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Innovativeness and the nursing executive: Organizational and individual predictors

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INNOVATIVENESS AND THE NURSING EXECUTIVE: ORGANIZATIONAL AND INDIVIDUAL PREDICTORS

By

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ABSTRACT

INNOVATIVENESS AND THE NURSING EXECUTIVE:

ORGANIZATIONAL AND INDIVIDUAL PREDICTORS

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This investigation was an attempt to add to the body of research in innovation diffusion in the sector of nursing management. The study was designed to answers questions about the effect of selected factors on innovation adoption by the chief nursing executive.

A major element of innovation research is the innovation process and this provided the theoretical framework for the study. Two levels of variables, organizational and individual, were operationalized and integrated into the framework of the Zaltman model of the innovation process. The first stage of the process, initiation; with its substages knowledge-awareness, attitude formation, and decision making, provided the basis for this study.

The research was planned to survey the population

of chief nursing executives of hospitals in Michigan. The survey instrument was designed with the assistance of researchers in innovation diffusion and hospital administration. A panel of nurses, composed of experts from the field of computer technology in health care, developed the list of computerized management applications which comprised the innovation index.

The data were analyzed using univariate frequencies, Chi-square tests, correlation coefficients, and multiple regression statistics. The analysis focused on two questions. First, what is the significance of each of the eight bivariate relationships? Secondly, which variables contribute the most to an explanation of the variance in the dependent variable?

Data from bivariate relationships revealed a positive correlation between six of the eight independent variables and the dependent variable, innovation adoption. The organizational level variables, size and climate were significantly related and fiscal control was not. The individual level variables, role/position, computer knowledge, professionalism, and education were significantly related and experience was not. Three multiple regression equations were estimated to assess the effects of predictor variables both overall and by levels. The individual variables computer knowledge and

education were determined to be the strongest predictors with size a weaker predictor. The individual level variables were stronger predictors of innovation adoption by chief nursing executives than the organizational level variables. Additional findings, conclusions, and recommendations are included in the study.

DEDICATION

TO MY HUSBAND

BOB

Whose constant support and love made this effort possible

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I want to acknowledge the following individuals who have contributed to my professional development.

The chairman of the Guidance Committee, Lou Anna Simon, who provided counsel and continuing support and gave generously of her time.

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Nancy Kline, research associate, who provided assistance in statistical data analysis and interpretation.

Nursing executives from 155 Michigan hospitals participated in the study and thus contributed to nursing research.

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CHAPTER I: THE PROBLEM

Introduction

The nursing executive in the health care delivery system of the 1980s faces an increasingly turbulent environment. Problem resolution both internal and external to the health care setting requires extraordinary skills and abilities. The nurse administrator is in a crucial position to affect not only the quality of patient care but also the employment future of health care personnel. The nursing executive must be aware of and willing to adopt innovative management strategies and tools. Selected factors which may enhance the innovativeness of the nursing executive were investigated. Specifically, the relationships among organizational characteristics, individual characteristics, and the nursing executive's innovativeness were examined.

Background of the Problem

Health care institutions face difficulties arising from two directions - increasing requirements for services and the technology explosion (Wieland, 1981; Rakich, 1985). The first problem, expanded health care requirements, is the result of changes in the social

environment. With the enactment of federal legislation in 1965 (Title 18 of the Social Security Act) and the implementation of Medicare and the state counterpart (Title 19) for Medicaid, the federal government mandated the availability of health care services for the elderly and indigent (O'Connor, 1984). The result was an increased demand for and utilization of services (Grimaldi, 1983). Health care agencies as providers of health care and recipients of federal and state funds must respond to guidelines and regulations for the admission and care of all individuals covered by Medicaid and Medicare as well as clients with other third party reimbursement. This change enlarged both the scope and size of hospitals. In addition, new delivery systems such as health maintenance organizations and home health care services have been developed. The changing financial reimbursement strategies and modes of delivery have stimulated management to search for innovative solutions (Goldsmith, 1981).

The second problem, increasing technology with its attendant rising costs, is particularly a concern in hospitals. Perrow (1965) described hospitals as both technologically based and facing a dynamic technologic environment. The explosion of technology in the past 30 years has profoundly impacted the health care industry. Technology to save lives, sustain lives, and provide complex forms of treatment has been rapidly expanding.

Yet Kaluzny (1974) and others report that differentiation and specialization arising from technology leads to fragmented costly care. The result is institutional, governmental, and personal concern about escalating health care costs.

The governmental response to rising health costs resulting from increased utilization of services and the expansion of technology, has been the development and implementation of fiscal controls on reimbursement to health care agencies. The control mechanism, Prospective Payment System (PPS), was the result of the Tax Equity and Fiscal Responsibility Act of 1982 (Public Law 92-248). The plan was first initiated in New Jersey and it provides for payment to providers prospectively, based upon a diagnostic entity. The Diagnostic Related Groups (DRG's) presently include 470 entities which are reimbursed at a set fee. The plan covers both Medicaid and Medicare patients and as Grimaldi (1983) reported was to be fully operationalized in all 50 states on October 1, 1986. This fiscal restraint has increased the turbulence in health care and stimulated broad scale interest among administrators in developing innovative approaches to health care delivery. Nursing executives should be in the forefront of this movement (McHugh, 1986; Porter-O'Grady, 1985).

The nursing executive is an integral part of the administrative team responsible for the management of

health care agencies in the 1980s. As the administrator of often the largest department, nursing services, the nursing executive employs the greatest number of personnel, has the largest budget, and has 24-hour responsibility for the care of patients (McHugh, 1986). Consequently, the department of nursing services is of primary importance to both the professional and financial success of the hospital (Friss, 1983). When turbulence occurs, the nursing department is usually the first sector considered for financial retrenchment.

To respond positively to turbulence, the nursing executive must be capable of strategic planning and problem solving (Brown, 1984; Kirk, 1986). Plans for responding to the external competitive environment must be accompanied by planning for the internal disruptions resulting from financial problems. The critical services provided by the nursing department are dependent upon an educated and conscientious staff. Employee relations are directly tied to stable employment and satisfactory working conditions. Disruptions of staff as a result of repeated layoffs and callbacks cause internal turbulence and this stress is reflected in the quality of patient care. It is crucial that the nursing executive be able to gather data, simulate conditions, and plan strategically for the future. The nursing executive must develop innovative strategies and utilize innovative tools to solve the problems of today and prepare for the

challenges of tomorrow (Pointer and Pointer, 1985; Thomas, 1986; Hartley, 1986).

The computer, the major tool of the information age, can provide nursing executives with the capability of developing innovative solutions to management problems. Computer technology now provides a diverse selection of applications for managers. This includes data management, spreadsheet formats for calculation, and simulation models. These tools can provide accurate, complete and up-to-date information (McHugh, 1986). They offer an innovative methodology for nursing executives to employ in dealing with the financial constraints of health care delivery in the 1980s and into the future. Because the use of management applications of computer technology has not been an integrated into the functions of nursing executives the adoption of specific managerial computer applications should be considered innovative.

The Purpose of the Study

The researcher's purpose in this study was to investigate the innovativeness of chief nursing executives. A systematic review of the literature and consultation with researchers in innovation theory and health care administration provided direction for the selection of predictor variables. In his review of the research on innovation in organizations, Rogers (1983)

described three classes of independent variables; leader characteristics, internal characteristics of the organization, and external characteristics of the organization. Kimberly and Evanisko (1981) proposed that innovation adoption by organizations is influenced by the characteristics of organizational leaders, the characteristics of the organization and the characteristics of the context in which it operates and out of which it emerged. These properties were combined in two levels, organizational and individual, for the present study.

The organizational level variables include structural and environmental characteristics. Size and fiscal control of the institution were selected from a number of structural characteristics. Organizational environment was defined by both internal and external characteristics. The individual level variables which were selected for investigation include the role and position, computer knowledge, professionalism, and management preparedness obtained through education and experience.

The researcher's purpose in this study was to examine the relationships between two levels of independent variables, organizational and individual, and the nursing executive's innovativeness. The following section identifies the rationale for the inclusion of each predictor variable.

Organizational Level

Organizational characteristics included in this study were those of structure and environment. Structural characteristics which have been investigated and reported in the literature on innovation and organizations include size, resources, centrality, formalization, and complexity (Rogers, 1983).

Size has been consistently found to be related to organizational innovativeness (Rogers, 1983). The size of hospitals, defined by number of beds, was included in this study for several reasons. Size leads to economies of scale which enhance the feasibility of innovation adoption (Moch & Morse, 1977) and creates a critical mass which can be used to justify the purchase of computer technology for the nursing department of a health care institution. The nursing management process is often a function of size, i.e., 24-hour staffing from a large force of workers.

The corporate structure of health care institutions has evolved to include a spectrum of options for fiscal control. These include the single nonprofit hospital, the multiple hospital corporation, and the parent holding company with both profit and nonprofit companies. The more complex structures offer opportunities for shared resources, access to specialists, and profit-making

capabilities. These factors can stimulate and support adoption of innovation by nursing executives. This structural attribute, labeled fiscal control, was included as an explanatory variable in this study because it reflects a organizational change in the field of health care which may affect innovation adoption.

The structural attributes of centrality, formalization, and complexity were not included in this study for several reasons. Rogers (1983) contended that these attributes related more directly to the process of innovation than to the innovator. Reviewing the results of several hundred studies using these variables, Rogers reported low correlations with innovation adoption. He proposed that the independent variables may be related to innovation in one direction during initiation and in the opposite direction during implementation (p. 361).

Another concern is the degree of variance in these attributes in health care institutions. The structure of hospitals has been described by Perrow (1965) as highly centralized, formalized, and complex and Georgopoulos (1972) reiterated this concept. Therefore, in the present study, the degree of variance in these structural attributes may be restricted and consequently problematic.

The organization, as an open system, is in constant interaction with its environment. Increasing turbulence in the environment signals problems and a need for change

(Etzioni, 1975). The organization's awareness of problems and needs and the type of response is directly related to the organizational climate. An organization with a climate of openness can respond quickly and positively to change, while an organization with a closed climate is late and less positive in its response. Executives often respond to problems or needs with a search for innovations. That search is enhanced by a climate of openness. Thus an open climate is thought to play a significant role in organizational innovation.

Hospitals face a multiplicity of environmental factors which are ever-changing. Those with a primary impact on hospitals are legislation, regulations, and new technology. In short, responding to change through innovation adoption is crucial to the future of hospitals. Organizational climate may be a significant predictor of innovativeness in the dynamic health care sector and thus merited inclusion in the study.

The organizational variables categorized as structural or environmental were included in this study to provide data to answer the following research questions.

1. Is size of the hospital a factor in the innovativeness of the chief nursing executive?

2. Are multiple hospital corporations and parent holding companies more likely to facilitate the

innovativeness of the chief nursing executive than single hospital entities?

3. Does an open organizational climate enhance the innovativeness of the chief nursing executive?

Individual Level

The individual level variables selected for this study represent those attributes considered most germane to the context of the chief nursing executive. Included were role/position, computer knowledge, professionalism, education, and experience.

The role/position of the chief nursing executive is a major factor in the adoption of innovation (Pointer and Pointer, 1985). The two terms are combined for this study and a composite definition follows; the term "role" signifying those behaviors required by the functional relationship, the term "position" identifying the cognitive organization of role expectations. Nursing executives have both a boundary-spanning role for importation of information and a decision-making position for initiating innovation adoption. These two attributes are crucial to the process of innovation adoption (Zaltman , Duncan & Holbek, 1973). Thus the question arises concerning what effect the role/position of the nursing executive has on innovation adoption by the nursing department.

The knowledge-awareness of an innovation is the first step in the process of innovation adoption (Zaltman et al., 1973). The nursing executive may obtain knowledge of innovation through multiple sources. Included in the study were an examination of sources of information and the relationship of computer knowledge to the adoption of computerized management applications by the chief nursing executive.

The concept of professionalism entails a commitment on the part of the individual to increase individual skills and to enlarge the knowledge base of the particular field. This requires a heuristic mode of practice which encourages innovativeness. The study was designed to determine if a positive relationship between professionalism and innovativeness which has been affirmed for physicians and hospital administrators (Greer, 1977; Counte & Kimberly, 1974) occurs in the context of the nursing chief executive.

Preparation for the executive role can be bi-modal including both formal education and experiential learning. The term "management preparedness" will be used in this study to denote the education and experience contributing to the management role. The relationship between education and innovation adoption has been studied in the context of administrators and physicians and conflicting results were obtained (Becker, 1970b; Coleman, Katz & Menzel, 1966; Kimberly & Evanisko, 1981).

The relationship in the context of the nursing executives was investigated in this study because of the lack of research in this area and because the educational process is changing (ANA, 1985:Blaney, 1986). Nursing executives may hold a variety of educational credentials from a diploma to a doctoral degree, depending upon the educational requirements of the employing institution. While the number of nurses prepared at the master's level is not large, it is increasing rapidly in response to pressure from professional groups. These individuals are primarily attracted to larger hospitals. The result is that smaller hospitals and those in more remote locations most often have nursing executives with minimal educational credentials (the diploma). The purpose of the inclusion of this variable in the study was to examine the relationship between education and innovativeness in view of the changes occurring in educational preparation of nurses.

Experience in the executive position provides knowledge of how to navigate the political waters for a desired outcome and longevity as a leader may increase power to implement innovations. A positive relationship between innovativeness and tenure is reported by Rogers and Shoemaker (1971). However an opposing view suggests that new leaders with a fresh perspective are more likely to initiate innovations (Kimberly & Evanisko, 1981). A similar thesis, that receptivity to innovation is

inversely related to age, and thus the older individual is less likely to be innovative, provides support to the alternate view. Furthermore, Kimberly suggests that the relationship between experience and innovation adoption may be curvilinear. The relationship between experience and innovation adoption by nursing executives should be investigated. The lack of research findings in the nursing context and the absence of clear-cut support for the opposing view directed the researcher to the hypothesis that experience is positively related to innovation adoption.

Individual predictors of innovation often studied but not included in this research were cosmopolitanism and age. The cosmopolite values external referents and looks beyond the local situation (Becker, 1970b). While studies of physicians show a strong correlation between cosmopolitanism and innovativeness, this should not be assumed for nursing executives. The cosmopolitanism property has not been prominent among nursing executives and the concepts of gender and role/position seem to explain this lack (Long, 1986). The nurse-wife-mother may be more place bound than a male physician or executive. Thus there is limited exposure to external referents. Also, nursing executives have limited their interactions with peers because of perceived competition among institutions. For these reasons, the attribute cosmopolitanism was not included in this research.

Most research on the relationship between age and innovativeness reports an inverse relationship (Counte & Kimberly, 1974). The population of nursing executives in Michigan covers a diverse age span, includes nurses with varying years of experience and represents individuals with a diversity of educational credentials obtained at differing times during their careers. Education and experience have been included for study of their relationships with innovation adoption. Age was not included because it would add another dimension which would increase the interrelations and thus the complexity of the research beyond the scope intended.

The investigation of the relationships between these individual level variables and the dependent variable, innovativeness, was designed to provide answers for the following research questions.

1. Does the role/position of the chief nursing executive affect his/her degree of innovativeness?

2. Does knowledge about computer technology affect the innovativeness of the chief nursing executive?

3. Does the degree of professionalism affect the innovativeness of the chief nursing executive?

4. Does the level of management preparedness, acquired through education, affect the innovativeness of the chief nursing executive?

5. Does the level of management preparedness,

acquired through experience, affect the innovativeness of the chief nursing executive?

Significance of the Study

This study adds to the body of knowledge in the field of innovation theory by examining innovation in a context (nursing management) heretofore unstudied. A review of the literature in the social sciences and management science included the work on classic diffusion theories and studies of organizational innovation. This review revealed no studies which examined the nursing executive's use of computer technology as a measure of innovativeness. Next, the literature in nursing was examined and two comprehensive meta-analyses of nursing research were reviewed (Abdellah, 1970; Loomis, 1985). No reported research was specific to the study of the nursing executives's innovativeness through the use of management applications of computer technology. The nursing content was overwhelmingly concerned with clinical entities, human behaviors, and social issues affecting nursing.

A review of the research on innovation in health care revealed that three authors had analyzed and categorized the materials (Kaluzny, 1974; Greer, 1977; and Kimberly, 1981). These analyses indicated the context of innovation research in health care to be the

physician, the hospital administrator, and the organization. No studies which focused on the nursing executive and innovation adoption were found in the literature reviewed.

Computerized bibliographic database searches were the basis of the review and provided, in addition to citations of earlier works, access to more timely materials (through August, 1986). It is clear that this study of innovativeness and the nursing executive investigated areas previously unstudied and provided new knowledge.

While providing an investigation of innovation in a different context, nursing administration, the study also tested some predictors previously examined in the hospital setting with a different unit of analysis. Organizational climate factors as explanatory variables of innovativeness have been the specific focus of research by Kimberly (1981) and others. The effect of structure on innovation has been studied by Moch and Morse, (1977); Blau, (1973); and Baldridge and Burnham, (1975). The research on size as a structural feature has resulted in conflicting theses (Thompson, 1969; Baldridge & Burnham, 1975). The inclusion of size in the present study served to replicate some aspects of these earlier works and provided confirmation of some earlier findings.

An examination of the relationships between institutional fiscal control and innovativeness was

carried out. The current trend in health care management is to develop more diverse financial structures, such as parent holding companies and corporate systems, which may have a significant effect on innovation adoption. Research in this sector is non-existent, therefore this phenomenon was examined in the context of the chief nursing executive.

The individual level predictors examined in this study have been researched in many contexts. Examination of these variables in the health care sector has been limited to physicians and hospital or health department administrators. Investigation of the relationship of individual attributes and the innovativeness of chief nursing executives provides new information which is important to the understanding of the diffusion of innovation.

Empirically, the study results are useful in the following two areas:

1. Identification of factors in organizational structure and climate which might influence the innovativeness of the chief nursing executive.

2. Identification of professional development areas for enhancement of innovativeness in nursing executives.

Procedure for the Study

A survey of the chief nursing executives of all hospitals in Michigan was conducted. The highest level administrative position in nursing is sometimes entitled Director of Nursing, Vice President for Nursing, or Associate Hospital Director for Nursing Services. For this study the term "chief nursing executive" was used.

The population included the chief nursing executives of Michigan hospitals contained in the records of the American Hospital Association. Specialty institutions for the care of children, women, veterans, and military personnel and dependents were included in the study. Also included were hospitals for rehabilitation, substance abuse, and psychiatric/mental health. Hospitals type was identified via a questionnaire item and the data were analyzed both as a part of the total population and as a subset. The population was divided into four size categories (by number of hospital beds) to assist in determining the representativeness of the sample.

The study employed a questionnaire to collect data from one source per hospital, the chief nursing executive. The information requested was of self-report nature. No archival materials were requested.

Data analysis was designed to address specific research questions. The Statistical Package for the

Social Sciences (SPSSX) was utilized for statistical analysis on the IBM Mainframe at Michigan State University.

Assumptions of the Study

In investigating the research questions, the following assumptions were made:

1. The demonstrated ability to adopt innovation is good.
2. Organizations and individuals should seek innovative solutions to problems.
3. The nursing executive should develop the attribute of innovativeness.
4. Management applications of computer technology are a measure of innovativeness.

Delimitations of the Study

The study was limited to the context of the nursing executive. As the highest level administrator for the department, the nursing executive is in a position to make decisions which affect both the department and the hospital. His/her impact on innovation adoption is direct.

The population to be studied was limited to Michigan.

This limitation controlled the quantity of data to meet constraints of time and costs. The researcher was able to utilize a network of peer administrators in Michigan as subjects. Their familiarity with the researcher promoted participation in the study.

The predictor variables were limited to three organizational attributes and five individual attributes. This provided a balance of criteria from the two classes of predictors. It further focused the study on the examination of factors expected to show significant relationships.

The study was limited to management applications of computer technology. Management applications versus clinical (patient care) applications of computer technology are used by the nursing chief executive in planning, organizing, directing, and controlling. Further, innovative management applications are crucial to the nursing executive for the strategic planning necessary to meet the challenges of the 1980s.

Limitations of the Study

Methodological limitations of the study included the use of the cross-sectional survey, the self-report, and single response per institution.

Definition of Terms

The following definitions are supplied to assist in the interpretation of the study and to facilitate replications.

Boundary Spanner -- An individual who has access to the external environment through formal or informal position.
Chief Nursing Executive -- The highest level administrator in the nursing department. The individual with final authority and responsibility for nursing services.
Corporation --A body of persons or organizations recognized by law as an entity having its own name and identity.
Implementation Stage -- The second stage of the process of innovation diffusion. Composed of two substages; initial implementation and continued-sustained implementation.
Initiation Stage --The first stage of innovation diffusion. Composed of knowledge-awareness, formation of attitudes, and decision making.
Innovation -- An idea, practice, or object that is perceived as new by an individual or unit of adoption (Rogers, 1983).
Innovativeness --The degree to which the individual or unit of adoption is relatively earlier in adopting new ideas than other members of a system (Rogers, 1983).
Innovator -- An active information seeker about new ideas with interpersonal networks extending to a wide area usually reaching outside the local system (Rogers, 1983).

Interorganizational Linkage -- A connection between organizations facilitating interaction with the external environment. Linkage may be accomplished through an individual, a group or a formal structure.

Openness -- The state of receptivity to ideas. Affording access to ideas and information.

Organizational Climate -- The prevailing trend or condition of the organization. Conditions or attributes which make up the environment.

Organizational Environment -- All physical and social factors, both internal and external, which affect the decision-making process of the administrators of organizations.

Position -- "...a cognitive orientation of role expectations" (Sarbin, 1954, p. 224).

Professionalism -- Exhibiting the attributes of a professional. Utilizing the skills of the profession to expand knowledge through research and publication.

Role -- "...a patterned sequence of learned actions or deeds performed by a person in an interaction situation" (Sarbin, 1954 p. 225).

Technology -- "The application of scientific knowledge and technical knowledge to the practical purposes of a particular field" (Knezevich & Eye, 1970, p. 16).

Overview of the Study

The report of the study is presented in five chapters. Chapter I includes the background of the problem, the need for the study, the purpose of the study, the significance of the study, the procedure of the study, the assumptions of the study, the limitations of the study, the definition of terms, and the overview.

A review of the literature pertinent to the study is presented in Chapter II. The research on diffusion of innovation, innovation in organizations, and innovations in health care institutions is described. In addition, sources on computer utilization in nursing management are reported.

Chapter III contains the research methodology used. Included are descriptions of the population, the sample, the subjects, the instruments, the pretest of the instruments, the analysis of data from the pretest, the data collection process, the research questions, the hypotheses, and the method of analysis.

Descriptive univariate and bivariate data followed by the discussion of the statistical analysis of data for each hypothesis comprise Chapter IV.

Chapter V includes the overview, the discussion of findings, limitations of the study, contributions to the literature, conclusions, recommendations, and the implications of the study.

Chapter II: REVIEW OF THE LITERATURE

Introduction

The research literature summarized here includes information pertinent to the central issues of the study -innovativeness and its predictors. Specifically, key research which provides direct support, theoretically or empirically, of the research questions is discussed. In addition, selected work which provides indirect support and background for this research is included. Conflicting views of specific concepts, such as size, are presented. The research literature reviewed includes work from the social sciences, management science, and health care administration. The chronological scope of the review varied with the discipline, the variable being researched, and the research history around the criterion.

This chapter is organized by sections which include the research specific to a particular variable. The first section focuses on the research in the area of the dependent variable, innovativeness or innovation adoption. These terms, based upon definitions by Rogers (1983), are used interchangeably. Included in this section are concepts and research issues in innovation. Selected constructs in organizational innovation which

have relevance to this study are discussed. Research specific to innovation in health care organizations is examined.

The second section contains a summary of research which contributes to the understanding of the conceptualization and operationalization of the independent variables. The variables categorized as organizational characteristics will be discussed first, followed by the individual characteristics. The third section contains materials documenting the utilization of computerized management tools as measurement criteria for the dependent variable.

Dependent Variable: Innovativeness

Literature on Innovation

Since its beginning, the study of innovation has included contributions from several disciplines employing a diversity of methodologies. Rogers and Shoemaker (1971) noted the beginning of interdisciplinary studies in the 1960s. That movement has continued and developed into a research tradition that includes the study of the social, organizational, and technical aspects of research in innovation.

With wide and ambiguous use of the concept of innovation across the disciplines, it is important for

the researcher to define the term and its usage (Mohr, 1969). For this study the definitions developed by Rogers (1983) are most relevant and are cited below.

"An innovation is an idea, practice or object that is perceived as new by an individual or other unit of adoption (p. 11). Innovativeness is the degree to which an individual or other unit of adoption is relatively earlier in adopting new ideas than the other members of a system (p. 22)." For this study the terms innovation adoption and innovativeness will be used interchangeably.

The study of innovation is a large research field which has come to be known as "diffusion of innovation" (Rogers, 1983, p. xvi). The field includes the study of the following aspects:

1. The process of innovation diffusion.
2. The attributes of innovations.
3. Innovativeness and adopter characteristics.
4. Innovation in organizations.

A survey of the field was conducted in 1971 (Rogers and Shoemaker) and in 1983 (Rogers) and a meta-analysis completed. Meta-analysis is a methodology which synthesizes the empirical research findings into more general conclusions at the theoretical level. This is accomplished by developing a propositional inventory from the conclusions of each research study. These propositions are then translated into generalizations.

Meta-research provides information about the reliability of a research finding across a number of studies. This presents a stronger base for other researchers as well as support for the translation of research into practice (Rogers, 1983).

These meta-analyses, as well as many individual studies, were utilized in determining the research history of the explanatory variables in this study. In addition, the critique of the methodological approaches was important to the design of the study. A critique by Downs and Mohr (1976) of Rogers and Shoemaker's meta-research (1971) provided additional information to support the selection of variables and the design of the study. This information will be further discussed in the section on independent variables.

Literature on Innovation in Organizations

Innovativeness as an organizational property stimulated an early interest. Rogers and Rogers (1976) established the concept of innovativeness as a general characteristic of individuals or organizations. Research on innovation in organizations has resulted in some basic constructs which can help explain the process which occurs when organizations act innovatively. These constructs include the idea of an innovation process and the characteristics of organizations and innovations.

Two of these constructs, the process of innovation and organizational characteristics, provide theoretical support in the proposed study and will be discussed in the following paragraphs.

The Innovation Process

The study of the process of innovation comprises a major segment of the early research in the field. Zaltman, Duncan, and Holbek (1973) in their work on organizational innovation, reported that the process approach is composed of stages in which certain characteristics appear to a greater or lesser degree but in a certain order of occurrence. Generally, the process has been subdivided into two stages - initiation and implementation. These stages are the bases of numerous organizational models of the innovation process (Milo, 1971; Shepard, 1967; Hage and Aiken, 1970; Wilson, 1966; and Zaltman, Duncan, and Holbek, 1973). The model designed by Zaltman et al. is utilized in the present study.

Zaltman, Duncan, and Holbek Model (1973)

I. Initiation stage
    1. Knowledge-awareness substage
    2. Formation of attitudes toward the innovation substage
    3. Decision substage
II. Implementation stage
    1. Initial implementation substage
    2. Continued-sustained implementation substage

Zaltman et al. (1973) suggest that the study of the diffusion of innovation has focused on the initiation stage while the study of planned change focused on the implementation stage. They define the stage of initiation as "...the point either where the new idea has become legitimized by powerholders of the unit or where the decision has been made to implement the new idea" (p. 58). Three substages comprise this stage. Knowledge-awareness is the crucial first substage. Before innovation can be adopted, potential adopter must be aware of the innovation. The second substage is concerned with the formation of attitudes toward the innovation. The process is affected here by the potential adopter's openness to ideas and the potential for adoption of the innovation. The decision substage

focuses on evaluation of information about the innovation. Effective organizational communication channels are crucial for gathering that information. The decision to adopt the innovation occurs as a result of the decision-maker's motivation and attitude.

The stage of implementation is defined in Zaltman's model as "... the actual mechanics of managing the changes that innovation may imply..." (p. 59). The initial implementation substage is focused on the first attempt to use the innovation. This attempt may be a trial of the innovation limited to an area or a portion of the process. With a successful initial implementation, the innovation is most likely to be continued and sustained.

The first stage, initiation, was the context utilized for this study. The substages knowledge-awareness, formation of attitudes, and decision provide a paradigm for the variables studied here. The ability to gain knowledge-awareness of a potential innovation is enhanced by the professionalism of the individual and the openness of the organizational climate. The professional is characterized by an active interest in new knowledge and an openness to new ideas. An open organizational climate stimulates communication flow and the information exchange about innovation.

The formation of attitudes about innovations is reflected in several of the predictor variables used in

the present study. Professionalism, education, experience, and the organizational climate all contribute to the formation of attitudes about innovation.

The decision stage is influenced by the properties of size and fiscal control of the organization and the role/position of the individual. Resources, a function of size have a direct impact on decisions about adoption of innovations. Authority for decision making is derived from the role/position. An assumption can be drawn from stage theory (Greer, 1977) that the nursing executive in an organizational climate of openness will be able to gain knowledge about innovations. Additionally, professionalism, education, experience, role/position, and computer knowledge will affect the nursing executive's receptivity to innovation and ability to initiate innovative practices.

This information about the process of innovation provides a preface to the second construct, characteristics of organizations.

The Characteristics of Organizations

The characteristics of organizations which affect the innovation process have been the focus of much empirical research. Organizational attributes have been conceptualized as structural or environmental.

Organizational structure as a correlate of innovation has been studied by Thompson (1969), Hage and Aiken,(1967), Burns and Stalker (1961), Lawrence and Lorsch (1967), and Argyris (1965). In these works, the correlation between size, centrality, formalization, complexity, and the adoption of innovation was examined.

Size has been the leitmotif of many studies of organizational innovativeness. Baldridge and Burnham (1975) emphasized that size creates problems of control and management which demand innovative practices. Kimberly and Evanisko (1981) affirmed that increases in size create a "critical mass" which can be used to justify the acquisition of innovations (p. 699). Further, organizations with more activity can better afford innovation. Conversely, Thompson (1969) stated that increases in size resulted in an enlarged bureaucracy which decreased flexibility and stifled innovativeness. In this study it is postulated that positive relationship between size and innovativeness in accordance with the generally held view. Studies specific to the context of this research will be reviewed in the section on independent variables.

Directly related to the issue of size and innovativeness is the fiscal control of organizations. Single institutions and multiorganization corporations approach innovation adoption from different perspectives. Economies of scale available to a

multicorporate body can provide resources not available to the single organization. Tilton (1971) suggested that subsidiaries of large firms through their access to specialists in the parent organization have a high capacity for innovation adoption. Aiken and Hage (1971) confirmed that when two or more organizations shared resources innovation was more possible. Health care institutions in the 1980s are moving to an increasing use of complex corporate structures as a financial management strategy. Inclusion of the concept of fiscal control in this research will be discussed further in the section on independent variables.

The organizational environment has been defined by Zaltman et al.(1973) "...as the totality of physical and social factors taken directly into consideration in the decision-making behavior of individuals in organizations" (p. 114). Those factors can be classified as internal (inside the organizational bounds) or external (outside the organizational bounds).

It is evident that organizations as conceptualized by Zaltman are not closed systems (1973), but they are open systems constantly interacting with the environment. Changes in the environment require an organizational response. Research has shown that different organizations may have quantitatively and qualitatively different environments, and thus respond differently (Emery and Trist, 1965; Terreberry, 1968).

Organizational dynamics can explain some of the differences in responses to the environmental changes. Etzioni (1975), Mohr (1969), Zaltman et al.(1973), and others studied the relationship between the stability of organizational environments and innovation adoption. They concluded that environmental calm leads to more stable organizational function and less innovativeness. Reciprocally, turbulent times result in increased organizational innovativeness.

Efforts to understand the response to environmental change led to studies of organizational boundaries (Hage and Aiken, 1967, 1970), resource availability (Mohr, 1969; Cyert and March, 1963), external regulations (McNeil and Minihan, 1977), and a mix of individual, organizational and environmental factors (Baldridge and Burnham, 1975). Kimberly (1978) explored the effects of mechanisms which integrate organizations into external information environments. This research bears directly on the present study and will be discussed in the section on independent variables.

Innovation in Health Care Organizations

The previous discussion of innovation concepts germane to organizations set the stage for an examination of innovation in health care organizations. Greer (1977) emphasized that studies of health care

organizations have drawn from and adapted the work of such organizational theorists as Simon (1957), Thompson (1967), Cyert and March (1963), March and Simon (1958) and Perrow (1979). In addition, the social scientists, Katz and Kahn (1978) provided a conceptual framework of social systems which is adaptable to hospitals. They reported that social systems function as an open system and constantly interact with their environment. Their work was an adaptation of the work of Miller (1972) and von Bertalanffy (1951) on systems theory. Georgopoulos,(1972) affirmed the hospital as an open system and it is clear that many of the constructs about the open system are operationalized in hospitals. The concept of equifinality is an excellent description of the process of health care delivery. That process reflects the input of multiple patients requiring diverse treatment strategies from a spectrum of professionals to reach a goal of health and/or wellness.

Perrow (1965) discussed the technological climate of health care and its effect on innovation. Others have looked empirically at innovation in health care settings. This work was a major source of information and documentation for the study of the predictors of the nursing executive's innovativeness. Of particular significance are the combined works of Kaluzny and associates (1974), Munson and Pelz (1981, 1982), Munson (1973), Munson and Hancock (1972), Coleman (1966),

Becker (1970), Greer (1977), and a large body of work by Kimberly (1978), Counte and Kimberly (1974), and Kimberly and Evanisko (1981). The work encompassed in this collection includes studies of the impact of organizational structure, size, slack resources, and the environment on innovation. In addition, the process and typology of innovation, as well as some research on the attributes of professionals as innovators is examined. The studies which contributed directly to the development of the present work, will be discussed in the next section. While these studies of health care organizations did not address directly the nurse administrator as an innovator, they did provide theoretical underpinnings for the research questions.

Independent Variables

This study was framed to examine the predictors of the nursing executive's innovativeness at two levels - organizationally and individually. Two organizational level predictors, structure and environment were included. Organizational structure as a predictor is defined in this study through size and fiscal control. The organizational level predictor, environment, was conceptualized as the openness of the organization to information, i.e., an open climate. Five individual level predictors were included and are conceptualized

as: managerial role/position, computer knowledge, professionalism, and managerial preparedness, (operationalized as two variables, education and experience). In the next section, research pertinent to the independent variables is reviewed and the rationale for selection of the variables is presented.

A number of researchers have examined organizational structure in the context of health care organizations. Size, considered as a facet of structure, has been included in many studies of innovation in health care (Kaluzny, Gentry and Veney, 1974; Mohr, 1969; Moch and Morse, 1977; Mytinger, 1968). Kaluzny et al. (1978) described size as both a causal variable and an emergent variable. They concluded that there is a direct relationship between size and innovation adoption. Mohr (1969) speculated that innovation was directly related to resources which are a function of size. Mytinger (1968) confirmed the interrelationship among organizational size and resources and innovation. Moch and Morse (1977) proposed that slack resources were required for organizational innovativeness and cited the correlation with size. These studies provide support for the inclusion of size as an explanatory variable in the proposed research.

Researchers have proposed resources as a function of size and thus related to innovation adoption (Mohr,

1969; Mytinger, 1968). In this study resources are examined as part of the larger entity of fiscal control. Designing a fiscal structure for increased flexibility of resources is a major trend in the health care delivery system of the 1980s (Batchelor, 1985). Corporations which include multiple agencies and institutions can accumulate the resources of personnel, equipment, space, and money needed for innovation. Thus, health care institutions facing turbulence in the economic environment are moving in increasing numbers toward the development of multicorporate systems (Freund and Mitchell, 1985). This corporate restucturing offers hospitals greater financial stability while allowing more organizational flexibility to meet health care needs (Batchelor, 1985).

While a number of journal articles have examined multicorporate systems (Hoch, 1984; Ernst and Whinney, 1982), a review of research in health care administration reveals no studies specific to fiscal control of hospitals and innovation adoption. The lack of empirical research on this trend supports the inclusion of the structural attribute fiscal control in the proposed research.

Other structural characteristics which may predict innovation adoption have been the focus of researchers in organizational innovation. They include centrality, formalization, and complexity. These variables were not

included in this study because prior research results have been mixed. Rogers (1983) contends that the relationship between these variables and innovation adoption changes with the stage of the innovation process. Thus there may be a need for decentralization during the initiation stage and a need for centralization at the implementation stage.

Perrow (1965) said that most hospitals are complex, highly centralized institutions. The variance in these attributes in a sample of hospitals would be very small, making their inclusion in the study problematic.

The third organizational level variable, environment, is operationalized as the openness of the climate. Openness stimulates the intake of information about new ideas, concepts, products, and services. Since the greatest source of ideas are found outside an institution, (Zaltman et al., 1973; Bigoness and Perreault, 1981), a system must provide for interactions with the environment. Mechanisms which promote interactions include interorganizational linkages, joint programs, and boundary spanners. Substantial research has confirmed the positive relationship between these mechanisms and innovation (Rogers and Shoemaker, 1971; Coleman, Katz, and Menzel, 1966; Aldrich and Herker, 1977; Tushman, 1977; Tushman and Scanlan, 1981a, 1981b).

Interorganizational linkages may be created using individuals or entities. Individuals may link health

care institutions through consultation or provision of a special service. Linkage may occur through collaboration on projects and programs. Professional organizations and academic institutions may link institutions through research projects and educational programs. All these forms of linkage function to open hospitals to information and provide a conduit to and from external sources.

The individual providing the linkage may be described as a boundary spanner (Tushman & Scanlan, 1981a). The primary characteristics of a boundary spanner reported by Pelz and Andrews (1966) were professional involvement and perceived competence. The staff of hospitals include a diverse population of professionals and specialists with contacts beyond the organizational boundaries. Boundary spanners in a department of nursing include nurse clinicians, clinical specialists, and researchers. Tushman and Scanlan in more recent studies (1981b) affirmed the importance of boundary spanning individuals as a key mechanism for linking the institution to external information sources.

Openness is directly linked with communication processes. Likert (1976) used the System 4T theory which provided a paradigm for quantifying organizational effectiveness to measure the openness of the organizational climate. Upward, downward, and lateral communication which is accurate and timely is posited by

Likert as the hallmark of an open climate.

Hospitals, as other institutions and organizations, use interorganizational linkages and individuals to cross the boundary of the system and interact with others. Those interactions as well as interactions internal to the system are enhanced by the flow of communications. Understanding the relationships between an open climate and innovativeness is crucial for executives of the health care delivery system. Therefore, organizational climate was included as an organizational level variable to be studied.

The first managerial attribute to be investigated in this study is the role/position. These attributes are used as a composite label. Role is defined as "..a patterned sequence of learned actions or deeds performed by a person in an interaction situation" (Sarbin, 1954, p. 225). Position is defined as "...a cognitive organization of role expectations (Sarbin, 1954, p. 224). The executive plays an important boundary role in the importation of information on innovations (Bigoness and Perreault, 1981; Baldridge and Burnham, 1974; March and Simon, 1958). In addition, the executive has access to multiple information environments (Kaplan, 1967). In complex organizations such as hospitals, where differentiation and specialization are present, staff members are specialists who are searching for new solutions and have access to other organizations and

individuals. This provides sources of knowledge for decision-making.

In addition to communication linkages, power and sanctions are important factors in the adoption of innovation. Having imported or received information about innovations, the executive must have decision-making power and the resources to facilitate the adoption (Baldridge and Burnham, 1975). Is the role/position of the nursing executive powerful enough to gain innovations for the nursing department? An examination of the relationship between role/position and innovativeness is important to this study.

The second individual level variable, computer knowledge, is hypothesized to be directly related to the adoption of computer technology. In their study of the innovation process, Lin and Zaltman (1971) identified the first stage as knowledge-awareness. They asserted that the knowledge stage commences when the individual is exposed to an innovation's existence. There are conflicting views as to whether exposure is an active or passive process. Rogers (1983) reported that many researchers feel that the individual plays a passive role in exposure to knowledge about innovations. This was confirmed in Coleman's (1966) study of physicians and their passive acceptance of knowledge about new drugs. Other researchers asserted that individuals gain awareness-knowledge of innovations only through

behaviors that are initiated. They affirmed that exposure is an active process. Rogers and Shoemaker (1971) concluded that "... research does not provide a clear answer to the question of whether awareness of a need or awareness of an innovation comes first" (p.106).

In the case of organizations, Zaltman et al. (1973) proposed that awareness of an innovation, which would improve an organization's function, could alter the frame of reference of decision-makers. This could lead to the perception of a performance gap and a change in the expectation concerning performance, which in turn would lead to the adoption of the innovation. The nursing executive with interest in computer technology is exposed to innovations in the field. He/she may learn of an innovation, determine that there is a performance gap or problem, and move to solve the problem or close the gap with the adoption of the innovation. The role of knowledge-awareness in the innovation process is well substantiated in the literature therefore the variable computer knowledge has been included in this study of nursing executives.

Professionalism as a predictor of innovation adoption was studied in a population of physicians by Becker (1970b) and Counte and Kimberly (1974) and a positive correlation was found between professionalism and innovation. Greer (1977) noted that adoption of innovations was a mechanism utilized by physicians to

increase their professional status. The attribute, professionalism, has different dimensions in nursing and medicine. Nursing is a developing profession with a fairly recent history of academic preparation which fosters professional growth. Further, nurses who are primarily female have not sought careers but rather have worked in interrupted periods at jobs with limited futures. The need for further investigation of the relationship of an emergent professionalism and innovativeness dictated the inclusion of professionalism as a predictor variable.

The attribute, managerial preparedness, is related to education and experience. Studies of innovation in health care have examined education and experience of physicians as an explanatory variable (Becker, 1970b; Coleman et al. 1966; Counte and Kimberly, 1974; Mytinger, 1968; Mohr, 1969). These studies report a positive correlation between levels of education and degree of innovativeness. On the other hand, Kimberly and Evanisko's (1981) study of health care administrators and physicians and their adoption of two kinds of innovations reported mixed results. There were strong correlations between administrators' education and experience and innovativeness. However, the correlation between physicians' education and experience and innovativeness was not significant.

No studies of nursing executives and innovation

using education and experience as explanatory variables were found in the literature reviewed. The educational preparation of nurses is very different from the physician and the hospital administrator and has changed over time. Early educational programs were based primarily in hospital diploma schools, with a small number of university-based schools of nursing found primarily in the northeastern United States (Blaney, 1986). In the 1950s encouragement for the development of academic based programs began with and was sustained by professional nursing organizations such as the American Nurses Association (ANA) and the National League for Nursing (NLN). This resulted in the development of both associate and baccalaureate degree programs. Soon graduate level programs were added at larger universities (ANA, 1985). By 1985 there were 132 NLN-accredited Master's programs (Forni, 1987). This evolution in nursing education is reflected in the diverse educational credentials of nursing executives. Many executives have a diploma education and many years of experience, while another group of executives are prepared at the graduate level and have less experience. The impact of changing educational requirements on innovation adoption should be investigated and thus is included in this study.

Although no studies of the relationship between management experience and innovativeness were found in

the nursing literature, the relationship has been studied in a population of physicians and hospital administrators. Kimberly and Evanisko (1981) presented alternate views of the impact of job tenure. First, that longevity fosters innovation adoption because it provides skills important in obtaining desired outcomes. Second, that new leaders with new ideas and without obligations to constituencies may be more innovative. They hypothesized a positive relationship in their study of hospital administrators and physicians and found mixed results. The hospital administrators' tenure was a contributor to innovation adoption but physicians' tenure was not. For this study a positive relationship is hypothesized because this is the generally held view in adoption research (Rogers and Shoemaker, 1971) and because the nursing executive's role is similar to that of the hospital administrator.

Individual predictors often studied but not included in this study were cosmopolitanism and age. Cosmopolites value external referents and look beyond the local situation (Becker, 1970b). This attribute is not prominent among nursing executives. Two concepts may explain the lack of cosmopolitanism - gender and role/position. Long (1986) studied the relationship between gender and work roles in women physicians and nurses and reported that wife/mother roles have first priority. Nurses who are wives and mothers may be place

bound with limited opportunity for exposure to external referents. Also, the nursing executive has difficulty in establishing associations with peers outside of the hospital because of the competition for market share prevalent in the health care sector.

Researchers who have examined the relationships between age and innovativeness argue that there is an inverse relationship (Rogers & Schramm, 1962). The population of nursing executives in Michigan ranges across a diverse age span. Because of the increasing supply of masters prepared nurses discussed earlier, many executive positions are being filled by young nurses with limited experience. On the other hand, many institutions have executives with limited formal educational preparation and 20 to 30 years experience. The inter-relationships of age with other factors present a complex problem which was not appropriate to the scope of this study.

Utilization of Computer Technology

The multidisciplinary approach to innovation research has resulted in numerous products, programs, and services being designated as innovations. Early researchers looked at agricultural products and practices (Ryan and Gross, 1943); later, educational practices (Carlson, 1965) were studied. In the health

care field, medical sociologists and physician researchers examined the adoption of new drugs and family-planning methods (Coleman et al. 1966; Rogers, 1973).

With the advent of the information age, a primary measure of innovativeness has been the adoption and adaptation of computer technology. In 1981, Kimberly and Evanisko studied administrative and technical innovations in hospitals. The administrative innovation selected was the adoption of computer technology for management. There is an increasing research effort focused on health care management with special emphasis on utilization of computer technology (Pocklington & Guttman, 1984). This research trend supported the selection of the utilization of management applications of computer technology as a measure of innovativeness in nursing executives.

Nursing executives are struggling with not only turmoil in the financial management of health care delivery, but also the trend toward increasing technology with changes in the duties and responsibilities of nursing employees. Computer technology offers the nursing executive potential for better management of data and the opportunity to use simulation for prediction and decision making. In a high-technology field, where information access and manipulation is a top priority, the innovative executive

will utilize the tools of the trade - computerized management applications. Therefore, innovation will be measured by an index which quantifies the adoption of selected computer management application and associated factors.

In order to develop a scale of innovativeness it was necessary to obtain an assessment of computer utilization in nursing. Review of the literature began with Pocklington's and Guttman's (1984) comprehensive annotated bibliography of all publications about nursing applications of computer technology from 1960 to 1984. Individual reports of computer applications in nursing management were extracted from Ball and Hannah (1984), Grobe, (1984), and Saba and McCormick (1986). In addition, Proceedings of the Symposium on Computer Applications in Medical Care (SCAMC), and articles from The Journal of Nursing Administration, The Nursing Administration Quarterly, and Nursing Management, were utilized to establish a baseline for development of the innovation scale. The scale is described in detail in the chapter on methodology.

Summary

The literature reviewed here includes the innovation process, innovation in organizations, and innovation in health care institutions. Much of the

literature focused on the innovation adoption process and contained models which had been constructed to explain the process (Milo, 1971; Shepard, 1967; Hage & Aiken, 1970; Wilson, 1966). The Zaltman model (1973) is a classic interpretation of the process utilizing two stages - initiation and implementation. Substages of the initiation stage include 1) knowledge-awareness, 2) attitudes, and 3) decisions. Substages of the implementation stage include 1) initial implementation and 2) continued-sustained implementation. This model was utilized as a framework for the independent variables in the present study.

Organizational innovation occurs as the result of interactions among structural and environmental factors and individuals (Rogers, 1983). Structural correlates of innovation such as size, centrality, formalization, and complexity which have been widely researched were summarized here (Thompson, 1969; Hage & Aiken, 1967; Burns & Stalker, 1961; Lawrence & Lorch, 1967; and Argyris, 1965). The environment as an organizational characteristic has been researched more generally through conceptual frameworks as system theory and organizational dynamics and specifically through studies of organizational boundaries, interorganizational linkages and the role of boundary spanners. These studies have confirmed the propositions that communication with external sources provide access to

information about innovations and that organizations have many channels for access to innovations. The open organizational climate supports innovativeness and this is especially true in the health care sector.

Hospitals are complex, highly structured organizations which function as open systems. However, innovation adoption must be initiated by individual interest and effort (Rogers, 1983). Hospitals because of their bureaucratic properties require initiation and implementation of innovative measures by top level executives. The innovative executive is described by individual attributes which have been researched by many disciplines. Among those reviewed for this study were computer knowledge, professionalism, education, and experience. The role/position of the executive was included with the individual attributes but also acts as a bridging element between the individual and the organization.

The literature contains little research about innovation adoption by nursing executives. As the health care delivery system faces increasing complexity and change, nursing executives must be prepared to respond with innovative solutions and strategies. This study was designed to answer questions about the impact of both organizational and individual factors on innovation adoption.

Chapter III: METHODOLOGY

This chapter provides descriptions of the design, methods, and procedures used in conducting this study. The chapter is divided into sections on the population, the sample, the subjects, the instrument, the pretest of the instrument, the analysis of data from the pretest, the data collection process, the respondent profile,the research questions, the hypotheses, the method of analysis, and the summary.

The Population

The population for this study consisted of the chief nursing executives of all hospitals in Michigan. The sampling frame was compiled from the records of the American Hospital Association and contained 225 institutions. The survey population included chief nursing executives of general hospitals, specialty institutions, military hospitals, and veterans facilities. The designation of specialty institutions includes hospitals providing rehabilitation, substance abuse, and psychiatric/ mental health services and children's and women's hospitals.

The Sample

A stratified random sample of fifty institutions was used for the pretest of the survey instrument. The sample was stratified by size which was operationalized as number of hospital beds. The total population (excluding those participants in the pretest) was used for the survey.

The Subjects

Respondents to the questionnaires were individuals in the highest level administrative position in nursing in the institution. This position has many titles which may include Director of Nursing, Associate Hospital Director for Nursing, Vice President for Nursing, or Director of Nursing Operations. The survey packet was addressed to the highest level nursing executive in each hospital.

The Instruments

A self-administered questionnaire was utilized which included specially designed measurement paradigms. These paradigms were developed by the researcher after consultation with experts in the fields of innovation diffusion and health care administration research.

Total scale scores were obtained for each of the independent variables. For the independent variable organizational climate, for example, responses to questions about the openness of the organization were measured using a Likert-type response format (i.e., rarely, occasionally, usually, and almost always (Likert, 1976). The total scale score, formulated by summing across variable items was designed to reflect an intensity measure of that variable. Other variables were measured by items with several responses forms, for example, dichotomous choices as well as Likert-format intensity measures. These were also summed to yield total variable scores, which were labeled "scales" because they were treated as intensity measures.

Measuring the Dependent Variable

An instrument comprised of six subscales (one for each of six management functions) measured the dependent variable and provided a total scale score of innovativeness. Innovativeness was operationalized as the early adoption and the degree of adoption and adaptation of computer technology for six selected management functions in the nursing department. Each subscale contained ten items which were used to obtain information about a specific management function. The six subscale scores were summed to yield an

innovativeness scale score.

The management functions included in this study were personnel, resource allocation, quality assurance, staffing, summary reports, and forecasting and they were selected through a multidimensional approach. Using Pocklington's and Guttman's (1984) annotated bibliography of the literature on computer applications in nursing, a list of management applications was compiled. This was supplemented by information from articles from 1984 to the present obtained through a computerized database search. This list of management applications was then sorted into categories of management functions suggested by Saba and McCormick (1986). A panel of experts was selected to assist in the development of a short list of management functions which would be appropriate for inclusion in the questionnaire. The panel included experts from a private multicorporation, a hospital management company, the federal government, and an editor of a professional computer journal (Appendix A).

The expert panel used a simple form of the Q technique in sorting the possible computer management applications. The expert panel was utilized to provide content validity for the scale of innovativeness. The reliability of the scale was examined as a part of the pretesting process.

Measuring the Independent Variables

The second measurement paradigm was a set of instruments and selected individual items designed to measure the independent variables. The instruments followed the format of those designed to measure the same or similar criteria in prior research. For example, the instruments used to measure the individual variables professionalism, management preparedness, and role/position were previously tested in research studies of physicians and health care administrators. (Kimberly, 1978; Kimberly and Evanisko, 1981; Becker, 1970b). The instrument for professionalism includes items about research, publication, presentations consultations, organizational memberships, conference attendance, and professional reading. Management preparedness was operationalized as education and experience, and information was requested on educational preparation and years of experience. The instrument for role/position measured the scope of responsibility with emphasis on decision making and the quantity and diversity of information sources. The items comprising the computer knowledge instrument were based on studies of this concept specific to health care personnel (Merrow, 1985; Ronald, 1983). The measure included information sources such as journals, classes, courses, organizations, and individuals. Individual items were

used to measure the organizational variables size and fiscal control. The instrument for organizational climate included items on communication patterns which affect openness, items on boundary spanners, and items on interorganizational linkages. Selected items on communication were drawn from Likert's (1976) work on organizational characteristics and conflict management.

The use of measures which have reliability and validity confirmed in previous studies does not ipso facto confirm their reliability and validity in this study. Rather, it simply indicates a greater probability that these psychometric characteristics would persist in the current study. A description of the validity and reliability of this instrument was provided through the pretest.

The Pretest

The development of the instruments to be pretested began with the organization of the items. The instruments included a six part scale to measure the dependent variable and scales and individual items to measure the independent variables. The design of the questionnaire followed guidelines from the work of Babbie (1973), Dillman (1978) and Sudman and Bradburn (1985). In particular, an effort was made to comply with the following design elements:

1. A clean, uncluttered format.
2. Clarity of the items.
3. Ease of response
4. Precoding for ease of analysis.
5. Inclusion of space for comments from respondents.

The instrument was then submitted to a peer group of six nurse educators with interest in and knowledge about computer applications in nursing. Their responses were used to clarify two items and to add additional foils to two items. The instruments were then prepared for use in the pretest.

Pretest Data Collection

A packet of materials was mailed to chief nursing executives from 50 institutions. The packet contained a letter of transmittal, the questionnaire, a stamped return envelope, and a return postcard. The letter of transmittal contained the rationale for the study and requested the assistance of the chief nursing executive. The letter described the process by which anonymity would be maintained and stressed the importance of returning the postcard to prevent unnecessary follow-ups.

Fifty packets were mailed and follow-up began one week later using a reminder postcard. A second follow-

up was planned for two weeks after the postcard follow-up. The second follow-up was deemed unnecessary since a return rate of 75 percent (38) was achieved within three weeks of the initial mailing.

Analysis of Pretest Data

The pretest data were organized, coded and entered into a data file using VM/CMS on the IBM mainframe. Data were checked for entry errors and data cleaning completed. The following statistical procedures were done:

1. Frequencies of all variables.
2. Crosstabulations and statistics of selected variables.
3. Scatter plots of selected variables.
4. Reliability of scales measuring the dependent and independent variables.

The analysis of the pretest returns began with the organization of the data through the use of the SPSSX procedure FREQUENCIES. Crosstabulations of selected variables produced the Chi-square measure of association. These measures were used to confirm the association between variables and support the validity of the instrument. The scatter plots allowed a visual check for linearity of relationship and no curvilinear patterns were evident.

The reliability of the scales was then analyzed. Cronbach's Alpha Coefficients for the six part scale measuring the dependent variable are presented in Table 3.1.

Table 3.1

Reliability of Dependent Variable Scale

Scale	No. of Items	Standardized Item Alpha
Scale a1 (Personnel)	10	.9454
Scale a2 (Quality Assurance)	10	.9407
Scale a3 (Resource Allocation)	10	.8859
Scale a4 (Staffing)	10	.8964
Scale a5 (Report Writing)	10	.9279
Scale a6 (Forecasting)	10	.9108
Total Scale (Innovativeness Score)	60	.8101

The scales measuring the independent variables were

examined for reliability using Cronbach's Alpha Coefficient. For data in dichotomous form the alpha is equivalent to the reliability coefficient Kuder-Richardson 20. This information is presented in Table 3.2.

Table 3.2

Reliability of Independent Variable Scales

Scale	Number of Items	Standardized Item Alpha
Individual Level		
Scale 1 (Role/Position)	8	.6181
Scale 2 (Comp. Knowledge)	9	.6187
Scale 3 (Ed./Experience)	7	.5483
Scale 4 (Professionalism)	11	.8188
Organizational Level		
Scale 5 (Org.Climate)	7	.8306

Those scales which had coefficients of below .70

were further examined. The alpha coefficient of Scale 3 (.5383) suggested that this scale was not internally consistent. The scale, measuring management preparedness through education and experience, contained four items about education and three about experience. The items themselves seemed to reflect independent information of a factual nature and the decision was made to consider education and experience separately. Scale 3 was discarded and the individual items were employed as measures of education and experience. An item to reflect the number of years since graduation was added. Scale 1 was modified to improve reliability by deleting two items which were not homogeneous. Scale 2 was modified with the addition of one item addressing the issue of staff members as sources of information. The variables size and fiscal control were measured by individual items.

To investigate the predictive validity of the instruments, the relationships between the independent variables and the dependent variable were tested. The Spearman correlation technique was selected for those situations in which one or both of the variables were in the form of ranks or dichotomies while the Pearson correlation procedure was used for those situations in which both variables were measured by ordinal data. The correlation coefficients ranged from .07 to .70 and significance level ranged from .07 to .001. Negative

values ranged from -.15 to -.25 and the significance levels ranged from .07 to .19. Scale 3 had the lowest correlation coefficients and changes were instituted as described above.

In addition to the changes made to improve the reliability of the scales other modifications of the questionnaire were made in response to comments from respondents. Some items were restated for clarification and the sequence of the items in the dependent variable instrument was reorganized to clarify the branching process.

The Data Collection Procedure

Changes in the questionnaire items resulting from the data analysis described above were completed and the revised instrument was printed for distribution to the population of nursing chief executives in Michigan. This population excluded those individuals who had participated in the pretest.

One hundred and ninety-four packets were prepared for mailing. The packets contained the questionnaire, a stamped return postcard, a stamped return envelope, and the letter of transmittal. In order to facilitate returns, the packets were personalized addressing the individual by name as well as title. The packets were mailed using first class postage on March 1, 1987. A

follow-up postcard was mailed one week later on March 8, 1987. Twenty four surveys were returned within the first four days and these respondents were not included in the first follow-up by postcard.

The second follow-up was done by letter and was mailed on March 22, 1987, two weeks after the follow-up postcard. This follow-up was sent only to nonrespondents as determined by comparison of the return postcard with the participants' signatures and the master list. A spreadsheet was designed to organize the data on survey returns, follow-ups, and participants' requests for results of the study.

By April 1, 1987, 50 percent of the questionnaires had been returned. A third follow-up by telephone to a random selection of nonrespondents elicited the following information. Three hospitals had closed with one hospital transferring its services and personnel to another institution. In eight hospitals the chief nursing executive had resigned within the past month and the position was held by an acting director. Ten individuals had misplaced the survey packet.

Another survey packet was mailed to the ten non-respondents mentioned above. By April 15, 1987 the return rate reached 60 percent. Data entry began on April 15, 1987 and was completed on April 20, 1987.

The Respondent Profile

Responses were received from 116 (60 percent) chief nursing executives of the population of 194. They represented hospitals varying in size from 15 to 929 beds. To determine the representativeness of the respondents, in terms of hospital size and type, a comparison of the sample and the population was conducted. Classifications of hospitals by number of beds have been derived by the American Hospital Association and include a model of eight groups for large data sets and a model with the eight groups collapsed to four groups for smaller populations. The latter model was used for this study. The classifications are listed and a comparison of the sample to the Michigan population is shown in Table 3.3.

Classification Size (Number of Beds)

Classification Size	Pop Percent	Sample Percent	Percent of Pop. Sampled
1. 06-99	45.36	43.48	56.82
2. 100-249	24.74	24.35	58.33
3. 250-399	17.53	18.26	61.76
4. 400+	12.37	13.91	66.67
Total Number	194	115	59.79

The number of respondents per classification was considered representative of the population. The sample represented 60 percent of the population and the four classes varied by a total of 4.54 percent. The smaller hospitals were underrepresented by 1.88 percent while the two classes of larger hospitals were overrepresented by .73 and 1.54 percent, respectively.

Respondents were also classified according to type of clients the hospital served or the services provided. Hospitals were divided into four classes, general, specialty, veterans, or military. The specialty

classification included institutions for women, children, rehabilitation, psychiatric/mental health and substance abuse. Table 3.4 presents these data.

Table 3.4

Classification Type of Hospital

Type	Population Percent	Sample Percent	Percent of Pop.Sampled
1. General	83.51	79.65	55.56
2. Specialty	13.40	15.93	69.23
3. Veterans	2.06	2.65	75.00
4. Military	1.03	1.77	100.00
Total Number	194	113	

These data were examined for goodness-of-fit using the Chi-square statistic. Because two classes (veterans and military) had less than the minimum expected cell frequency (3.3) for a valid test, they were combined. The resulting three classes were examined and the Chi-square statistic was 15.24 with two degrees of freedom and significant at .002. The sample was deemed to be representative of the population in regards to type

hospital.

Reliability of the Survey Instruments

The questionnaire, which was modified in response to the pretest findings, was examined again for reliability using the survey data. The scales measuring the dependent variables had alpha coefficients of .82 to .93. Coefficients for the independent variable scales calculated from the survey data ranged from .60 to .71. The modifications to the questionnaire made only a slight improvement in the reliability of the independent variable scales. These data are presented in Table 3.5 and Table 3.6.

Table 3.5

Reliability of Dependent Variable Scales

Survey Data

Scale	No. of items	Standard Item Alpha
Scale a1 (Personnel)	11	.8455
Scale a2 (Quality Assurance)	11	.8418
Scale a3 (Resource Allocation)	11	.8237
Scale a4 (Staffing)	11	.8376
Scale a5 (Report Writing)	11	.8588
Scale a6 (Forecasting)	11	.8170
Total Scale (Innovation Score)	66	.9260

Table 3.6

Reliability of Independent Variable Scales

Survey Data

Scale	No. of Items	Standardized Item Alpha
Individual Level		
Scale 1 (Role/position)	7	.6497
Scale 2 (Comp. Knowledge)	9	.6040
Scale 4 (Professionalism)	11	.6772
Organizational Level		
Scale 5 (Org. Climate)	11	.7136

The interpretation of the reliability coefficient includes the concept of true variance measurement, stability or test-retest reliability, and internal consistency of test items (Kerlinger (1964). The concept of internal consistency is of importance in this case. The degree of homogeneity of test items may have contributed to lower alpha coefficients in two of the

scales. The concept of true variance was investigated by an examination of the scatterplots of the independent variables. A limited range of responses was evident in the scatterplot of data on the scales with lower coefficients and this could have an impact on the total variance. Kerlinger (1964) has stated that reliability, while not the most important aspect of measurement, is extremely important. Consequently the findings of this study must be interpreted with careful consideration of the reliability coefficients.

Research Questions

The study is designed to address the research questions listed below. The questions are listed by organizational and individual levels followed by questions about multiple relationships and prediction.

Organizational Characteristics

1. Is the size of the hospital a factor in the chief nursing executive's innovativeness?
2. Are multiple hospital corporations and parent holding companies more likely to facilitate the innovativeness of the chief nursing executive than single hospital entities?
3. Does organizational climate affect the

3. Does organizational climate affect the innovativeness of the chief nursing executive?

Individual Characteristics

1. Does the role and/or position of the chief nursing executive affect his/her degree of innovativeness?
2. Does knowledge about computer technology affect the innovativeness of the chief nursing executive?
3. Does the degree of professionalism affect the innovativeness of the chief nursing executive?
4. Does the level of management preparedness, acquired through education affect the innovativeness of the chief nursing executive?
5. Does the level of management preparedness, acquired through experience affect the innovativeness of the chief nursing executive?

Multiple Correlation and Prediction

1. What combination of variables is the best predictor of the innovativeness of the chief nursing executive?

The Research Hypotheses

The hypotheses tested in this study are listed below; immediately following is a restatement in the null form.

H_1: There is a significant relationship between size of hospital, as measured by number of beds, and the innovativeness of the chief nursing executive.

HO_1: There is no significant relationship between size of hospital, as measured by number of beds, and the innovativeness of the chief nursing executive.

H_2: There is a significant relationship between levels of institutional fiscal control and the innovativeness of the chief nursing executive.

HO_2: There is no significant relationship between level of institutional fiscal control and the innovativeness of the chief nursing executive.

H_3: There is a significant relationship between organizational climate, as measured by openness to the environment, and the innovativeness of the chief nursing executive.

HO_3: There is no significant relationship between organizational climate, as measured by openness to the environment, and the innovativeness of the chief nursing executive.

H_4: There is a significant relationship between role/position and the innovativeness of the chief nursing executive.

HO_4: There is no significant relationship between role/position and the innovativeness of the chief nursing executive.

H_5: There is a significant relationship between computer knowledge and the innovativeness of the chief nursing executive.

HO_5: There is no significant relationship between computer knowledge and the innovativeness of the chief nursing executive.

H_6: There is a significant relationship between professionalism and the innovativeness of the chief nursing executive.

HO_6: There is no significant relationship between professionalism and the innovativeness of the chief nursing executive.

H_7: There is a significant relationship between managerial preparedness, acquired through education, and the innovativeness of the chief nursing executive.

HO_7: There is no significant relationship between managerial preparedness, acquired through education, and the innovativeness of the chief nursing executive.

H_8: There is a significant relationship between managerial preparedness, acquired through experience, and the innovativeness of the chief nursing executive.

HO_8: There is no significant relationship between managerial preparedness, acquired through experience, and the innovativeness of the chief nursing executive.

H_9: There is a significant relationship between multiple independent variables considered simultaneously and the innovativeness of the chief nursing executive.

multiple independent variables considered simultaneously and the innovativeness of the chief nursing executive.

Method of Analysis

This study was designed to examine the relationships between the dependent variable, innovativeness and selected independent variables both organizational and individual. Specifically, the researcher sought to test whether innovativeness is a function of size, fiscal control, and climate of the organization and/or role/position, computer knowledge, professionalism and management preparedness of the chief nursing executive. The intent of the researcher was to investigate relationships between variables; not to examine differences between groups or treatments. This intent was translated into a research design which focused on the measurement of bivariate and multivariate relationships.

Descriptive analysis was used to organize and summarize data from the sample and included:

1. Univariate distributions with measures of central tendencies and variability.

2. Bivariate distributions for pairs of variables and their measures of relationships.

The Chi-square goodness-of-fit test was used to

determine whether the univariate distributions in this study could have been selected randomly from a specified population distribution. Thus the frequencies for each cell of the observed distribution estimate the frequencies that would be expected if the sample was randomly drawn from the specific population. Expected frequencies based upon the known population were used in selected cases such as type of hospital. For other distributions the a priori assumption was made that an equal proportion of frequencies is expected in each cell.

The correlation coefficient was the statistic used to measure the linear relationship between variables. The coefficient of determination (r^2) was used in association with r to evaluate the total variation in the dependent variable explained by the independent variable. This coefficient is used to measure closeness and is referred to as "goodness-of fit" (Schroeder, 1986). Several variants of the statistical technique correlation were utilized. The Pearson Product-Moment Correlation Coefficient is widely employed in situations where the relationship between variables is basically linear, where assumptions about normality and homogeneity of variance can be made, and where both variables are measured on a more-or-less continuous scale (Howell, 1982). For this study, the Pearson correlation technique was employed for most situations.

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correlation technique was employed for most situations. For those data occurring in the form of ranks the Spearman's coefficient (RHO) was calculated. For categorical data the correlation ratio (ETA) was used.

The second stage of analysis involved inference about the population and the testing of the hypotheses. Here the sample is used as an estimate of the population correlation. That estimate is compared against a known value to determine if the difference between the estimate and the known value was due to random sampling fluctuation or a real population difference. The procedure for hypothesis testing is presented in Appendix B.

To test the hypothesis p = 0 the t-test for Pearson r is employed. The t statistic and its probability of occurring are calculated by the SPSSX program PEARSON CORR. Only the probability is reported in the data analysis as the printout does not provide the t statistic nor the degrees of freedom.

Multiple regression techniques were used to predict the criterion variable, innovation adoption, on the basis of several predictor variables simultaneously. To test the hypothesis R = 0 and B = 0 the F statistic, the t statistic and the significance were calculated using the SPSSX program REGRESSION.

Summary

A survey of chief nursing executives of all hospitals in Michigan was conducted using a self-administered questionnaire. The questionnaire was designed by the researcher with the assistance of experts in diffusion innovation research and hospital administration research. An expert panel was utilized to develop the list of computerized management applications which measured the dependent variable, innovation adoption.

The questionnaire was pretested with a sample of 50 chief nursing executives from Michigan. Data from the pretest were analyzed and the instruments were modified to improve their reliability. Individual items were clarified in response to comments from respondents. The modified questionnaire was mailed to all hospitals in Michigan with the exception of the pretest participants.

The response rate for the survey was 60 percent (n = 116) after three follow-ups to the original mailing. Three questionnaires were unusable because of incomplete data. The respondent profile was examined to determine if the participants were representative of the population. The data obtained were analyzed using descriptive and inferential statistics. Univariate and bivariate frequencies and measures of central tendency,

variability, and association were employed. Chi-Square, the correlation ratio, and correlation coefficients were the statistics chosen. Multiple correlation and regression were used for prediction. In the following chapter, the analysis of the data is presented.

Chapter IV: Analysis of the Data

In this chapter, an analysis of the study's results is presented. The analysis includes descriptive and inferential statistics. Descriptive statistics used to organize and summarize the observed collected data included univariate and bivariate frequency distributions, measures of central tendency, measures of variability, and measures of relationships. The second stage of the analysis involved the making of inferences about the population on the basis of the sample data and the tests of the hypotheses based on the research questions. The chapter is organized to present the descriptive information about the dependent variable first, followed by information about the independent variables,and lastly the data on bivariate and multivariate relationships.

Descriptive Data

Dependent Variable

The criterion variable, innovativeness or innovation adoption, was measured with a scale comprised of six subscales. Each subscale focused on the adoption and adaptation of a computer application for a specific

management function. The functions included were personnel, quality assurance, resource allocation, staffing, report writing, and forecasting. Of the 113 respondents, 52 (46 percent) reported that 132 computerized management applications had been adopted, while 61 (54 percent) of the respondents reported no adoptions. The distribution of adopted management applications by function are listed in Table 4.1

Table 4.1

Management Applications Adopted By Function

Function	Frequency	Percent
Personnel	16	12.12%
Quality Assurance	20	15.15%
Resource Allocation	40	30.30%
Staffing	33	25.00%
Report Writing	15	11.36%
Forecasting	08	6.06%
Total number of applications adopted	132	

Thirty-one respondents (27 percent) reported that 91 applications had been purchased but not yet implemented. A breakdown of these data is found in Table 4.2.

Table 4.2

Number of Adoptions and Purchases

No. Adopted	Hospitals	No. Purchased	Hospitals
1	13	1	12
2	17	2	07
3	10	3	06
4	10	4	06
5	03	5	01
6	00	6	03
Adopted	132	Purchased	91
Mean	2.5	Mean	2.5
Median	2	Median	2
Mode	2	Mode	1

One indicator of innovativeness employed by Rogers (1983) was the relative earliness/lateness with which an

innovation is adopted. Information on the time of adoption revealed that 54 (44 percent) of the adoptions were prior to 1985, 22 (17 percent) in 1985, and 51 (39 percent) in 1986. The larger percent of early adoptions (before 1985) is a good indicator of innovativeness in these executives. Furthermore, the increase in adoptions from 17 percent in 1985 to 39 percent in 1986 is indicative of rising interest in computerized management applications. Other variables which may affect this movement are increasing availability of software specific to nursing management functions and reduced costs of software as a function of vendor competition.

The initiator of the innovation was requested and the purpose of this information was to clarify if indeed the adoption was the result of innovative behavior by the nursing executive or rather the actions of others. If the initiator was identified as the chief nursing executive a value was included in the scale score, however, if initiated by others the response was recorded as 0. The number of initiations by nursing executives differed among the management functions. For example, the generic functions, such as personnel and resource allocation, were more often computerized by other department heads while the staffing function, which directly impacted nursing care delivery, was most often computerized by the nursing executive. The data

on initiation by nursing executives are broken down by categories and presented in Table 4.3.

Table 4.3

Nursing Initiator of Innovation Adoption

Function	Adoptions Initiated by Present Nurse Ex.	Adoptions Initiated by Former Nurse Ex.	Total Initiated by Nurse Ex.
Personnel	46.66%	13.33%	59.99%
Quality Assurance	63.15%	15.78%	78.93%
Resource Allocation	56.41%	12.82%	69.23%
Staffing	78.12%	15.62%	93.74%
Report Writing	76.92%	15.38%	92.30%
Forecasting	75.00%	.00%	75.00%

Other initiators were the hospital administrator, other department heads, and nursing department staff members. Of the 223 management applications either implemented or purchased, only two, a quality assurance and a budget program had been initiated by a nursing department staff member.

This study focused on initiation, the first stage of the innovation process. However, information about

the effect of the innovation after initiation was collected to provide some confirmation of a central thesis of innovation theory, i.e., the occurrence of change. The survey items asked if the adoption effected change in policy, procedure, and/or process (yes/no) and an average of 79 percent of the adoptions reportedly resulted in change. The highest frequency of change was in the personnel function while the lowest was in the report writing function. Notable was the information that seven of the eight respondents who adopted forecasting applications reported changes. Additional data about change after innovation adoption are listed in Table 4.4 below.

Table 4.4

Change After Innovation Adoption

Function	Frequency of Change/Adoption	Percent
Personnel	14/15	93.33%
Quality Assurance	15/19	78.94%
Resource Allocation	28/39	71.79%
Staffing	25/32	78.12%
Report Writing	08/13	61.53%
Forecasting	07/08	87.50%

Another aspect of innovative behavior is the modification of an innovation to fit the organization's requirements. The innovator redesigns a generic application to a specific set of criteria important to the organization. The data revealed that 68 percent of the adoptions reported had been modified. The proportion, by function, of adoptions reported to have been modified is displayed in Table 4.5.

Table 4.5

Modification of Innovations

Function	Frequency of Modif/Adoption	Percent
Personnel	12/15	80.80%
Quality Assurance	15/19	78.94%
Resource Allocation	27/39	69.23%
Staffing	21/32	65.62%
Report Writing	08/13	61.53%
Forecasting	04/08	50.00%

Modification of management applications adopted by the nursing department was done by nursing department

staff, data processing department staff, and representatives from computer hardware and software companies. Of the 87 applications modified only two applications (2 percent) were modified by company representatives while 13 modifications (14.94 percent) were made by data processing department personnel and 72 modifications (82.75 percent) were made by nursing department staff. Seven modifications (8 percent) were the joint effort of nursing and data processing departments and these were in the areas of personnel, quality assurance, staffing, and report writing. The distribution of modifications by nursing department staff is displayed in Table 4.6.

Table 4.6

Modifications By Nursing Department Staff

Function	Frequency	Percent
Personnel	11/12	91.66%
Quality Assurance	14/15	93.33%
Resource Allocation	21/27	77.77%
Staffing	21/21	100.00%
Report Writing	08/08	100.00%
Forecasting	03/04	75.00%

The upgrading of computerized applications implies an interest in improving a function through the use of an enhanced product or process. Upgrading occurred with 57 (44 percent) of the adoptions reported (see Table 4.7). Factors which may affect the decision to upgrade are the length of time the application has been in use, the amount and regularity of utilization, and the availability of new products.

Table 4.7

Upgraded Management Applications

Function	Frequency of Upgrade/Adoption	Percent
Personnel	10/15	66.66%
Quality Assurance	07/19	36.84%
Resource Allocation	19/39	48.71%
Staffing	14/32	43.75%
Report Writing	06/13	46.15%
Forecasting	01/08	12.50%

While some organizations may be improving their computerized management system, others may be discontinuing management applications. The respondents

reported only nine instances of discontinuation or exnovation. When asked about reasons for discontinuation, three respondents reported the replacement of a computerized application with more advanced systems. Others reported staff resistance (n = 1), inefficiency (n = 1), inability to produce appropriate programs (n = 1), and limited use (n = 3). These data seem to indicate that, in the majority of cases, once an innovation was initiated, implementation as well as the integration of the innovation into the ongoing operation, followed.

Another measure of innovativeness was the number of computer tools adopted. For all management functions, an average of three tools were adopted. Simpler functions such as report writing averaged 2.4 tools while more complex functions such as forecasting averaged 3.6 tools. The measures of central tendency are reported in table 4.8.

Table 4.8

Number of Tools Adopted

Function	Mean	Median	Mode
Personnel	2.5	4.0	3.0
Quality Assurance	3.4	3.0	2.0
Resource Allocation	3.0	3.0	3.0
Staffing	2.8	2.0	2.0
Report Writing	2.4	2.0	2.0
Forecasting	3.6	4.0	4.0

Rogers (1983) described communication channels as one of the four main elements in the diffusion of innovation. The respondents reported their channels of information about the innovations they adopted. Sources were classified as internal, external, or commercial, i.e., vendors. In addition to the classifications provided, the respondents listed other sources as engineers, management consultants, nursing consultants, data processors, corporations, regulatory agencies, and university and college classes. Further descriptive data about sources are found in Table 4.9.

Table 4.9

Sources of Information

Classification	Percent	
Internal		
Nursing Department Staff	10%	
Hospital Administrator	05%	
Department Heads/Peers	11%	
		26%
External		
Professional Journals, Books	15%	
Professional Meetings	17%	
Peers From Other Organizations	20%	
Others (engineers, consultants, regulatory agencies, courses)	12%	
		64%
Commercial		
Vendors		10%
		100%

These data reaffirm the importance of external

communication sources.

Independent Variables

The independent variables included both organizational and individual predictors. Size of hospital and fiscal control were the structural organizational attributes investigated. Size was measured by the number of hospital beds. The population ranged from 15 beds at two military hospitals to 1099 beds at a state psychiatric hospital. The distribution of size in the sample is included in Chapter 3 in the discussion of the respondent profile.

Data on the second structural characteristic, fiscal control, revealed that 34 (30 percent) of the sample were individual institutions, 14 (12 percent) were institutions with memberships in purchasing consortiums, 12 (11 percent) were members of parent holding companies with multiple hospitals, 25 (22 percent) were members of parent holding companies comprised of hospitals, service and supply companies, properties companies, and alternate care agencies, and 27 (24 percent) were municipal, state or federal institutions. The national trend toward multiple corporation entities is reflected in Michigan, to some extent, with 22 percent of the respondents identifying this structure.

A demographic of interest was the type of hospital

as characterized by type of services or type of client served. The sample was comprised of 88 (78 percent) general hospitals, 16 (14 percent) specialty hospitals, four (3.6 percent) veterans facilities, and two (1.8 percent) military hospitals.

The third organizational level variable, environment, was measured by the openness of the organizational climate to the environment. The questionnaire requested information about the organization's internal communication channels, interorganizational linkages, and boundary-spanning individuals or programs. Internal communication was measured by a scale (Likert, 1976) which gauged the flow of communication, the process of getting input, and the receptivity of supervisors to ideas and suggestions. The scale was comprised of nine items with ranked values from one to four. The scale score for the respondent population averaged 3.08 with a median of three and a standard deviation of .743. Measures of central tendency and variability for each item on the scale are found in Table 4.10.

Table 4.10

Organizational Climate Scale

Item	Mean	Med	Min	Max	S.D.
1.	3.2	3.	1.	4.	.640
2.	2.8	3.	1.	4.	.694
3.	3.3	4.	1.	4.	.726
4.	3.4	4.	1.	4.	.680
5.	2.9	3.	1.	4.	.928
6.	2.9	3.	1.	4.	.977
7.	2.8	3.	1.	4.	.534

Collaborative projects which linked institutions were reported by 86 (76 percent) of the respondents and 81 (72 percent) reported nursing department staff who served as board members of policy-making organizations.

These data are presented in Table 4.11 and Table 4.12.

Table 4.11

Collaborative Projects

Number of Projects	Frequency	Percent
0	27	23.89%
1	16	14.15%
2	21	18.58%
3	16	14.15%
4	10	08.84%
5 or more	23	20.35%
Total	113	

Mean 2.28	Minimum 0
Median 2.0	Maximum 5
Mode .0	Std. Dev. 1.82

Table 4.12

Board Memberships in Policy-making Organizations

Number	Frequency	Percent
0	32	28.31%
1	29	25.66%
2	22	19.46%
3	16	14.15%
4	8	7.07%
5 or more	6	5.30%
Total	113	

Mean	1.6	Minimum	0
Median	1.0	Maximum	5
Mode	0	Std. Dev.	1.47

Descriptive data about individual level variables included information about role/position, computer knowledge, professionalism, education, and experience. The role/position of the nursing executive is defined by the scope of decision-making responsibilities. For nursing executives, the scope of responsibility may be one dimensional i.e., the nursing department, or it may encompass related departments and/or other hospital

divisions. The respondents in this study were divided evenly between the three levels described in Table 4.13.

Table 4.13

Scope of Responsibilities

Responsibility	Frequency	Percent
The Nursing Department Only	37	32.74%
Nursing and Related Departments	38	33.62%
Nursing and Other Hospital Dept/Div.	38	33.62%

Another stratum of decision making is found in hospital administrative committees and boards. Respondents in this study reported their participation level and those data are shown in Table 4.14.

Table 4.14

Decision-making Levels

Level	Frequency	Percent
Hospital Administrative Staff	34	30.63%
Adm. Staff and Medical Staff	40	36.03%
Adm. Staff, Medical Staff and Board of Directors/Trustees	37	33.33%
Total	111	

Clinical decisions are the responsibility of hospital committees on practice. Ten committees were identified on the survey tool and respondents were requested to add others. The committees are listed in Appendix D. The frequency of nursing representation on hospital committees is reported in Table 4.15.

Table 4.15

Hospital Committee Memberships

Mean	7.9	Minimum	4
Median	8	Maximum	13
Mode	9	Std. Dev.	1.52

Nursing executives often have responsibility for non-nursing personnel assigned to the department for special functions. The assignments may include statistical analysis, budget management, information systems, payroll, and recruitment. These individuals both increase the executive's scope of authority and provide additional communication channels. The number of non-nursing assigned personnel ranged from none to six. The frequency distributions for the number of assigned non-nursing personnel is included in Table 4.16.

Table 4.16

Assigned Non-nursing Personnel

Number	Frequency	Percent
0	19	17.11%
1	12	10.81%
2	26	23.42%
3	21	18.91%
4	15	13.51%
5	18	16.21%
Total	111	

Mean	2.49	Minimum	0
Median	2.5	Maximum	5
Mode	2	Std. Dev.	1.72

One attribute of organizational structure which can identify both complexity and centrality is extent of the hierarchy. Further, it describes the chief executive's scope of authority. Nursing executives reported the number of personnel levels or classes in the nursing department. Ten levels were identified in the questionnaire with space provided to add others. The listing in displayed in Appendix E. Respondents

reported from one to nine levels with a mean of seven. Data from this item are summarized in Table 4.17

Table 4.17

Nursing Department Personnel Levels

Number	Frequency	Percent
1	01	.9%
2	01	.9%
4	04	3.6%
5	15	13.4%
6	18	16.1%
7	23	20.5%
8	21	18.8%
9	29	25.9%
10	00	00.0%

Mean 7.0	Minimum 1
Median 7	Maximum 9
Mode 9	Std. Dev. 1.64

Within the department, decision-making may be centralized or decentralized. The questionnaire requested information about the levels of involvement in decision making. Four levels of managers were identified in the item and four decision areas were

included. The decision areas were 1) personnel, 2) patient care, 3) products and services, and 4) budget and resources. A number of hospitals did not have an assistant director and entered 0 for these decision levels; this lowered the mean for this position compared to the mean of the lower-level supervisor. Measures of central tendency and variability are in Table 4.18.

Table 4.18

Levels of Decision Making

Position	Mean	Med	Mode	Min	Max	S.D.
Nurs. Exec.	3.6	4	4	0	4	.73
Asst.Dir.	2.0	2	4	0	4	1.82
Supervisors	2.6	3	4	0	4	1.36
Head Nurses	2.1	2	4	0	4	1.55

Committees can provide a mechanism for both policy making and information sharing. The internal committees of nursing departments may be employed for both functions. Seven nursing department committees were listed in the survey item with space for others to be

added. A listing of the committees is displayed in Appendix F. The number of committees may indicate the extent of shared decision making and information input. Respondents reported from none to seven departmental committees with a mean of 4.3. Additional statistics are found in Table 4.19.

Table 4.19

Nursing Department Committees

Mean	4.3	Minimum	0
Median	4	Maximum	7
Mode	5	Std. Dev.	1.44

Knowledge sources about computer technology included a range of persons, organizations and courses. Membership in computer organizations through nursing or other professional groups was limited with only nine percent (10) of the participants involved in either special interest groups or councils. Respondents using professional journals for information sources comprised 35 percent of the sample (40). Of special interest was the small proportion of executives (35 percent) who utilized a staff member for computer information. The source most used was educational offerings which included courses, conferences, and seminars. Of note

was the proportion of executives (69 percent) who learned about computers through management conferences. Additional data are displayed in Table 4.20.

Table 4.20

Computer Knowledge Sources

Source of Knowledge	Percent
Organizations	
Computer Councils	8.84%
Special Interest Groups	8.84%
Literature	
Professional Journals	35.39%
Individuals	
Staff Member	35.39%
Educational Offerings	
Seminar-Computer Literacy	66.37%
Professional Conferences for Managers	69.02%
Short Course 2-3 days	27.43%
Management Training Course 2-3 weeks	28.31%
Hands-on Experience	
Personal Computer at Home	32.74%

Professionalism was measured through organizational memberships, consultations, presentations, research, and

other activities. Data on membership in professional organizations reflected a range of frequencies from none to five. Nineteen of the respondents (16.8 percent) belonged to five or more organizations which reflects the strength of their commitment to professionalism. Five of 113 respondents belonged to no professional organizations. This may be a function of organizational resistance to executive involvement in professional organizations with a collective bargaining role. Information on professional organizations follows.

Table 4.21

Memberships in Professional Organizations

No. of Memberships	Frequency	Percent
0	5	4.42%
1	14	12.38%
2	26	23.00%
3	34	30.08%
4	15	13.27%
5 or more	19	16.81%
Total	113	

Table 4.21 (continued)

Memberships in Professional Organizations

Mean	2.86	Minimum	0
Median	3	Maximum	5
Mode	3	Std. Dev.	1.35

Attendance at professional conferences drew a wide range of responses with three executives (2.7 percent) attending none and 46 (41 percent) attended five or more. Conference attendance by nursing executives is a function of organizational support, through provision of the conference costs and released time for travel and attendance. The frequency distribution for conference attendance is displayed in Table 4.22.

Table 4.22

Professional Conferences Attended

No. Attended	Frequency	Percent
0	3	2.65%
1	4	3.53%
2	23	20.35%
3	22	19.46%
4	15	13.27%
5 or more	46	40.70%
Total Number	113	

Mean	3.59	Minimum	0
Median	4	Maximum	5
Mode	5	Std. Dev.	1.43

Respondents were asked to identify professional management journals which they read on a regular (monthly) basis. The list of eight journals included nursing, hospital, and health care periodicals which have a broad coverage of management topics, as well as journals which focused more narrowly on topics such as financial management and strategic planning. Other journals added by the respondents included The Harvard

Business Review (n = 1), Forbes (n = 2), and The Wall Street Journal (n = 2). Among the three categories, nursing, hospitals, and health care, the response was fairly evenly divided with most nursing executives reading journals in all three areas. The statistics on the number of journals read are found in Table 4.23

Table 4.23

Professional Management Journals Read

Mean	3.5	Minimum	0
Median	4	Maximum	7
Mode	4	Std. Dev.	1.50

The survey requested information about professional activities such as research, presentations, publication, consultation, and teaching, via adjunct academic appointments. Consultation was the most frequent activity at 42 percent (n = 47) and publication the least frequent activity at 11 percent (n = 12). Consultation services were provided to other hospital departments, other institutions, governmental agencies, and colleges and universities. Research was conducted in collaboration with universities, health care agencies, other hospital departments, and within the

nursing department. The frequency of research with a university was slightly higher (27 percent, n = 30) than with other entities. Of interest was the fact that interdepartmental research had the lowest frequency (18 percent, n = 21) which may be a function of limited hospital research and/or lack of departmental collaboration. The activity reported with the smallest frequency was teaching at universities and colleges via joint or adjunct appointments (12 percent, n = 14). This activity is a function of both required academic credentials and the location of the hospital in relation to academic institutions. The distribution of frequencies is displayed in Table 4.24.

Table 4.24

Professional Activities

Activity	Frequency	Percent
Presentations at Meetings	33	29.20%
Consultation	47	41.59%
Publications	12	10.61%
Research/Nursing Dept.	22	19.46%
Research With Other Dept.	21	18.58%
Research With Other Agencies	29	25.66%
Research With a University	30	26.54%
Joint/adjunct Appointment	14	12.38%

Education of the nursing executive is reported in Table 4.25. The position of chief nursing executive has a scope of responsibility which requires advanced education and management experience and 43.3 percent (n = 49) of the participants reported preparation at the masters or doctoral level. Higher education for nursing executives has been promoted vigorously by professional nursing organizations and academic institutions and one-third of the respondents are presently enrolled in a degree granting prcgram. Seventy-six of the sample reported a minumum of a baccalaureate degree which professional groups and boards of licensure are now

proposing as the professional entry level. This is encouraging, however the fact remains that nearly one-fourth of the nurse executives in this sample reported diploma or associate degree preparation which is being proposed as the entry level for the practical nurse. These findings are discussed further in Chapter 5.

Table 4.25

Educational Preparation

Highest Degree	Frequency	Percent
1. Diploma/AD	27	23.89%
2. BSN/BS/BA	35	30.97%
3. MSN/MS/MA/MBA/MHA	49	43.36%
4. Ph.D/Ed.D/D.NSc	02	1.76%

Mean	2.23	Minimum	1
Median	2	Maximum	4
Mode	3	Std. Dev.	1.50

Continuing education was seen as important with 111 (99 percent) of respondents attending seminars and short courses. Certification in management was not a top priority, as only 29 (26 percent) reported certification from the American Hospital Association, the American

Nurses Association or a post-Master's program.

The experience of the chief nursing executive was requested in three items; number of years as a registered nurse, as a nursing executive, and as chief nursing executive in the present location. The last item was used as a cross-validation of responses to the innovation scale. Experience as a registered nurse ranged from seven to 42 years with a mean of 21 years. Experience as a nursing executive ranged from less than one year to 29 years with a mean of six years. These data are displayed in Table 4.26.

Table 4.26

Years of Experience

Position	Mean	Median	Mode	Min	Max	S.D.
R.N.	21	21	25	7	42	8.25
Nursing Ex.	6	5	1	1	29	5.22
Nursing Ex. Present Location	5	3	1	1	20	4.37

Bivariate Measurements

The measurement of relationship employed here, the correlation coefficient, is preferred over other measures of association because it provides a single number which summarizes the strength and direction of the relationship and allows comparison of relationships. In the section following, the bivariate relationships are discussed individually by hypothesis. The hypotheses were tested using the SPSSX program which does not report the t-test value, only the significance level. All hypotheses were tested at an Alpha level of .05 to minimize the possibility of a Type I error. The possibility of a Type II error was minimized by the large sample size, with n = 113. MacEachron (1982) reports that in testing Pearson r a sample size of 50-100 is categorized as large. In addition, the robustness of the parametric test is increased by size of sample. The alternate hypotheses are directional, based upon previous research findings reported in the review of the literature. The one-tailed tests used are more powerful because they have a greater likelihood of rejecting the null hypothesis and providing empirical support for the research hypotheses. The hypotheses are now presented in order, with organizational level variables first, followed by the individual level variables.

$H0_1$: There is no significant relationship between size of hospital, as measured by number of beds, and the innovativeness of the chief nursing executive.

It was expected that larger hospitals would have more resources and the amount of innovation adoption would be higher. Innovation adoption was found to be significantly higher in large hospitals. The Pearson correlation coefficient of .36 was significant ($p < .001$). The strength of the relationship was interpreted as low to moderate. The null hypothesis was not retained.

$H0_2$: There is no significant relationship between institutional fiscal control and the innovativeness of the chief nursing executive.

The trend toward increasingly complex multicorporate fiscal structure was expected to have a positive effect on innovation adoption as a result of increased profit-making capabilities and flexibility in resource allocation. The Spearman coefficient was used to measure these ranked data and a coefficient of .11 was obtained with a $p = .114$. The coefficient was small and not statistically significant, therefore, the null hypothesis was retained.

$H0_3$: There is no significant relationship between organizational climate, as measured by openness to the environment, and the innovativeness of the chief nursing executive.

The variable organizational climate was comprised of internal and external sectors; a scale measured the internal communication patterns, and individual items measured the interorganizational linkages through persons and programs. The findings indicated that the openness of the organizational climate and the number of interorganizational linkages had a positive effect on innovativeness. A Pearson coefficient of .20 (p =.015) was obtained for the internal factor, while external factors had slightly higher coefficients; linkage by programs was correlated at .22 (p =.012) and linkage by persons (boundary spanners) was correlated at .26 (p =.005). The three factors combined as one measure yielded a coefficient of .25 (p = .004). The null hypothesis was not retained.

$H0_4$: There is no significant correlation between role/position and the innovativeness of the chief nursing executive.

The expectation that nursing executives with a position of authority would be more likely to adopt

innovations was supported by the findings. Nurse executives with a wide scope of responsibility and input at the highest administrative levels had higher innovation scores. The positive relationship between role/position and the innovativeness of the chief nursing executive yielded a Pearson coefficient of .36 and the strength of the relationship was interpreted at low to moderate. Testing the hypothesis resulted in a significance level of less than .001, therefore, the null hypothesis was not retained.

H_{o_5}: There is no significant relationship between computer knowledge and the innovativeness of the chief nursing executive.

The expectation that individuals who have knowledge about innovations will have a higher level of innovation adoption than those with less knowledge was supported by the survey data. Nursing executives who attended educational programs, read professional journals, and had resource persons in the department were more likely to adopt innovations. The Pearson correlation coefficient was .36 and the strength of the relationship was judged to be low to moderate. The test of the hypothesis revealed a significance level of less than .001. The null hypothesis was not retained.

H_{0_6}: There is no significant relationship between professionalism and the innovativeness of the chief nursing executive.

The expectation that high levels of professionalism lead to increased adoption by nursing executives was tempered by the knowledge that nursing is an evolving profession and that professionalism is not at a high level. This was borne out by the correlation coefficient of .31. Although a somewhat weaker relationship was identified, it was evident that research, publication, consultation, and professional memberships did contribute to the development of innovativeness. The test of the hypothesis resulted in a significance level of less than .001, and the null hypothesis was not retained.

H_{0_7}: There is no significant correlation between managerial preparedness, acquired through education, and the innovativeness of the chief nursing executive.

A relationship between levels of educational preparation and innovation adoption was expected and supported by the survey findings. Nursing executives with graduate level preparation were more likely to adopt innovations. The educational levels were ranked

from diploma/A.D.to Ph.D and the Spearman coefficient calculated. The coefficient was .23 (p =.008) and the null hypothesis was not retained. Respondents were also asked to report their enrollment in academic programs and data from the two items were weighted and combined for a third item which measured preparation and education in progress. The coefficient was .21 (p = .014). The significance of these data is discussed in Chapter 5.

$H0_8$: There is no significant relationship between management preparedness, acquired through experience, and the innovativeness of the nursing executive.

The expectation that experiential preparation for management might contribute to innovativeness was not supported. In fact, the correlation coefficient was negative indicating that an inverse relationship was more likely. This suggests that managers with less experience may be more innovative than the more experienced executive. (Rogers & Schramm (1962) and Counte and Kimberly (1974) posited an inverse relationship between age and innovativeness and in situations where age and years of experience are reasonably equivalent, i.e., an older person with lengthy tenure, a similar argument could be advanced.

The Pearson correlation coefficient was -.02 (p = .436) and the null hypothesis was retained. Further discussion of these results is found in Chapter 5.

Demographic information about type of hospital was included in the questionnaire and discussed in Chapter 3 in the section on the respondent profile. Although type of hospital was not an independent variable, as a matter of interest its relationship with innovation adoption was investigated using an analysis of variance with the correlation ratio ETA. Because the frequencies were badly skewed (90 general, 18 specialty, 4 veterans, and 2 military), the correlation ratio (ETA) of .20 and the ETA squared of .04 cannot be considered an adequate measure. A comparison of the means for the two larger groups general ($\bar{x}$ =14.22) and specialty ($\bar{x}$ =14.44) hospitals revealed no significant difference in innovation adoption between the two types.

Multiple Correlation and Regression

H_0: There is no significant relationship between multiple independent variables, considered simultaneously, and the innovativeness of the chief nursing executive.

It is important to note that the bivariate correlation coefficients will not fully reflect the

relationship between the independent and dependent variables if moderate correlations exist among the independent variables. To investigate this possibility, correlations among the independent variables were obtained (see Appendix G). Because hospital size was found to be a major correlate of a majority of the independent variables, the correlation of predictor variables and the criterion variable, controlling for the variable hospital size, were also calculated (see Appendix H). These data indicate that there were reduced correlations between the independent variables and the criterion variable when size was factored out. The confirmation of intercorrelations among the independent variables and the confounding effect of size substantiated the need for a model to address the issue of multiple simultaneous causation. Lewis-Beck (1980) affirmed that single causation is rare and multiple variables offer a fuller explanation of the dependent variable. Further, the true effect of a particular independent variable can be ascertained when distorting influences from other independent variables are removed using the multiple regression model.

To examine the combined effects of the independent variables on innovation adoption, a least-squares multiple linear regression model was used. Regression analysis is based on the assumption that the independent variables are measured accurately and are independent.

A major issue is multicollinearity which results in larger standard errors with smaller t ratios. To address this issue a matrix of correlations was computed and is displayed in Appendix I. The magnitude of the correlations was considered insufficient to suggest a problem of collinearity since .54 was the highest, considerably lower than the .8 level recommended for further investigation (Lewis-Beck, 1980). Because it was difficult to decide which variables to include in the regression equation, an exploratory method, the stepwise regression technique, was used first.

Stepwise Method

This technique allows the computer to experiment with different combinations of independent variables. With the independent variables entered in the equation, the variable with the largest probability of F is removed, if this value is larger than POUT. The default value of POUT ((Probability of F-to-remove) is 0.10. The equation is then computed without the variable and the process is repeated until no more independent variables can be removed. Then the individual variable with the smallest probability of F (not in the equation) is entered if the probability is smaller than PIN. The default value of PIN (Probability of F-to-enter) is

0.05. Again all variables are examined for removal. The process continues until no variables in the equation need to be removed or no variables still in the equation need to be entered. Central to the entry or removal of variables using PIN or POUT values is the tolerance criteria. The variables must pass tests of tolerance and minimum tolerance to enter the equation. Tolerance is defined as the proportion of the variable's variance not accounted for by other independent variables in the equation. The minimum tolerance, which a variable not in the equation must have to enter, is the smallest tolerance any variable already in the equation would have if the variable were entered (SPSSX Users Guide, 1985).

The stepwise regression for this study began with the entry of the variable, size, on the first step. The multiple correlation coefficient (R) at this step was .36 and the coefficient of determination (R^2) was .13. This indicates that the correlation between size and innovativeness, holding the other independent variables constant, was .36 and that 13 percent of the variance in the dependent variable could be accounted for by size. Using the F statistic to test whether the R is significantly different from 0, an F of 16.36 was obtained which was significant ($p < .001$) ($p = .0001$). The validity of the hypothesis test was based upon the assumption of a multivariate normal distribution.

The regression coefficients were examined to determine the effect of independent variables on the criterion variable. The unstandardized regression coefficient (B) for size was .03 and the standardized regression coefficient (Beta) was .36. The *t* value for B was 4.05 at a significance level of less than .001.

At step two, the variable, computer knowledge, was entered. The multiple correlation coefficient was .45 with a coefficient of determination of .20. Hence, size and computer knowledge together explained 20 percent of the variance in innovation. To test whether R was significantly different from 0, the *F* statistic was used and an *F* of 14.11 was obtained and was significant at ($p < .0001$).

The unstandardized regression coefficients were .03 for size and 2.48 for computer knowledge. The standardized coefficients were .29 for size and .28 for computer knowledge. The *t* values were 3.35 ($p < .005$) ($p = .0011$) for size and 3.24 ($p < .005$) ($p = .0016$) for computer knowledge. No further variables were entered as a PIN of .05 had been reached. The variable education (Q 31), had a *t* value of 1.89 ($p = .06$) and a standardized regression coefficient of .18. Although not statistically significant, the data suggest that the variable education should be further investigated. Data from the computer output are displayed in Appendix J.

Forced Entry Method

The next stage of analysis was the testing of selected variables entered in the equation as a block. The forced entry method enters the variables one at a time in order of decreasing tolerance but treats all variables as a single block and computes change based upon the block. Eight variables which met the tolerance criteria comprised the block for the ENTER method. The multiple correlation coefficient was .51 with a coefficient of determination of .26. The *F* statistic was used to test the null hypothesis that all independent variables, together, do not account for a significant amount of the variance in innovativeness. The null hypothesis was not retained ($F = 4.12$, $p < .0005$).

Examination of the variables in the equation reveals unstandardized coefficients (B) of 4.46 for education, 2.25 for computer knowledge, and .02 for size. Testing the hypothesis B = 0 revealed two variables, computer knowledge and education, which had *t* values significant at .05, $t = 2.54$ and $t = 2.06$, respectively. Size had a nonsignificant *t* value of 1.69 ($p = .09$).

The standardized coefficients (Beta) were .21 for education, .26 for computer knowledge and .18 for size. Thus, in the more definitive forced entry method,

computer knowledge was the strongest predictor followed by education. Selected significant data are presented in Table 4.27 and the computer output for the regression equation is found in Appendix K.

Table 4.27

Regression of Innovation Adoption on Individual and Organizational Variables

Variable	Beta	SE
Organizational Level		
Size	.18	.10
Fiscal Control	.01	.08
Org. Climate	.08	.08
Individual Level		
Role/position	.05	.11
Computer Knowledge	.26 *	.10
Professionalism	.01	.11
Education	.21 *	.10
Experience	-.26	.11

* p <.05

Table 4.28

t test

Variable	*t* value	Sig.
Organizational Level		
Size	1.69	.09
Fiscal Control	.15	.88
Org. Climate	.92	.35
Individual Level		
Role/position	.47	.63
Computer Knowledge	2.54	.01
Professionalism	.09	.92
Education	2.06	.04
Experience	-1.62	.10

A comparison of data from the two methods reveals that the eight variables used in the forced entry method account for more of the variation in the dependent variable than the two that entered using the stepwise regression method. Data are presented in Table 4.29.

Table 4.29

Comparison of the Results of Two Regression Methods

Method	R	R Square
Enter	.51	.26
Stepwise	.45	.20
	---	---
Difference	.06	.06

Of interest was the fact that the significant predictors of innovation adoption (from the forced entry method) were individual level variables only. This stimulated further scrutiny of the variables by levels and the independent variables were divided into two subsets, individual and organizational predictors, and analyzed using the regression method TEST. The TEST method computes R change and its test of significance excluding each subset in turn from the model.

Test Method

The regression of innovation adoption on the subsets organizational and individual attributes reaffirmed that the individual level variables were better predictors of innovation adoption. The F

statistic for the individual level subset was 2.7 ($p < .05$) ($p = .02$) and the F value for the organizational level subset was 1.25 ($p = .29$). These findings are discussed in Chapter 5.

Summary

The analysis included an examination of univariate frequencies and bivariate and multivariate relationships. The univariate data described the adoption, modification, upgrading, and discontinuation of six computerized management functions. The function with the highest frequency was resource allocation and staffing was second. A larger proportion of the innovations were modified than were upgraded and a very small number (four percent) were discontinued.

The person initiating the innovation was most often the chief nursing executive and the adoption was more often early (before 1985) than later. The sources of information about the innovation were primarily external and included individuals, organizations, and journals.

Information about individual attributes revealed that the scope of responsibility of nursing executives ranged from the nursing department to multiple departments, services, and divisions. Communication and decision making were operationalized through a spectrum of nursing and hospital clinical practice committees and

higher-level administrative boards. Nursing executives acquired computer knowledge through conferences, short courses, and journals. Individuals who served as resources were more often experts external to the system. Professional activities most often reported were conference attendance, organizational membership, and consultation. Research and publication were reported by a very small proportion. The respondents were diverse in educational preparation which ranged from a hospital-based diploma program to the Ph.D. Additional education was a priority with one-third of the respondents enrolled in a degree-granting academic program. Experience as a nursing executive was variable; a large portion of the sample reported one to five years of experience, another large portion reported 10 to 29 years of experience, and only a small number with experience of five to 10 years.

Organizational characteristics included the size, fiscal control, and climate of the institution. Hospitals varied in size from 29 to 929 beds and the majority were general hospitals. The fiscal structure was dissimilar and varied from single institutions (many of which were municipal, state or federally owned) to multicorporate organizations. The respondents evaluated the organizational climate as very open with a mean score of 3.0 on a scale of one to four. Linkages to other organizations and individuals provided information

about innovations and individuals provided the conduit more often than programs or projects.

The bivariate relationships were measured by correlation coefficients and found to be significant for six of eight independent variables. The organizational level variables size and climate, were significantly correlated with innovation adoption and fiscal control was not. The individual level variables role/position, computer knowledge, professionalism, and education were significantly correlated with innovation adoption and experience was not.

Multiple regression techniques were used to determine the ability of independent variables to simultaneously predict the criterion variable innovation adoption and identify the strongest predictors of this variable. The stepwise method was used in the first stage of analysis as an exploratory measure. The regression results indicated that hospital size and computer knowledge were the stongest predictors. The t value (1.89) and significance level (.06) of the variable education were indicators for further examination. The forced entry method was used for the next stage of analysis and the regression results indicated that computer knowledge and education were the best predictors and size was less significant. A third equation was tested using the test method for subsets of variables. The variables were divided by individual and

organizational levels and the regression results confirmed that individual level variables were better predictors of innovation adoption than organizational level predictors. The null hypotheses were tested and seven hypotheses were not retained while two were retained. Summary data is presented in Table 4.30.

Table 4.30

Summary of Hypothesis Testing

Hypo	Level	Test	Alpha	Actual	Decision
1	ORG	t	.05	<.000	Not Retain
2	ORG	t	.05	.114	Retain
3	ORG	t	.05	.010	Not Retain
4	IND	t	.05	<.000	Not Retain
5	IND	t	.05	<.000	Not Retain
6	IND	t	.05	<.000	Not Retain
7	IND	t	.05	.008	Not Retain
8	IND	t	.05	.436	Retain
9	MULTIPLE	F	.05	<.0000	Not Retain

Chapter V: Summary, Conclusions, Recommendations

Overview

The researcher's purpose in this study was to examine the relationships among selected individual and organizational factors and the innovativeness of the chief nursing executive. Three organizational characteristics were investigated, size, fiscal control, and climate. Individual attributes included role/position, computer knowledge, professionalism, education, and experience. The need for the study arose from the dynamics of the health care delivery system of the 1980s. Effective institutional response to increased regulation and expanding technology requires an innovative administrative team. The chief nursing executive has a pivotal role on the team in administering the delivery of 24-hour care to clients and must respond to environmental changes with innovative management strategies. Thus, information is needed on the determinants of innovativeness in chief nursing executives.

A review of the innovation diffusion literature disclosed studies of the innovation process, characteristics of organizational innovation, and innovation in health care institutions. The nursing literature reported primarily on adoption of innovations

for direct patient care. Studies of innovation adoption by nursing executives were lacking in the literature reviewed and research on computer technology in hospitals focused on clinical applications for patient care or administrative applications for accounting departments. No studies particular to nursing management applications and their relationship to innovativeness were found in the literature reviewed.

The study was designed to answer questions about the effect of selected factors on innovation adoption by the nursing chief executive. Two levels of variables, organizational and individual, were set within the theoretical framework of the Zaltman model of the innovation process (1973).

The survey instrument was designed with the assistance of researchers in innovation adoption and hospital administration. A panel of nurses, drawn from experts in the field of computer technology in health care, developed the list of management functions which were the focus of the instrument measuring innovation adoption by nursing executives. The instrument was pretested with a sample of 50 chief nursing executives from the population of Michigan hospitals. Results from the pretest were examined and modifications were made to improve the reliability of the instruments which measured the independent variables. The modified questionnaire was sent to all nursing executives in

Michigan hospitals except those who had participated in the pretest.

A response rate of 60 percent was obtained after three follow-ups to the original questionnaire. The respondent sample was inspected and found to be representative of the population using the criteria of size and type of hospital. The survey data were entered into a data file and the Statistical Package for the Social Sciences (SPSSX) was used for statistical analysis. Univariate frequencies and the Chi-square Goodness-of-fit test were employed to examine the distribution of values. Bivariate relationships were investigated using correlation coefficients (Pearson and Spearman) and the correlation ratio ETA. Lastly, the least-squares multiple regression model was employed to determine the effect of independent variables on the dependent variable, holding other variables constant.

Summary of Findings

Univariate findings not related to a specific hypothesis are reported first followed by bivariate and multivariate findings. Of note was the data which indicated that adoption of computer technology for management functions was increasing at a rapid rate. The number of tools purchased but not yet implemented showed the strength of this trend. A second finding was

the number of chief nursing executives presently enrolled in an academic degree-granting program. One-third of the respondents were involved in increasing their educational credentials, an encouraging finding in view of the need for better-prepared nursing executives. At the same time, the discovery was surprising because the requirements of the executive position leave little time for either part-time or full-time study in a rigorous academic program. The finding, that only two of 223 management applications, either implemented or purchased, had been initiated by a nursing department staff member, lends support to the thesis that power and authority are requisites for innovation adoption in bureaucratic structures such as hospitals. A salient point, relevant to a study of innovation, was that seven of eight respondents who adopted forecasting tools reported changes in policies, procedures, and process. Consequently, there is support for the thesis that forecasting, as a strategic planning technique, enhances decision making and promotes innovation adoption.

The data analysis focused on two distinct but related questions. First, for the bivariate relationships, what is the significance of each variable? Second, which variables make the largest contribution to explained variance in the dependent variable when all other variables are held constant? Bivariate correlation findings revealed a statistically

significant correlation between six of the eight independent variables and the dependent variable, innovation adoption. The organizational level variables, size and organizational climate, were positively correlated and fiscal control was not. The individual level variables, role/position, computer knowledge, professionalism, and education, were positively correlated and experience was not.

Three multiple regression equations were estimated to assess the effects of predictor variables both overall and by levels. The first regression using the stepwise method as an exploratory stage examined the effect of organizational and individual level factors on innovation adoption. The results indicated that size and computer knowledge were the strongest predictors with education weaker and approaching significance. The second regression utilized the forced entry method with eight selected variables. Computer knowledge and education were the strongest predictors, respectively, with size a weaker factor. The third regression, employing the test method, examined the two levels of variables as subsets and the results indicated that individual level variables were better predictors of innovation adoption than organizational level variables.

Discussion of Findings

The computerization of management functions in nursing departments in Michigan hospitals is described here followed by a discussion of findings. The percentage of innovation adoption (46 percent) by respondents indicates that nursing is in the early stages of computerization of management functions. However, the rate of adoption is increasing rapidly as evidenced by a 125 percent increase in adoptions from 1985 to 1986. Information on the frequency of adoption of the six management functions and some interpretation of these data are germane to later discussion and are presented here.

The management function most often computerized was resource allocation. Computerized packages for financial reports are utilized by many health care institutions and signify the crucial need for financial data in a climate of increasing reimbursement regulation. The staffing function, second in frequency, is particularly amenable to computerization in institutions with large nursing staffs. More software, specially designed for nursing, is available in this sector than any other of the listed functions and increased adoption in this sector is predicted. Quality assurance, which had its formal beginnings in medicine, has evolved to an administrative function for which

nursing departments have either partial or full responsibility. The quantity and quality of software for this function has improved and increased utilization of computerized programs to meet reimbursement requirements is inevitable.

Personnel records are generally computerized by the personnel departments of hospitals, however, many nursing departments have adopted computer programs for data management in personnel areas such as education, training, evaluation and promotion. One of the earliest computerized management practices was report writing because word processing software provided both an efficient process for generating routine internal communications and reports for regulatory agencies, corporate boards, and planning commissions.

The computerized management function least used by nursing participants in this study was forecasting. Eight respondents utilized decision support tools for forecasting personnel and service needs. Exposure to forecasting models through educational programs, professional journals and meetings, and peer interactions should increase nursing utilization. A critical nursing management problem of the 1980s, nurse attrition, can be addressed more effectively with forecasting and should be high on the list of potential adoptions for the nursing executive. The rate of adoption of computerized management functions by health

care institutions should continue to increase in the 1990s with the increasing awareness of technology. Therefore, the discovery of good predictors of innovation adoption by nursing executives is essential. Some answers are found in the analysis of data and discussed in the following section.

An examination of the bivariate relationships indicates positive correlations between the organizational variables, size and open climate, and innovation adoption. The relationship between fiscal control of the institution and innovation adoption, however, was not significant. Thus the proposition that a more complex fiscal structure with both profit and nonprofit centers would provide flexible resources and enhance innovation adoption was not supported. It was evident that fiscal control was not the primary requirement for innovation adoption by nursing executives, a somewhat encouraging discovery since this factor is less amenable to change than others studied here.

Although there was a relationship between size and innovation adoption, it was not as strong a predictor of innovation as computer knowledge and education. The bivariate relationship between size and innovation adoption yielded a correlation coefficient of .36, the highest among the variables, thus the variable size was entered first in the stepwise regression model. The

results of the stepwise regression indicated that size and computer knowledge were the strongest predictors of innovation adoption. Education with a t value of 1.89 (p = .06) was strong enough for further investigation and therefore was forced into an equation, using the ENTER method. As a result of this entry, size dropped out as a significant predictor. Hence, when education was disengaged from the variable pool and entered into the equation the overlay of the effect of size was reduced. Finally the data suggested that there was a significant relationship among size, education, and innovation. Thus, the nursing executive educated at the graduate level is more likely to adopt computer technology for management functions, at the same time this individual is more likely to be the executive at a larger hospital. Although the larger institution will have the resources necessary to employ executives with advanced educational credentials; it appears to be education rather than size per se, that is a major contributor to innovation adoption. Thus smaller hospitals may be able to increase innovation adoption by increasing the educational preparation of the nursing executive.

The third organizational variable, open climate, was positively correlated with innovation adoption in a bivariate relationship but was not a significant contributor in the regression model. The degree of

openness was measured by internal communication patterns, the number of boundary spanners, and interorganizational linkages. Responses to this scale displayed restricted variance which could impact the statistical outcomes. The addition of another rater for subjective input, such as perceptions about communication patterns, could provide validation of responses. The data on interorganizational linkages indicated that individual actions more often than formal programs provided the access to innovation information. It is obvious that boundary spanners, either the executive or designated staff, play a major role in the importation of information about innovations. The study findings support the concept of organizational openness as a facilitator of knowledge-awareness.

Individual variables, with the exception of experience, were positively correlated with innovation adoption. There was a negative, though not significant, relationship between experience and innovation adoption. The research by Rogers and Schramm (1962) and others has indicated that age and innovation are inversely related. If years of experience are considered somewhat parallel to age, then the proposition that experience is inversely related to innovation adoption can be supported. The data on years of experience, although covering a range from one to 29 years, exhibited a interesting distribution pattern because 21 percent had

one year of experience, 20 percent had from ten to 29 years and the remainder were distributed between one and ten years. Further study of the distribution of longevity and its effect on innovation adoption is warranted.

The strongest predictor of innovation adoption was computer knowledge. This supports Rogers' hypothesis that knowledge-awareness is essential to innovation adoption (1981). At the knowledge-awareness substage of the innovation adoption process, selected independent variables in this study, i.e., role/position, education, professionalism, and open climate functioned. Each contributed to a greater or lesser degree to innovation adoption by aiding knowledge-awareness. Bigoness and Perreault (1981) postulated that innovation comes primarily from outside the organization and the findings here confirm that notion. Sixty-four percent of the sources were external to the institution and included individuals, professional journals and meetings, organizations, and courses. Notable was the fact that regulatory agencies suggested applications to institutions they reviewed. Individuals who contributed information were usually sources outside the organization. Only 35 percent of respondents obtained information from a staff member. This may represent the lack of assigned personnel with computer expertise and/or the lack of perceived need for experts in the

department. Overall the data confirmed that external informants are utilized most to obtain knowledge about innovations.

Education was a strong predictor in two of the three regression equations tested and the second strongest predictor of innovation adoption in the forced entry equation. Changes in educational programs, as well as job requirement for executive positions, are altering the profile of chief nursing executives and this was evident in the findings. Nursing executives with less than five year of experience were more likely to be Masters-prepared and those with more than 10 years of experience were more likely to have credentials of a diploma or associate degree. The trend toward more education, both undergraduate and graduate, is evident in the number of executives presently enrolled in degree-granting programs. Increased educational preparation bodes well for the profession, the health care system, and the consumer. The educational process ideally stimulates a search for new knowledge and leads to innovative behaviors and this is supported by the findings of this study.

Professionalism, usually associated with educational preparation, was not a strong predictor of innovativeness in this study. Studies of older professions, such as medicine, indicate that physicians with strong professional commitments exhibit innovative

behaviors (Counte & Kimberly, 1974; Greer, 1977). Nursing, a slowly evolving profession, has only a small number of members with professional status and this may explain the relatively small contribution of professionalism to innovation adoption by nursing executives.

The final individual variable, role/position might be considered a bridging element between individual and organizational factors. The role /position is often prescribed by the organization and interpreted and implemented by the individual. The relationship between role/position and innovation adoption was positively correlated but the contribution to innovativeness was less significant than computer knowledge and education. This may be explained by the proposition that, although authority and power inherent in role/position are the chief requisites at the decision-making substage, computer knowledge and education supply the impetus for the initiation of the innovation process. This axiom is an outgrowth of the Zaltman model of the innovation process.

Limitations of the Study

The study is limited in its generalizability. The respondent sample of 60 percent was representative of, and therefore useful for prediction about, the Michigan

population. For generalization beyond this region consideration must be given to differences in eccnomic climate, state regulations, and population profiles.

A second limitation to the study is the degree of reliability of three of the 10 scales used to measure variables. Seven scales had reliability coefficients of .70 or higher and these data can be interpreted with less concern. Three scales with coefficients of .60 to .68 are somewhat less reliable and caution must be used in interpretation of these data. It is possible, however, that correlation coefficients involving these scales, may have been attenuated as a consequence of the low reliability (and, hence, greater error).

Contributions to the Literature

The study was designed to provide contributions to the literature by focusing on relationships heretofore unstudied,i.e., the nursing executive and innovativeness, by investigating predictors of innovativeness which had been studied in the context of physicians or hospital administrators, and by exploring the fiscal organizational structure of hospitals and its effect on innovation adoption by nursing executives. Although the findings supported the generally held thesis that innovation adoption is positively related to organizational size, additional insight was gained when

education and computer knowledge were also considered. Previous studies that found a relationship between size and innovation adoption failed to account for the variables underlying the relationship. The findings here disclosed significant relationships among size, education, and innovation adoption by nursing executives. These intercorrelations have implications for further investigation in nursing as well as other sectors.

The information on institutional fiscal control provides baseline data which could be of value in future studies of the trend toward financial restructuring of hospitals and the effect of that change on innovation adoption. The findings about organizational climate lend support to the thesis proposed by Zaltman et al. (1973) that openness is essential to information transfer and the proposition that most information about innovation comes from sources external to the organization (Bigonness and Perreault, 1981). New findings about interorganizational linkages, which are germane to the nursing executive's innovativeness, are an important addition to the literature.

The information elicited about the decision-making power and authority of the nursing executive confirms the primacy of nursing within the hospital structure. This is most evident in the proportion of nursing executives with responsibility for departments and

divisions in addition to nursing. A second marker was the high proportion of executives who were members of the highest level administrative boards. Data about organizational structure strongly supported Perrow's proposition that hospitals are highly centralized institutions.

The confirmation of computer knowledge as a strong predictor of innovation adoption, supports the proposition of Rogers (1983), Zaltman et al.(1973) and others that knowledge-awareness is a critical component of the innovation process. This information will be of value to organizations and individuals interested in developing strategies to enhance innovativeness in the health care sector. Of more particular interest are the data about the sources of computer knowledge utilized by nursing executives. The finding that professionalism and innovativeness are positively correlated supported the findings of Becker (1970) and Counte and Kimberly (1974) with a physician population in a sample of nursing executives. The study results are encouraging as they reflect the continuing evolution of nursing as a profession comparing with physicians as a model of professionalism. Comparisons with other professional groups with similarities to the nursing population would be of value.

Research on the relationship between experience and innovation adoption has produced mixed results. In some

studies positive relationships were found, but in others there was found an inverse relationship. The findings of this study indicated an inverse relationship but it is not a significant one. The distribution of years experience is skewed, which warrants further investigation. Further, there are questions about the relationships among job tenure, political astuteness and innovativeness. The point might be raised that a senior executive alert to the political climate might ascribe to normative conforming behaviors rather than innovativeness. These issues suggest areas for other studies.

The salient finding of this study was the role of education in innovation adoption. There was a significant relationship between education and innovativeness. Furthermore, of the independent variables, education was one of the strongest predictors of innovation adoption. This discovery provides supportive data for the profession which is urging increased educational preparation for nurses. Encouraging information from the research is the degree of participation of respondents in advanced educational programs. These findings could provide the basis for several related studies in which might be examined the types of educational preparation which best prepare nursing executives and the effect of experiential preparation on management skills.

Conclusions

The conclusions based upon the results of the data analysis are listed below.

1. Adoption of computerized applications for management functions is in an early stage of development. As the availability and knowledge of management applications, specialized for nursing, increases there should be an increased rate of adoption by nursing executives.

2. Computer knowledge, education, and hospital size are the most important factors in innovation adoption by nursing executives. Therefore nursing executives who have information about computers, are prepared at the graduate level, and are employed by large hospitals are more likely to be innovative.

3. General knowledge about computers was obtained primarily from educational offerings and information about particular computerized management applications was acquired essentially from external sources which include individuals and organizations. Consequently, an increase in educational programs designed for the nursing executives should enhance awareness of innovations and increase adoption. Further, organizational development and support of interorganizational links should increase innovation adoption.

4. Higher levels of education advances innovativeness. As the level of formal education rises adoption of innovations by chief nursing executives should increase.

5. The contribution of size to innovation adoption may be a function of education. Large institutions are more likely to employ executives prepared at the graduate level. However, as individuals respond to the pressure (from both employers and the profession) for increased educational credentials more executives prepared at the master's level will be available to medium and small sized hospitals and innovativeness may be increased.

Recommendations

Research about nursing executives and innovation adoption is limited. This study was an attempt to learn more about the predictors of the adoption of computer technology for management functions. The present study produced much descriptive data about the population of nursing executives in Michigan. Additionally, it produced data for inferences about predicting innovativeness in the population. The following areas are recommended for further investigation.

1. The scales developed for this study should be further refined to increase their reliability. Low

correlation coefficients in relationships involving the scales for role/position and professionalism may be the result of their relatively low reliability.

2. More refined measures are needed to quantify openness of organizational climate. The tools should include both internal and external factors which impact openness.

3. Further study of the relationships among size, education, and innovation adoption is in order. A study focused on small hospitals which includes interviews of the nursing executive and others to ascertain barriers to innovation adoption would be of great value.

4. Comments by respondents from large institutions which were under governmental control at local ,state, or federal levels indicated concerns about bureaucratization affecting innovativeness. Research may be needed to investigate the relationship among size, highly bureaucratized institutions, and innovation adoption.

5. Research is needed to clarify the relationships among age, experience, education, and innovativeness.

6. A study of professionalism and innovation adoption which compares nursing executives to some similar class of professional would supply data for determining the developmental stage of nursing as a profession.

7. The implementation stage of the innovation

process merits the attention of researchers. Better understanding of the change process would be of great value to executives of health care organizations in the present climate of turmoil and constant change.

Implications

The strongest predictor of innovativeness was knowledge about computers and the findings disclosed the information sources most often utilized by nursing executives were educational offerings such as conferences, courses, and seminars. Nursing executives should be encouraged to use these sources through institutional support of released time and reimbursed conference expenses. Short courses on information system technology germane to nursing administration should be developed and available at a number of sites or through interactive cable television conferencing. Computer seminars developed by internal or external experts should be presented on hospital sites. Participation in computer councils and special interest groups of professional organizations should be encouraged. Professional journals should increase their coverage of computerized management technology. The education of selected staff members as computer resources for the nursing executives should be considered.

The role of education in innovation adoption was strongly supported by the study findings. Given that education has an impact on innovation adoption, leaders in educational and service institutions must increase their support of the professional development of nurses at all levels. Health care organizations, represented by chief executive officers, must insist upon extensive management education for chief nursing executives. The manager of the future must be prepared for the use of sophisticated information systems which include forecasting models. Administrators and faculty in higher education must enlarge and enhance courses, tracks, and degree programs in nursing administration. Enhancement must include advanced information management with special emphasis on the computerization of management functions.

Finally, the effect of size on innovativeness must be considered. Increasing the size of institutions to increase the innovativeness of nursing executives does not seem to be a viable alternative. Rather, increasing the educational preparation of nursing executives in small hospitals might be emphasized and access to computer knowledge increased. Further research, targeting small hospitals, to learn more about barriers to innovativeness is essential.

APPENDICES

APPENDIX A

EXPERT PANEL

APPENDIX A

Expert Panel

Patricia Schwirian, R.N., Ph.D.
Ohio State University
Editor, Management Applications
Computers in Nursing

Roy L. Simpson, R.N. Ph.D.
Director, Information Systems
Hospital Corporation of America
Nashville, Tennessee

Mary McHugh, R.N., Ph.D.
Management Information Systems
St. Joseph Mercy Hospital
Ann Arbor, Michigan

Karen Rieder, R.N., D.NSc.
Director of Resource Analysis and Management Systems
Office of Asst. Sect. of Defense for Health Affairs
Washington, D.C.

APPENDIX B

HYPOTHESIS TESTING PROCEDURE

APPENDIX B

Hypothesis Testing Procedure

The following procedure was used to test the hypotheses:

1. A statement of the null hypothesis.
   $H : \underline{p} = 0$
2. A statement of the research or alternate hypotheses. $H : \underline{p} > 0$
3. Selection of the statistical test that fits the null hypothesis. $\underline{t}$-test for Pearson r equal to zero in the population
4. Identification of the sampling distribution of the test statistic under the null hypothesis. $\underline{t}$ distribution
5. Calculation of degrees of freedom to use in this sampling distribution. n-2 (113-2=111)
6. Selection of the level of significance. $a = .05$. Alpha was set at .05 indicating that if the observed statistic was among the 95 percent of more likely outcomes, the null hypothesis was retained. If the observed statistic was among the five percent of least likely outcomes the null hypothesis was not retained and support was provided for the research hypothesis.

7. Decision to retain or not retain the null hypothesis. Given the level of significance, the type of research question, and the degrees of freedom the table of critical values was used to make the decision. If the absolute value of the statistic was equal to or greater than the tabled value then there was support for the research hypothesis, and the null hypothesis was not retained. Otherwise the null hypothesis was retained. For the one-tailed research hypotheses, if the r was positive and the observed value was greater than or equal to the tabled value, then there was support for the research hypothesis and the null hypothesis was not retained. If not, then the null hypothesis was retained.

APPENDIX C

APPROVAL FOR RESEARCH FROM UCRIHS

MICHIGAN STATE UNIVERSITY

UNIVERSITY COMMITTEE ON RESEARCH INVOLVING
HUMAN SUBJECTS (UCRIHS)
238 ADMINISTRATION BUILDING
(517) 355-2186

EAST LANSING • MICHIGAN • 48824-1046

November 3, 1986

Ms. Eunice A. Bell
4559 Eleanor Street
Linden, Michigan 48451

Dear Ms. Bell:

Subject: Proposal Entitled, "Innovativeness and the Nursing Executive: Organizational and Individual Predictors"

I am pleased to advise that I concur with your evaluation that this project is exempt from full UCRIHS review, and approval is herewith granted for conduct of the project.

You are reminded that UCRIHS approval is valid for one calendar year. If you plan to continue this project beyond one year, please make provisions for obtaining appropriate UCRIHS approval prior to November 3, 1987.

Any changes in procedures involving human subjects must be reviewed by the UCRIHS prior to initiation of the change. UCRIHS must also be notified promptly of any problems (unexpected side effects, complaints, etc.) involving human subjects during the course of the work.

Thank you for bringing this project to my attention. If I can be of any future help, please do not hesitate to let me know.

Sincerely,

Henry E. Bredeck, Ph.D.
Chairman, UCRIHS

HEB/jms

cc: Dr. Lou Anna Kimsey Simon

APPENDIX D

HOSPITAL COMMITTEES

APPENDIX D

HOSPITAL COMMITTEES

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1. Pharmacy and Therapeutics
2. Quality Assurance/ Utilization Review
3. Administrative Board/Council
4. Infection Control
5. Medical Records
6. Safety
7. Medical Staff Executive
8. Emergency Dept/ Inpatient Surgery/Ambulatory Surgery
9. Department Heads
10. Others

APPENDIX E

PERSONNEL LEVELS

APPENDIX E

Personnel Levels

1. Assistant Directors/ Nurse Managers/ Department Heads
2. Administrative Assistants
3. Supervisors/ House Directors (3-11, 11-7)
4. Head Nurses
5. Charge Nurses/Assistant Head Nurses
6. Team Leaders/Module Leaders
7. Staff Nurses-Resgistered Nurses
8. Licensed Practical Nurses-L.P.N
9. Technicians/O.R./E.M.T
10. Nurses' Aides/ Orderlies
11. Others

APPENDIX F

NURSING DEPARTMENT COMMITTEES

APPENDIX F

Nursing Department Committees

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1. New Products
2. Nursing Practice, Process, Diagnosis
3. Nursing Research
4. Quality Assurance/ Audit
5. Policies and Procedures
6. Risk Management
7. Head Nurse Council/ Executive Council
8. Others

APPENDIX G

INDEPENDENT VARIABLE CORRELATIONS

APPENDIX G

Table A 1

Independent Variable Correlations

	Q71	Q73	S5	S1	S2	S4	Q31	Q37
Q71		-.0081	-.0273	.5137	.2322	.4419	.4589	.0863
Q73			.1175	.1437	.1160	.2361	.0143	-.0392
S5				.0712	.1416	-.0423	-.1040	.0522
S1					.4016	.5401	.3562	.1093
S2						.4729	.1440	.0207
S4							.3480	.0067
Q31								-.0926
Q37								

Organizational Level		Individual Level	
Q71	Size	S1	Role/position
Q73	Fiscal Control	S2	Computer Knowledge
S5	Organizational Climate	S4	Professionalism
		Q31	Education
		Q37	Experience

APPENDIX H

PARTIAL CORRELATIONS CONTROLLING FOR SIZE

APPENDIX H

Table A 2

Partial Correlation Controlling for Size

Variable	Coefficient	Significance
Organizational Level		
Fiscal Control	.0763	.212
Organizational Climate	.1896	.024
Individual Level		
Role/position	.2145	.013
Computer Knowledge	.2999	.001
Professionalism	.1797	.031
Education	.1811	.030
Experience	-.0415	.334

APPENDIX I

ZERO ORDER CORRELATIONS

APPENDIX I

Table A 3

Zero Order Correlations

	Q71	Q73	S5	S1	S2	S4	Q31	Q37
Q71		-.0081	-.0273	.5137	.2322	.4419	.4589	.0863
Q73			.1175	.1437	.1160	.2361	.0143	-.0392
S5				.0712	.1416	-.0423	-.1040	.0522
S1					.4016	.5401	.3562	.1093
S2						.4729	.1440	.0207
S4							.3480	.0067
Q31								-.0926
Q37								
IS	.3584	.0683	.1046	.3457	.3509	.3129	.3163	-.0153

Organizational Level	Individual Level
Q71 Size	S1 Role/position
Q73 Fiscal Control	S2 Computer Knowledge
S5 Organizational Climate	S4 Professionalism
Dependent Variable	Q31 Education
IS Innovativeness Score	Q37 Experience

APPENDIX J

RESULTS OF STEPWISE REGRESSION

APPENDIX J

Table A 4

Results of Stepwise Regression

Variables			
Size		Role/position	
Fiscal Control		Computer Knowledge	
Organizational Climate		Professionalism	Experience
Education			

Variable Entered on Step 1	Size		
Multiple R	.35841	R Square Change	.12846
R Square	.12846	F Change	16.36081
Standard Error	16.64464	Signif. F Change	.0001
F = 16.36081		Signif. F = .0001	

B =.034442 Beta =.358414 SE = .08 t = 4.045 Sig..0001

Variable Entered on Step 2	Computer Knowledge		
Multiple R	.45191	R Square Change	.07576
R Square	.20422	F Change	10.47193
Standard Error	15.97692	Signif. F Change	.0016
F = 14.11443		Signif. F = .0000	

Variable	B	Beta	SE	t	Sig
Size	.028128	.292705	.08	3.347	.0011
Comp. Know.	2.475879	.282976	.08	3.236	.0016
Education(not in equation)		.179226		1.892	.0611

APPENDIX K

RESULTS OF FORCED REGRESSION

APPENDIX K

Table A 5

Results of Forced Regression

Variables
Size, Fiscal Control, Organizational Climate, Education, Role/position, Computer Knowledge, Professionalism, Experience

Multiple R	.51442	R Square Change	.26463
R Square	.26463	F Change	4.11830
Standard Error	15.87186	Signif. F Change	.0002

F = 4.11830 Signif. F = .0002

Variable	B	Beta	SE	t	Sig
Comp. Know.	2.249108	.257058	.10	2.541	.01
Education	4.460259	.209732	.10	2.056	.04
Size	.017467	.181769	.10	1.685	.09
Org. Climate	.452735	.080799	.08	.920	.36
Role/position	.137681	.053847	.11	.473	.66
Fis. Control	.152726	.013257	.08	.149	.88
Professional	.046872	.010565	.11	.092	.93
Experience	-.880651	-.261308	.16	-1.621	.11

APPENDIX L

SURVEY QUESTIONNAIRE

In the first four sections, I will be asking you about your role, computer interests, education, experience, and professional activities.

PART ONE

Q1. What is the scope of your responsibilities as chief nursing executive? (circle the appropriate answer)

1 THE NURSING DEPARTMENT
2 NURSING AND RELATED DEPARTMENTS e.g., HOME HEALTH CARE, SCHOOL OF NURSING, QUALITY ASSURANCE, INFECTION CONTROL
3 NURSING AND OTHER HOSPITAL DEPARTMENTS OR DIVISIONS
4 OTHER_____

Q2. Within the nursing department, how many levels of personnel are included? (circle all that apply)

1 ASSISTANT DIRECTORS/NURSE MANAGERS/DEPT HEADS
2 ADMINISTRATIVE ASSISTANTS
3 SUPERVISORS/NURSE MANAGERS (3-11, 11-7)
4 HEAD NURSES
5 CHARGE NURSES/ASSISTANT HEAD NURSES
6 TEAM LEADERS/MODULE LEADERS
7 STAFF NURSES-RN
8 STAFF NURSES-LPN
9 TECHNICIANS/O.R./E.M.T etc.
10 NURSES'AIDES/ORDERLIES
11 OTHERS_____

Q3. Which of the following functions are done by personnel assigned to the nursing department and reporting directly to you? (circle all that apply)

1 STATISTICAL ANALYSIS
2 FINANCIAL/BUDGET MANAGEMENT
3 INFORMATION SYSTEM LIAISON
4 NURSING PAYROLL
5 NURSE RECRUITMENT
6 OTHER_____

Q4. Please indicate which committees your department includes. (circle all that apply and indicate by a check whether they are ad hoc or standing committees.

		STANDING COM.	AD HOC COM.
1	NEW PRODUCTS	[ ]	[ ]
2	NURSING PROCESS	[ ]	[ ]

3	NURSING DIAGNOSIS	[ ]	[ ]
4	NURSING RESEARCH	[ ]	[ ]
5	QUALITY ASSURANCE	[ ]	[ ]
6	RISK MANAGEMENT	[ ]	[ ]
7	HEAD NURSE COUNCIL	[ ]	[ ]
8	EXECUTIVE COMMITTEE	[ ]	[ ]
9	OTHER_____	[ ]	[ ]

Q5. Please list all the hospital committees on which you or a designee represent nursing. (circle all that apply)

1 PHARMACY AND THERAPEUTICS
2 QUALITY ASSURANCE/AUDIT/UTILIZATION REVIEW
3 ADMINISTRATIVE BOARD/COUNCIL
4 INFECTION CONTROL
5 MEDICAL RECORDS
6 SAFETY
7 MEDICAL STAFF EXECUTIVE
8 EMERGENCY DEPT/ SURGERY - INPATIENT, OUTPATIENT 9 DEPARTMENT HEADS
10 OTHER_____

Q6. When decisions are made which affect the entire nursing department (in the four areas listed below); who is directly involved in the decision-making process? (check all that apply)

	CHIEF NURSE EXECUTIVE	ASST DIRECTORS	SUP. NURSE MGRS	HEAD NURSES
1 PERSONNEL	[ ]	[ ]	[ ]	[ ]
2 PT. CARE POLICY	[ ]	[ ]	[ ]	[ ]
3 PRODUCTS/SERVICE	[ ]	[ ]	[ ]	[ ]
4 BUDGET/RESOURCES	[ ]	[ ]	[ ]	[ ]

Q7. Outside of the nursing department, at what levels are you involved in decision making? (circle all that apply)

1 WITH THE HOSPITAL ADMINISTRATIVE STAFF GROUP
2 WITH THE MEDICAL STAFF GROUP
3 WITH THE BOARD OF DIRECTORS
4 OTHER_____

PART TWO

Q1. Do you, or a staff member, belong to computer councils of professional organizations such as the ANA Council on Computer Applications, SCAMC, AAMSI, etc.?

0 NO
1 YES

Q2. Do you, or a staff member, utilize Special Interest Groups (SIGs) through computer information services such as Compuserve, The Source, Knowledge Index etc.?

0 NO
1 YES

Q3. Do you regularly (monthly) read articles about computers in these professional journals?

A.	NURSING	YES	NO
B.	HOSPITALS/HEALTH CARE	YES	NO
C.	MANAGEMENT SCIENCE	YES	NO
D.	COMPUTERS	YES	NO

Q4. Do you regularly receive information from a member of your staff about computer applications in health care?

0 NO
1 YES

Q5. Have you attended seminars on computer literacy? (basic information about computers)

0 NO
1 YES

Q6. Have you attended professional conferences which included a component on computer applications for managers?

0 NO
1 YES

Q7. Have you attended a short course (2-3 days) with a single topic of computer applications for nursing managers?

0 NO
1 YES

Q8. Have you attended a management training program (2-3 weeks) which contained a segment on information systems technology?

0 NO
1 YES

Q9. Do you use a personal computer at home?

0 NO
1 YES

PART THREE

Q1. What is your highest degree of education?

1 DIPLOMA/ ASSOCIATE DEGREE IN NURSING
2 BSN/BS/BA
3 MSN/ MS/ MA/ MBA/ MHA
4 Ph.D/ Ed.D/ D.N.Sc.

Q2. Have you attended continuing education programs for administrators? (circle all that apply)

1 CONFERENCES (ONE DAY) ON MANAGEMENT TOPICS
2 A SERIES OF SEMINARS (2 OR MORE DAYS)
3 SPECIAL COURSES FOR NURSING ADMINISTRATORS (TWO WEEKS OR MORE)

Q3. Have you attained certification in management through ANA/AHA or a post-masters certificate program?

0 NO
1 YES

Q4. Are you presently enrolled in a degree-granting academic program?

0 NO
1 BSN/ BS/ BA
2 MSN/ MS/ MA/ MBA/ MHA
3 Ph.D/ Ed.D/ D.N.Sc.
4 OTHER_____

Q5. What is the number of years you have been employed as a registered nurse? _____

Q6. What is the number of years since you obtained your highest degree of education?_____

Q7. What is the number of years you have held the position of chief nursing executive? _____

Q8. What is the number of years you have been the chief nursing executive at your present location? _____

PART FOUR

Q1. During the past two years, to how many state, regional and national professional organizations did you belong?

0 NONE
1 ONE
2 TWO
3 THREE
4 FOUR
5 FIVE OR MORE

Q2. During the past two years, how many professional conferences did you attend?

0 NONE
1 ONE
2 TWO
3 THREE
4 FOUR
5 FIVE OR MORE

Q3. During the past two years, have you made a presentation at a meeting of a professional organization?

0 NO
1 YES

Q4. During the past two years, have you provided management consultation services to other hospital departments, nursing departments in other agencies, governmental agencies, and/or colleges and universities?

0 NO
1 YES

Q5. Which of the following management journals do you read on a regular (monthly) basis? (circle all that apply)

1 JOURNAL OF NURSING ADMINISTRATION
2 NURSING ADMINISTRATION QUARTERLY
3 NURSING MANAGEMENT
4 NURSING ECONOMICS
5 HOSPITALS
6 HEALTH CARE STRATEGIC PLANNING
7 HEALTH CARE FINANCIAL MANAGEMENT
8 OTHERS _____
_____
_____

Q6. During the past two years, have you had professional work published (either as author or contributor)?

0 NO
1 AN ARTICLE(S) IN A JOURNAL/MONOGRAPHS/CHAPTER/BOOK

Q7. During the past two years, have you initiated a research study in the nursing department?

0 NO
1 YES

Q8. During the past two years, has your department collaborated with a college or university on a research study in your department?

0 NO
1 YES

Q9. During the past two years, has your department collaborated with another department on a hospital-wide research study?

0 NO
1 YES

Q10. During the past two years, has your department collaborated with other agencies and/or institutions on a research study?

0 NO
1 YES

Q11. Do you have a joint or adjunct appointment with a school of nursing in a college or university?

0 NO
1 YES

Now I would like to ask about your organization.

PART FIVE

Q1. To what extent do supervisors in your institution attempt to get ideas and opinions from employees?

1 RARELY
2 OCCASIONALLY
3 USUALLY
4 ALMOST ALWAYS

Q2. What mechanisms are used to get ideas and opinions from employees? (circle all that apply)

1 SUGGESTION BOX
2 SUGGESTION COMMITTEE
3 BRAINSTORMING SESSIONS
4 STAFF MEETINGS
5 PARTICIPATION ON COMMITTEES
6 OTHER _____

Q3. To what extent do supervisors use ideas and opinions from their employees?

1 RARELY
2 OCCASIONALLY
3 USUALLY
4 ALMOST ALWAYS

Q4. What is the major direction of communication flow in your institution?

1 ALWAYS DOWNWARD
2 MOSTLY DOWNWARD
3 DOWN AND UP
4 DOWN, UP AND WITH PEERS

Q5. To what extent are supervisors in you institution willing to share information with subordinates?

1 MINIMAL
2 GIVE ONLY WHAT SUPERVISOR FEELS IS NEEDED
3 GIVE WHAT IS NEEDED AND ANSWERS MOST QUESTIONS
4 GIVE ALL RELEVANT INFORMATION AND ANSWERS QUESTIONS

Q6. What mechanisms are used to share information? (circle all that apply)

1 MEMOS
2 STAFF MEETINGS
3 NEWSLETTERS
4 OTHER_____

Q7. To what extent is downward communication accepted?

1 VIEWED WITH SUSPICION
2 SOME ACCEPTED, SOME VIEWED WITH SUSPICION
3 OFTEN ACCEPTED
4 GENERALLY ACCEPTED

Q8. To what extent is upward communication accurate?

1 INACCURATE
2 SOMEWHAT RESTRICTED AND FILTERED (EXCEPT WHAT BOSS WANTS TO HEAR)
3 INCOMPLETE (EXCEPT WHAT BOSS WANTS TO HEAR)
4 ACCURATE AND COMPLETE

Q9. To what extent is lateral communication accurate?

1 RARELY
2 PARTLY
3 MOSTLY
4 ALWAYS

Q10. What is the number of collaborative projects among local institutions in which your hospital is presently involved?

0 NONE
1 ONE
2 TWO
3 THREE
4 FOUR
5 FIVE OR MORE

Q11. What is the number of representatives from the nursing department serving on boards of health care related agencies, e.g., health planning boards, health education councils?

0 NONE
1 ONE
2 TWO
3 THREE
4 FOUR
5 FIVE OR MORE

Selected questions in Part Five are from Rensis Likert's New Ways of Managing Conflict (1974)

The following questions are about your department's adoption of computer technology for selected management functions. Computer technology is defined as either formal programs designed for a specific function or generic tools such as spread sheets which are utilized for that function. Please report adoptions occuring during your tenure at your present location or in prior locations. Information about the type of hardware used i.e., micro, mini, or mainframe computer is not needed for this study.

PART SIX

A. Function: Personnel Files (this might include performance evaluations, educational records, employment history)

Q1. Has the nursing department adopted a computer application for the management of personnel files?

0 NO --------IF NO PROCEED TO Section A1
1 YES --------|

IF YES
|

Q2. When adopted?

1 IN 1986
2 IN 1985
3 PRIOR TO 1985

Q3. Which tools were adopted? (circle all that apply)

1 WORD PROCESSOR
2 SPREAD SHEET
3 GRAPHICS
4 DATA BASE MANAGEMENT SYSTEM
5 COMMUNICATION PACKAGE
6 MANAGEMENT INFORMATION SYSTEM
7 OTHER_____

Q4. The adoption of a computer application for personnel files was initiated by:

1 THE HOSPITAL CHIEF EXECUTIVE
2 DIRECTOR OF ANOTHER HOSPITAL DEPT.
3 THE NURSING CHIEF EXECUTIVE
4 A PRIOR NURSING EXECUTIVE
5 A NURSING DEPARTMENT STAFF MEMBER

Q5. If initiated by you, from what sources did you receive information about this computer application? (circle all that apply)

1 PROFESSIONAL JOURNALS, BOOKS
2 PROFESSIONAL MEETINGS
3 PEERS WITHIN THE HOSPITAL
4 STAFF
5 HOSPITAL CHIEF EXECUTIVE
6 PEERS FROM OTHER ORGANIZATIONS
7 OTHER_____

Q6. Once adopted, were there changes in the procedures and policies in this management area?

0 NO
1 YES

Q7. Was adoption followed by modification and/or adaption of the tool?

0 NO
1 YES

Q8. If modifications were made the persons responsible were:

1 YOUR STAFF
2 DATA PROCESSING DEPT PERSONNEL
3 CONSULTANTS FROM COMPUTER COMPANIES
4 OTHERS_____

Q9. Have you upgraded the original computer technology adopted for this management application by implementing a more advanced technology?

0 NO
1 YES

SECTION A1

Q10. If computer technology had been used in this management function in the past and discontinued, please indicate the reason.

1 INEFFICIENT
2 REPLACED BY MORE ADVANCED METHODS/TOOLS
3 TOO EXPENSIVE
4 STAFF RESISTANCE TO UTILIZATION
5 OTHER_____

Q11. Has computer technology been purchased for this management function but not yet implemented?

0 NO
1 YES

B. Function: Quality Assurance (might include patient acuity, DRGs, utilization review)

Q1. Has the nursing department adopted a computer application for the management of quality assurance?

0 NO --------IF NO PROCEED TO Section B1
1 YES --------|

IF YES
|

Q2. When adopted?

1 IN 1986
2 IN 1985
3 PRIOR TO 1985

Q3. Which tools were adopted? (circle all that apply)

1 WORD PROCESSOR
2 SPREAD SHEET
3 GRAPHICS
4 DATA BASE MANAGEMENT SYSTEM
5 COMMUNICATION PACKAGE
6 MANAGEMENT INFORMATION SYSTEM
7 OTHER_____

Q4. The adoption of a computer application for quality assurance was initiated by:

1 THE HOSPITAL CHIEF EXECUTIVE
2 DIRECTOR OF ANOTHER HOSPITAL DEPT.
3 THE NURSING CHIEF EXECUTIVE
4 A PRIOR NURSING EXECUTIVE
5 A NURSING DEPARTMENT STAFF MEMBER

Q5. If initiated by you, from what sources did you receive information about this computer application? (circle all that apply)

1 PROFESSIONAL JOURNALS, BOOKS
2 PROFESSIONAL MEETINGS
3 PEERS WITHIN THE HOSPITAL
4 STAFF
5 HOSPITAL CHIEF EXECUTIVE
6 PEERS FROM OTHER ORGANIZATIONS
7 OTHER_____

Q6. Once adopted, were there changes in the procedures and policies in this management area?

0 NO
1 YES

Q7. Was adoption followed by modification and/or adaption of the tool?

0 NO
1 YES

Q8. If modifications were made the persons responsible were:

1 YOUR STAFF
2 DATA PROCESSING DEPT PERSONNEL
3 CONSULTANTS FROM COMPUTER COMPANIES
4 OTHERS_____

Q9. Have you upgraded the original computer technology adopted for this management application by implementing a more advanced technology?

0 NO
1 YES

SECTION B1

Q10. If computer technology had been used in this management function in the past and discontinued, please indicate the reason.

1 INEFFICIENT
2 REPLACED BY MORE ADVANCED METHODS/TOOLS
3 TOO EXPENSIVE
4 STAFF RESISTANCE TO UTILIZATION
5 OTHER_____

Q11. Has computer technology been purchased for this management function but not yet implemented?

0 NO
1 YES

C. Function: Resource Allocation (might include productivity/ cost-of-care studies, budget compliance, financial reports.

Q1. Has the nursing department adopted a computer application for resource allocation?

0 NO --------IF NO PROCEED TO Section C1
1 YES --------|

IF YES
|

Q2. When Adopted?

1 IN 1986
2 IN 1985
3 PRIOR TO 1985

Q3. Which tools were adopted? (circle all that apply)

1 WORD PROCESSOR
2 SPREAD SHEET
3 GRAPHICS
4 DATA BASE MANAGEMENT SYSTEM
5 COMMUNICATION PACKAGE
6 MANAGEMENT INFORMATION SYSTEM
7 OTHER_____

Q4. The adoption of a computer application for resource allocation was initiated by:

1 THE HOSPITAL CHIEF EXECUTIVE
2 DIRECTOR OF ANOTHER HOSPITAL DEPT.
3 THE NURSING CHIEF EXECUTIVE
4 A PRIOR NURSING EXECUTIVE
5 A NURSING DEPARTMENT STAFF MEMBER

Q5. If initiated by you, from what sources did you receive information about this computer application? (circle all that apply)

1 PROFESSIONAL JOURNALS, BOOKS
2 PROFESSIONAL MEETINGS
3 PEERS WITHIN THE HOSPITAL
4 STAFF
5 HOSPITAL CHIEF EXECUTIVE
6 PEERS FROM OTHER ORGANIZATIONS
7 OTHER_____

Q6. Once adopted, were there changes in the procedures and policies in this management area?

0 NO
1 YES

Q7. Was adoption followed by modification and/or adaption of the tool?

0 NO
1 YES

Q8. If modifications were made the persons responsible were:

1 YOUR STAFF
2 DATA PROCESSING DEPT PERSONNEL
3 CONSULTANTS FROM COMPUTER COMPANIES
4 OTHERS_____

Q9. Have you upgraded the original computer technology adopted for this management application by implementing a more advanced technology?

0 NO
1 YES

SECTION C1

Q10. If computer technology had been used in this management function in the past and discontinued, please indicate the reason.

1 INEFFICIENT
2 REPLACED BY MORE ADVANCED METHODS/TOOLS
3 TOO EXPENSIVE
4 STAFF RESISTANCE TO UTILIZATION
5 OTHER_____

Q11. Has computer technology been purchased for this management function but not yet implemented?

0 NO
1 YES

D. Function: Staffing (might include patient classification systems, daily staffing and/or monthly scheduling)

Q1. Has the nursing department adopted a computer application for staffing?

0 NO --------IF NO PROCEED TO Section D1
1 YES --------|

IF YES
|

Q2. When Adopted?

1 IN 1986
2 IN 1985
3 PRIOR TO 1985

Q3. Which tools were adopted? (circle all that apply)

1 WORD PROCESSOR
2 SPREAD SHEET
3 GRAPHICS
4 DATA BASE MANAGEMENT SYSTEM
5 COMMUNICATION PACKAGE
6 MANAGEMENT INFORMATION SYSTEM
7 OTHER_____

Q4. The adoption of a computer application for staffing was initiated by:

1 THE HOSPITAL CHIEF EXECUTIVE
2 DIRECTOR OF ANOTHER HOSPITAL DEPT.
3 THE NURSING CHIEF EXECUTIVE
4 A PRIOR NURSING EXECUTIVE
5 A NURSING DEPARTMENT STAFF MEMBER

Q5. If initiated by you, from what sources did you receive information about this computer application? (circle all that apply)

1 PROFESSIONAL JOURNALS, BOOKS
2 PROFESSIONAL MEETINGS
3 PEERS WITHIN THE HOSPITAL
4 STAFF
5 HOSPITAL CHIEF EXECUTIVE
6 PEERS FROM OTHER ORGANIZATIONS
7 OTHER_____

Q6. Once adopted, were there changes in the procedures and policies in this management area?

0 NO
1 YES

Q7. Was adoption followed by modification and/or adaption of the tool?

0 NO
1 YES

Q8. If modifications were made the persons responsible were:

1 YOUR STAFF
2 DATA PROCESSING DEPT PERSONNEL
3 CONSULTANTS FROM COMPUTER COMPANIES
4 OTHERS_____

Q9. Have you upgraded ther original computer technology adopted for this management application by implementing a more advanced technology?

0 NO
1 YES

SECTION D1

Q10. If computer technology had been used in this management function in the past and discontinued, please indicate the reason.

1 INEFFICIENT
2 REPLACED BY MORE ADVANCED METHODS/TOOLS
3 TOO EXPENSIVE
4 STAFF RESISTANCE TO UTILIZATION
5 OTHER_____

Q11. Has computer technology been purchased for this management function but not yet implemented?

0 NO
1 YES

E. Function: Summary Reports (from departments, committees, and individuals)

Q1. Has the nursing department adopted a computer application for summary reports?

0 NO --------IF NO PROCEED TO Section E1
1 YES --------|

IF YES
|

Q2. When Adopted?

1 IN 1986
2 IN 1985
3 PRIOR TO 1985

Q3. Which tools were adopted? (circle all that apply)

1 WORD PROCESSOR
2 SPREAD SHEET
3 GRAPHICS
4 DATA BASE MANAGEMENT SYSTEM
5 COMMUNICATION PACKAGE
6 MANAGEMENT INFORMATION SYSTEM
7 OTHER_____

Q4. The adoption of a computer application for summary reports was initiated by:

1 THE HOSPITAL CHIEF EXECUTIVE
2 DIRECTOR OF ANOTHER HOSPITAL DEPT.
3 THE NURSING CHIEF EXECUTIVE
4 A PRIOR NURSING EXECUTIVE
5 A NURSING DEPARTMENT STAFF MEMBER

Q5. If initiated by you, from what sources did you receive information about this computer application? (circle all that apply)

1 PROFESSIONAL JOURNALS, BOOKS
2 PROFESSIONAL MEETINGS
3 PEERS WITHIN THE HOSPITAL
4 STAFF
5 HOSPITAL CHIEF EXECUTIVE
6 PEERS FROM OTHER ORGANIZATIONS
7 OTHER_____

Q6. Once adopted, were there changes in the procedures and policies in this management area?

0 NO
1 YES

Q7. Was adoption followed by modification and/or adaption of the tool?

0 NO
1 YES

Q8. If modifications were made the persons responsible were:

1 YOUR STAFF
2 DATA PROCESSING DEPT PERSONNEL
3 CONSULTANTS FROM COMPUTER COMPANIES
4 OTHERS_____

Q9. Have you upgraded the original computer technology adopted for this management application by implementing a more advanced technology?

0 NO
1 YES

SECTION E1

Q10. If computer technology had been used in this management function in the past and discontinued, please indicate the reason.

1 INEFFICIENT
2 REPLACED BY MORE ADVANCED METHODS/TOOLS
3 TOO EXPENSIVE
4 STAFF RESISTANCE TO UTILIZATION
5 OTHER_____

Q11. Has computer technology been purchased for this management function but not yet implemented?

0 NO
1 YES

F. Function: Forecasting (using models as decision-support tools to predicts needs and services)

Q1. Has the nursing department adopted a computer application for forecasting?

0 NO --------IF NO PROCEED TO Section F1
1 YES --------|

IF YES

Q2. When Adopted?

1 IN 1986
2 IN 1985
3 PRIOR TO 1985

Q3. Which tools were adopted? (circle all that apply)

1 WORD PROCESSOR
2 SPREAD SHEET
3 GRAPHICS
4 DATA BASE MANAGEMENT SYSTEM
5 COMMUNICATION PACKAGE
6 MANAGEMENT INFORMATION SYSTEM
7 OTHER_____

Q4. The adoption of a computer application for forecasting was initiated by:

1 THE HOSPITAL CHIEF EXECUTIVE
2 DIRECTOR OF ANOTHER HOSPITAL DEPT.
3 THE NURSING CHIEF EXECUTIVE
4 A PRIOR NURSING EXECUTIVE
5 A NURSING DEPARTMENT STAFF MEMBER

Q5. If initiated by you, from what sources did you receive information about this computer application? (circle all that apply)

1 PROFESSIONAL JOURNALS, BOOKS
2 PROFESSIONAL MEETINGS
3 PEERS WITHIN THE HOSPITAL
4 STAFF
5 HOSPITAL CHIEF EXECUTIVE
6 PEERS FROM OTHER ORGANIZATIONS
7 OTHER_____

Q6. Once adopted, were there changes in the procedures and policies in this management area?

0 NO
1 YES

Q7. Was adoption followed by modification and/or adaption of the tool?

0 NO
1 YES

Q8. If modifications were made the persons responsible were:

1 YOUR STAFF
2 DATA PROCESSING DEPT PERSONNEL
3 CONSULTANTS FROM COMPUTER COMPANIES
4 OTHERS_____

Q9. Have you upgraded the original computer technology adopted for this management application by implementing a more advanced technology?

0 NO
1 YES

SECTION F1

Q10. If computer technology had been used in this management function in the past and discontinued, please indicate the reason.

1 INEFFICIENT
2 REPLACED BY MORE ADVANCED METHODS/TOOLS
3 TOO EXPENSIVE
4 STAFF RESISTANCE TO UTILIZATION
5 OTHER_____

Q11. Has computer technology been purchased for this management function but not yet implemented?

0 NO
1 YES

Finally, I would like to ask about the characteristics of your hospital.

PART SEVEN

Q1. What is the number of beds in your hospital? _____

Q2. What is the number of FTE's in the nursing department? _____

Q3. Which best describes the fiscal control of your hospital?

1 AN INDIVIDUAL institution, PROFIT OR NON-PROFIT
2 AN INDIVIDUAL INSTITUTION AND MEMBER OF A PURCHASING CONSORTIUM
3 A CORPORATION WITH A PARENT HOLDING COMPANY AND MULTIPLE HOSPITALS
4 A CORPORATION WITH A PARENT HOLDING COMPANY, HOSPITALS, SERVICES AND SUPPLIES COMPANIES, PROPERTIES COMPANIES, AND ALTERNATE CARE ORGANIZATIONS
5 MUNICIPAL/STATE/FEDERALLY OWNED
6 OTHER_____

Q4. Which best describes your hospital?

1 A GENERAL HOSPITAL
2 A SPECIALTY HOSPITAL (CHILDREN'S, WOMEN'S, PSYCHIATRIC, SUBSTANCE ABUSE)
3 A VETERANS ADMINISTRATION FACILITY
4 A GOVERNMENT FACILITY FOR SERVICE PERSONNEL
5 A UNIVERSITY HOSPITAL
6 OTHER_____

This completes the survey. Thank you for your assistance. Please return the questionnaire and the return postcard. Returning the postcard will prevent your receiving unnecessary follow-up contacts. Thank you.

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BIBLIOGRAPHY

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