staff members have said that your organization should not own a computer(s).

... Funders have said that the organization should not own a computer(s).

II. Agency Information

2. Budget - please complete the following chart.

Total Current Budget: \$

Source	Appr. Percentage of Budget
1. United Way
2. FCSS
3. Government contracts or grants
4. Foundations, client fees, fundraising
5. Non-government contracts or grants

2. If your agency uses one or more computers, please circle each function for which computers are used. Please note that this question asks about all computers used regardless of whether they are owned by your organization.

Code	Computer Function
1 Word processing
2 Accounting functions (one or more of accounts receivable, general ledger, payroll, billing, cash receipts)
3 Budget planning
4 Mailing lists
5 Keep client records
6 Help make decisions about clients
7 Statistical analysis
8 Other (specify)

APPENDIX D

OPINIONS AND KNOWLEDGE QUESTIONNAIRES

OPINIONS ABOUT COMPUTERS.

Here are a number of statements about computers. Using the following code, circle the number to the right of each statement that indicates the extent to which you agree or disagree with it.

- 1 - strongly agree
- 2 - slightly agree
- 3 - no opinion
- 4 - slightly disagree
- 5 - strongly disagree

- | | | | | | |
|---|---|---|---|---|---|
| 1. A well organized computer system improves the overall efficiency of an organization. | 1 | 2 | 3 | 4 | 5 |
| 2. The computer, because it can process and create so much data, has in fact complicated the world situation rather than simplified it. | 1 | 2 | 3 | 4 | 5 |
| 3. The use of computers frees management from petty issues and thus enables them to concentrate more on real issues | 1 | 2 | 3 | 4 | 5 |
| 4. With a computer, the correction of errors is made more difficult. | 1 | 2 | 3 | 4 | 5 |
| 5. A drawback of computer systems is that they depersonalize or dehumanize the work setting. | 1 | 2 | 3 | 4 | 5 |
| 6. People who use computers become so carried away with what a computer can do that they lose sight of real problems. | 1 | 2 | 3 | 4 | 5 |
| 7. Because the computer cannot easily discriminate between small and large problems, it spends time, and hence money, wastefully. | 1 | 2 | 3 | 4 | 5 |
| 8. One of the major values of the computer is that it increases human efficiency. | 1 | 2 | 3 | 4 | 5 |
| 9. Computers dehumanize society by treating everyone as a number. | 1 | 2 | 3 | 4 | 5 |
| 10. Computers are a tool, just like a hammer or a lathe. | 1 | 2 | 3 | 4 | 5 |
| 11. Computers will improve education. | 1 | 2 | 3 | 4 | 5 |
| 12. Computers slow down and complicate simple business operations. | 1 | 2 | 3 | 4 | 5 |
| 13. Computers will improve law enforcement. | 1 | 2 | 3 | 4 | 5 |
| 14. Computers make mistakes at least 5 percent of the time. | 1 | 2 | 3 | 4 | 5 |

- 1 - strongly agree
- 2 - slightly agree
- 3 - no opinion
- 4 - slightly disagree
- 5 - strongly disagree

- | | | | | | |
|--|---|---|---|---|-----|
| 15. Computers isolate people by preventing normal social interactions among people who use them. | 1 | 2 | 3 | 4 | 5 |
| 16. Credit rating data stored on computers have prevented billions of dollars of fraud. This is a worthwhile use of computers. | 1 | 2 | 3 | 4 | 5 |
| 17. Programmers and operators make mistakes, but computers, for the most part, are error free. | | 1 | 2 | 3 | 4 5 |
| 18. Overall, computers improve the quality of life in Canada. | 1 | 2 | 3 | 4 | 5 |
| 19. Computers cause the general public more grief than benefit. | 1 | 2 | 3 | 4 | 5 |
| 20. We have barely scratched the surface of the computer's potential. | 1 | 2 | 3 | 4 | 5 |

WHAT DO YOU KNOW ABOUT COMPUTERS?

This questionnaire tests your technical knowledge about computers. In the space provided, indicate whether you consider each of the following statements True (T), or False (F). If you are uncertain, enter U in the space provided.

1. Once a computer is programmed, it can expand its capabilities to suit any problem. _____
2. A computer can correct input errors. _____
3. Branching logic moves from the general to the specific by the systematic exclusion of alternatives. _____
4. If a computer is on a repetitive logic loop, it will cease on its own accord. _____
5. A major new tool in the processing of data is the punched card. _____
6. Voice input of data is now widely used in computer installations. _____
7. Floppy disks are not floppy and they are not disks. _____
8. Microcomputers are said to be "user friendly" because the cost of owning and operating one is within most people's budget. _____
9. A data base management system is a computer program especially designed for business managers. _____
10. The central processing unit is the heart of a computer. _____
11. Computer equipment in good working order is "on-line." When the computer isn't working, it is "off-line." _____

Select the one alternative that best fits for each of the following 15 items.
Circle your choice for each question.

12. A system in which the user is in direct communication with the computer is called:

- a direct access system1
- an on-line system2
- an off-line system3
- a sequential file system4

13. Documents stored by a word processing system will usually be stored on

- punched cards1
- paper2
- magnetic tape3
- magnetic disk4

14. The operating sequence of the four basic computer functions is:

- input, output, processing, storage1
- input, processing, storage, output2
- processing, input, output, storage3
- storage, input, processing, output4

15. A major impediment to wider use of minicomputers and microcomputers is:

- a shortage of computer designers1
- production problems plaguing the industry2
- the relative underdevelopment of software3
- most applications require larger computers4

16. Which of the following is not characteristic of information systems?

- a large volume of information is stored and used.1
- the information is organized.2
- the basic purpose is to provide reports and summaries of data3
- they contain only alphabetic data4

17. Data processing is best described as:

- the collection of data1
- producing reports2
- manipulating data according to instructions3
- entering data on punched cards with a keypunch machine4

18. A floppy disk:

- is so called because it is made of lightweight cardboard on which data is recorded by use of holes1
- is commonly used for computer output on large computers2
- has data stored on its oxide coated surface by electrical impulses3
- contains data that can be read with the naked eye4

19. Software is:

- a term synonymous with hardware1
- only important to those installations that do not have their own programmers2
- used to find electronic circuits which are termed "soft" because they fail on occasions3
- a series of programs that aid in the running of a computer system4

20. Output units are used to:

- store data after it has been processed and
before it is made available to the user.....1
- display, print, or otherwise make available to
the user, the results of data processing2
- make the data available for processing3
- process the data prior to making it
available for use4

21. A computer system can manipulate data:

- in one of three ways1
- in many ways2
- only if the data are first sorted in the proper
sequence3
- only if the data are first stored in auxiliary
storage4

22. An intelligent terminal is one which:

- has the capability of processing data without
sending the data to the main computer1
- can communicate directly with the main
computer system2
- is difficult to operate and requires a highly
trained operator3
- has the ability to place the data directly into
main computer storage of the computer system
without first placing the data on disk, as is
required with dumb terminals4

23. The higher within an organization an individual works:

- the more detailed the information obtained from
printed reports should be1
- the fewer the number of reports the person
requires to do their job2
- the more summarized report information
should be3
- the less printed reports should be relied upon.....4

24. In order for information to be useful, it must be:

- accurate and timely1
- complete and concise2
- relevant3
- all of the above4
- none of the above5

25. The process of data collection includes:

- checking the data for completeness and
correctness1
- recording the data2
- summarizing or condensing the data into more
manageable units3
- 1 and 2 above4
- 2 and 3 above5