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A study of the effectiveness of a management consulting system for long term residential health care food service systems

Turl, Marvi Eugene, Ph.D.

University of Illinois at Urbana-Champaign, 1987

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A STUDY OF THE EFFECTIVENESS OF A MANAGEMENT CONSULTING SYSTEM FOR LONG TERM RESIDENTIAL HEALTH CARE FOOD SERVICE SYSTEMS

BY

MARVIN EUGENE TURL

B.A., Iowa Wesleyan College, 1966
M.S., Illinois State University, 1969

THESIS

Submitted in partial fulfillment of the requirements
for the degree of Doctor of Philosophy in Education
in the Graduate College of the
University of Illinois at Urbana-Champaign, 1987

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MARVIN EUGENE TURL

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Joseph Zaccarella
Director of Thesis Research

Nancy S. Cole
Head of Department

Committee on Final Examination†

Joseph Zaccarella
Chairperson

Henry R. Kaczkowski

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A STUDY OF THE EFFECTIVENESS OF A MANAGEMENT CONSULTING SYSTEM FOR LONG TERM RESIDENTIAL HEALTH CARE FOOD SERVICE SYSTEMS

Marvin Eugene Turl, Ph.D.
Department of Education
University of Illinois at Urbana-Champaign, 1987

This research studied the impact of a specified management system for long term care food services systems in the State of Illinois. Specifically, the CNCI Management System was developed as a food service management system within an open systems conceptual framework. The input variables included three sets of resources: 1) Labor Cost, 2) Raw Food Cost, and 3) Supply Costs. Application of the management system, which represented the throughputs or conversion process, was accomplished via on-site consulting services and food service management manuals. The system outputs were the meals provided to residents in Illinois long term care facilities. This study demonstrated three aspects of continuing professional education. First, the consultants received continuing in-service professional education regarding the CNCI Management System. Second, the entire intervention was educational in quality, i.e. the consultants taught food service personnel how to implement the CNCI Management System. Third, the CNCI Management System includes two management manuals. The Consultants Policy and Procedures Manual which provides a description of the content and process for training food service personnel. In addition the Facility Policy and Procedure Manual

provides the long term care facility administrator and food service supervisor with detailed educational materials regarding how to manage long term care food service systems.

A monetarily defined variable, tray cost, was sampled to assess performance of the food service system. Average monthly tray costs were sampled seven times, one pre-intervention and six post-intervention, for all 16 intervention facilities and for 16 non-intervention, comparison facilities. Participating in this study were long term residential care facilities which were legally organized as for profit corporations in the state of Illinois. A quasi-experimental data collection design was used to gather the data. Analysis of variance with repeated measures and t-tests were the principle statistics used to analyze this data.

Results indicated a statistically significant difference between the intervention and non-intervention groups with reference to average monthly tray cost. Wide variability of tray costs within both the intervention group and the non-intervention group was observed over time. Also noted was an absence of significant differences in the performance of the intervention group tray costs due to different consultants who were assigned to various facilities. The data revealed the development of a trend toward consistently lower mean tray costs and lower variability of those costs within the intervention group over the six-month research period. Implications for further research were discussed.

DEDICATION

To My Wife Deborah. Without Her Love, Work and Tolerance

It Would Not Have Been Possible!

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CHAPTER I

INTRODUCTION

This research project was developed to study the effectiveness of a management consulting system. The consulting system was designed for use within the food service departments of long term health care facilities and its published portions were based upon the principles of systems theory. As a medium for increasing the performance efficiency of food service personnel extensive structured and unstructured educational activities were included in the management system. Implementation of the various elements of the management consulting system, including the educational processes, were the responsibility of a food service management consultant.

This study was conducted within the context of natural field research. It was influenced by the complexities of an institutional management consulting system. In a laboratory, foci may be precisely controlled. However, in a quasi-experimental field research effort the influence of numerous factors found in the natural environment must be considered during the design and performance of the research.

In the most generic sense, this research study investigated the effectiveness of an institutional food service management system. The term "effective" refers to the act or process of producing a result. Van DeVen and Ferry (1980) noted that three somewhat general questions must be answered to determine

organizational effectiveness. "(1) What is the desired result? (2) How does one measure the desired result? (3) What produces or causes the desired result?" (Van Deven & Ferry, 1980, p. 27). These general questions provided a basis for the further development of this research project.

To determine a desired result of the performance of institutional food service systems the literature from a number of diverse but related fields was examined. Literature from systems theory, healthcare, organizational development, management of food service systems and general business management was used to begin the development of one output of long term care food service systems.

There may be many measurable results in any given intervention, program, or activity. In this study the dependent variable, per patient day food cost (tray cost), which will be defined later, was selected for measurement purposes. Tray cost was chosen because it allowed a reasonably economical and precise method for measuring the activities of food service systems in long term health care. It was chosen, also, because it fairly and consistently represents a major outcome which is valued and used by the organizations which participated in the project.

In an attempt to understand what caused changes in organizational performance, as reflected in tray cost, the assumption was made that socio-technical systems are not simple.

Even small organizations have multiple components as well as a complex array of inter-relationships. A given psychological, sociological or organizational event is not "caused" by a single variable. Individual and organizational behavior is the result of multiple factors. To the extent that the organizations and methodology permitted, this research focused on a limited set of interventions in specific organizations and then measured certain behavior.

The concept of organizational effectiveness is, as noted by Cameron and Whetten (1983), an abstraction which exists only in the minds of investigators. The criteria of effectiveness are subjective and "based on the values and preferences of individuals" (Cameron & Whetten, 1983, p. 12).

Overview of Relevant Literature

Healthcare

The scientific literature contains relatively little research into the organizational structures, system dynamics and performance of long term residential care facilities in the United States. A computerized literature search of 26 on-line research data bases with a total of over 17 million citations revealed no studies in either systems theory or long term residential care food service. Detailed investigations of the specific design elements, structures, mechanisms, and procedures

required to allow researchers and managers to improve the functions of the individual long term residential care system and hence provide high quality care at the best possible cost are lacking. Also, there are no studies which utilize an analysis of archival data to test theoretical propositions regarding systems theory and long term residential care as will be presented in this dissertation.

Conversely, there is a voluminous amount of essentially descriptive material generated by federal and state governments, insurance companies and others interested in the health care industry (Metropolitan Life Ins. Co., 1984, National Center for Health Statistics, 1983). The literature regarding clinical issues and biopsychosocial care of patients in long term residential care is substantial and growing. Much research (Vogel & Palmer, 1982) focuses on national concerns regarding the complex economic issues of health care in general, long term residential care specifically, and the development of national and state policy which attempts to control the burgeoning problems of long term residential care. Very little scientific effort is directed toward the development of specific management techniques designed to improve organizational functioning and the quality of services provided by these health care organizations.

Much research has focused on the consumer either as a recipient of the system's outputs or as a system input.

Additional research has been developed with regard to the influence of various governmental agencies which have the increasing burden of paying for long term residential care. Studies of the management of individual long term residential care facilities, ways of bringing about desired change within such a system and the analysis of the economic functioning of specific organizational sub-systems are desirable but not yet available in the literature.

A review of the literature indicates a substantial need for development of policies which will regulate the rapid and largely unregulated growth of the long term health care industry in general. Rakich, Longest and Darr (1985) report the growth in the long term care industry which has been predicted and monitored for many years by a wide range of groups and government agencies. From the literature of long term health care represented by Vogel and Palmer (1981), one is left with the impression that long term health care is a confused, poorly regulated and frequently improperly run industry. There are those authors, such as Brody (1979, 1980), who are making systematic efforts toward bringing theory formation and rational policy development to long term care.

Institutional Food Service Systems

The literature regarding the food service component within

long term health care facilities is quite limited. The focus in this literature has frequently been on clinical nutrition and not on operational performance. There have been still fewer studies conducted which evaluate the impact of consultants in food service systems. A thorough literature review revealed no studies in the area of long term residential care food service management which use educational components as the central process by which consultants bring about desired organizational goals.

Consulting and Education

Consulting activities span literally every industry across this country. Consulting services are being developed by a wide range of professionals who provide services to an ever increasing number of client organizations.

This burgeoning of consulting activity has grown out of an educational base. Consulting is a logical extension of the educator's role. Consulting is largely educational in that the consultant teaches organizational members understanding skills and action skills. These skills enable organizational members to change their behavior, i.e. to learn, thereby enhancing organizational performance.

Blake and Mouton (1983) noted, "By making theories and principles that are pertinent to the client's situation evident, the consultant aids the client to internalize systematic and

empirically tested ways of understanding and acting. When learned so well as to be personally useful, these principles permit the client to view his or her situation in a more analytic, cause-and-effect fashion than has hitherto been possible. Thus the client becomes able to diagnose and deal with present and future situations in more valid ways. From the outset he or she can correct an immediate problem or can plan for long-range improvements on the basis of proven effective approaches. Interventions that bring theories and principles into use involve an integration between education and consultation" (p. 14).

Additionally, De Cecco (1968) has observed, "There appears to be an increased emphasis on the training and retraining of manpower, an activity which takes place in most organizations. . . . more attention is being given to organizations as learning systems" (p. 10). Traditionally, education has taken place within very specific geographic locations and physical structures, i.e., schools, universities, colleges. However, the rapidly changing demands of a society which are increasing in complexity, size and risk result in a nearly inexhaustible demand for information, knowledge and skill. The important difference in the new demand structure for education has to do with the change in location and a shift in the content focus of the educational efforts.

The development of in-service training, on-site professional training, specialized educational experiences and other forms of

non-academic based learning is extensive. This process of exporting education to the work site or other off-campus locations continues to grow and represents a central component of the management consulting system being studied in this dissertation.

Fritz (1975) observed that learning is at the center of consulting. He also stated that learning may be shown to be connected to change and some performance aspects within the organization. According to Fritz it is necessary to view consulting and the subsequent learning function in terms of a process which includes specific behaviors, feedback, and instruction which may include formal structured learning as well as a coaching process.

Various authors have noted the contribution of educational and consultation activities in enhancing the performance of organizations. Blake and Mouton (1983) stated that "Education and consultation are probably two of the most important factors behind the forward movement of society. . . . When these (here and now) problems are resolved, people can make real progress in the way they live and work" (p. iii). Lippitt and Lippitt (1975) clearly delineate the overall goals of the consulting process. They are organizational learning, growth, change, and the solution of problems. When one speaks of organizational learning or growth, it is clear that any organization is defined in terms of its people and their behavior.

The processes employed by consultants to bring about learning and subsequent change are quite diverse. They can be found operating in the roles of technical specialize, teacher, advocate, problem solver, resource provider, fact finder, or any combination. The consultant is most frequently an information or knowledge provider who brings information, techniques, skills and procedures from a formal education background as well as from his or her unique experiential history.

In view of the widely accepted fact that healthy organizations are constantly required to change, there must be some rational, planned method by which that change takes place. That method may be found within specific management systems.

The Research Problem and Purposes of This Study

The purpose of this study was to examine the effectiveness of food service systems in long term health care institutions. It was assumed that a food service management approach predicated on systems theory would significantly affect the system's cost performance.

The first step was to examine the efficacy of a specific management system designed to be used in long term residential care food service departments. The impact of the management system on the food service system was studied in terms of the changes in monthly costs per patient day (tray cost) and the variability of

those costs over the period during which the intervention was used. The extent and direction of these changes was assumed to measure the management system's ability to produce desired results.

The second step compared the performance of a group of facilities which used the systems-based management system with a comparison group which used a wide variety of non-systems-theory-based food management procedures. The study attempted to draw conclusions regarding the relative effectiveness of institutional food management procedures derived from systems theory and educational models, as contrasted with institutional food management procedures which are not specifically derived from those sources.

This research project focused on eleven research questions. The first group of questions pertained to the impact of the institutional food management system on mean tray costs of the 16 long term health care facilities which utilized the intervention of this study. A second group of questions pertained to tray cost performance of the 16 non-intervention long term health care facilities. In the third group, the data for both the intervention group and the non-intervention (comparison) group were compared in terms of variance of tray costs. In the fourth set of questions, the intervention group and the non-intervention (comparison) group were analyzed in terms of time-related changes reflected in the mean tray costs. The fifth set of questions had to do with time

related changes reflected in the variance of the tray costs for both groups.

The research questions are:

1. Can significant differences be demonstrated in pairwise comparisons of the pre-intervention tray cost and the six post-intervention tray costs of the sixteen intervention organizations?

2. Can significant differences be demonstrated in pairwise comparisons of the pre-intervention variance and the six post-intervention variances of the sixteen intervention organizations?

3. Can significant overall variability be demonstrated among all comparisons of tray cost means of the sixteen intervention organizations over the research period?

4. Can significant differences be demonstrated in mean tray costs among the sixteen test facilities assigned to specific consultants over the life of the study?

5. Can significant differences be demonstrated in pairwise comparisons of the pre-intervention mean tray cost and the six post-intervention mean tray costs of the sixteen comparison organizations?

6. Can significant differences be demonstrated in pairwise comparisons of the pre-intervention variance and the six post-intervention variances of the sixteen comparison organizations?

7. Can significant variability be demonstrated among all comparisons of tray cost means from all sixteen comparison

organizations over the life of the study?

8. Can a significant difference be demonstrated between the pre-intervention mean tray cost of the sixteen intervention organizations and the pre-intervention mean tray cost of the sixteen comparison organizations?

9. Can significant differences be demonstrated between the six post-intervention mean tray costs of the sixteen intervention organizations and the six post-intervention mean tray costs of the sixteen comparison organizations?

10. Can significant differences be demonstrated between the sixteen intervention organizations and the sixteen comparison organizations mean tray costs at any of the six post-intervention time levels?

11. Can significant differences be demonstrated between the sixteen intervention organizations and the sixteen comparison organizations variances at any of the seven pre-intervention and post-intervention time levels?

Summary

This research project was an effectiveness study. Specifically, it investigated the efficacy of a food service management consulting system derived from consultation and education. The performance of a group of 16 intervention institutions using a food service management consulting system

derived from consultation and education was analyzed and contrasted with the performance of 16 non-intervention (comparison) institutions. The guiding question for this research project was: Does a food service management system derived from systems theory result in more cost effective operations than more random or unplanned food service management efforts?

The design of this project was based on quasi-experimental field research methodology. A total of 32 long term health care facilities in Illinois, 16 intervention and 16 non-intervention, participated in this study. The dependent variable which was measured throughout the study was per patient day food costs (tray cost), which will be discussed in Chapter III. One pre-intervention measure of tray cost was taken for all 32 facilities three months prior to the initial intervention. Six measures, on a monthly schedule, were taken following the initial intervention. The independent variable (intervention) was the long term health care food service management consulting system developed and utilized by Consulting Nutritionists of Central Illinois, Inc., hereafter referred to as CNCI.

CHAPTER II

REVIEW OF SELECTED LITERATURE

Systems Theory

A review of the extensive literature of systems theory is essential to highlight the major features which were used to design the management system being studied in this dissertation. A complete search of Dissertation Abstracts, just one of many computerized data base sources, revealed a total of 396 Ph.D. dissertations in which systems theory has been used. Significantly there were no citations which dealt with systems theory and the areas of interest of this study, i.e. the consulting process, education as an intervention method in healthcare organizations, long term residential care food service management, and long term health care.

Properties of Systems

Bertalanffy (1968) is generally considered the first to clearly explicate the tenets of General System Theory with its precise and logical theoretical propositions. It rapidly grew to be a substantial influence in a large number of disciplines from biology to physics, sociology, psychology, and others. Bertalanffy apparently defined and worked mainly with open systems to explain general principles which he hoped would act as a

unifying meta-theory for all of science.

As work in systems theory and analysis developed, some authors picked out one element upon which to focus. There were, as a result, a number of sub-specialties developed, e.g. Information Theory, Systems Dynamics, Open Systems Theory, and Game Theory.

It is important to note that when one attempts to analyze a "system" that system is usually conceived from the standpoint of identifying the target as a functional part of a larger entity. The concept of system only makes sense when defined in relationship to both its external environment and its internal elements and relationships.

Events in social systems invariably have the important quality of interaction or connectedness. Frequently this connectedness requires research into not just isolated elements, but rather selected groups of elements and their combined effects. The defining characteristics of a system lie both inside and outside its boundaries, in the elements, environment, interaction, functions, inputs, outputs, and processes of transformation.

Cortez et al. (1974) proposed that because of the unique properties and considerations in systems analysis which revolve around social processes and objects, there is a danger of some specific biases being introduced as one views a system. They stated that the focus is often on the set of elements or objects

which interact. This focus then delineates the interaction in terms of the transformation processes of the system. The authors concluded that one must be aware of the tendency to restrict observations to just those elements in dealing with systems. They push for the extension of systems theory to include an accurate method of predicting the behavior of any given system, social, biological or other. They strive to establish procedures which will allow the determination of behavior (output), or function of a system, if one is given information about its structure.

Cortez et al. (1974) proposed one of many workable definitions of systems theory:

> Systems Theory is the intellectual tool for studying the relation between the structure of a system and its functioning. More precisely, this theory provides a set of rules by which the function of a system can be associated with a known structure and by which the states of the system, as well as its outputs, can be associated with the inputs. The analysis of systems consist of associating a function with a known structure. To analyze a system is to identify the manner of functioning of a system with a known structure. (p. 5)

The concept of structure has been a centrally important focus of systems theory. All theorists in systems theory eventually deal with it. The concept of structure appears to have

these consistent identifying characteristics:

1. It must have some external autonomy.

2. The internal elements must be clearly inter-dependent.

3. It must take the form of a well defined model of observed social interactions.

4. It is a model of something relatively invariant in gross structure and goals.

5. The organization of structural parts is invariant, but the specific parts may vary.

6. There is a very definite ordering of the system elements.

Succinctly Cortez et al. (1974) define the structure ". . . as an ordered set of inter-connected operations performed by the elements of a system" (p. 8). The specific management system which is being evaluated by this dissertation had, as its first goal, the delineation of the elements, operations, and inter-connections necessary for successful operations in the long term health care industry.

Functions of Systems

The concept of function is the next crucial construct to be considered in systems analysis. This construct represents a way of conceptualizing the relationship between system elements and some state of the whole system. It also includes an understanding of the way in which the system uses the elements to effect

transformations of variable inputs into variable outputs. This concept is built upon a super-ordinate set of rules or operations which are in some manner communicated to the elements and which affect their behavior and productivity.

An open system is one in which there is a continual, but perhaps variable, exchange occurring between the system and that which surrounds, or is able to communicate with, it. Also, the open system is one which is dynamic. It changes or produces changes in something else over time. The processes of observing, measuring, accounting for and predicting change over time are critical systems analysis foci. Systems theory shares with science in general the consistent goal of attempting to accurately predict events.

Although the inputs from an environment, the internal states, and the outputs of a given system are all defined as variable, the transformations within the system take place under the direction and dictates of a relatively invariant set of transformation rules. These rules are apparently super-ordinate and have the ability to affect and direct the behavior of systems toward whatever goals have been developed. The management system evaluated in this study was constructed to represent this pivotal, relatively invariant, set of inter-connected transformation rules.

It seems reasonable to assume that the way a system is structured will determine its potential, or actual outputs. Also,

the manner in which a system responds to its own internal requirements and those of the environment are strongly affected, perhaps determined, by the definition of its function. Its history, in terms of inputs, structure, and outputs, allows reasonably good understanding of both the functions and the structure of a given system. The ways in which system elements perform certain invariant acts, and the order in which those acts are performed, represent the major elements of systems analysis.

Negandhi (1975) predicted that studies of organizational effectiveness would be changing. He observed that the thrust of investigations should be ". . . to examine the impact of different structural patterns on behavior and effectiveness" (Negandhi, 1975, p. 117). This study attempted to extend knowledge in that direction. The research in systems theory repeats consistently the concept that when one organizes the parts or elements of a system in a planned and thoughtful way, the output of that system is predictable. Systems theory research also demonstrates that an organization with a clear and specific systems perspective will utilize resources in the most economical manner, and result in a predictable output.

In contemporary business, many corporations either accidentally or from good planning, utilize a systems approach in at least portions of their business. Successful nationwide fast food companies have developed very detailed and specific

procedures and controls over all aspects of production which allow them to produce consistent products in any area of the country. Also, they are able to control costs as well as the quality of the final product.

The use of systems theory to provide the best framework within which to begin upgrading the quality of products and services in a rapidly growing industry, such as long term care, is certainly a rational step. The major value of systems theory is that it reduces the randomness and accidental qualities sometimes associated with planning. It requires a precise set of definitions and understandings of the frequently diverse parts of an organization in order that a rational and productive integration of those parts may take place.

Concepts of Organizational Development

This study incorporates many of the basic concepts and principles of organizational development. Huse (1980) provided the following observation of Organizational Development as:

> . . . a process by which behavioral science principles and practices are used in an ongoing organization in a planned and systematic way to attain such goals as developing greater organizational competence, bringing about organization improvement, improving the quality of work life, and improving organizational effectiveness. The focus

> includes the motivation, utilization, and integration of human resources within the organization. (p. 3)

Organizational development is often discussed in terms of diagnosis and subsequent intervention within a single organization. The organizational population of long term residential care facilities, within which this research was implemented, is experiencing rapid changes in the form of quick turnover of ownership, personnel, patient mix, and in the external environment of long term health care. The environment is dominated by such factors as changing reimbursement procedures, increasingly aggressive regulatory agencies, and an increasingly demanding and often hostile market place. One of the needs of the long term care industry is a set of workable methods for stabilizing operations in a rapidly changing environment. This research was the outgrowth of an attempt to provide that type of stabilizing and cost effective process, utilizing certain principles of behavioral and social sciences.

Health Services Organizations

In view of the fact that the management system under study in this dissertation was designed for a segment of the health care industry, it is important to look at the major characteristics of contemporary health care delivery in the United States.

Rakich, Longest and Darr (1985) note that statistics

regarding the number, size and services provided by hospitals in the United States are quite extensive. However, similar information about long term residential care facilities is very limited. These authors cite a 1977 Federal Government Publication which reports a national census of "18,900 nursing homes with 1,402,000 beds and 1,303,100 residents" (p. 41). They continue with the fact that "of the 452 million patient days of care provided, 69.9% were provided in investor-owned facilities" (p. 41). The growth of the number of long term residential care beds nationwide has continued steadily since the study cited by these authors. One of the major features of this growth is the steadily increasing entrance of investor-owned corporations into the industry.

The structure, intent, and subsequent functioning of any given health services organization is, to a significant extent, strongly influenced by its ownership. The nature of the two broad groups, for-profit organizations and not-for-profit groups, tends to dictate structure and procedures. The for-profit organization focuses on financial performance, with delivery of health care services being instrumental to making a profit. The primary goal of not-for-profit groups tends to be their interest in the "mission" of the organization, or the provision of services with monetary considerations secondarily important in upgrading quality or reducing costs.

Perhaps the definitive recent work in the management of health services organizations employing a systems perspective is Rakich, Longest and Darr (1985). The authors define management as ". . . a process composed of inter-related social/technical functions and activities (including roles), occurring within a formal organizational setting for the purpose of accomplishing work activity and pre-determined objectives through utilization of human and other resources" (Rakich, Longest & Darr, p. 13). They continue by detailing the "input-conversion-output perspective" (Rakich, Longest, & Darr, p. 13) as a model of management which outlines the procedures by which various inputs of resources are converted by pre-determined activities into specified outputs of a sub-system.

Rakich, Longest, and Darr (1985) clearly support the development of systems theory in health services organization. They note, "Viewing organizations as systems provides a frame of reference or a viewpoint and permits the manager to see the organization as a whole with interdependent parts, a system composed of subsystems" (Rakich, Longest, & Darr, p. 160). These systems, however, are special according to these authors in that they are ". . . contrived systems, designed, built and operated by human beings . . . Human imperfections can cause a system to come apart" (p. 160). They continue with the view that "The systems concept emphasizes the dynamic nature of an organization

and prevents the manager from viewing the job as one of the managing static, isolated elements of the organization" (p. 160).

In other research, Johnson, Kast, and Rosensweig (1964) have taken Bertallanfy's concept of system and applied it aptly to the business environment. They note that there are six important subsystems in any organization. First some type of sensor or feedback subsystem is needed which measures and records change. In the long term residential care food service systems under consideration, the food service supervisor, the administrator and the accountant jointly fulfill this role. Second there must be an information processing subsystem. This, too, is a joint function of the food service supervisor and the administrator with direction and suggestions of the consultant. Third there must be a decision making system. Again, the food service supervisor and administrator are charged with these functions with the input from the consultant an important resource. Fourth a processing subsystem is needed which is responsible for accomplishing certain defined work tasks. The food production workers including cooks, assistants, and others in the food service department fulfill this role. Fifth the control component insures that the production activities are generating planned outputs. The food service supervisor, the consultant, and occasionally the administrator are the responsible persons in this subsystem role. Finally, there must be some ability to acquire, store and analyze

information in various forms. These functions are shared by the food service supervisor, the accounting department and the administrator.

A similar view of systems with reference to business organizations was provided by Rice (1969). He observed that a system is a complex of activities needed to complete the process of transforming some input into a predictable, intended output. Further, he noted that a system is distinguished from a mere aggregate of activities by the existence of regulations, policies, order, and transformation rules. A system is, in fact, a structured means to an end.

Additionally, Rakich, Longest, and Darr (1985) discuss a major set of management functions which distinguish between cost containment and productivity improvement. Basically, cost containment is the effort on the part of management to reduce the amount of monetary resources flowing into a system or being committed to a sub-system. Productivity improvement is a set of functions aimed at gaining the highest levels of output from a system for a specified or controlled amount of resource input.

To accomplish this maximization of production, they suggest such strategies as efforts toward "manpower productivity, and improvements in work process and methods, job design, facilities layout, scheduling and material flows" (p. 267). More significant for this study, they note, "Productivity at its simplest is the

ratio of outputs to inputs" (p. 268). This ratio is the one which is developed in this dissertation to assess the productivity improvement which came about as a function of the influence of the management system intervention. Improvement in productivity is evident when the outputs increase in number or improve in quality but inputs are reduced, remain relatively stable or increase only very little.

Although these authors continue their discussion with a look at the forces which they feel are stimulating the emphasis on productivity improvement, the most important consideration from a functional standpoint is the maxim which they cite: "Behavior (of health services organizations) is largely influenced by the financial implications of a given action" (p. 268). Nowhere is that more true than in the long term health care field. The impetus toward productivity management is ultimately to make more money. The way in which this is brought about varies widely in the health care field, from influencing third party payors to increasing a marketing effort aimed at maintaining high bed capacity, preferably with private pay patients.

Issues in Long Term Residential Care

In a meeting of the U.S. Senate Special Committee on Aging (U.S. Senate Committee on Aging, 1984), New Jersey Senator William Bradley presented some of the more visible problems currently

facing the nation with reference to long-term care. He observed that by the year 2000 there will be a 50 percent increase in the number of persons suffering from chronic diseases which will limit their independence and make them additional consumers of long-term care services. He went on to cite the conditions found in nursing homes and the cost factors which are continually increasing. He then gave a statement outlining his views of the position of the Federal Government and its responsibility in meeting the needs of the long-term care patient. There is little doubt that a crisis point in health care in general and in long-term care specifically is looming ever nearer with few innovative answers being provided by those currently in leadership positions.

Vogel and Palmer (1981) have set the stage for a substantial amount of long term residential care research by explicating public goals focusing on the availability of care, the quality and manner of delivery of care, and the critical issue of cost effectiveness. In their introduction, they relate long term care to mental health services, social services, other health care, nursing care and medical care. All these services can be provided in a wide range of settings, from retirement villages or apartments, home health care, and complete residential care provided by governmental agencies, not-for-profit groups or proprietary agencies. The deciding factors revolve around the degree of independence which the recipient is able to maintain, the level of

medical or personal care needed, and cost factors. One taxonomy developed by Grimaldi and Sullivan (Vogel & Palmer, 1981) differentiates potential recipients by assessing the degree of dependence upon others for various activities or resources.

Palmer (Vogel & Palmer, 1981) contends that although there is a wide range of elements identified as long term care service components, there is no "systems" approach to those services. In other words, the industry is seen by Palmer as being extremely fragmented, with little coherent organization. There are few linkages among and between elements, only partial or non-existent communications channels, and high degrees of competition among service providers. Further, open adversarial relationships between providers of long term residential care and regulatory agencies result in confusion over how to define the output of such a system.

Horen (Vogel & Palmer, 1981), noting the rapid increase in size and complexity of health care and the trend toward greater organization, observed that the outputs are hard to operationalize, and that it is frequently necessary to compare different kinds of outputs. This study attempted to provide a specific operationalized output measure at an individual facility level.

The system of health care exists at both a macro and a micro level. However, the system elements are poorly constructed, loosely organized and fragmented in their individual and group

functions. Also, Kurowski and Shaughnessy (Vogel & Palmer, 1981) noted that in long term residential care systems well defined procedures represent components of the system's transformation elements. McNally (1983) extended this position on long-term care noting that the long-term care system really is a very loose conglomeration of many services, i.e. social, supportive and medical, with no structure or coordination.

Further research recently supported by the United States Department of Health and Human Services and conducted by Mareasa and Goldman (1984) led to the same conclusion. They could detect no consistent system of long term care but commented on the fragmented variety of different approaches being taken in each state.

One of the few researchers who has taken a systems approach to the problems of this field is James Callahan (1979). In this discussion paper, he provided an overview of the inputs and outputs of the system. Listed as an input was the long term residential care-dependent person with various salient characteristics noted. He listed the desired outputs of the system of long term care as the prevention of medical and social problems, the development of maximum independence, a stable level of humane care, and an increase in longevity.

Callahan, Brody, and Palmer are three researchers who have taken initial steps toward applying systems theory to long term

residential care. Their efforts have been aimed toward the development of national and state policy. There has been relatively little work specifically utilizing the concepts and principles of systems theory for systems development in the individual long term residential care facility.

One reason for the lack of detailed research is the explosive growth the industry has experienced in the past 10 to 15 years and the nearly chaotic changes which have taken place. Three primary forces are producing turbulence in long term residential care. The first force is the startling increase in the percentage of older persons requiring these services. The Metropolitan Life Insurance Company (1984) reports statistical information which is virtually mirrored in other sources. They observe that through the year 2050 this nation will increase its population from the 1980 level of 227.7 million to approximately 309 million. During the same period, the percentage of persons over 65 years of age will increase from the current 11 percent to 22 percent (Metropolitan Life Insurance Co., 1984). This increase in elderly persons, in both percentage and absolute terms, will result in an increase in the already substantial demand for medical and long term care services. The second force is the group of patients who had resided in state institutions which have been closed during the past 10 to 15 years. They make up a substantial, but poorly identified, portion of the consumers of long term residential care.

The third force is the profit potential which has increased and prompted the entrance of large corporate entities into a system which had previously been dominated by small groups or individually-owned facilities.

There is an ever-increasing competition for long term residential care facilities by business people. With the supply of long term residential care beds artificially controlled by government regulations, such as Certificates of Need Legislation, and with demand continuing to increase, the prices paid for existing facilities are increasing. These inflated cost factors are then passed on to the consumer. In view of the fact that the Federal Government, through Social Security Medicaid and Medicare funds, is the country's largest purchaser of long term residential care, there is continuing pressure for increased reimbursements, stronger demand for tax dollars and higher prices to those paying privately for such care. Further, Vogel (Vogel & Palmer, 1981) has noted that the long term residential care industry is unique in two ways: (1) the very limited capacity for informed choice by the consumer and (2) the role of the Federal Government as, first, the major purchaser of services and, second, as the major regulator of the industry. This dichotomy has evolved into a social problem.

Several writers have utilized a systems approach in their research. Palmer (Vogel & Palmer, 1981) defined the initial uses

of a systems orientation to the problems in long term care. They were: (1) some goal definitions, (2) measurement standards to assess goal attainment, and (3) a clear systems design of the elements of this health care segment. These basic parameters have not been used widely within long term care research. However, Vogel and Palmer (1981) presented a now prominent model of the long term residential care facility constructed on an economic framework. They report in terms of the long term residential care facility being a profit-oriented economic system which attempts to produce a given set of services for definable groups of clients. They report that 70% of the long term residential care facilities in this country are for-profit organizations. Further, they assume that in these facilities, the major goal is to maximize the wealth of the owner(s), with the provision of services being instrumental to that goal. This article reports on the functioning of for-profit and not-for-profit facilities, interjecting the issues of private pay and Medicaid-reimbursed beds. They discuss the potential power of the federal government to manipulate revenues for facilities in an attempt to control both cost and quality.

The question then arises concerning what is the prime output of a long term residential care system: profits, services, people, or something else. In much of the literature and day-to-day activities in the field, an implication that we face is an either/or

situation. The research presented in this dissertation assumes that there are many possible outputs of any system, including health care systems. Some of those outputs are clearly intended and some of them are not.

Not-for-profit facilities seek to make "profits," too, although they may be given different names. However, the not-for-profit organization is less bound to the primary task of generating excess income due to the availability of external funding from a variety of sources. Profits are still made which are obviously important to all facilities, but that importance is somewhat hidden. The goals of organizational growth and continuation can only be accomplished with sufficient levels of income. The often stated goal of a not-for-profit health care facility is to "provide quality care." The administrators clearly realize that quality care costs substantial amounts of money.

Food Service Systems in Long Term Residential Care

The literature regarding the operation of food service systems in long term residential care facilities reveals very little research (Matthews, 1983; Matthews, 1983; Sempos & Matthews, 1982; McCool & Posner, 1982; Yung & Johnson, 1981; Yung & Johnson, 1980; Spear et al., 1979) where researchers specifically studied the operation of long term residential care food service systems. None utilized systems theory. None studied the variables

under consideration in this study. There were no studies conducted specifically with a population of defined long term residential care facilities in Illinois. None constructed a specific change intervention in the food service system, and none utilized the design of this study. These studies looked at the role of the consultant dietitian in the long term residential care facility, issues of clinical nutrition and a variety of production and design issues.

For example, Spears et al. (1979) concluded that after gathering data from administrators regarding opinions of their consultant dietitian's role, they did not feel the consultant dietitian had much impact on a variety of operational areas. They suggested additional research which could include "specific measures of the effectiveness of the consultant dietitian as a change agent" (p. 448).

In other research, Yung et al. (1980) developed one of the few studies concerned with the productivity of food service systems in long term care facilities. They specifically looked at labor time within these systems and at labor minutes per meal. Their conclusion was that "Ranges in labor minutes per meal equivalent obtained for the ten similar homes could serve as guides for comparing quantitative productivity in nursing homes with similar characteristics" (p. 164). However, labor minutes per meal is just one of the resource inputs which should be analyzed

to determine productivity in the system.

In a companion article Yung et al. (1981) attempted to enumerate variables which were important in the productivity of long term care food service systems. Although sixteen variables were defined and measured in this study, they, for the most part, related to issues revolving around labor costs. For instance, purchased food was evaluated by a measure of how much labor was required to prepare a given item for final consumption. The studies by Yung et al. (1981, 1980) suffered from a consistent weakness in that the attempt was made to discuss too many complex assessment procedures which did not add to the efficient acquisition of data but rather unduly complicated matters. These studies mixed measurements extensively.

Much of the available research into food service operations uses the term "system." However, the term "system" is typically used in its most generic form to refer to generalized concepts of organized, sustained effort toward given goals, usually in a production environment. Researchers seem to use this term as a substitute for discussions of technology, work flow, and related issues.

In reviewing this research one finds discussion regarding the selection of a food service system. A variety of models are presented for which strengths and weaknesses are developed. The models are based primarily on the problems of production control

and appear to have been developed within a basically linear format. There is no discussion of feedback, circularity of process, interrelatedness of elements, transformation processes and other concepts from systems theory.

Summary

The research which appeared relevant to this study contained substantial concern regarding the problems associated with the increase in the percentage of our population which will be dependent upon long term residential care in coming decades. Projections indicated an increase in the percentage of the population over age 65 and an increase in persons suffering from debilitating illness and other socio-economic problems which will require more long term residential care services. Concepts and procedures developed by those persons working within the frameworks of Organizational Development and Open Systems Theory, however, presented viable methods for organizing and developing the facilities and services which will be necessary to meet these growing needs.

Further, little scientific research was found which covered operational issues designed to understand and subsequently improve the daily functioning of long term residential care facilities. Also, there was a similar lack of studies which attempted to specify the activities of consultants in the long term care

setting. This point is particularly important in view of the legally required nature of these services and the associated cost.

After consideration of the literature reviewed, this researcher concluded that there appeared to be knowledge and techniques available from a diverse group of academic disciplines which would support a study which was designed to test the functioning of long term residential care sub-systems. Such a study appeared potentially valuable in light of current and projected demands on long term residential care services.

CHAPTER III

METHODOLOGY

Design

The design of this study was based on well developed field research methods discussed by a wide range of writers (Allerhand, 1971; Suchman, 1971; Campbell, 1957, 1963). Suchman (O'Toole, 1971) stated that such studies must include an assessment of the intervention and its ability to change some causal process in an organizational setting. Rutman (1977) set forth the pre-conditions for an effective study of this type. He proposes the following:

1. The program being studied must be very clearly defined.
2. The program's goals or effects must be clearly specified.
3. The causal assumptions which link the program's activities to the goals or effects must be specified and logically acceptable.
4. The above pre-conditions apply to both experimental and quasi-experimental designs.

For the purposes of this study, an ex post facto data collection design was chosen. This is a quasi-experimental, non-intrusive procedure which is described in Campbell and Stanley (1963) as the best of the feasible quasi-experimental designs particularly suited to the measurement of a change after it has occurred. They went on to note that the design is particularly appropriate for organizational settings which have data available

in regularly collected, on-going quantitative records.

The organizations in this study collected a wealth of data over a substantial span of time during the course of ordinary business activities. As a result, these data had high levels of accuracy and reliability due to the usual demands of business operations, i.e. financial reports to stockholders, taxing bodies, and regulatory agencies. This retrospective format allows a researcher to compensate for the assumed imprecision associated with data recording done by others in the past against the biases normally cited when the combined role of the participant observer involves the collection of data regarding the operation of a host organization. At the time all data were compiled, there was no indication that any of it would be used for research purposes and it was, therefore, collected in a "normal" manner, i.e. relatively unbiased, or with biases at least consistent and continuous.

From a design standpoint this procedure has as its strengths the multiple measures which were taken from each organization. The multiple measures were compared with the pre-treatment measure for each intervention organization. In addition comparable data were gathered and analyzed from the non-intervention (comparison) organizations. Each intervention organization acted as its own control and the non-intervention (comparison) facilities provided additional data. Reviewing the repeated measures research design which was used in this dissertation research, Neter, Wasserman and

Kutner (1985) noted the principal advantage of the design is "that all sources of variability between subjects are excluded from the experimental errors; only variation within subjects enters the experimental errors. Thus, one may view the subjects as serving as their own controls" (p. 949).

Suchman (Miller, 1977) pointed out that there is no way of developing a single, absolutely correct, experimental design. A research design is to be viewed not as iron clad rules to be followed blindly, but rather procedures, approaches and principles to assist the scientiest in maintaining proper direction in his or her efforts and to control and reduce error as much as is realistically possible.

Subjects

The sixteen long term residential care facilities which were the intervention organizations were selected from the active client list of Consulting Nutritionists of Central Illinois, Inc., a long term health care consulting firm. The sixteen intervention organizations were essentially self-selected and were all active clients of the consulting firm prior to the beginning of this study. All active client organizations were contacted on a random basis and were offered the opportunity to participate in this study. Sixteen out of approximately eighty Illinois clients agreed to participate.

The sixteen long term residential care facilities which made up the non-intervention (comparison) group were selected as follows: Illinois long term care facilities, excluding the active CNCI clients, were randomly contacted by telephone and asked to participate in this study. Of the remaining for-profit long term care facilities in Illinois 253 institutions were contacted until 16 agreed to participate in this study.

The 32 for-profit long term residential care organizations which participated in this study represented 7% of the total 449 for-profit long term care residential facilities in the state of Illinois at the beginning of this study. All 32 organizations in the two groups were selected on the basis of specific criteria to assure reasonable similarity among them with reference to important characteristics. There were no incentives offered to any organization for their participation in this study. All of the participating organizations maintained adherence to the following selection criteria throughout the duration of the study.

1. All facilities were legally organized as for-profit corporations.

2. All facilities were licensed by the State of Illinois and followed appropriate state laws and regulations.

3. All facilities were licensed for either intermediate or skilled care only.

4. All facilities used a standard "Cook/Serve" food

production format.

5. All facilities used only paid labor in the food service operation and purchased all raw food and associated materials.

6. All facilities conformed to standard, generally accepted business, accounting and tax procedures.

7. All menus were prepared and served within the facility.

8. All facilities maintained standard menus with no self-selection features.

9. Ownership of each facility did not change during the life of this study.

All organizations were functionally separated from one another in the field environment. There was no substantive communication among any of the facilities being used in this study. Cook et al. (Rutman, 1977, p. 124) consider this issue of isolation of subjects in the experiment to be of considerable importance for the development of a strong design. The non-intervention organizations were not exposed to any component of the management system at any time prior to or during the study. The size of each facility in terms of bed capacity was not controlled in this study. The main reason is that the dependent variable tray cost, which will be discussed later, was developed in such a way that licensed bed capacity did not affect its value. However, all 32 organizations were licensed for 90 to 110 beds.

A major consideration in selecting any facility for inclusion

in the study was the type of food production format used in their food service system. McCool and Posner (1982) reviewed four basic food production formats. All facilities which participated in this study used the "Cook/Serve Foodservice System" (McCool & Posner, 1982, p. 8). In this format raw food products are processed and served in the same day, or at least within a very short time span for certain select food items. These materials are supplemented by pre-packaged materials such as bread or milk. This format is used in the vast majority of long term residential care facilities in Illinois and is used in all intervention and non-intervention organizations selected for this study.

Food service management and clinical dietetic consulting services are mandated for long term health care facilities in Illinois by both Federal and State regulatory agencies. The minimum number of hours that a consultant spends in a long term care facility is determined by the State of Illinois Department of Public Health which governs the operation of these facilities. The minimum amount of consulting time in each of the 32 participating organizations was eight hours per month. The consultation provided by the CNCI staff to the intervention facilities was derived from systems theory as reflected in the design and implementation of the policies and procedures of that system described in the next section. In contrast, the non-intervention (comparison) group received a variety of different

types of consulting services from a variety of individual food service consultants.

Variables

Five sets of variables, as identified by Ruf (1975), which were thought to be centrally important to productivity in hospital food service systems are: (1) human resources, (2) administrative policy decisions, (3) materials management issues, (4) available facilities, and (5) on-going operational decisions. For the long term residential care setting, additional variables are critical and were taken into account in the design of the independent variable. Some of the most important are the requirements of (1) various state and federal regulatory agencies, (2) the needs, both clinical and non-clinical, of the long term residential care patient and his or her collaterals, (3) the influence of advocacy groups, and (4) the general small size of long term residential care facilities which present unique purchasing, organizational and staffing problems.

The derivation of the components of the CNCI Management System being studied in this research reflects these requirements. The first component, that of the on-site services of a consultant dietitian/food service management expert, was in response to the requirements of the State of Illinois Department of Public Health which mandates that these services be secured. The next three

components were derived from an analysis of the needs of long term residential care facilities from the standpoint of clinical dietetics, management procedures, and educational/training needs. The independent variable in this study has four components which are interrelated and which are presented below:

1. The regional consultant. The independent variable was constructed in such a way that the individual regional consultant is considered the first element of the system.

2. A Consultant's Policy and Procedure Manual for use by the consulting firm's regional consultant.

3. A Facility's Policy and Procedure Manual for use by the administrator and/or food service supervisor in each client organization.

4. A Menu System specifically designed for long term residential care facilities and designed to be used by the food service supervisor and appropriate dietary personnel, with direction from the regional consultant.

Major Features of Component One:

The Regional Consultant

The food service/clinical dietetic consultant is generally viewed as an educator, clinician and manager. In her educational role, the dietitian conducts on-going staff development programs and direct, on-site training for both dietary and nursing personnel. She also trains food service supervisors in management skills and provides individual education and consultation services to administrators or owners of health care systems relative to the delivery of quality nutrition services.

In this study, the eight regional consultants who provided the initial and ongoing implementation, training, clinical consultation, and management consultation to the intervention groups were Registered Dietitians with M.S. degrees in either Food Service Management or Clinical Dietetics. Their average years of experience as consultants was 3.5 at the beginning of this study. Their overall professional experience in other

clinical and/or food service settings was 7.2 years. The same consultant was assigned to each intervention facility throughout the research project.

Each of the eight consultants for the intervention organizations was provided with one month in-service training in the implementation and monitoring of the management system. After the initial training, all consultants were provided with continuous in-service training in consultation and with a variety of materials relevant to the operation of long term residential care food service systems.

The consultants who provided services to the non-intervention organizations, by state regulation, were also registered dietitians. However, none of the consultants in this group was, at any time, exposed to any of the CNCI management system procedures or information. They, it is assumed, provided consultation service based on their own individual understanding of the needs of the facility. Casual observation of these services indicates a very wide range of skill levels and quality of services offered to the 16 non-intervention organizations. There was no substantial information available regarding the activities and procedures followed by the consultants who provided services to the comparison group of facilities. The assumption used in this study is that a range of activities and procedures were used reflecting actions and results common to a non-systems

approach.

Major Features of Component Two:

The Consultant's Policy and Procedure Manual

The scope and general content of the Consultant's Policy and Procedure Manual is reflected in its Table of Contents which can be found in Appendix B. This 207 page manual develops a policy and procedure for the listed areas of concern for the consultant. It provides well structured guidelines and procedures for the consultant which can be used within certain limits in each facility. The education component is considered to be the core of the consultants' activities and responsibilities. Fully 60% of this manual is comprised of educational materials in the form of completely developed in-service training programs. The remaining 40% of this document is a group of structured policies and procedures and various management tools. They were developed to assist the consultant in providing on-site services to the administrator and food service supervisor and to complement the policies and procedures developed in the facility manual. Further, in-service training for all long term residential care food service employees is required by rules and regulations of the State of Illinois Department of Public Health. However, neither a minimum amount of training nor the topics to be covered are stipulated. This is one area where the consultant's judgment is allowed. The

consultant, in consultation with the Food Service Supervisor and the Administrator, determines the needs of the organization and employees with subsequent scheduling of in-service sessions. In the event a facility is experiencing specific problems, a series of intensive training sessions is scheduled for the staff to deal with those identified needs.

In addition to the formalized training represented in the in-service programs, one of the major functions of the consultant is to be available during her consulting visits for on-site individualized training. This educational effort frequently takes the form of a "coaching" relationship with the employees in a "hands-on" situation. It represents an intensive educational effort combining the best components of a traditional didactic methodology and an apprentice-like reality-based set of on-the-job activities.

From the perspective of systems development and management, the researcher assumed that the educational component built into the management system was critical for bringing about lasting and positive organizational changes. Thus, the educational role of the food service management consultant was emphasized throughout the consultation process employed with the 16 intervention facilities. Changes can best take place when the competence of each staff member is maximized. Ultimately, the performance of the entire system reflects this increasing competence. By

providing frequent educational/training opportunities for all food service staff members, the intervention sought to maximize the impact of the educational component of the systems-derived food service management system. The educational component of the intervention was based on the assumption that consistent education could result in demonstrable positive results as reflected in the dependent variable, viz., tray cost.

The development of this educational component of the management system grew out of five principles outlined by Ott (1982):

1. The correct learning objective at the appropriate level must be selected.

2. The instructor must continue to teach toward a very specific learning objective.

3. The focus of the learner must be on the learning process as well as on the content of the learning.

4. The skills acquired in the learning process must be directly transferable to the work setting.

5. The instructor must periodically monitor the learning needs of the staff and adjust instruction and materials in light of those learning needs.

Stokes (1984) notes that labor costs represent 50-60% of the total outlay for food service operations in long term care facilities. She asserts that effective education provided on-site

can lay the foundation for increasing employee productivity. This study is an attempt to test that assertion.

Attempts to intervene in organizational performance must change some type of behavior to be successful. Rakich, Longest, and Darr (1985) noted that change is best accomplished by positive means. One of the most positive methods of accomplishing that goal is through education. Specifically, they focus on the clear importance that a continuing education component plays in organizational development and the subsequent high level of performance of a given system. They continue:

> While it may not appear on the surface to be an organizational development technique, one key to managing change in HSOs (Health Service Organizations) is to have a work force that is well-informed on the latest developments in their various fields. Such employees are more likely to be helpful in each step of the process than less well-informed counterparts. (p. 391)

This study measured one impact of a management system which has as a major component the positive educational influences referred to here.

Educational materials, communications tools, and the State's rules and regulations are included in the Consultant's Policy and Procedure Manual for rapid access when the consultant is in the field facing a specific situation or organizational need. In

those rare instances when something occurred which is not covered in the manual, the consultant was free to contact the consulting company for further information, clarification or support.

A format was developed for this manual which contained a statement regarding the rationale for the policy, the policy itself, and the procedure to follow to actualize the policy. Each policy is further integrated with the State of Illinois Department of Public Health Rules and Regulations regarding the operation of long term care facilities, the most up-to-date information and practices in institutional food service management, and the most advanced concepts and practices regarding individual clinical services to residents in long term care. This procedure and resource manual is to be used only by the regional consultant and contains memos and updated material from the central office of Consulting Nutritionists of Central Illinois, Inc. which are directly relevant to the provision of services.

Procedures, also, were developed for the consultant to use in monitoring both the clinical condition and needs of the long term residential care patient and to survey periodically the patients and their collaterals to gain their responses to the output of the food service system from their unique and critically important perspectives. The ultimate purpose for the system is to serve the consumer in such a way that health, well-being, and best interests are maintained, while enhancing and supporting the legitimate goals

of each organization.

Major Features of Component Three:
The Facility Policy and Procedure Manual

The 151-page Facility Policy and Procedure Manual was written specifically to be used by the long term care administrator and/or food service supervisor and is outlined in Appendix C. The first two sections of this document will be considered together because procedures are a direct extension of policy formulation. Rakich, Longest, and Darr (1985) discuss policies and procedures in health services organizations from the standpoint that policies "represent officially expressed guidelines for behavior, decision-making, and thinking within the organization" (p. 220). Procedures represent formalized guides to action, usually defined for fairly specific purposes or situations. They continue by suggesting that good policy has certain consistent features. A good policy must be well thought out, consistent with overall organizational goals, reasonably flexible, communicated in an appropriate form, and consistent with other policies.

Health services organizations generally, and long term residential care facilities particularly, exist in a very tumultuous environment with rapid internal and external changes occurring with great frequency. To most effectively allocate resources and manage the human resource element of a system, clear

and appropriate policies and procedures are mandatory. This portion of the management system is written from the standpoint of, and for use by, the person or persons who will be charged with carrying out policies and procedures on a daily operational basis. It is not written from the standpoint of the consultant who has the responsibility of monitoring and recommending alterations in the activities on a once or twice a month basis.

The second critical group of variables to be considered in this phase of development was the issue of purposeful communication loops, through which each organization could develop internal self controlling mechanisms and begin using the accumulating knowledge and skills of the staff. Rakich, Longest, and Darr (1985) note that when information is considered as an input for a system and is combined with other resources, more predictable outputs are possible. The process of feedback loops is one in which information is sent back to the process section of a system which allows self-regulation toward pre-determined output goals. However, one of the most important concepts which refers to feedback is the idea from Rakich, Longest, and Darr (1985) of the "feedforward" (p. 304) information loop. This type of information loop represents information which is presented to the system which may allow it to anticipate deviation, problems, or possible courses of action. It should be pro-active when possible, instead of just reactive and after-the-fact. The management

system tested in this study is designed to provide a set of procedures and printed materials which could be combined with training in order to establish this level of control mechanism within each organization. If each element of a system functions at high levels, the probability increases that the system as a whole will reach an optimal level of functioning. The functioning of each level is enhanced by adequate communications, information flow and feedback channels.

Management and communication tools designed to install new or augment existing methods in the facility were included to provide purposeful redundancy for consistent, smooth, and appropriate communications among all parties. The consultant interfaces with the administrator, director of nursing, food service supervisor and various food service personnel during consultations. Direct verbal communication and meetings are essential. However, there are mechanisms for written communications as well in this document.

There is no reference to educational materials in the facility policy and procedure manual. Although the food service supervisor or the administrator may provide training, coaching and other educational materials to the staff, the majority of training as established by this management system is the responsibility of the consultant. Information regarding similar materials may or may not have been available to the non-intervention organizations. If

so, it is not available for inclusion in this study. As noted earlier, the reason for this is that information about individuals, materials, and activities in food service operations is not maintained consistently by most long term care facilities.

Major Features of Component Four:

The Integrated Menu System

The integrated menu system includes four major components:

1. Menus
    A. General Menus
    B. Modified Menus
    C. Sack Lunch Menus
2. Recipes coordinated with menus
3. Production guide
4. Purchase order-inventory control guide

Probably the most technically complex and demanding document, the Integrated Menu System for Institutional Food Service was designed specifically to provide quality control over the final product in the following areas: High nutritional standards, ease of operation in the production phase, cost control, inventory control, and responsiveness to the widely varying special dietary needs of the long term health care client. The Integrated Menu System provides the food service supervisor with:

1. A 28-day cycle of menus for all three meals and an

evening snack.

2. A complete set of recipes required to produce every cycle. The recipes have been scaled for production purposes.

3. Information regarding a wide variety of clinically required diets.

4. Production charts with a feedback mechanism for the food service supervisor to monitor quantities for production.

5. Ordering guide designed as a control mechanism which directs the re-ordering of a given commodity consistent with amounts used in any given facility.

Discussion of the Interaction of the Management System Components

Ultimately, the goal of the entire management system is to provide the highest quality nutrition to the client in long term care at the most cost effective level possible for the facility. The education, communication and interactions network within the management consulting system which is required to accomplish this task is extensive and complex and must be both sensitive and responsive to numerous, simultaneous dynamics. Frequent reports, telephone conferences, in-person interviews with corporate staff, and periodic on-site consulting visits are some of the major system components.

The management system was designed to accomplish the task of

controlling the internal transformation processes discussed earlier. The primary mechanism by which the management system accomplishes this task is through the extensive educational activities provided to all levels of personnel within the organization. The CNCI Management System stresses a well defined set of procedures which gives coherence and control to the processing of inputs into the food service sub-system. These processes are methods for controlling outputs and final services to the facility and patient by interacting with system elements in specified ways. The system remains constant over time, but has built into it the mechanisms with which personnel may deal with unique or emergency situations as well as allowing the immediate adjustment of operations by providing for a number of feedback loops. The elements of the food service sub-system have been clearly identified and accounted for, as have the major procedural activities which constitute the production process.

It is clear that any system may have intended and unintended outputs. One goal for any system, then, is to maximize the intended outputs and minimize the unintended ones. Some unintended outputs in a long term care setting may be, for example, citations by the Illinois Department of Public Health. Citations are responses from a regulatory agency to undesirable outputs of the system. Examples of undesirable outputs might be inappropriate or dangerous food or cases of illness among the patient population

attributable to the food service operations.

There is significant amount of educational material in the consultant's policy and procedure manual. Formal educational classes and other in-service training are provided to increase information and functional performance levels by target audiences with reference to specific skills. There is little doubt that the management system being studied in this research project is complex.

Dependent Variable

Monthly Per Patient Day Meal Cost

The monthly per patient day meal cost (tray cost) was chosen as the dependent variable in an attempt to focus sharply on just one aggregate set of inputs in relationship to one output of the system. A major intent of this design is to avoid the weaknesses of the few other relevant studies which included a large number of dependent variables. In economic terms, the dependent variable of per patient day meal cost, or tray cost, is a ratio of system inputs, in terms of certain dollar costs, to output, expressed in terms of the number of people for whom the system provided products and services in a given time period. The tray cost variable was chosen because it is one of the main standards used by the long term residential care industry to assess performance of a facility.

Tray cost was derived from two aggregated data sources. First, specific variable resource inputs of any given food service system for any time period (e.g. raw food costs, labor costs, supply costs, expressed in dollars) were computed. Next, the number of patient days census (output demand) for a given facility in a given time period was used as the standard output variable. For example if a 100-bed facility had a population of 90 residents on a given day, that represented 90 patient days which were then totaled over a week, month, quarter, or year as needed. All total monthly costs were divided by that month's total patient days. The resulting variable standardized the measure across subjects in a form which allowed statistical manipulation.

There are other formats for computing costs (Kirschner & Associates, 1981). However, they are cumbersome, frequently call for expenditures not made (e.g. transportation costs) and are not used as a standard in the industry itself. Tray cost, as defined in this study, is used over all facilities participating in this study, as well as the majority of those in the state of Illinois with which the researcher is familiar.

There are other dependent variables which may be validly measured in any given study, e.g. quality, labor minutes, sanitation, Department of Public Health Citations, etc. However, one of the main problems with much of the research being generated in social and behavioral sciences is the tendency to

attempt to measure, analyze, and evaluate far too much in one study with limited samples. Additionally, many of the variables defined in research have little direct relationship to the functional situations which are under investigation.

The costs measured in this study account for all variable resource inputs into the food service operation. Fixed costs, such as allocation of fixed assets, and depreciation, are not included. As mentioned earlier, the tray cost variable does not require that the size of each facility be the same to make valid comparisons of costs. The computation of the patient day census used in this ratio allows figures from one facility to be validly compared with others with reference to direct costs related to food service operations.

Intervention

In this study there was one intervention condition in the form of the installation of all components of the CNCI Management System. Tray cost was measured once three months prior to the intervention as a base-line measure. After the CNCI Management System was put into operation, tray cost figures were gathered six times, at monthly intervals, from each of the organizations. The management system was in place and operating over all six months of this test period in all 16 intervention facilities. The installation of the treatment condition occurred at various dates during the regular

business activities of CNCI. The period of time covered by this study was a total of 22 months from September of 1983 to June of 1985.

The 16 non-intervention facilities provided the same tray cost data, for the same time periods provided by the intervention facilities, but were not exposed to any aspect of the CNCI Management System. Due to the lack of adequate record keeping and the high turnover of personnel in the non-intervention (comparison) group, information regarding the form and content of consulting services provided to these facilities was not available.

The individual components of the independent variable were not studied separately in this research project, but were implemented and considered as a total system in their effects. It was not possible, in this study, to hold various combinations of components constant and vary others systematically due to the ex post facto nature of the investigation.

Data Collection Procedure

In this study data were collected from sixteen long term residential care intervention organizations on an ex post facto basis. Comparison data were collected from 16 non-intervention organizations. The data collection from each of the 32 organizations was conducted in the same way. Figures required by the researcher were collected by the long term residential care

facilities during their normal business operations. Business, accounting and tax records of the facilities were developed in accordance with generally accepted accounting principles. These figures were then made available to the researcher on request. The researcher then selected and recorded data for the proper time periods.

The beginning date of data collection varied for the intervention organizations. The data collection for each of the non-intervention organizations was then matched with each intervention facility. In that way, for example, the data for intervention facility one and non-intervention facility one were collected over the same time period. Figure 2 presents a listing of data collection periods for each intervention and non-intervention organization.

Data from each of the organizations were collected by the researcher for the following variables: (1) Monthly Raw Food Cost, (2) Monthly Total Labor Cost, (3) Monthly Supply Costs, (4) Monthly Patient Days Census. For each intervention organization, a sample measure of the dependent variable, tray cost, was taken at a point 90 days prior to the introduction of the treatment condition. Measures of the tray cost were then taken at 30-day intervals after the treatment condition was instituted, for a total of six months. Thirty-day intervals were chosen because they are the normally occurring intervals of

	Baseline	Intervention
	Month	Months
Intervention #1-5	9/83	12/83, 1/84, 2/84, 3/84, 4/84, 5/84
Non-Intervention #1-5	9/83	12/83, 1/84, 2/84, 3/84, 4/84, 5/84
Intervention #6-9	1/84	4/84, 5/84, 6/84, 7/84, 8/84, 9/84
Non-Intervention #6-9	1/84	4/84, 5/84, 6/84, 7/84, 8/84, 9/84
Intervention #10-16	10/84	1/85, 2/85, 3/85, 4/85, 5/85, 6/85
Non-Intervention #10-16	10/84	1/85, 2/85, 3/85, 4/85, 5/85, 6/85

Data Collection Time-Table

Figure 1. Data collection for baseline and intervention schedules.

measurement in the business community. Data could have been generated on a daily basis but would have been prohibitively expensive and cumbersome. Samples of the necessary data were taken from the non-intervention organizations in exactly the same manner as described above for the intervention group and over exactly the same time periods.

Hypotheses

In this study 11 hypotheses were tested which were developed from the 11 research questions discussed in Chapter 1. All hypotheses are stated in the null form.

Hypothesis 1: There are no statistically significant differences between the pre-intervention mean tray cost, and the six post-intervention mean tray costs, of 16 Illinois long term care facilities which implemented and used the CNCI Management System throughout a six-month research period.

Hypothesis 2: There are no statistically significant differences between the pre-intervention tray cost variance, and the six post-intervention tray cost variances, of 16 Illinois long term care facilities which implemented and used the CNCI Management System throughout a six-month research period.

Hypothesis 3: There is no statistically significant difference among mean tray costs of 16 Illinois long term care facilities which implemented and used the CNCI Management System

throughout a six-month research period, when all differences are analyzed simultaneously.

Hypothesis 4: There is no statistically significant difference in mean tray cost among 16 Illinois long term care facilities which implemented and used the CNCI Management System throughout a six-month research period, when comparisons are analyzed according to the eight individual consultants who provided on-site consulting services to the facilities.

Hypothesis 5: There are no statistically significant differences between the pre-intervention mean tray cost, and the six post-intervention mean tray costs of 16 Illinois long term care facilities, which did not implement and use the CNCI Management System throughout a six-month research period.

Hypothesis 6: There are no statistically significant differences between the pre-intervention tray cost variance and the six post-intervention tray cost variances of 16 Illinois long term care facilities which did not implement and use the CNCI Management System throughout a six-month research period.

Hypothesis 7: There is no statistically significant difference among mean tray costs of 16 Illinois long term care facilities which did not implement and use the CNCI Management System throughout a six-month research period, when all differences are analyzed simultaneously.

Hypothesis 8: There is no statistically significant

difference between the pre-intervention mean tray costs of a group of 16 Illinois long term care facilities which implemented and used the CNCI Management System throughout a six-month research period and the pre-intervention mean tray costs of a group of 16 Illinois long term care facilities which did not implement and use the CNCI Management System throughout a six-month research period.

Hypothesis 9: There is no statistically significant difference between the six post-intervention combined measures of mean tray cost of a group of 16 Illinois long term care facilities which implemented and used the CNCI Management System throughout a six-month research period, and the six post-intervention combined measures of mean tray cost of a group of 16 Illinois long term care facilities which did not implement and use the CNCI Management System throughout a six-month research period.

Hypothesis 10: There are no statistically significant differences between each of the six post-intervention measures of mean tray cost of a group of 16 Illinois long term care facilities which implemented and used the CNCI Management System throughout a six-month research period when compared with the six post-intervention measures of mean tray cost of a group of 16 Illinois long term care facilities which did not implement and use the CNCI Management System throughout a six-month research period.

Hypothesis 11: There are no statistically significant differences at each of the seven measurement levels of tray cost

variance between a group of 16 Illinois long term care facilities which implemented and used the CNCI Management System throughout a six-month research period and a group of 16 Illinois long term care facilities which did not implement and use the CNCI Management System throughout a six-month research period.

Data Analysis Procedures

Data analyses were performed on an Apple IIe computer using the APP-STAT (StatSoft, 1986) statistical computation software. One analysis was performed on a Cyber 174 mainframe computer utilizing the SAS Statistical Software Package (SAS Institute, Inc., 1984). This analysis was completed with the assistance of the Department of Statistics, College of Mathematics, University of Illinois, Urbana, Illinois.

Pearson's correlations, t-tests, and one-way analysis of variance with repeated measures were the principal statistical methods employed in this research. Independent samples t-tests were employed because the relationships between the intervention and non-intervention groups (independent groups) were being analyzed.

Analysis of variance techniques are considered to be a robust set of analytic procedures which are reasonably insensitive to minor violations of the necessary basic assumptions of normal distribution and equal variances. One-way analysis of variance

with repeated measures was used as a major statistical technique.

In this study the dependent variable, tray cost, was measured 7 times in 16 intervention facilities, resulting in an N of 112. Likewise, the dependent variable tray cost was measured 7 times in 16 non-intervention (comparison) facilities resulting in an additional N of 112. The level of significance chosen for all statistical tests in this study was .05.

CHAPTER IV

PRESENTATION OF RESULTS

In this chapter each research question and the null hypothesis developed from that question will be presented. The statistical methods used to evaluate the data, results of the analysis and a brief statement regarding the outcome will be presented in that order. A complete discussion and summary of the results and implications will be presented in Chapter 5.

Presentation of Results Pertaining to An Analysis of the Viability of the CNCI Management System

Section One: Intervention Group Results

Research Question One

The first research question considered the impact, if any, of the CNCI Management Consulting System on tray costs of the 16 intervention facilities over the six-month intervention period. Can significant differences be demonstrated in pairwise comparisons of the pre-intervention tray cost, and the six post-intervention tray costs of the 16 intervention organizations?

The first formal hypothesis of the study which grew out of this research question was: There are no statistically significant differences between the pre-intervention mean tray cost and the six post-intervention mean tray costs of 16 Illinois long term care facilities which implemented and used the CNCI

Management System throughout a six-month research period.

A table of means, standard deviations and variances of tray costs for the 16 intervention facilities over all time levels is included for descriptive purposes (Table 1). Other statistical methods employed were a series of independent t-tests to test the significance of differences found in mean tray costs and a series of correlations to test further any relationships which may exist between levels of the data (Table 2).

Table 1

Mean Tray Costs, Standard Deviations and Variances for the 16 Intervention Facilities Over All Seven Measurement Levels of Time

Pre/Post measurement Level Time		Mean	S.D.	Var.
Pre-Intervention	(1)	4.37	.68	.46
Post-Intervention	(2)	4.51	.68	.46
Post-Intervention	(3)	4.31	.70	.49
Post-Intervention	(4)	4.32	.52	.27
Post-Intervention	(5)	4.17	.65	.42
Post-Intervention	(6)	4.52	.85	.72
Post-Intervention	(7)	4.11	.48	.23

The results presented in Table 2 show that Hypothesis 1 is supported by the data. There is no significant difference in the mean of the pre-intervention measure of tray cost when pairwise comparisons are made with the other six measurement levels as none of the t-values reached the significance level.

Table 2

t-Values and Correlations of Mean Tray Costs for the 16 Intervention Facilities Comparing Time 1 with Time 2 through Time 7

Time 1 Mean	4.37		
WITH		t-value /	r
Time 2 Mean	4.51	.5661 /	.8354
Time 3 Mean	4.31	.2525 /	.7198
Time 4 Mean	4.32	.2568 /	.7759
Time 5 Mean	4.17	.8725 /	.6308
Time 6 Mean	4.52	.5533 /	.5586
Time 7 Mean	4.11	1.2500 /	.6009

t (df 30) = 2.04

When the correlation figures are viewed over time, however, it is apparent that there is a reduction in the association, or relationship, of the pre-intervention measure, Time 1, with the others. The correlations begin at a substantial level and reduce over the six-month test period. This result is important in that it tends to demonstrate an influence of the management system which was not detected by the pairwise comparisons of the t-test. Thus, though the formal null hypothesis of no significant difference was supported, the management system provided a positive impact on the performance of the intervention facilities' tray costs over the time of the study.

Research Question Two

Next, it was important to determine what impact the CNCI Management Consulting System had on the variability of tray costs within the 16 intervention facilities. The second research question was: Can significant differences be demonstrated in pairwise comparisons of the pre-intervention variance and the six post-intervention variances of the 16 intervention facilities?

The second hypothesis which was developed from this question was: There are no statistically significant differences between the pre-intervention tray cost variance and the six post-intervention tray cost variances of 16 Illinois long term care facilities which implemented and used the CNCI Management System

throughout a six-month research period.

To answer this question, a test was made to determine whether or not they were in the predicted downward direction. The F-test for hypotheses about two variances, as detailed in Hays (1963), was employed here as the principal statistic to test this difference. The F-ratio was developed according to Richmond (1964).

The results presented in Table 3 indicate that none of the comparisons between the pre-intervention variance and the six post-intervention variances was significant. Hypothesis 2 is, therefore, supported by the data.

Table 3

F-Values of Tray Cost Variance from the 16 Intervention Facilities Comparing Time 1 with Time 2 through Time 7

Time-1 Var. .46	
WITH	F
Time 2 Var. .46	1.000
Time 3 Var. .49	1.065
Time 4 Var. .27	1.704
Time 5 Var. .42	1.095
Time 6 Var. .72	1.565
Time 7 Var. .23	2.000
F (df=15,15)=2.40	

However, this level of analysis was performed in a pairwise comparison and dealt with only portions of the data at any one time. The descriptive data in Table 1 provide evidence that there was downward tendency in both the mean tray costs and in the variability of those tray costs although not a statistically significant decrease.

Research Question Three

The first two analyses employed pairwise comparisons, using t-tests and F-tests, to determine the significance of differences between the pre-intervention and the individual post-intervention measures of tray cost. Research question three was: Can significant overall variability be demonstrated among all comparisons of tray cost means of the 16 test organizations over the life of the study? At this point, the intent was to analyze the data, overall, with all differences among means across all time levels considered simultaneously.

The hypothesis which was developed stated: There is no statistically significant difference among mean tray costs of 16 Illinois long term care facilities which implemented and used the CNCI Management System throughout a six-month research period, when all differences are analyzed simultaneously.

One-way analysis of variance with repeated measures was used as the test statistic in this section. This procedure was

used to analyze the differences among all means in the data matrix, and evaluate the significance of that variability. This is the most economical and direct method for developing a response to the research question of this section.

The first ANOVA (Table 4) was developed to deal with the data for all seven time levels of the research project, i.e. the pre-intervention data as well as all six levels of the post-intervention data. The second ANOVA (Table 5) was performed to evaluate the variability of the data from the six post-intervention measures. The difference between the variability of the data with the pre-intervention measure left in, and with it eliminated, was important for determining the influence of pre-intervention conditions.

The differences which were found between the results of the two ANOVAs presented above and the results of the previous two research questions are quite important. The results presented in Table 4 and Table 5 indicate that the variability, or differences between all pairs of means within the data, is significant. Hypothesis 3 is not supported by the analysis at this level. The evidence suggests that the amount of change in the intervention group data was significant. Although both sets of ANOVAs were significant, with the influence of the pre-intervention measure removed, the degree of the difference among the means is even more apparent. The variability of the data over time exceeds that

Table 4

One Way Analysis of Variance with Repeated Measures Using the 16 Intervention Facilities Tray Cost Data over Time 1 through Time 7

EFFECT	SS	DF	MS	F	P
TIME (Between)	2.32	6	.3867	3.002	.0102
ERROR (Within)	11.59	90	.1289		
TOTAL	13.91	96	.145		

Table 5

One Way Analysis of Variance with Repeated Measure Using the 16 Intervention Facilities Tray Cost Data over the Six Post-Intervention Samples, Time 2 through Time 7

EFFECT	SS	DF	MS	F	P
TIME (Between)	2.29	5	.4575	3.77	.0045
ERROR (Within)	9.10	75	.1213		
TOTAL	11.39	80	.142		

which is expected by chance fluctuation.

The ANOVA results suggest that tray costs, on a practical level, were affected by the management system under study in this project. Coupled with the downward trend found by inspection of the data earlier, the management system probably had the effect of lowering mean tray cost expenditures and tray cost variability over the six-month time period which is being used in this study.

Research Question Four

At the outset of this study, it was assumed that the individual consultants in any facility or facilities may have a differential effect on the performance of tray costs, largely due to general personality and social interaction factors. Thus, the data were analyzed to see if any such individual effect of the consultant could be detected. The specific research question was: Can significant differences be demonstrated in mean tray costs among the 16 test facilities assigned to specific consultants over the life of the study?

The hypothesis stated: There is no statistically significant difference in mean tray cost among 16 Illinois long term care facilities which implemented and used the CNCI Management System throughout a six-month research period, when comparisons are analyzed according to the eight individual consultants who provided on-site consulting services to the facilities.

Table 6 displays mean tray costs of the facilities assigned to each consultant. The number of facilities handled by each consultant varied. However, the number of facilities for each consultant remained constant over the six months of the study.

Table 6

Mean Tray Costs of 16 Intervention Facilities Grouped by Consultants over the Six Post-Intervention Sampling Levels

	Consultants							
	Sample Size							
Level Time	Means							
	I	II	III	IV	V	VI	VII	VIII
	N=5	N=4	N=1	N=1	N=1	N=2	N=1	N=1
2	4.15	4.50	3.85	5.65	5.50	4.81	3.46	5.31
3	4.11	3.74	4.01	5.58	5.30	4.94	3.48	5.19
4	4.04	4.29	3.56	5.05	4.78	~4.83	3.54	5.13
5	3.93	3.56	4.44	4.93	4.60	4.81	3.55	5.16
6	4.13	3.83	4.44	5.49	6.29	5.73	3.84	4.89
7	4.08	3.57	3.87	5.02	4.45	4.57	3.81	4.85
Mean =	4.07	3.92	4.03	5.29	5.15	4.95	3.61	5.17

Once again, the most powerful and economical statistic for responding to this question is the one-way analysis of variance with repeated measures. The model was designed to analyze the "Time by Consultant" effect over six post-intervention measures of tray cost. The ANOVA was used to analyze the overall effects of each individual consultant relative to all other consultants over time (Table 7).

Table 7

One-Way Analysis of Variance with Repeated Measures Testing the Variance of Mean Tray Cost by Individual Consultant Across All Levels of Time

Source	DF	Type III SS	Mean Square	F	P
Time * Cons. (Exp)	35	73687.1158	2105.346	1.01	.4707

There appeared to be a wide range of variability in the mean tray costs among the consultants. However, the results of the ANOVA indicate that the differences in mean tray costs over time for each of the individual consultants when compared with each of the other consultants were not statistically significant. Hypothesis 4 is supported by the results.

This result implies that the published management material is probably effective in a wide range of situations, regardless of the individual consultant who implements the system. It appears that the total management system exhibits a consistent effect across facilities.

Section Two: Non-Intervention Group Results

Research Question Five

A series of analyses of the 16 non-intervention comparison long term care facilities was undertaken at this point. The fifth research question was: Can significant differences be demonstrated in pairwise comparisons of the pre-intervention mean tray cost and the six post-intervention mean tray costs of the 16 comparison organizations?

Hypothesis 5 was then developed as follows: There are no statistically significant differences between the pre-intervention mean tray cost and the six post-intervention mean tray costs of 16 Illinois long term care facilities which did not implement and use the CNCI Management System throughout a six-month research period.

A table of means and standard deviations of tray costs for the 16 non-intervention facilities over the various time levels was included (Table 8).

Table 8

Mean Tray Costs, Standard Deviations and Variances for the 16 Non-Intervention Facilities Over All Seven Measurement Levels of Time

	Mean	S.D.	Var.
Pre-Intervention (Time 1)	4.66	.68	.46
Post-Intervention (Time 2)	4.95	.49	.24
Post-Intervention (Time 3)	4.04	1.41	1.99
Post-Intervention (Time 4)	5.06	.71	.50
Post-Intervention (Time 5)	4.79	.82	.67
Post-Intervention (Time 6)	4.59	1.03	1.06
Post-Intervention (Time 7)	4.66	1.02	1.04

The statistical methods used to analyze data from the 16 non-intervention facilities were the same as those employed in the first research question. A series of independent t-tests was employed which compared the significance of differences found among mean tray costs between the pre-test measure, and the post-test measures. Also, a series of correlation was developed for the same data (Table 9).

Table 9

t-Values and Correlations of Mean Tray Costs for 16 Non-Intervention Facilities Comparing Time 1 with Time 2 through Time 7

Time-1 Mean 4.66			
WITH	t-value	/	r
Time 2 Mean 4.95	-1.367	/	.7190
Time 3 Mean 4.04	1.562	/	.6394
Time 4 Mean 5.06	-1.615	/	.7810
Time 5 Mean 4.79	-.4760	/	.6700
Time 6 Mean 4.59	.2304	/	.7691
Time 7 Mean 4.66	-.0122	/	.7142
t (df 30)=2.04			

The analysis at this point was revealing in that, by inspection, one finds no particular trend or tendency toward reduction of the means or standard deviations over time. The standard deviations from Time 1 to Time 7, however, nearly doubled while the mean tray costs varied over a wide range and were the same value on the last measure as they were on the first.

Second, there were no significant differences found in the

pairwise comparison of Time 1 with the six later measures. This was true for both the t-test results and the correlation figures. Unlike the correlations from the intervention group, these correlations figures were fairly consistent and demonstrate no apparent trend. Based on the results of this analysis, Hypothesis 5 was supported by the data.

Research Question Six

As with the case with the intervention facilities, the analysis was brought to focus on the variability of the tray costs within the comparison group. The research question was: Can significant differences be demonstrated in pairwise comparisons of the pre-intervention variance and the six post-intervention variances of the 16 comparison organizations?

Hypothesis 6 stated: There are no statistically significant differences between the pre-intervention tray cost variance and the six post-intervention tray cost variances of 16 Illinois long term care facilities which did not implement and use the CNCI Management System throughout a six-month test research period.

In this question, the focus was placed upon whether or not the changes in variances over time were significant. The F-test for hypotheses about variances, as detailed in Hays (1963), and as discussed earlier, was employed here.

Results presented in Table 10 indicate that one comparison,

Time 1 with Time 3, indicated a significant difference. The remaining comparisons do not reach the level of significance although the Time 6 and Time 7 comparisons approached it. The conclusion supported by this test is that the differences in comparison group tray cost variances over time are not statistically significant. Hypothesis 6 was supported by the data. This result is consistent with expectations regarding the comparison group.

Table 10

F-Values of Tray Cost Variance from the 16 Non-Intervention Facilities Comparing Time 1 with Time 2 through Time 7

Time 1 Var. .46	
WITH	F
Time 2 Var. .24	1.917
Time 3 Var. 1.99	4.326
Time 4 Var. .50	1.087
Time 5 Var. .67	1.457
Time 6 Var. 1.06	2.304
Time 7 Var. 1.04	2.261
F (df 15,15)=2.40	

Research Question Seven

In this question, a determination of the significance in the variability among the means of all 16 intervention facilities was undertaken. The research question was: Can significant variability be demonstrated among all comparisons of tray cost means from all 16 comparison organizations over the life of the study. At this point the interest was in viewing the data, overall, with all differences among means across all time levels, analyzed simultaneously.

Hypothesis 7 stated: There is no statistically significant difference among mean tray costs of 16 Illinois long term care facilities which did not implement and use the CNCI Management System throughout a six-month research period when all differences are analyzed simultaneously.

One-way analysis of variance with repeated measures was employed to determine the amount and significance of difference among all means in the data matrix.

The most significant finding in this section was the high degree of variability found within the comparison group. The F-value indicates a high degree of variability within the data, which exceeds that expected by chance factors alone. This variability was greater than that found in the analysis of the intervention group. Over the period of the study, there were conditions operating within the facilities which produced widely

varying tray costs which were statistically significant. As was the case for the intervention facilities, the variability over time was demonstrated only by the ANOVA procedure and was not seen in the pairwise comparisons of the earlier t-tests. Based on the results of the ANOVAs presented in Table 11 and Table 12, Hypothesis 7 was not supported.

Section Three: Comparison of Data from the Intervention Group with Data from the Non-Intervention Groups

Research Question Eight

When the 16 intervention facilities were compared with the 16 non-intervention facilities were there any differences in the pre-intervention measures of mean tray costs? The interest here was whether or not the two groups, intervention and non-intervention, were equivalent at the beginning of the research prior to the intervention. The research question was: Can a significant difference be demonstrated between the pre-intervention mean tray costs of the 16 test organizations and the 16 comparison organizations?

Hypothesis 8 stated: There is no statistically significant difference between the pre-intervention mean tray costs of a group of 16 Illinois long term care facilities which implemented and used the CNCI Management System throughout a six-month research period and the pre-intervention mean tray costs of a

Table 11

Analysis of Variance with Repeated Measures Using Data from the 16 Non-Intervention Facilities Over the Seven Sample Levels of Tray Cost, Time 1 through Time 7

EFFECT	SS	DF	MS	F	P
TIME (Between)	10.20	6	1.70	5.88	.0001
ERROR (Within)	26.00	90	.289		
TOTAL	36.20	96	.377		

Table 12

Analysis of Variance with Repeated Measures Using Data from the 16 Non-Intervention Facilities Over the Six Post-Intervention Sample Levels of Tray Cost, Time 2 through Time 7

EFFECT	SS	DF	MS	F	P
TIME (Between)	10.20	5	2.04	6.70	.0001
ERROR (Within)	22.81	75	.304		
TOTAL	33.01	80	.413		

group of 16 Illinois long term care facilities which did not implement and use the CNCI Management System throughout a six-month research period.

The statistical procedure employed in this section was the independent samples t-test. This procedure was used to determine the significance, if any, of the difference between the baseline mean tray costs of the intervention and non-intervention facilities.

This level of analysis between the intervention and the non-intervention group data was very important as it allowed a comparison of the data from both groups, gathered prior to the beginning of the intervention procedure. Table 13 presents results which support the contention that both groups were sampled from the same parent population and were statistically equivalent at the beginning of the study. Without this baseline definition, any subsequent changes which may have been observed, could not have been validly attributed to the management system's effects. The formal hypothesis was supported by the data.

Research Question Nine

Since the initial equivalence of the two groups has been established, the next level of comparison used combined data from the two groups. The research question at this point was: Can a significant difference be demonstrated between the six

Table 13

Independent Samples t-Test Between 16 Intervention and 16 Non-Intervention Groups Mean Tray Cost Over the Pre-Intervention Level, Time 1

INTERVENTION	NON-INTERVENTION
MEAN = 4.37	MEAN = 4.66
S.D. = .68	S.D. = .68
N= 16	N= 16

t(30) = -1.19, p = .2434

post-intervention mean tray costs of the 16 test organizations and the six post-intervention mean tray costs of the 16 comparison organizations?

Hypothesis 9 then stated: There is no statistically significant difference between the six post-intervention combined measures of mean tray cost of a group of 16 Illinois long term care facilities which implemented and used the CNCI Management System throughout a six-month research period and the six post-intervention combined measures of mean tray cost of a group of 16 Illinois long term care facilities which did not implement and use the CNCI Management System throughout a six-month research period.

To analyze this question, the independent samples t-test was again employed. However, the data for each group were combined across all facilities and all six post-intervention time levels. This pooled process was employed to provide a total view of the differences between the two groups after the management system had been operating for six months. The goal was not to provide pairwise comparisons of each of the post-intervention time levels, but to view the effects by using a more general comparison of the two groups.

Two issues were revealed by the results of the analysis presented in Table 14. First, the t-value of -2.21 was statistically significant. This value demonstrates that the difference between the two groups is greater than that expected by chance fluctuations. Also, the direction of the difference indicated that the pooled mean tray cost of the intervention group was lower than the pooled mean tray cost of the non-intervention group. This was the direction which was predicted by the assumed effects of the management system. By inspection of the values in Table 14, not only was the combined mean value less in the intervention group, but the standard deviation was approximately 50% less than the non-intervention group standard deviation. Not only did this demonstrate a lower mean tray cost for the intervention group, but it also demonstrated that the variation of those costs was less. Hypothesis 9 was not supported.

Table 14

Independent Samples t-Test of Mean Tray Costs Between 16 Experimental and 16 Control Groups Using Combined Data from the Six Post-Intervention Measures, Time 2 through Time 7

INTERVENTION	NON-INTERVENTION
MEAN = 69.17	MEAN = 74.88
S.D. = 2.71	S.D. = 5.71

$t(10) = -2.21$, $p = .0493$

Research Question Ten

The next research question was: Can a significant difference be demonstrated between the 16 test organizations and the 16 comparison organizations mean tray costs at any of the six post-intervention time levels?

Hypothesis 10 stated: There are no statistically significant differences between each of the six post-intervention measures of mean tray cost of a group of 16 Illinois long term care facilities which implemented and used the CNCI Management System throughout a six-month research period when compared with the six post-intervention measures of mean tray cost of a group of 16 Illinois long term care facilities which did not implement

and use the CNCI Management System over a six-month research period.

The analysis in this section was performed by the independent samples t-test as in earlier analyses. The goal at this point was to determine if the means of the two groups were significantly different at any specific times in the post-intervention interval. This procedure attempted to determine if there was an identifiable point at which the tray costs of the two groups began to diverge.

The results displayed in Table 15 were mixed. Time 2, Time 4 and Time 5 demonstrated significant differences between the two group means. However, Time 2, Time 6 and Time 7 did not demonstrate such significant differences. Time 7 closely approached the significance level. In view of the split in significance across time levels, Hypothesis 10 was not supported by the data. All of the comparisons which demonstrated significant differences between the two groups also demonstrated that the intervention group means were lower than the comparison group.

Research Question Eleven

After an examination of the changes in the mean tray costs, the final question addressed by this study was: Can a significant difference be demonstrated between the 16 test organizations and the 16 comparison organizations variances at any of the seven

Table 15

Table of Independent Samples t-Tests Comparing Mean Tray Costs of 16 Intervention Facilities with 16 Non-Intervention Facilities on Post-Intervention Measures, Time 2 through Time 7

Measurement Times	t-value	p value
TWO	t(30)= -2.09	.0431
THREE	t(30)= .58	.5690
FOUR	t(30)= -3.36	.0024
FIVE	t(30)- -2.05	.0470
SIX	t(30)= .19	.8276
SEVEN	t(30)= -1.91	.0627

pre-intervention and post-intervention time levels?

Hypothesis 11 stated: There are no statistically significant differences at each of the seven measurement levels of tray cost variance between a group of 16 Illinois long term care facilities which implemented and used the CNCI Management System throughout a six-month research period and a group of 16 Illinois long term care facilities which did not implement and use the CNCI Management System throughout a six-month research period.

As in earlier analyses, the F-test for hypotheses about

variances was used (Hays, 1963).

The results presented in Table 16 indicate there was no consistent relationship found across time in the comparison of tray cost variances of the two groups in this study. By chance fluctuation alone one would expect to find two comparisons which would fall past the level of significance.

Table 16

Comparisons of the 16 Intervention Facilities with the 16 Non-Intervention Facilities Tray Cost Variances Over All Seven Measurement Levels of Time

Intervention	S.D.	Var.	Non-Intervention	S.D.	Var.	F-Value
(Time 1)	.68	.462	(Time 1)	.68	.462	1.00
(Time 2)	.68	.462	(Time 2)	.49	.240	1.925
(Time 3)	.70	.490	(Time 3)	1.42	2.016	4.114
(Time 4)	.52	.270	(Time 4)	.71	.504	1.866
(Time 5)	.65	.423	(Time 5)	.82	.672	1.589
(Time 6)	.85	.723	(Time 6)	1.03	1.061	1.467
(Time 7)	.48	.230	(Time 7)	1.02	1.040	4.522

F (df 15,15) = 2.40

CHAPTER V

DISCUSSION AND IMPLICATIONS

As stated in Chapter 1, this study focused on organizational behavior and effectiveness. The concept of effectiveness, for the purposes of this study, has been understood to mean a reduction in monthly tray costs and a reduction of the variability of those costs. It was assumed that at least a representative number of the most influential organizational variables which reflect changes in effectiveness were included in the dependent variable, tray cost. They were labor costs, raw food costs and supply costs.

There were two aspects of the research. First, an evaluation of the effects of the consulting system on the performance of the intervention group of facilities was developed. Second, a comparison was made of the intervention and non-intervention groups relative to their performance on the tray cost variable. If the CNCI Management Consulting System had the intended effect on the organizational behavior of the intervention facilities, what would be the predicted outcomes of that intervention?

Hypothesized first was that the mean tray costs of the intervention group would reduce over time. Second, mean tray costs of the intervention group were hypothesized to reduce in variability over time demonstrating increased control over expenditures. Third, the comparison of the intervention and non-intervention groups could be expected to reveal a difference in

mean tray costs and lower variability in favor of the intervention facilities. Fourth, the non-intervention comparison group should demonstrate no particular change in either mean expenditures or variability. There should be no downward trend indicated in the comparison facilities' data.

Table 17 provides the results of the analyses of all research questions. Null hypotheses 3, 7, 9 and 10 were not supported by the data. Statistically significant differences and variations were found which relate to those research questions. The discussion of results will begin with a consideration of those questions. The remaining null hypotheses were supported by the data, indicating that the difference or variation was not found to be statistically significant.

Discussion of the Results

Discussion of Questions Three, Seven, Nine and Ten

Although it is traditional to report results of the research hypotheses in order, they were grouped for discussion purposes in an attempt to provide continuity and clarity. The first null hypothesis which was not supported by the data was Hypothesis 3 which referred to question three. The question related to whether or not significant differences in performance of the intervention facilities, as measured by tray costs, could be attributed to the influence of the management system.

Table 17

Summary of Results of Data Analysis by Hypothesis

Hypotheses	Question	Null Hypoth. Supported? Yes	No	Result
1	Any pre to post intervention group mean tray cost change?	X		No Significant Diff. from Pre to Post
2	Any pre to post intervention group variance changes?	X		No significant Diff. from Pre to Post
3	Any overall variation found in intervention group ANOVA?		X	Significant overall variation detected

Table 17--continued

Hypotheses	Question	Null Hypoth. Supported? Yes	No	Result
4	Any significant differences due to consultant effects?	X		No Significant Diff. Due to Cons. Effect
5	Any pre to post non-intv. group mean tray cost change?	X		No Significant Diff. from Pre to Post
6	Any pre to post non-intv. group variance change?	X		No Significant Diff. from Pre to Post
7	Any overall variation found in non-intv. group ANOVA?		X	Significant overall variation detected

Table 17--continued

Hypotheses	Question	Null Hypoth. Supported? Yes	No	Result
8	How do pre-intv. mean scores of the two groups compare?	X		Groups Equivalent at start of research
9	How do post-intv. means of the two groups compare?		X	Significant Diff. between the groups
10	Any time related differences among group means?		X	Significant time related differences
11	Any time related differences among groups variances?	X		No consistent diff. found among the var.

The significant F-statistics in Table 4 and Table 5 were both beyond the .05 significance level. When all combinations of means in the data matrix were considered, over all seven time levels and over all 16 facilities, the result exceeded that which would have been expected by chance fluctuations alone.

The next question, number seven, focused on the variation of the non-intervention group of facilities. The hypothesis of no significant difference was rejected after the data analysis. This analysis also involved using one-way analysis of variance with repeated measures. Table 11 and Table 12 displayed F-statistics which were even more strongly significant than those revealed for the intervention group. These results indicated an amount of variation within the scores of the non-intervention group considerably greater than that expected by chance. Also, the variability found within the non-intervention group was greater than that found within the intervention group, although both were statistically significant.

The results of the ANOVAs used to test variability for both groups indicated only that there was a statistically significant amount of variability within the data matrix of each group when all means were compared. If this had been the only analysis, it would have been virtually impossible to determine whether or not the management system had any differential effect on the

performance of the groups. However, the next analysis was designed to answer research question nine regarding the differences between the intervention group and the non-intervention group in terms of post-intervention mean tray costs.

The tray costs of all facilities at each level of measurement were combined and then compared via a t-test for independent samples. The result was significant from two standpoints. First the t-test results, $t(10) = -2.21$, $p=.0493$ indicated a difference between the two sets of data which was statistically significant. Second, the difference between the two groups was in the predicted direction, i.e. both the mean and standard deviation of the intervention group were lower than the non-intervention group. Reduction of mean tray costs and standard deviations within the intervention group as compared with the non-intervention group represented the major prediction of this research.

The final analysis which resulted in rejection of the null hypothesis related to whether or not any time related changes, or significant differences in mean tray costs, could be found when a comparison of the two groups was performed. Question ten dealt with whether or not there were any significant differences between the two groups when they were compared at each of the six post-intervention levels. The table of t-values in Table 15 presented results which indicated that three out of the six comparisons, Time Two, Time Four, and Time Five were statistically significant.

Time Seven was marginal, but not significant. Time Three and Time Six were not significant. By inspection of the data, however, unexplained peaks in tray costs occurred at the Time Three and Time Six levels. With the amount of information available during this research, an understanding of those sudden rises in costs cannot be offered. All of the significant comparisons supported the observation that the intervention group was lower in terms of mean tray costs than was the non-intervention group. The highest peak in mean tray costs, and subsequently in non-significant results, came at the Time Six level. It appeared from the data that the intervention facilities were not quite able to recover from that particular upward surge in costs within a one month period. This resulted in the Time Seven comparison being just under the level of significance. The recovery evident in the data could reasonably be expected to bring the expenditures back in line with earlier performance given additional time.

Comparison of the values of the mean tray costs and associated variances between the two groups of facilities revealed further support for the positive impact of the intervention. The mean tray costs of the intervention group were consistently lower than the mean tray costs of the non-intervention group except at one time level, Time Three. Only at this point was the mean of the non-intervention group tray cost lower than the intervention group tray cost. Further, there was only one point at which the

variance of the non-intervention group was less than the variance of the intervention group. That occurred at Time Two. These observations provide additional support for the assertion that the CNCI Management System probably was responsible for producing lower mean tray costs and lower variance than those found in the non-intervention group. These influences were consistent over the six months of the intervention research period.

Throughout the research period there were, apparently, substantial influences operating within the environment of the long term health care facilities in Illinois which strongly affected tray costs. There were unidentified forces, either inside the organizations or in the external environment, which resulted in unstable costs. We may assume that these influences toward higher costs and higher variability were operating on both sets of facilities. However, the intervention group was able to counteract those forces and reverse the direction of the costs in the predicted, downward direction. The success of the intervention group in lowering costs and variability began with the initiation of the management consulting system. The implication of the data was that the management consulting system was effective in producing predicted results.

The analysis of question ten supported the contention that the intervention facilities performed better on tray costs than

did the non-intervention group on a time related basis. This pairwise comparison over time provided understanding of the positive effect of the management system.

Discussion of Questions One, Two, Four, Five, Six, Eight and Eleven

The discussion of these results will be presented in order of their significance for the research and not necessarily in numerical sequence.

The strength of the results reported earlier was further enhanced by the support of the null hypothesis in question eight. This question referred to whether or not the two groups, intervention and non-intervention, were significantly different on the pre-intervention, baseline measure of mean tray cost. The result of that t-test ($t(30)= -1.19$, $p=.2434$) supported the assumptions that both groups were equivalent at the beginning of the research and were drawn from the same parent population. In view of this initial equivalence of the two groups, and recalling the pressures which were present across all facilities which tended to drive costs up over the research period, the management system exhibited a predictable influence on the performance of the tray cost variable.

Questions one and five were designed to consider similar issues. Question one had to do with whether or not there were

significant differences between the pre-intervention measure and the six post-intervention measures of mean tray cost within the intervention group. Question five considered the same issue except with reference to the non-intervention group's performance.

In both the intervention group (question one) and the non-intervention group (question five) the results of the t-test comparisons found no significant pre-test to post-test differences. However, when the associated correlation figures were examined, a difference between the two group patterns emerged. The correlations for the intervention group revealed that the relationship between the pre-intervention mean tray cost and each of those six post-intervention means was reduced over time. We may assume that this reduction was due to the influence of the management system. There was no similar reduction in correlation coefficients found within the non-intervention group's data. There appeared to be relationships in the non-intervention group between each post-intervention measure and the pre-intervention measure.

Research questions two and six considered the variability of the intervention facilities' tray costs and those of the non-intervention facilities. A series of F-tests comparing the variance of the pre-test tray cost measure with each of the six post-test measures was conducted for each of the two groups of facilities. The analysis of question two, relating to the intervention group of facilities, revealed that no time related

significant differences could be demonstrated when comparisons were made of the tray cost variances of the pre-intervention measure with the six post-intervention tray cost measures. This is consistent with the expectations of the influence of the CNCI Management System which was designed to reduce variability and stabilize the range of that variability. This is further demonstrated by the data presented in Table 3. None of the F-values reached the significance level. The variance at Time Seven was half that of the variance of Time Two which may indicate a slowly developing trend toward even lower variability. Also, over time the variance figures of the intervention group remained within a narrower range of values than those of the non-intervention group (Table 10).

The results of the comparisons within the non-intervention facilities, displayed in Table 10, reveal characteristics which were different from those presented by the intervention facilities. All six F-ratios were high with the comparison of Time One with Time Three exceeding the significance level. The Time Six and Time Seven comparisons resulted in F-ratios which were very near the significance level. Also, the range of variance scores within this group of facilities was greater than that found in the intervention group. Those results were consistent with the earlier observation that unidentified forces were influencing both groups. Without the benefit of the management system, however, the costs

and variability of the non-intervention group remained high.

A more thorough comparison of the two groups (Table 16) with reference to the variance of the tray costs was addressed in question eleven. At this point, a comparison of variance scores of the two groups at each time level of the study was made to determine if there were any significant differences or trends. It was assumed that there would be significant differences between the two groups. This assumption followed from the hypotheses which predicted a tendency toward more stability with a narrower range of tray cost variances across time within the intervention group and, conversely, less stability with a wider range of tray cost variances within the non-intervention group. This analysis sought to determine if those differences were statistically significant.

The Time One, pre-intervention, comparison found that both group variances were the same. As noted earlier, this supports the observation that the two groups of facilities were equivalent at the beginning of the research. The Time Two, Time Four, Time Five and Time Six F-ratios were high but did not reach the level of significance. However, the Time Three and Time Seven comparisons were statistically significant. At only one point, Time Two, did the variance of the non-intervention group drop below that of the intervention group. At all other time levels the intervention group values were lower. These results, however,

did not allow rejection of the formal hypothesis of no significant differences. Inspection of the data supported earlier observations that the differences between the two group variances over time existed and favored the intervention group although those differences were not statistically significant. Had the research project extended over a greater time period the movement toward consistent statistical significance may have developed.

Finally, question four tested the assumption that there may have been differences in tray costs in facilities which were due to the influence of a specific consultant. The one-way analysis of variance with repeated measures was the principle test statistic. That ANOVA revealed no statistically significant differences within the intervention facilities' data matrix due to any specific consultant's influence. This result strengthens the assertion that the system works, not because of individual personality factors of the consultants, but rather because of the form and content of the total management system.

The data of this research project supported the contention that the four components of the CNCI Management System exert a consistent downward effort on mean tray costs and the variability of those costs. The effect of the total system has been measured, evaluated over time, and appears to achieve its intended goals.

Implications of the Results

Organizational Effectiveness and Systems Theory

This dissertation was developed to study the effectiveness of a management consulting system for long term health care food service systems. Both Van DeVen and Ferry (1980) and Cameron and Whetten (1983) have stated that the definition of a desired result, used to determine effectiveness, is a subjective issue chosen by the researcher. In this study, the desired result was defined in terms of the lowering of certain monetary costs and controlling the variability of those costs. The method of measuring this result was via the construction of the dependent variable, tray cost. The results of the study led this researcher to the conclusion that the influence of the CNCI Management System is most likely the cause of the consistent, positive, and predicted changes found within the tray cost data. The management system appears to have accomplished the goals for which it was designed, i.e. the lowering and controlling of tray costs.

However, the CNCI Management System has other goals, or potential effects, which were not subjected to specific study in this research. Some of them are: (1) improved quality of the final products and services of long term health care facilities' food service systems which are provided to their clients, (2) improved working conditions for the employees of the long term care facilities, (3) increased levels of skills for the employees

of the long term care facilities, (4) fewer unintended outputs of the system in the form of food related illness, or punitive citations by state and federal regulatory bodies, (5) fewer legal actions against the long term care facilities by clients or their collaterals stemming from problems within the food service systems.

Blake and Mouton (1983) have suggested that the behavior of systems or individuals is, perhaps, cyclical over time. The major features of such behavior will tend to repeat, unless some specific intervention, designed to address a specific set of conditions, is brought to bear on the organization. This research indicated that when a specific, well-designed intervention is placed within an organization, predictable results and a change in the performance of the system will occur.

The management system studied in this research had, as a central focus, the improvement of the monetary effectiveness of the intervention organizations. It was developed by utilizing various constructs of systems theory to bring about internal changes in the transformation processes of the system and, thus, predictable results. One of the first constructs cited earlier in this dissertation was that of the interaction component of elements within a system. The interactions with which this management system dealt consisted of both internal and external elements of the food service system and its environment. Detailed procedures were arranged to include all pertinent interaction

components, with the main purpose being to reduce uncertainty.

All organizations, particularly those in highly dynamic environments, must deal with uncertainty on a daily basis. Uncertainty revolves around the process of decision making, both at an individual level and at an aggregate, organizational level. If "wrong" decisions are made, serious problems for the system may occur. If "right" decisions are made, then the system's life and functioning are enhanced. Organizing to increase the probability that persons within any given system will make consistently accurate or "right" decisions is essential. Those decisions must be made: (1) in the optimal manner by the appropriate personnel, (2) at the appropriate time, and (3) with relative economy. Bringing this type of control to any organization is a critical issue. The CNCI Management System designers recognized that all possible combinations of influences and problems cannot be predicted. Common problems were grouped into larger conceptual areas, and procedures were developed to deal effectively with atypical demands of operations and the environment. To the extent possible, recurring problems or decision points were anticipated and dealt with specifically. In the CNCI Management System the problem of reducing uncertainty within a framework of systems theory was of central importance. The policy and procedure section was designed to structure decision making and subsequent action.

It is necessary for any viable system to have the ability to

make effective internal decisions. It is also necessary for the efficient system to be aware of, and appropriately responsive to, the requirements of the external environment within which it exists. The adaptability of any given organization, with reference to the demands of its environment, is critical for survival and growth. This flexibility is particularly apparent in the long term health care field which is highly regulated by federal, state and local agencies, as well as the "normal" regulation which occurs in any for-profit business by influences of the marketplace. The CNCI Management System did not attempt to deal with marketplace issues of long term health care systems. Rather, one point of emphasis during the design was on interactions with regulatory agencies. This analysis was performed as a response to the extreme, frequently capricious, and potentially catastrophic impact which the regulatory agencies may have on any long term care facility.

The internal and external interactions of system elements were dealt with not only through the complex of detailed procedures but also with specific on-the-job training of personnel. This training exposed food service workers to a wide range of information and techniques for dealing effectively with representatives of regulatory agencies. Also, many of the learning experiences offered to employees reflected the need for constant upgrading of knowledge and specific skills in the areas

of quantity food production and sanitation. The CNCI Management System, as designed, could not deal with all possible interactions. Only those interactions which were felt to be centrally important to the performance of the food service production element of the intervention organizations were considered.

The next critical systems theory concept which was addressed by the development and subsequent study of the CNCI Management System was the idea of structure as related to function. As noted in Chapter 1, this construct of structure was defined as an ordered set of operations. The CNCI Management System, unlike any other known management effort in long term health care food service, was developed around a complex of highly structured, ordered educational efforts, published operational definitions, and rules and procedures designed to enrich interactions among elements of the system and reduce uncertainty of outcome.

Discussions which relate to the functioning of a system imply the existence of goals. Within the food service systems studied here, the main goal was to provide the highest quality meals to the client populations at the most cost effective levels. This research focused on the issue of cost of production, or cost of attaining this goal, as the indicator of success. By all indications from the analysis of the research data, the proper foci were maintained, and the intended outcomes in terms of

functioning of the system were attained.

Both intervention and non-intervention groups demonstrated one of the principle characteristics of an open system, that is, goal-directed behavior. Organizations constantly adjust their performance to achieve greater movement toward pre-determined goals. The research reported in this dissertation indicates that the intervention group tended to maximize the attainment of certain goals to a greater extent than did the non-intervention group. The CNCI Management System appeared to direct successfully the attainment of those goals.

The goal-directed behavior of any system requires close consideration of tactics which are to be employed in the attainment of goals. This study investigated the effects on tray cost of the combined impact of four synergistic intervention tactics which were aspects of the CNCI Management system. Those tactics included (1) extensive education and training, (2) systems organization principles, (3) communications devices and procedures, and (4) specific definitions of goals, procedures and roles within the system. It was assumed that none of these tactics, by itself, could produce the desired impact. Using Systems Theory principles the attempt was made to produce a synergistic effect by combining various powerful components into an influential whole. The results of this study indicate that such an influence was provided by the CNCI Management System within the intervention facilities.

The designers of the CNCI Management System were aware that it was necessary to show, in terms of tray cost reduction, the effectiveness of the management system. The owners of for-profit long term care facilities are concerned with the baseline issue of cost effectiveness. The provision of health care services is instrumental to making money in these settings. Business people generally do not consider whether or not a change in the amount of an operational variable, such as tray cost, is due to random variation or to a specific influence. They usually react to absolute changes and subsequently tend to have relatively narrow views of potentials for action. The CNCI Management System, as a secondary effect, may have broadened the knowledge and understanding of individual administrators and owners. This assumption, however, remains to be tested in other research efforts.

The CNCI Management System may focus the owner/administrator's attention on the fact that problems in a highly uncertain field are not caused or determined by one factor, but rather are multi-determined by numerous interconnected conditions. Over time this broadening of focus may tend to reduce the reliance by business people on simplistic, almost ritualistic methods of dealing with administration in unstable environments. Administrators may be prompted to adopt a more complete view of their organization, of their solutions to problems and of their attempts to attain goals. The viability of the constructs of Systems Theory when put into

action in an unstable environment have also been demonstrated.

The CNCI Management System was designed to provide a structure for dealing with the dynamic forces at work both within and outside the organizations while, at the same time, organizing repetitive efforts in the most efficient manner. This research demonstrated the existence of such influences. It further demonstrated the CNCI Management System's ability to control those forces.

One final construct of Systems Theory which should be mentioned here is that of the Principle of Equifinality. This principle states that the same final state (goal or goals) may be attained by a variety of methods. The CNCI Management System represents one of many potential methods for attaining certain organizational goals in a dynamic environment.

Implications Regarding Education

The design of the management system studied in this research had as one of its major components a pivotal reliance upon various educational procedures. Didactic methods and on-the-job training procedures were employed to take advantage of the learning process as a method of up-grading personnel skills and, subsequently, improving organizational performance. Learning was specifically arranged to include on-the-job training in specific skills acquisition, as well as academic learning of theory and information.

The findings of this study suggest that the systems derived

CNCI Food Service Management System was more cost effective, in terms of tray cost, than the variety of food service management procedures found in the non-intervention (comparison) group which used other food service management methods. It appeared that since the educational component is central to the CNCI Management System the education process may have been the key element in transmitting the knowledge, attitudes and skills inherent in the influence of the CNCI Management System. The findings of this study did not explicate the relative importance of the content of the CNCI Management System vis a vis the importance of the educational component. Further research may explore the relative contributions of educational activities with reference to the overall results. The salient point was that the total intervention viz., namely the content of the CNCI Management System plus the education-based consultation, resulted in lower tray costs than a variety of other food service management systems.

Curriculum development in higher education would be well-directed if it took into account the rapidly changing needs of society. A major shift being experienced currently within this country is the movement from a manufacturing to a service economy. The educational requirements of persons in the health-care-related services specifically require, first, minimal levels of initial education and, second, substantial on-going efforts to maintain and upgrade skills. Educators may consider the development of

educational experiences for persons who do not have college educations. They may develop these experiences for presentation in off-campus work locations. The curricula for such experiences would perhaps focus on practical, work-related educational experiences and information and reduce theory and philosophical issues which are characteristic of traditional higher education. An acceleration of the exportation of advanced education away from specific campus locations would be a major development which may allow the growth of skills and knowledge levels of a substantial group of persons who may not otherwise have those growth opportunities. Also, educators should explore the creative use of technological developments with reference to computer assisted instruction and interactive video techniques. These could be highly useful and cost effective educational tools in on-the-job training.

In summary, this study demonstrated the efficacy of the CNCI Management System in reducing tray cost. This system illustrates many of the best features of high quality continuing professional education programs in such fields as vocational education, continuing education and continuing professional education for health care professionals. The CNCI Management System is conceptually derived and pragmatically focused in order to achieve positive bottom-line results for long term care facilities.

Limitations of the Current Study and Suggestions for Further Research

The nature of the independent variable (the CNCI Food Service Management System) precluded the use of certain statistical manipulations such as multiple regression analysis. All four components of the CNCI Food Service Management System were employed as integrated sub-systems. Future studies should develop methods of quantifying all four components of the management system to more precisely evaluate their varying influences on tray costs(s).

The dependent variable, tray cost, developed for this research, can and should be analyzed with reference to its components, i.e. labor cost, raw food cost, and supplies cost. Additional dependent variables, other than tray cost, should be developed and measured. Some potential variables for study might include:

1. The educational level of the Food Service Supervisor, Administrator and other food service personnel.

2. The type of purchasing and budget structure which are placed on the food service supervisor by owners.

3. Atypical problems which inflate cost on a one-time basis.

Development of additional variables would allow a more complete assessment of organizational performance and further expand the understanding of inter-relationships and interactions which were

not able to be tested in this research project.

By virtue of the fact that the intervention organizations in this study chose to install within their systems a formal management structure which was designed to reduce costs and variability of costs while the non-intervention facilities did not make that choice may indicate a difference in business skill and/or judgment operating between the two. Further study specifically measuring and controlling for the variability in business skill evident among long term care facility owners and administrators is definitely warranted.

The fact that a trend over time of the influence of the management system on tray cost was detected throughout the data indicates that further research should extend the period of data collection to explore more fully the time related changes in the dependent variable. Additionally, unexplained peaks in costs which were observed in the data of this study should be analyzed further.

The quasi-experimental design, employed in this study, did not allow for the a priori randomization of intervention and non-intervention facilities. Although the overall strength of the design and the data more than compensated for that design weakness, further research which allows for randomized assignment of subjects to conditions would be quite valuable. Also, the ability to examine influences as they occur would be helpful in

explaining atypical results.

The significant results of this research should be generalized only to the population of for-profit long term residential health care facilities in the State of Illinois since the sampling of this study was conducted only within that population. The major reason for this limitation is that legislation, regulatory agencies, and enforcement policies vary widely from state to state. A study which samples from long term residential care facilities on a national scale may be potentially useful.

Conclusion

This study was undertaken to determine whether or not a specified management system had any significant impact on the monetary performance of specified organizations. Results of the data analysis indicated that the CNCI Management System for long term residential health care facilities in Illinois reduced average monthly tray costs and the variability of those tray costs at a statistically significant level. The design of the study was such that threats to validity were reduced by virtue of the fact that intervention organizations were used as their own controls and by employing non-intervention, comparison facilities. In view of the fact that there is reason to believe that both the intervention and non-intervention groups were sampled from the same population,

the ability to generalize the results to the wider population of Illinois long term care facilities is good. However, it should be noted that this study can be expected to generalize only to the population of for-profit long term residential health care facilities in the state of Illinois. Attempting to generalize to all long term care organizations in the United States would be unwarranted.

The major conclusion of this study is that the intervention, in terms of the influence of the CNCI Management System on the tray costs of the intervention facilities, performed as it was designed to perform.

APPENDIX A

INTEGRATED LONG TERM RESIDENTIAL CARE FOOD SERVICE MANAGEMENT SYSTEM

Published by:

Consulting Nutritionists of Central Illinois, Inc.

524 West Forrest Hill

Peoria, Illinois 61604

Copies of The Management System are available from the above address.

APPENDIX B

TABLE OF CONTENTS OF CONSULTANT'S POLICY AND PROCEDURE MANUAL

Dietary Policies and Procedures

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APPENDIX C

TABLE OF CONTENTS OF FACILITY'S POLICY AND PROCEDURE MANUAL

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Table of Contents, continued:

The information that follows has been developed and/or compiled by the Dietitian/Consultants of Consulting Nutritionists of Central Illinois, Inc. and is the property of CNCI, Inc.

The materials are intended for use ONLY in CNCI, Inc. accounts and are to be used SOLELY by CNCI consultants.

Appendix 1: Forms and Handouts

Appendix 2: Index of Inservices

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VITA

Marvin E. Turl attended Iowa Wesleyan College, in Mt. Pleasant, Iowa, and received his B.S. in Psychology in 1966. After graduation, he worked as a broadcast journalist/producer until 1969 for WMBD T.V., part of Midwest Broadcasting Company, Inc., Peoria, Illinois.

In 1969, Dr. Turl received his master's degree in Psychology from Illinois State University, Normal, IL. After his master's work, he interned until 1970 for the State of Illinois, Department of Mental Health, at Peoria State Hospital, in a supervised internship in Clinical Psychology. He continued on at the hospital and worked also at the Zeller Mental Health Center in Peoria until 1983, in the position of Clinical and Administrative Psychologist. During that time, Dr. Turl became owner and vice-president of C.N.C.I., Incorporated, 524 W. Forrest Hill, Peoria, and held these positions until Oct. 1, 1986.

Dr. Turl has published articles in Dietetic Currents and Public Health Currents, concentrating on the role of nutrition in the treatment of the alcoholic.