

An Evaluation of the Selection Process of Hospital Information Systems

April M. Thompson

This research study evaluates the selection process of a Hospital Information System (HIS), focusing on the level of compromise required by healthcare professionals during said process and the level of satisfaction achieved with the system selected. How other variables, such as job title, length of experience in the healthcare, data processing, and information systems fields affect these measured levels are also evaluated. Results of this study indicate that a HIS is critical to the viability of a hospital's operation and the level of compromises made during the selection process have an impact upon the how satisfied the healthcare provider is with the HIS they select.

INTRODUCTION

The Research Problem

Government and other payers of medical bills have pressured hospitals to reduce the cost of medical care. As a result, hospitals have dramatically changed their methods of operation. These changes have resulted in an increasing need for sophisticated Hospital Information Systems (HISs) and an increasing need for hospitals to contract with software vendors for information services they do not have the resources to develop themselves. HISs, however, have not kept pace with industry changes and a high level of hospital dissatisfaction with available HISs prevails.

Creation of Hospital Information Systems (HISs) began in the early 1960s. Products initially developed for acute care hospitals were either financial or partial patient care systems. Most of the products developed during this time were discontinued; many of the companies that developed these products had gone bankrupt or were acquired by other corporations.¹

The subsequent generation of HISs were introduced in the mid to late 1970s. These systems focused primarily on hospital financial applications. Patient care and clinical systems still remained in the embryonic stages of development.

In the late 1970s, a new generation of database software emerged. These new

From 569 El Capitan Drive, Danville, California 94526.

systems offered increased screen flexibility and pathways. Patient care software expanded and began to offer full patient care systems. Automated systems finally became more economically feasible and accommodating to the smaller hospitals of less than 200 beds.

The role of HISs since the late 1970s has become more expansive within the acute care hospital. According to Coulter,² the traditional reporting structure of a hospital during the 1970s consisted of the data processing department reporting to the Chief Financial Officer (CFO) because the majority of automated information systems were designed to support the operations of the financial department. A trend developed, however, which separated data processing from finance. Data processing began to report to the hospital's Chief Operations Officer (COO). This shift in the traditional hospital reporting structure indicated the hospital industry's recognition that HISs were not an exclusive need or concern of the financial operations, and all operational aspects of a hospital were becoming dependent upon information systems.

Coulter also reported that the motivating factors behind this reporting structure were changes in the healthcare computer industry.² After implementation of financial information systems, many hospitals began to acquire specialized systems for other areas within the hospital, such as laboratory, pharmacy, and medical records. Patient care systems became more pervasive in the hospital environment and admission/discharge/transfer modules of information systems were introduced. Many hospitals also began to automate the nursing units for order entry and results reporting. Other clinically based systems, which had an impact upon a number of departments within the hospital, were also being developed and implemented.²

Other changes which have occurred in the healthcare industry since the late 1970s have further prompted the expansion of HISs and the need for a new generation of automated systems. Dorenfest reported the rapid change in industry needs began with diagnosis-related groups (DRGs) of illnesses and fixed pricing in 1983.³ As the hospitals' volume of ambulatory-care increased, the volume of inpatient care decreased. In addition, hospitals began to pursue diverse business ventures in response to the expanded scope of healthcare needs in the marketplace.

Alternative delivery mechanisms, decreased utilization of acute care services, and competition had a great influence upon the products that became available in the hospital computer industry and the way in which automated information systems were perceived.

Many of the financial systems designed in the 1970s did not meet the changing needs of the hospital industry in the early 1980s. A study done by Dorenfest revealed a high level of hospital dissatisfaction with automated patient accounting systems existed in 1987.⁴ Dorenfest further demonstrated the overall frustration of the industry with available automated systems by revealing that a formerly automated hospital user switched to a manual system.

Dorenfest noted that after more than two decades of computer use, the hospital industry had still been unable to tap the potential of computerization.⁵ It was further asserted that dissatisfaction with current computerized financial systems was widespread amongst the healthcare industry and computer use in patient care areas had still not met hospital needs.

The cause of this lack of needed sophistication within the industry was not from the lack of invested resources. The hospital industry had invested heavily in the development of patient care systems during the past two decades. Two companies in particular, Spectra

Medical Systems and Nadacom, invested an estimated \$100 million in the development of comprehensive, integrated patient care systems. Nearly all of the 50 hospitals that purchased these systems, however, have replaced them. These two companies, both founded in 1969, are no longer in the patient care system business.⁵

Ginsburg and Caretta concurred with Dorenfest⁵ about the dissatisfaction with HISs and reported that some of the deficiencies identified by hospital financial managers were as follows: operation and maintenance required excessive time; features needed by hospital management for cost accounting, case-mix analysis, or corporate management were not available; customization and adaptation to local hospital requirements were unavailable; integration or interface to patient information systems was inefficient; timeliness and flexibility desired by the hospital was not provided.^{5,6}

Even after 20 years of development, the leading patient care systems do not provide hospital executives what they need: an automated system in which patient medical records, financial statistics, and ancillary service orders and entries are updated simultaneously. Dorenfest claimed the typical automated system might allow entry of a physician's order by a nurse or clerk, but only 50% to 75% of these orders were communicated to ancillary service departments and the patient billing.⁵ The remaining orders were still handled manually.

In the 1960s and 1970s, the alternatives for acquiring new software were so limited, many hospitals chose to develop their own. Keeping up with the changing needs of the hospital industry, however, made it economically unfeasible for a single hospital to continue to develop a new system and maintain it on their own.⁴

With fewer hospitals developing their own software, the need for hospitals to buy from a software vendor had increased. Dorenfest revealed that 76% of hospitals with more than 100 beds who were using automated patient systems in 1987 were served by six major software vendors.⁴ Dorenfest also revealed in another study that nearly 30% of the nation's community hospitals are considering purchasing a patient care system.⁵

With the increased demand for HISs and the increased need for hospitals to look for software products developed outside their organization, the demand for hospital personnel to evaluate available software has also increased to levels greater than ever before.

In summary, in the midst of the tremendous industry changes which entail cutting costs and still providing a high level of patient care, hospitals are not getting what they need, want, or demand with respect to information systems.

The Significance of the Study

The process of vendor system evaluation and decision making in this current state of flux is particularly critical. "The acquisition of a major software package for a healthcare institution may be considered, without exaggeration, a matter of life and death. If the software package is responsible for crucial financial operations such as patient accounting, the institution can live or die by the results. If the package performs vital functions relating to patient care, the health and safety of patients will, without question, depend upon that software."⁷ Mazzoni quoted Randall Osterhues, a product manager for Pacific Health Resources in Los Angeles, as saying that a hospital's investment in information systems was growing and a hospital must choose the right system if it expected to remain competitive and profitable.⁸

When choosing an information system, hospitals cannot afford to make mistakes; they must make the best decision possible based upon their individual needs, and in full consideration of the limitations of available healthcare software products.

The particular area of concern addressed in this study was the level of compromise required in the system evaluation process and whether the level of compromise during the process had an impact upon the level of satisfaction achieved with the system chosen. Compromise had been identified as an important component in the evaluation/decision making process of HISs based upon prior research. Krantz *et al.*⁹ reported that when Chilton Memorial, a 270 bed hospital in Pompton Plains, New Jersey, purchased a HIS, the vendor was asked to compromise during the negotiation process in order to accommodate Chilton's budget.⁹ Chilton Memorial found these compromises necessary in procuring a system that adequately met their hospital's needs. Savage addressed the subject of negotiation.¹⁰ It was noted that during this decade of strategic realignment within the healthcare industry, negotiation was one key to hospital survival. Since the process of negotiation consisted of a series of compromises between parties, Savage's study indicated that compromise played an important factor in hospital decision making.

Measuring the level of compromise was a cumulative measurement of: the amount of time invested in evaluating a system; the demand for a quality system being more important than the price of it; the strength of the cost of the system in the negotiation of the sale; the hospitals' preparedness in the systems evaluation/decision making process; the hospitals' attitudes toward the complexity of the system selection process; the hospitals' expectation level of a system fulfilling their needs; and the hospital's perceptions of the communication difficulties and conflicting interests of various evaluators when making a group decision. The measured level of compromise increased: (1) when getting a system was more important than how much it cost (because cost is always a factor for hospitals today, as research indicates); (2) when more parties were involved in the decision making process (because of their diverse needs, desires, and perceptions); (3) as hospitals objectives, requirements, and conditions rose; (4) as the complexities and communication difficulties between technically and non-technically oriented people and issues rose; and (5) as the disparity between the hospital budget and its need for a quality HIS widened. The measured level of compromise decreased: (1) as the systems offered by vendors increased in functionality and quality, and (2) as vendor prices decreased to accommodate the hospital's budget.

Resolution of the hospital industry's software problems with the development of sophisticated, integrated, user friendly, and efficient systems could be another 2 decades away. Until then, it is hoped that this research will provide insight to hospital and healthcare vendors about the evaluation process of an HIS, the efficiency and effectiveness of the evaluation process as perceived by hospital industry professionals, and how compromise during the selection process equates to hospital satisfaction.

The Research Question

The research question that guided this study involved the issue of compromise when evaluating an HIS, and whether there was a relationship between the level of compromise and the level of satisfaction achieved.

This descriptive study attempted to answer this question by evaluating the level of

compromise and the level of satisfaction with the system chosen during the evaluation and decision making process of choosing a HIS.

Seven variables were identified as possibly having an effect upon the outcome of these levels: length of employment at the hospital, length of employment in the healthcare industry, length of employment in the data processing/information systems field, sex, type of facility, and size of facility. An explanation as to why these variables were identified is provided in the Methodology Section.

Definition of Terms

Diagnostic Related Groups (DRGs) were referred to in this research for the purposes of identifying a leading cause for change of information needs within the acute care hospital. In 1983, the government implemented the Prospective Payment System (PPS) which changed the method in which acute care hospitals were paid for Medicare claims. All diseases, illnesses, and injuries that patients were treated for at hospitals were classified within a certain DRG, and reimbursement of services were based upon the DRG reported by the hospital on the patient's billing. Approximately 465 DRGs were introduced.

The introduction of the DRGs marked the end of acute care hospitals being paid for Medicare services strictly based upon the cost of services provided to the patient.

Goals and Objectives

This research was designed to focus on how individuals working in the hospital industry perceived the importance of HISs, how much compromise they perceived as being required when evaluating and selecting a HIS for their hospital, and how satisfied they are with the system they selected.

Delineation of the Research Problem

This research study determined whether hospital industry personnel's perceived importance of HISs varied based upon the gender of the respondent, their position at the hospital at the time of the evaluation, their length of employment within the healthcare, data processing or information systems field, their length of employment at the facility where the evaluation process was conducted, and the type and size of the facility where the evaluation took place. It also determined how much compromise hospital industry personnel perceived as being required during the evaluation and decision making process of a HIS and whether this level varied based upon the gender of the respondent, the position the respondent had at the hospital during the evaluation, the length of time the respondent was employed at the hospital at the time of the evaluation, the length of employment within the healthcare, data processing and information systems field, and the size and type of facility where the evaluation took place.

The degree of satisfaction achieved with the HISs selected and how it varied based upon the seven variables stated above was also determined in this study.

The questions which were posed in this research were as follows: What was the perceived level of importance of HISs among healthcare industry personnel? How much compromise did healthcare industry personnel perceive as being required during the

evaluation and decision making process of a HIS? What was the level of satisfaction achieved by healthcare industry personnel with the HIS selected?

The questions posed by this research were answered. The perceived level of importance of HISs among healthcare industry personnel, the amount of compromise the healthcare industry personnel perceived as being required during the evaluation and decision making process of a HIS, and the level of satisfaction achieved by healthcare industry personnel with the HIS they selected was determined in this study based upon a selected sample of the population. Also determined was the level of importance, compromise, and satisfaction for each of the seven variables: gender, position held at the evaluating hospital, length of employment in the healthcare, data processing, or information systems field, length of employment at the facility where the evaluation process was conducted, and the size and type of the facility.

Comparisons of the levels of importance, compromise, and satisfaction were to be made in an attempt to answer whether there was a correlation between the level of compromise perceived as required during the system evaluation process and the level of satisfaction achieved with the system chosen. The relationship between the level of importance of HIS and the level of compromise and satisfaction was also questioned and determined by this research.

Scope and Delimitations of the Study

Based upon the research methods employed and boundaries established, there were certain delimitations of this study. This study encompassed only business office, data processing, nursing, clinical, financial, and administrative personnel in California hospitals chosen by judgmental and snowball nonrandom sampling techniques. Not included in this study were healthcare representatives from software vendors, long-term healthcare facilities, or rehabilitation hospitals. This study focused on primarily acute care hospitals.

The measurement of the levels of importance, compromise, and satisfaction in this study was limited to seven variables: gender, size and type of facility, position and length of employment at the hospital, and length of employment within the healthcare and data processing fields.

This study also limited the population of healthcare personnel to those individuals who had participated in the evaluation and decision making process of a HIS within the last 3 to 5 years. The population, therefore, did not include those individuals that may have been acutely aware of the process at their hospital and yet were not directly involved in the actual selection and decision making process itself. These individuals insight and perception of said process were excluded from this study.

Responses to statements on the questionnaire (see Appendix A) were limited to either a positive or negative response. Not establishing a neutral category for "not relevant" or "don't know" responses was a delimitation of this study.

Summary

The need for healthcare institutions to reduce costs, increase productivity, and more efficiently deliver medical services has prompted the demand for sophisticated and comprehensive healthcare systems. Limited budgets, the complexity of hospital needs, and the

multifaceted, highly technical industry of computers make the selection of a HIS a challenging and complicated endeavor for healthcare professionals.

Research eluded to the fact that negotiation was one key to hospital survival. Since the selection of a HIS involves negotiation between vendor and healthcare personnel, this study attempted to apportion some of the components that contribute to the complication of selecting a HIS by measuring how important a HIS was to healthcare professionals, how much compromise was perceived as required during the selection process, and how satisfied healthcare industry professionals were with the system they had ultimately chosen.

REVIEW OF RELATED LITERATURE

Healthcare Industry Changes

Several studies have indicated that the implementation of Diagnostic Related Groups (DRGs) in 1983 strongly contributed to the changing needs of hospitals for sophisticated Hospital Information Systems (HISs). The literature reviewed also revealed that, in spite of attempts to keep pace with these healthcare industry changes, HISs still fell short of meeting hospital needs.

Dorenfest claimed the healthcare industry's demand for a new generation of automated processing systems began in 1983 when diagnosis-related groups (DRGs) of illnesses and fixed pricing were introduced.⁴ Other factors Dorenfest suggested as contributory to the growing obsolescence of systems were the rising share of the hospital industry's volume of ambulatory-care activities, rather than inpatient business, and hospital operations of diverse businesses, such as prepaid insurance plans and employer group discount plans.

Coulter also claimed the implementation of DRGs in 1983 decreased utilization of hospital inpatient services and competition had a serious affect upon the hospital's method of operation and the way in which automated information systems were perceived.² Lefort concurred that healthcare institutions' rapid change in information processing needs were due to the sudden shift from a cost-based environment—brought on by DRSs—to a competitive marketplace with increased bidding, custom pricing, and consumer selectivity.¹¹

Coulter concluded that the reporting structure within the hospital in the 1980s had changed in response to the changing needs of Hospital Information Systems (HISs).² This change in organizational structure separated data processing from finance, whereby Chief Financial Officers no longer had the sole responsibility of the data processing areas. Coulter claimed the reasons for this shift in responsibility were due to changes in the healthcare computer marketplace. Nonfinancial department systems were developed, and technological improvements prompted more "user-friendly" systems that did not require a highly technical background to use. HISs had more of an impact hospital-wide, and were no longer strictly of financial orientation.

Demonstrating the evolution of HISs, Sneider and Abrami reported three generations of HISs.¹ The first generation of products developed in the 1960s were discontinued. The second generation of HISs were introduced in the mid to late 1970s and, as also reported

by Coulter, this generation of HISs were primarily of financial orientation. Expanded and sophisticated HISs, with evolved hardware platforms, increased screen flexibility, and more efficient transition from various functionalities, were introduced in the third generation in the late 1970s.¹

The Increasing Need of Vendor HISs

Based upon research done within the last few years, an increase in the evaluation of HISs offered by various vendors was anticipated.

Jensen and Miklovic reported that each year since 1983, 5% more hospitals had developed in-house data processing systems to meet the need for information and hospital arrangements with outside data processing companies had declined.¹² Three years later, however, Dorenfest revealed that fewer hospitals developed their own software for patient accounting systems.⁴ Dorenfest asserted that the decline of inhouse developed software was because of the many options available for acquisition of software. Software vendors were having trouble keeping up with the changing needs of the hospital industry and, therefore, it became financial unfeasible for any individual hospital to continue to develop a new system and maintain it on their own.

Hurwitz¹³ supported what Dorenfest⁴ had asserted; Hurwitz agrees that the hospital's discontinued development of inhouse systems was because of difficulties in keeping up with industry changes and proved that a number of vendors who had focused on the development of a single system category had achieved excellent results. Hurwitz claimed this was one advantage vendors had over hospitals, and, therefore, hospitals would reap great rewards acquiring vendor systems as opposed to developing their own.

Interviews conducted by Dorenfest disclosed many more hospitals planned to buy new systems from vendors in the near future and purchases of new patient accounting systems were substantial in hospitals of all sizes.⁴

The Growing Importance of HISs

The literature reviewed indicated HISs were growing in importance and the decision to acquire an information system to meet the hospital's needs was a very costly one.

LeFort proclaimed the importance of proper information systems by pointing out the success and survival of many healthcare institutions was becoming increasingly more dependent upon the quality of the HISs that served them.¹¹

Mazzoni quoted Randall Osterhues, a product manager for Pacific Health Resources in Los Angeles, as saying that hospitals' investment in information systems and new software applications was growing.⁸ Osterhues also stated that a hospital must be careful to choose the right system if it expected to remain competitive and profitable in such an increasingly cost oriented environment. Also, according to Mazzoni, hospitals had grown very dependent upon a cost accounting system, particularly since the inception of DRGs. The hospitals' increased need to control costs, in response to DRGs and other cost cutting measures implemented by the government and other third party payers, had triggered an explosion in the development of cost accounting software.

In their research about the team approach in investigating software options, Manfredi and Peterson claimed the acquisition of software for a hospital must be considered a

matter of life and death because of the crucial financial operations and vital operations related to patient care that are involved.⁷ Manfredi and Peterson also claimed that because of the importance of HISs, the selection process in choosing software must be done in an organized and clear sighted manner.

Packer claimed that United States' hospitals would spend in excess of \$3.9 billion on information systems in 1987 and, therefore, the communication between hospitals and vendors would be critical.¹⁴ Packer also claimed that, since hospitals intended to spend from 3 to 6% of its annual budget on an information system, a hospital must thoroughly evaluate their system needs and the systems and services vendors had to offer.¹⁴

System Shortcomings and Hospital Dissatisfaction

Research studies have shown that in the last decade there has been growing dissatisfaction with HISs. The most current literature continued to reveal that healthcare personnel still found systems inadequate and hospital dissatisfaction continued to grow.

LeFort surveyed healthcare organizations and found their information systems did not adequately meet their organizations' needs.¹¹ A major issue concerning system failure was the inflexibility of the application software.

Packer revealed a continued dissatisfaction with healthcare information systems.¹⁴ Packer compared the information system applications of six leading vendors, and rated them on the basis of end-user satisfaction, technical satisfaction, functionality, and versatility. Packer found that only four of the six vendors received satisfactory ratings for their support services to end-users in three particular applications. Data processing professionals also expressed dissatisfaction with the performance of financial management applications. Packer concluded that vendors needed to provide a higher level of support services to both end-users and data processors and improve financial management applications.

According to Dorenfest, only a fraction of the benefits of automation had been realized by the hospital because of a variety of reasons.³ The hospital industry had not tapped the potential of computerization and a widespread dissatisfaction with current computerized financial and patient-care systems had been found.

Recent research on the level of hospital satisfaction with automated systems was conducted by Dorenfest.⁴ It reported a high level of hospital dissatisfaction with automated patient accounting systems. Dorenfest claimed that 11.5% of 3,039 hospitals (with more than 100 beds) surveyed were dissatisfied with their current system. Dorenfest also reported that new products were still falling short of industry requirements in key areas.⁴

System Selection Criteria

Research indicated that certain key criteria were used when selecting HISs. Important criteria declared by various research studies were system flexibility, expense, and growth potential. These items were considered when the questionnaire for this study (see Appendix A) was constructed.

Ginsburg and Caretta concluded the importance of completeness in the decision-making process of selecting the most appropriate system for the hospital could not be overemphasized.⁶ Ginsburg and Caretta claimed the development of a checklist should be considered a major part of the planning process for the purpose of forcing hospitals to

consider all its needs and requirements apart from the consideration of a specific vendor system. Ginsburg and Caretta also claimed that information should be gathered in five broad areas: general background, functionality and features, vendor profile, technical issues, and cost considerations.

Kennedy and Collignon also maintained that several key areas when selecting HISs were as follows: flexibility/versatility, ease of use, integration capabilities, price, support quality/availability, online capabilities, ease of modification, features, expansion/growth capabilities, and reporting system.¹⁵

The Decision Making Process

Individual differences in information handling abilities and the potential of information overload in the evaluation of HISs were considered, for the purposes of this research, contributing factors in the level of compromise required when making a system selection.

Research by Benbasat and Taylor addressed the problem of computer based management information system's designers not considering the capabilities and inadequacies of the human component.¹⁶ They stated the computer tends to overload the human user because of its vast information processing abilities.

Benbasat and Taylor also claimed one of the greatest difficulties that confronted administrative decision makers was their limited ability to process the large amounts of information required in complex decision problems. This may infer that the evaluation of an information system, assuming it required complex decision making, was complicated by the inability to absorb all information required to make a decision. Making a decision with lack of information was one factor defined, for the purposes of this study, as contributory toward the need to compromise.

Item 20 on the questionnaire used for this study established the degree to which the respondent rated their information processing capacities as a decision maker. Responses which indicated a high level of uncertainty and complication in the evaluation of HISs indicated a high level of compromise required in the decision making process.

Yaverbaum and Sherr indicated people search for a solution to a problem until a satisfactory solution is achieved, and that decision making was concerned with the selection of a satisfactory alternative.¹⁷ It might be inferred from this study that hospitals, out of the need to make a decision, selected a system prior to finding a satisfactory solution because of the inadequacies of the systems available to them. Decision making under this premise indicated a high level of compromise because factors defined, for the purpose of this study, as contributory to compromise are making a decision based upon incomplete information and making a decision within an unreasonable period of time.

Compromise as a Variable

Recent studies have indicated negotiations between vendors and hospitals are filled with compromises if both parties are to get what they want and finalize the sale of a HIS.

According to Gardner, vendors have been under pressure to compromise the cost of their systems by cutting the fees they charge to client hospitals. Gardner quoted Ronald Johnson of R. L. Johnson and Associates of Foster City as saying vendor price cutting in 1987 reduced vendor's revenues by an average of 7.6%.

Krantz *et al.* claimed hospitals must balance their need for sophisticated computer systems with current financial constraints.⁹ One such hospital recently faced with this balance was Chilton Memorial in New Jersey. Chilton had high expectations when they began to look for a HIS and found that the comprehensive software package they sought was usually found in hospitals with 500 or more beds that had a much larger budget than Chilton's 270 beds could warrant. Chilton was unwilling to compromise the quality of the system they desired and, therefore, sought vendors who were willing to make compromises with the cost of their systems. Chilton also employed the services of a consultant who was willing to look beyond the usual solutions for a smaller size hospital, and enter into serious negotiations with vendors. Chilton only considered vendors who were willing to cut their costs to what the hospital administrative staff felt were reasonable levels for the hospital's bed size.

According to Krantz *et al.*, Chilton was able to find a system within the price range they desired. Ultimately, the series of negotiations that occurred between Chilton and the selected vendor led them to the procurement of a system that met their needs "superbly."⁹

Healthcare managers, according to Morris, are faced with two opposing forces: to reduce and control costs and yet extend automated services.¹⁹ Morris claimed that although operational decisions must clearly consider the trade-off between service capability and cost, this trade-off cannot be too one-sided and cost control cannot always be primary in the decision. This dilemma faced by healthcare professionals suggests that in order to strike a balance between satisfying executive management by reducing costs and satisfying clinicians and business management personnel by providing more sophisticated automated services, a great deal of compromising is required, particularly with cost, in selecting HISs.

According to Morris, ". . . few institutions have attempted to either coordinate software acquisition or force compatibility."¹⁹ Morris' choice of word "force" infers that hospitals must find the most appropriate and responsive system for their facility if they are to achieve the information they desire from their HISs. A hospital's effort to find the most appropriate system, therefore, requires serious negotiation, which may lead to a series of compromises with the vendor in order to achieve compatibility.

Lemon and Meir also stipulated the conflict healthcare executives were faced with in trying to satisfy all hospital system users and still control costs.²⁰ According to Lemon and Meir, the decision of how to allocate the portion of the budget identified for information systems usually created conflict between marketing/planning strategists who wanted systems that were responsive to strategic information needs, and line managers who wanted increased functionality that would support their day-to-day operations.

Manfredi and Peterson revealed hospitals should enter into negotiations with vendors when preparing the contract for acquisition of a system.⁷ Manfredi and Peterson claimed vendors drafted contracts extremely favorable to them, and insisted that hospitals sign these contracts as-is. Manfredi and Peterson encouraged hospitals not to sign so quickly, but to fight for what they wanted and demand the vendor make necessary compromises.

Savage concluded that negotiation is one important way for hospital executives to manage conflict and accomplish new projects.¹⁰ Savage further concluded that because of the rapidly changing nature of the healthcare environment, as well as conflicts and politics within their organization, managers need to negotiate effectively.

Chapter Summary

Considering the process of negotiation consists of a series of compromises, the selection process of HISs is a negotiation between vendor and hospital and the path to final decision making consists of a series of compromises in itself.

The chapter that follows delineates the methodology used in this study to measure how important an HIS is to healthcare professionals and how much compromise is perceived as required in the evaluation of a HIS.

METHODOLOGY

Introduction

This exploratory study of the selection process of Hospital Information Systems (HISs) determined the relationship between the level of compromise required during the evaluation process and the level of satisfaction achieved with the system chosen by surveying healthcare professionals who had been involved in the selection and/or decision making process of HISs within the last 3 to 5 years.

Selection of Subjects

Healthcare professionals surveyed were Directors, Manager, and administrative personnel in the Business Office, Financial, Nursing, Clinical, Data Processing/Information Systems, Medical Records, and Quality Assurance areas within the hospital who were not only involved in the selection process, but also experienced the implementation and utilization of the system selected. These healthcare professionals' surveyed responses were based upon the facility where they experienced the selection process and, therefore, their current employment at that facility was not a requirement.

This research was limited to hospitals in California due to limited resources in obtaining information outside the state.

Research Procedures

A nonrandom sampling technique in choosing healthcare professionals was used. In consideration of the specific requirements of the population and in anticipation of the difficulty in obtaining responses from the busy, time-pressured healthcare professionals of today, judgmental and snowball sampling was deemed necessary.

An unstructured interview was conducted at the onset of this study, with two healthcare professionals, to ascertain the quality of the questions on the questionnaire (see Appendix A). Subsequent to the interviews, the questionnaire was slightly modified, primarily to clarify some questions, and individually administered by mail.

Some healthcare professionals chosen for research received telephone calls in an attempt to solicit interest and prompt their responses. Time and resource constraints did not enable the telephoning of all healthcare professionals selected.

Operational Definitions

This study of the evaluation and decision making process of HISs focused on compromise as a variable. This study determined the level of compromise during said process and the relationship between the degree of compromise and the degree of satisfaction achieved with the system selected.

Due to the broad definition of the word compromise, it was clearly defined (as expressed in the Introduction) for the purposes of this research study.

Data concerning the level of satisfaction achieved after the system had been implemented were also collected in this study.

Also determined in this study was the level of importance placed upon HISs. The value or importance of HISs as perceived by the healthcare professionals surveyed could not be assumed and, therefore, was established. At the onset of this study it was noted that a low overall level of importance of HISs might be critical when evaluating the results of this research.

Based upon prior research it was determined that the decision making process might vary depending upon the type of facility. According to Alexander and Fennel, the decision making authority between hospitals and corporate headquarters or governing boards of multi-hospital systems varied.²¹ Data were collected in order to determine whether a facility was part of a multi-hospital system. The relationship between the selection and decision making process with multi-hospital systems and standalone sites was evaluated. Multi-hospital systems were defined as organizations with two or more hospitals owned, leased, sponsored, or managed by a single corporate entity. Standalone sites were defined as hospitals that are not a part of a chain of hospitals owned, leased, sponsored, or managed by a single corporate entity.

Prior research also indicated that the size of a facility might have an impact upon the software selection and decision making process. Krantz *et al.* reported that comprehensive systems were usually found in large hospitals with 500 or more beds and, therefore, smaller hospitals might have needed to compromise their needs because of budget constraints.⁹ Sneider and Abrami also reported that the systems available to large facilities are generally total in-house approaches which start at a price of \$1 million (hardware included), whereas small facilities were limited to software that could run on minicomputers which ranged in price—including hardware—from 75,000 to \$400,000.¹

The size of the facility was measured by the number of licensed beds. The size of the facility, based upon the number of beds it had, was ascertained. The level of compromise between small and large facilities was compared.

Instrumentation

The questionnaire (see Appendix A) distributed for the purposes of this study collected data from three areas of concern: how healthcare professionals perceived the level of importance of HISs, the degree of compromise healthcare professionals perceived as required during the evaluation process, and how satisfied healthcare professionals were with the system chosen.

The questionnaire was divided into two parts. Part 1 contained seven questions which obtained descriptive information about the respondent and the facility in which the eval-

uation process took place. Questions 1, 5, and 6 determined the length of time the respondent had been in the healthcare and data processing field, and the length of time the respondent was employed with the facility at the time of the selection process began. Collection of these data determined whether the level of HIS importance, compromise, and satisfaction varied among those respondents that had been in the healthcare or data processing industry for a long period of time in comparison to those that had not. These variables were determined important based upon research which revealed the healthcare industry over the last decade had undergone dramatic changes and because HISs had not kept pace with the changes, a high level of dissatisfaction with HISs had eroded.^{3,4,11,14} Healthcare professionals who had experienced the evolution of the healthcare industry during the last decade may hold tainted perceptions of the selection process and the level of satisfaction achieved.

Questions 2 and 7 in Part 1 of the questionnaire determined the size and type of the facility. It was determined important to obtain this data because the decision making at multi-hospital chains (or systems) might vary from standalone sites and religious institutions.²¹ Types of hospitals similar to multi-hospital systems are government, religious, county, and community hospitals because of governing entities that might have strong influences on decision making outside the hospital administrative staff.

Question 3 in Part 1 of the questionnaire determined the gender and position of the respondent at the hospital; this study established whether these variables influenced the perceived levels of HISs importance, compromise, and satisfaction achieved.

Part 2 of the questionnaire consisted of three sets of questions: how the respondent rated the level of importance of HISs, how the respondent rated the level of compromise required during the evaluation process, and how satisfied the respondent was with the system chosen.

Items 1–3 in Part 2 of the questionnaire determined the importance of HISs. It asked the respondent to rate each statement in one of four categories: strongly agree, agree, disagree, and strongly disagree.

Items 5–6, 8–14, 16–18, 20, and 24 on Part 2 of the questionnaire determined the level of compromise required during the evaluation/decision making process of selecting a system. The respondent was asked to rate each of these statements in one of four categories: strongly agree, agree, disagree, and strongly disagree.

Items 19, 21, 23, and 25–28 on the questionnaire determined the degree of satisfaction with the system selected. The respondent was asked to rate each of these statements in one of four categories: strongly agree, agree, disagree, and strongly disagree. A strongly agree response indicated a high level of satisfaction with the system chosen; a strongly disagree response indicated a low level of satisfaction with the system chosen.

Data obtained from the survey instrument were entered into MYSTAT, the student version of Systat's statistical software package.²²

Data Analysis

Questions 1 (years of employment), 5 (years of experience), 6 (years of experience), and 7 (number of beds) on Part 1 of the questionnaire resulted in interval data. All three measures of central tendency and standard deviation were determined. The remaining questions in part 1 of the questionnaire, item 2 (type of facility), item 3 (sex), and item 4 (work position) resulted in nominal data; the mode was reported for this data.

Part 2 of the questionnaire used Likert-type scales. This resulted in ordinal data which were summed into interval scales and grouped in one of three categories. The first three statements (items 1 through 3) were grouped in one category: the importance of HISs (IMPLEVEL); items 19, 21, 23, and 25–28 were grouped in another category: satisfaction level of the system chosen (SATLEVEL); the remaining questions on Part 2 of the survey (excluding items 4, 7, 15, and 22) were grouped in a third category: level of compromise when choosing a system (COMLEVEL). Each of these groups of scores were added up to come up with a level of compromise, HIS importance, and level of satisfaction scale. The three measures of central tendency and standard deviation were found and reported.

A Pearson product-moment correlation coefficient was determined to establish the relationship between IMLEVEL, SATLEVEL, and COMLEVEL.

The level of compromise, level of satisfaction, and level of importance of HISs were determined for the various sizes and types of facilities, the various levels of healthcare and data processing experience, the various lengths of employment and positions held at the evaluating facilities, and among each gender. Tables 5 and 6 displayed these results.

Preparing Data Input

To ease the process of analyzing the results of the survey, the responses from the Likert-type scales in Part 2 were prepared so that all high scores would indicate a positive response (agreement) or high level of measurements (of importance, compromise, and satisfaction) and all low scores would indicate negative (disagreement) or low levels of measurements (of importance, compromise, and satisfaction). With the establishment of these parameters, the data were prepared for entry in the following manner:

1. Ratings Reversed—Because “agree” responses were given a lower rating than “disagree” responses on the questionnaire, reversing the responses on items 1 through 28 was required. In other words, strongly agree responses were changed from a rating of 1 to a rating of 4; strongly disagree responses were changed from a rating of 4 to a rating of 1.

2. Survey Items Reevaluated—Also in keeping with the evaluation standards as stated above, items 4 through 28 were reevaluated to ensure that a strongly agree rating equated to a high level of importance, compromise, and satisfaction and a strongly disagree rating equated to a low level measurement of these variables. For those items which did not follow these parameters, the responses were reversed.

3. Selected Survey Items Eliminated Or Reclassified—While reevaluating the survey instrument, it was also found that responses to some items previously identified as items related to the measurement of compromise could not, in fact, conclusively be evaluated in terms of the level of compromise faced by the respondents. These disputable items (4, 7, 15, and 22) were, therefore, eliminated; the responses to them were not recorded, evaluated, or reported. Additionally, some items previously identified as being a measurement of compromise were in fact measurements of satisfaction. These items—19, 21, and 23—were placed within the measurement of satisfaction category.

A conversion table (see Table 1) was used to ease the process of preparing the data for entry into the MYSTAT statistical software package.²² A two-step process was required. Step 1: All responses on the Likert-type scales (items 1 through 28) were reversed;

Table 1. Data Input Conversion Table

| Survey Item No. | Variable Name | Rating Reversal | Agree = High or Positive? | Final Decision |
|-----------------|---------------|-----------------|---------------------------|----------------|
| 1 | IMP1 | Reverse | Yes/Remain | Reverse |
| 2 | IMP2 | Reverse | Yes/Remain | Reverse |
| 3 | IMP3 | Reverse | Yes/Remain | Reverse |
| 4 | ELIMINATED | | | |
| 5 | COMP1 | Reverse | Yes/Remain | Reverse |
| 6 | COMP2 | Reverse | Yes/Remain | Reverse |
| 7 | ELIMINATED | | | |
| 8 | COMP3 | Reverse | No/Reverse | Remain |
| 9 | COMP4 | Reverse | No/Reverse | Remain |
| 10 | COMP5 | Reverse | No/Reverse | Remain |
| 11 | COMP6 | Reverse | No/Reverse | Remain |
| 12 | COMP7 | Reverse | Yes/Remain | Reverse |
| 13 | COMP8 | Reverse | No/Reverse | Remain |
| 14 | COMP9 | Reverse | No/Reverse | Remain |
| 15 | ELIMINATED | | | |
| 16 | COMP10 | Reverse | No/Reverse | Remain |
| 17 | COMP11 | Reverse | No/Reverse | Remain |
| 18 | COMP12 | Reverse | No/Reverse | Remain |
| 19 | SATIS1 | Reverse | Yes/Remain | Reverse |
| 20 | COMP13 | Reverse | No/Reverse | Remain |
| 21 | SATIS2 | Reverse | No/Reverse | Remain |
| 22 | ELIMINATED | | | |
| 23 | SATIS3 | Reverse | Yes/Remain | Reverse |
| 24 | COMP14 | Reverse | No/Reverse | Remain |
| 25 | SATIS4 | Reverse | Yes/Remain | Reverse |
| 26 | SATIS5 | Reverse | Yes/Remain | Reverse |
| 27 | SATIS6 | Reverse | Yes/Remain | Reverse |
| 28 | SATIS7 | Reverse | Yes/Remain | Reverse |

this transaction was indicated in the “Rate Reversal” column of the table. Step 2: All questions were reevaluated to ensure that a positive (agree) response indicated a high level measurement of importance, compromise, and satisfaction. If it did, the rating remained (as indicated by a “Yes/Remain” in the “Agree = High or Positive” column); if it did not, the rating was reversed (as indicated by a “No/Reverse” in the “Agree = High or Positive” column).

Determining whether a rating of a particular item was to be reversed prior to data entry, the reversal/nonreversal decisions in steps 1 and 2 were analyzed. Step 1 required the reversal of all responses of items 1 through 28. If the rating was reversed in Step 2, then the rating as stated on the survey remained; if the rating remained in Step 2, then the weighting of the rating was reversed on the survey.

Limitations

There were inherent limitations to this study. These limitations involved the method of sampling, the respondents completion of the questionnaire, and the questionnaire itself.

Preliminary telephone calls to healthcare professionals that briefed them on the research may have distorted their responses to the survey. Also, since some of these respondents were friends and business acquaintances of the researcher, responses may have also been biased.

Part 2 of the survey requested that statements be rated in one of four categories: strongly agree, agree, disagree, and strongly disagree. If the respondent did not know whether they agreed or disagreed to any particular statement, that item on the questionnaire might have been left blank, or an erroneous response may have been given.

The nonrandom sampling techniques also imposed limitations to this study.

Responses to the questionnaire might have been biased. The respondent might have been cautious about responding negatively (indicating a high level of compromise, or low level of dissatisfaction) because of a concern over confidentiality. The respondent may have also be less inclined to respond negatively about their dissatisfaction with the system chosen because of their contribution to what may have been a poor decision.

There may be other variables which influenced the level of compromise and satisfaction that are unknown. This represents another limitation of this study.

This study surveyed healthcare professionals who were involved in the selection of a HIS of unknown magnitude. The type of system and the number of components to the system that was evaluated were not requested and, therefore, the impact of these variables was not established.

In the questionnaire, there were statements about the cost of the system. Some of the respondents may have been reluctant to reveal information on this sensitive issue, or may not have been involved in the economics of the system selection process. Responses to these types of questions might have been biased or unanswered.

Limitations to this study existed in the method in which compromise was defined. There may be many other factors which contributed to the level of compromise that existed in the evaluation process. The factors identified as contributory to compromise for this study might also in fact not be contributory toward the need to compromise.

The relationship between the level of compromise and the level of satisfaction established in this study does not explain the cause and effect relationship between these two variables. Also, what these levels of compromise mean are not known.

RESULTS

This research study focused on hospital industry professional's perceived level of importance of a Healthcare Information System (HIS), the level of compromise perceived as required during the evaluation and decision making process in choosing a HIS, and the level of satisfaction they achieved with the system they selected. This chapter reports the findings of these levels, what impact certain variables had upon these levels, and the correlation between these measured levels of importance, compromise, and satisfaction.

The first section of this chapter describes the sample. The second section provides an analysis of the findings, and the third section of this chapter summarizes the chapter and introduces the following section.

Description of Sample

The survey instrument (see Appendix A) was individually administered in three phases. The first phase consisted of 32 healthcare professionals chosen from a nonrandom method of judgmental and snowball sampling. The second phase consisted of six other healthcare professionals also chosen by the same methods.

As a latent attempt to procure at least 30 completed questionnaires, a third group of questionnaires were administered to 40 healthcare professionals randomly chosen from a healthcare trade magazine that was published 1 year prior to the mailing.

All professionals chosen for this study in this first and second phases were prequalified as having had an experience within the last 5 years with the selection of a Hospital Information System (HIS). The first group of professionals were referred by various healthcare business associates within the industry. The second group of professionals were selected by the first group of respondents. (Appendix A contains an example of an attachment that was sent with the survey which requested the names and addresses of those that may be eligible to respond to the survey.) The third group of professionals which were administered the survey were not prequalified; it was unknown whether or not they had been involved in the selection of an HIS within the specified timeframe or whether they still could be reached at the address published in the trade magazine.

The first group of professionals had the highest rate of response. Out of 32 surveys administered, 27 (87.5%) were returned. Out of the six surveys administered in the second group, none were received. Out of the 40 surveys administered in the third group, 9 (22.05%) were returned. Out of these 9, however, 6 (15%) were disqualified because although the respondent had been involved in the selection process of a HIS, the system chosen had not yet been installed and therefore the satisfaction of the system chosen could not be evaluated.

A sample of the cover letter affixed to the questionnaire is included in Appendix A.

Level of Importance

Three items (1, 2, and 3 of Part 2) on the survey asked the respondent to rate their level of agreement or disagreement to a particular statement about the importance of a HIS. After the data were prepared for input as described in the Methodology Section, responses ranged from 1 to 4; items not rated were given a neutral rating of 2.5.

On items 1 and 2, there were no low level ratings. The mode for items 1 and 2 measured 4.00 while the mode for item 3 measured 3.00 (see Table 2).

For each respondent, the responses to each of these three items were added together to obtain a total score for the level of importance. The maximum rating possible was 12 and the minimum rating possible was 4. The actual range of responses was a minimum of 8 and a maximum of 12 (see Table 2).

Both the mode and median for the total level of importance of a HIS was 10.00; the mean was 9.97 with a standard deviation of 1.10 (see Table 3).

Level of Compromise

Fourteen items on Part 2 of the questionnaire were used to determine the level of compromise perceived by the respondents during the evaluation/selection process of a

Table 2. Frequency Distribution of Discrete Data^a

| Variable | Description of Value | Frequency | Percentage |
|--------------------------------|---------------------------------|-----------|------------|
| Gender | Male | 17 | 56.67 |
| | Female | 13 | 43.33 |
| Total | | 30 | 100.00 |
| Job title | Business manager/Director | 8 | 26.67 |
| | DP Manager/Director | 4 | 13.33 |
| | Admitting Manager/Director | 0 | 00.00 |
| | Financial Officer/Director | 8 | 26.67 |
| | Controller | 2 | 6.67 |
| | Consultant | 1 | 3.33 |
| | Assistant Administrator | 1 | 3.33 |
| | Medical Records/QA MGR/Director | 3 | 10.00 |
| | Clinical/Nursing MGR/Director | 3 | 10.00 |
| | Total | | 30 |
| Hospital Type | Standalone Facility | 20 | 66.67 |
| | Multi-Hospital Facility | 10 | 33.33 |
| Total | | 30 | 100.00 |
| For/Not for profit facility | Not for profit facility | 11 | 36.67 |
| | For profit facility | 19 | 63.33 |
| Total | | 30 | 100.00 |
| Job position in financial area | Position not in financial area | 13 | 43.33 |
| | Position in financial area | 17 | 56.67 |
| Total | | 30 | 100.00 |
| Hospital size | Beds: 0.00 | 1 | 3.33 |
| | Beds: 93.00 | 1 | 3.33 |
| | Beds: 136.00 | 1 | 3.33 |
| | Beds: 177.00 | 2 | 6.67 |
| | Beds: 180.00 | 1 | 3.33 |
| | Beds: 181.00 | 1 | 3.33 |
| | Beds: 210.00 | 1 | 3.33 |
| | Beds: 220.00 | 1 | 3.33 |
| | Beds: 250.00 | 1 | 3.33 |
| | Beds: 312.00 | 1 | 3.33 |
| | Beds: 324.00 | 1 | 3.33 |
| | Beds: 400.00 | 1 | 3.33 |
| | Beds: 475.00 | 1 | 3.33 |
| | Beds: 486.00 | 1 | 3.33 |
| | Beds: 500.00 | 2 | 6.67 |
| | Beds: 527.00 | 1 | 3.33 |
| | Beds: 533.00 | 1 | 3.33 |
| | Beds: 550.00 | 2 | 6.67 |
| | Beds: 560.00 | 1 | 3.33 |
| | Beds: 606.00 | 1 | 3.33 |
| | Beds: 650.00 | 1 | 3.33 |
| | Beds: 711.00 | 1 | 3.33 |
| | Beds: 2000.00 | 1 | 3.33 |
| Beds: 3000.00 | 1 | 3.33 | |
| Total | | 30 | 100.00 |
| Time employed at facility | Months: 0.00 | 3 | 10.00 |

Table 2. Continued

| Variable | Description of Value | Frequency | Percentage |
|-----------------------|----------------------|-----------|------------|
| | Months: 1.00 | 2 | 6.67 |
| | Months: 2.00 | 1 | 3.33 |
| | Months: 6.00 | 3 | 10.00 |
| | Months: 18.00 | 4 | 13.33 |
| | Months: 22.00 | 1 | 3.33 |
| | Months: 36.00 | 1 | 3.33 |
| | Months: 40.00 | 1 | 3.33 |
| | Months: 60.00 | 2 | 6.67 |
| | Months: 72.00 | 2 | 6.67 |
| | Months: 84.00 | 2 | 6.67 |
| | Months: 96.00 | 2 | 6.67 |
| | Months: 99.00 | 1 | 3.33 |
| | Months: 134.00 | 1 | 3.33 |
| | Months: 168.00 | 1 | 3.33 |
| | Months: 192.00 | 1 | 3.33 |
| | Months: 216.00 | 1 | 3.33 |
| | Months: 240.00 | 1 | 3.33 |
| Total | | 30 | 100.00 |
| Healthcare experience | Months: 40.00 | 1 | 3.33 |
| | Months: 60.00 | 1 | 3.33 |
| | Months: 96.00 | 1 | 3.33 |
| | Months: 120.00 | 3 | 10.00 |
| | Months: 123.00 | 1 | 3.33 |
| | Months: 156.00 | 2 | 6.67 |
| | Months: 165.00 | 1 | 3.33 |
| | Months: 168.00 | 2 | 6.67 |
| | Months: 204.00 | 1 | 3.33 |
| | Months: 216.00 | 1 | 3.33 |
| | Months: 222.00 | 1 | 3.33 |
| | Months: 228.00 | 1 | 3.33 |
| | Months: 240.00 | 9 | 30.00 |
| | Months: 286.00 | 2 | 6.67 |
| | Months: 300.00 | 1 | 3.33 |
| | Months: 312.00 | 1 | 3.33 |
| Total | | 30 | 100.00 |
| DP/IS experience | Months: 00.00 | 14 | 46.67 |
| | Months: 24.00 | 1 | 3.33 |
| | Months: 36.00 | 1 | 3.33 |
| | Months: 48.00 | 2 | 6.67 |
| | Months: 54.00 | 1 | 3.33 |
| | Months: 60.00 | 2 | 6.67 |
| | Months: 96.00 | 2 | 6.67 |
| | Months: 120.00 | 1 | 3.33 |
| | Months: 123.00 | 1 | 3.33 |
| | Months: 135.00 | 1 | 3.33 |
| | Months: 180.00 | 1 | 3.33 |
| | Months: 286.00 | 1 | 3.33 |
| | Months: 288.00 | 1 | 3.33 |
| | Months: 360.00 | 1 | 3.33 |
| Total | | 30 | 100.00 |

Table 2. Continued

| Variable | Description of Value | Frequency | Percentage |
|-------------------|--------------------------|-----------|------------|
| Importance Item 1 | (1.00) Strongly disagree | 0 | 00.00 |
| | (2.00) Disagree | 0 | 00.00 |
| | (2.50) Neutral | 0 | 00.00 |
| | (3.00) Agree | 9 | 30.00 |
| | (4.00) Strongly agree | 21 | 70.00 |
| Total | | 30 | 100.00 |
| Importance Item 2 | (1.00) Strongly disagree | 0 | 00.00 |
| | (2.00) Disagree | 0 | 00.00 |
| | (2.50) Neutral | 0 | 00.00 |
| | (3.00) Agree | 10 | 33.33 |
| | (4.00) Strongly agree | 20 | 66.67 |
| Total | | 30 | 100.00 |
| Importance Item 3 | (1.00) Strongly disagree | 2 | 6.67 |
| | (2.00) Disagree | 10 | 33.33 |
| | (2.50) Neutral | 0 | 00.00 |
| | (3.00) Agree | 16 | 53.33 |
| | (4.00) Strongly agree | 2 | 6.67 |
| Total | | 30 | 100.00 |
| Importance score | Score: 8.00 | 3 | 10.00 |
| | Score: 9.00 | 7 | 23.33 |
| | Score: 10.00 | 10 | 33.33 |
| | Score: 11.00 | 8 | 26.67 |
| | Score: 12.00 | 2 | 6.67 |
| Total | | 30 | 100.00 |
| Importance level | Low level of importance | 20 | 66.67 |
| | High level of importance | 10 | 33.33 |
| Total | | 30 | 100.00 |
| Compromise Item 1 | (1.00) Strongly disagree | 5 | 16.67 |
| | (2.00) Disagree | 9 | 30.00 |
| | (2.50) Neutral | 0 | 00.00 |
| | (3.00) Agree | 13 | 43.33 |
| | (4.00) Strongly agree | 3 | 10.00 |
| Total | | 30 | 100.00 |
| Compromise Item 2 | (1.00) Strongly disagree | 0 | 00.00 |
| | (2.00) Disagree | 5 | 16.67 |
| | (2.50) Neutral | 0 | 00.00 |
| | (3.00) Agree | 15 | 50.00 |
| | (4.00) Strongly agree | 10 | 33.33 |
| Total | | 30 | 100.00 |
| Compromise Item 3 | (1.00) Strongly disagree | 7 | 23.33 |
| | (2.00) Disagree | 18 | 60.00 |
| | (2.50) Neutral | 1 | 3.33 |
| | (3.00) Agree | 4 | 13.33 |
| | (4.00) Strongly agree | 0 | 00.00 |
| Total | | 30 | 100.00 |
| Compromise Item 4 | (1.00) Strongly disagree | 0 | 00.00 |

Table 2. Continued

| Variable | Description of Value | Frequency | Percentage |
|--------------------|--------------------------|-----------|------------|
| | (2.00) Disagree | 11 | 36.67 |
| | (2.50) Neutral | 0 | 00.00 |
| | (3.00) Agree | 15 | 50.00 |
| | (4.00) Strongly agree | 4 | 13.33 |
| Total | | 30 | 100.00 |
| Compromise Item 5 | (1.00) Strongly disagree | 3 | 10.00 |
| | (2.00) Disagree | 11 | 36.67 |
| | (2.50) Neutral | 2 | 6.67 |
| | (3.00) Agree | 12 | 40.00 |
| | (4.00) Strongly agree | 2 | 6.67 |
| Total | | 30 | 100.00 |
| Compromise Item 6 | (1.00) Strongly disagree | 1 | 3.33 |
| | (2.00) Disagree | 2 | 6.67 |
| | (2.50) Neutral | 0 | 00.00 |
| | (3.00) Agree | 19 | 63.33 |
| | (4.00) Strongly agree | 8 | 26.67 |
| Total | | 30 | 100.00 |
| Compromise Item 7 | (1.00) Strongly disagree | 2 | 6.67 |
| | (2.00) Disagree | 11 | 36.67 |
| | (2.50) Neutral | 4 | 13.33 |
| | (3.00) Agree | 11 | 36.67 |
| | (4.00) Strongly agree | 2 | 6.67 |
| Total | | 30 | 100.00 |
| Compromise Item 8 | (1.00) Strongly disagree | 0 | 00.00 |
| | (2.00) Disagree | 2 | 6.67 |
| | (2.50) Neutral | 1 | 3.33 |
| | (3.00) Agree | 19 | 63.33 |
| | (4.00) Strongly agree | 8 | 26.67 |
| Total | | 30 | 100.00 |
| Compromise Item 9 | (1.00) Strongly disagree | 1 | 3.33 |
| | (2.00) Disagree | 15 | 50.00 |
| | (2.50) Neutral | 1 | 3.33 |
| | (3.00) Agree | 10 | 33.33 |
| | (4.00) Strongly agree | 3 | 10.00 |
| Total | | 30 | 100.00 |
| Compromise Item 10 | (1.00) Strongly disagree | 1 | 3.33 |
| | (2.00) Disagree | 1 | 3.33 |
| | (2.50) Neutral | 2 | 6.67 |
| | (3.00) Agree | 15 | 50.00 |
| | (4.00) Strongly agree | 11 | 36.67 |
| Total | | 30 | 100.00 |
| Compromise Item 11 | (1.00) Strongly disagree | 0 | 00.00 |
| | (2.00) Disagree | 2 | 6.67 |
| | (2.50) Neutral | 0 | 00.00 |
| | (3.00) Agree | 19 | 63.33 |
| | (4.00) Strongly agree | 9 | 30.00 |
| Total | | 30 | 100.00 |

Table 2. Continued

| Variable | Description of Value | Frequency | Percentage |
|---------------------|--------------------------|-----------|------------|
| Compromise Item 12 | (1.00) Strongly disagree | 2 | 6.67 |
| | (2.00) Disagree | 14 | 46.67 |
| | (2.50) Neutral | 0 | 00.00 |
| | (3.00) Agree | 7 | 23.33 |
| | (4.00) Strongly agree | 7 | 23.33 |
| Total | | 30 | 100.00 |
| Compromise Item 13 | (1.00) Strongly disagree | 1 | 3.33 |
| | (2.00) Disagree | 2 | 6.67 |
| | (2.50) Neutral | 1 | 3.33 |
| | (3.00) Agree | 18 | 60.00 |
| | (4.00) Strongly agree | 8 | 26.67 |
| Total | | 30 | 100.00 |
| Compromise Item 14 | (1.00) Strongly disagree | 2 | 6.67 |
| | (2.00) Disagree | 10 | 33.33 |
| | (2.50) Neutral | 2 | 6.67 |
| | (3.00) Agree | 13 | 43.33 |
| | (4.00) Strongly agree | 3 | 10.00 |
| Total | | 30 | 100.00 |
| Compromise score | Score: 31.50 | 1 | 3.33 |
| | Score: 33.00 | 1 | 3.33 |
| | Score: 34.00 | 1 | 3.33 |
| | Score: 35.00 | 3 | 10.00 |
| | Score: 35.50 | 1 | 3.33 |
| | Score: 36.50 | 1 | 3.33 |
| | Score: 37.00 | 3 | 10.00 |
| | Score: 37.50 | 1 | 3.33 |
| | Score: 38.00 | 2 | 6.67 |
| | Score: 38.50 | 1 | 3.33 |
| | Score: 39.00 | 3 | 10.00 |
| | Score: 40.00 | 4 | 13.33 |
| | Score: 41.50 | 1 | 3.33 |
| | Score: 42.00 | 3 | 10.00 |
| | Score: 43.00 | 1 | 3.33 |
| | Score: 44.00 | 1 | 3.33 |
| | Score: 49.00 | 2 | 6.67 |
| Total | | 30 | 100.00 |
| Compromise level | Low level of compromise | 15 | 50.00 |
| | High level of compromise | 15 | 50.00 |
| Total | | 30 | 100.00 |
| Satisfaction Item 1 | (1.00) Strongly disagree | 1 | 3.33 |
| | (2.00) Disagree | 11 | 36.67 |
| | (2.50) Neutral | 0 | 00.00 |
| | (3.00) Agree | 14 | 46.67 |
| | (4.00) Strongly agree | 4 | 13.33 |
| Total | | 30 | 100.00 |
| Satisfaction Item 2 | (1.00) Strongly disagree | 3 | 10.00 |
| | (2.00) Disagree | 6 | 20.00 |

Table 2. Continued

| Variable | Description of Value | Frequency | Percentage |
|---------------------|--------------------------|-----------|------------|
| Total | (2.50) Neutral | 0 | 00.00 |
| | (3.00) Agree | 16 | 53.33 |
| | (4.00) Strongly agree | 5 | 16.67 |
| | Total | 30 | 100.00 |
| Satisfaction Item 3 | (1.00) Strongly disagree | 9 | 30.00 |
| | (2.00) Disagree | 14 | 46.67 |
| | (2.50) Neutral | 3 | 10.00 |
| | (3.00) Agree | 4 | 13.33 |
| | (4.00) Strongly agree | 0 | 00.00 |
| Total | | 30 | 100.00 |
| Satisfaction Item 4 | (1.00) Strongly disagree | 2 | 6.67 |
| | (2.00) Disagree | 4 | 13.33 |
| | (2.50) Neutral | 4 | 13.33 |
| | (3.00) Agree | 16 | 53.33 |
| | (4.00) Strongly agree | 4 | 13.33 |
| Total | | 30 | 100.00 |
| Satisfaction Item 5 | (1.00) Strongly disagree | 1 | 3.33 |
| | (2.00) Disagree | 6 | 20.00 |
| | (2.50) Neutral | 6 | 20.00 |
| | (3.00) Agree | 13 | 43.33 |
| | (4.00) Strongly agree | 4 | 13.33 |
| Total | | 30 | 100.00 |
| Satisfaction Item 6 | (1.00) Strongly disagree | 2 | 6.67 |
| | (2.00) Disagree | 3 | 10.00 |
| | (2.50) Neutral | 0 | 00.00 |
| | (3.00) Agree | 21 | 70.00 |
| | (4.00) Strongly agree | 4 | 13.33 |
| Total | | 30 | 100.00 |
| Satisfaction Item 7 | (1.00) Strongly disagree | 0 | 00.00 |
| | (2.00) Disagree | 5 | 16.67 |
| | (2.50) Neutral | 1 | 3.33 |
| | (3.00) Agree | 19 | 63.33 |
| | (4.00) Strongly agree | 5 | 16.67 |
| Total | | 30 | 100.00 |
| Satisfaction Score | Score: 8.00 | 1 | 3.33 |
| | Score: 11.00 | 1 | 3.33 |
| | Score: 12.00 | 1 | 3.33 |
| | Score: 14.50 | 1 | 3.33 |
| | Score: 15.00 | 2 | 6.67 |
| | Score: 17.50 | 2 | 6.67 |
| | Score: 18.00 | 3 | 10.00 |
| | Score: 18.50 | 2 | 6.67 |
| | Score: 19.00 | 4 | 13.33 |
| | Score: 20.00 | 5 | 16.67 |
| | Score: 20.50 | 3 | 10.00 |
| | Score: 23.00 | 1 | 3.33 |
| | Score: 24.00 | 1 | 3.33 |
| | Score: 25.00 | 1 | 3.33 |

Table 2. Continued

| Variable | Description of Value | Frequency | Percentage |
|--------------------|----------------------------|-----------|------------|
| Total | Score: 26.00 | 1 | 3.33 |
| | Score: 27.00 | 1 | 3.33 |
| | | 30 | 100.00 |
| Satisfaction level | Low level of satisfaction | 18 | 60.00 |
| | High level of satisfaction | 12 | 40.00 |
| Total | | 30 | 100.00 |

^a This table reports the frequency and percentage of responses for the discrete data obtained from the survey instrument.

HIS. Responses ranged from 1 to 4; items unanswered were given a neutral rating of 2.50 (see Table 2).

Responses on 10 (71%) of the 14 items ranged, after the data were prepared for input as described in Chapter 3, from the lowest level (a rating of 1) to the highest level (a rating of 4) of compromise; the remaining 4 (29%) items on the questionnaire were rated between 2 and 4. Ten of the 14 items had a mode of 3.00. The mode for three of the items measuring compromise was 2.00. One item was bimodal (2.00 and 3.00 both had a frequency of 11) (see Table 2).

The rating by each respondent on each of these 14 items was added in order to derive a total score for the level of compromise. The maximum possible score was 56 and the minimum possible was 14.

As shown in Table 3, the measures of central tendency for the level of compromise were as follows: the mean was 38.93, the median was 38.75, and the distribution was multimodal (35.00, 37.00, 39.00, 42.00 all had the highest frequency of 2). The standard deviation was 4.06.

Level of Satisfaction

Seven items (19, 21, 23, 25, 26, 27, and 28) on the survey were statements about how satisfied healthcare professionals were with the system they had chosen. After the data were prepared for input as described in the Methodology Section, responses ranged from a low level of satisfaction (a rating of 1) to a high level of satisfaction (a rating of 4). Unanswered items were given a neutral rating of 2.5 (see Table 2).

Responses to 5 of the 7 items ranged from 1 to 4. Responses to the remaining 2 items ranged from 2 to 4. The mode of 6 of the 7 items was 3.00; the mode of the remaining item (23) was 2.00 (see Table 2).

The rating by each respondent for each of these 7 items was added in order to derive a total score for the level of satisfaction. The minimum score possible was 7 and the maximum score possible was 28. The actual range of scores was a minimum of 8 and a maximum of 27 (see Table 2).

Table 3 displays the measures of central tendency for the level of satisfaction. The median was 19.00, the mode was 20.00, and the mean was 18.80 with a standard deviation of 4.13.

Table 3. Measures of Central Tendency for Continuous Data

| | No. of cases | Mean | Median | Mode | SD | Range | |
|--------------------------------|--------------|--------|--------|--------|--------|-------|---------|
| | | | | | | Min | Max |
| Importance level | 30 | 9.97 | 10.00 | 10.00 | 1.10 | 8.00 | 12.00 |
| Compromise level | 30 | 38.93 | 38.75 | 35.00 | 4.06 | 31.50 | 49.00 |
| | | | | 37.00 | | | |
| | | | | 39.00 | | | |
| | | | | 42.00 | | | |
| Satisfaction level | 30 | 18.80 | 19.00 | 20.00 | 4.13 | 8.00 | 27.00 |
| Length employed (months) | 30 | 62.17 | 28.00 | 18.00 | 68.50 | 0.00 | 240.00 |
| Facility size | 30 | 510.53 | 375.00 | 177.00 | 585.15 | 00.00 | 3000.00 |
| | | | | 500.00 | | | |
| | | | | 550.00 | | | |
| Healthcare experience (months) | 30 | 195.83 | 219.00 | 240.00 | 69.98 | 40.00 | 312.00 |
| DP/IS experience (months) | 30 | 67.13 | 30.00 | 0.00 | 97.26 | 0.00 | 360.00 |

Relationship Between Measured Levels

The relationship between the measured levels of importance, compromise, and satisfaction were evaluated using a Pearson product-moment correlational study (see Table 4).

The correlation coefficient between the level of importance and level of compromise was 0.04; a low relationship existed.

The correlation coefficient between the level of importance and the level of satisfaction was 0.07; a low relationship existed between these two variables as well.

The correlational coefficient between the level of compromise and the level of satisfaction was -0.41 ; a moderate inverse relationship between these two variables existed.

Length of Employment at Facility

The length of time the respondent was employed at the facility when the system evaluation began was ascertained in item 1 on Part 1 of the survey (see Appendix A). This length of time was asked in years and months, then converted to months for the purposes of analysis. The number of months ranged from 0 to 240 (20 years). A rating of 0 meant that the evaluation had taken place prior to or right at the time the respondent started employment. Table 2 reports the frequency distribution of these data.

Table 3 reports the three measures of central tendency (in months) for this variable. The median was 28.00, the mode was 18.00, and the mean was 62.17 with a standard deviation of 68.50. This represents a positively skewed distribution.

The relationship between length of time a person was employed at the facility where the HIS was evaluated and the levels of importance, compromise, and satisfaction were determined by the Pearson product-moment correlational study (see Table 5).

The correlation coefficient of -0.128 indicated there was a low relationship between the length of employment and the level of importance the respondents placed upon a HIS. There was also a low relationship between the length of employment and the level of compromise and level of satisfaction achieved; the correlation coefficient for these variables were -0.161 and -0.081 , respectively.

Facility Size

The size of a hospital is customarily measured by the number of licensed beds it has available for treating patients. The number of licensed beds the facility had where the

Table 4. Relationship Between the Levels of Importance, Compromise, and Satisfaction^a

| Pearson Product-Moment Correlation | | | |
|------------------------------------|---------------------|---------------------|-----------------------|
| | Level of Importance | Level of Compromise | Level of Satisfaction |
| Level of importance | 1.000 | | |
| Level of compromise | 0.042 | 1.000 | |
| Level of satisfaction | 0.071 | -0.405 | 1.000 |

^a This table describes the relationship between the levels of importance, compromise, and satisfaction found among healthcare professionals with the selection of a Healthcare Information System (HIS).

Table 5. The Levels of Importance, Compromise, and Satisfaction and Their Relationship with Other Variables^a

| Pearson Product-Moment Correlation | | | |
|------------------------------------|---------------------|---------------------|-----------------------|
| | Level of Importance | Level of Compromise | Level of Satisfaction |
| Length of employment | -0.128 | -0.161 | 0.081 |
| Hospital size | -0.187 | 0.039 | 0.214 |
| Length of healthcare experience | 0.414 | 0.201 | -0.073 |
| Length of DP/IS experience | -0.049 | 0.062 | 0.207 |

^a This table displays the relationship between importance, compromise, and satisfaction and other variables from this research study. This relationship is expressed by the Pearson Product-moment correlational statistic.

system evaluation process took place was requested in the survey (see item 7 of Part 1 of Appendix A). The number of beds ranged from 93 to 3000. The 3000 bed facility represented several facilities combined—all of which were subject to the same single decision making process as any individual facility. Table 2 reports the distribution and percentage of these data.

The three measures of central tendency were obtained (tabulated and shown in Table 3). The median was 375.00, the mean was 510.53 with a standard deviation of 585.15, and the distribution was multimodal: 177.00, 500.00, and 550.00, all had a frequency of 2.

The relationship between the number of beds and the levels of importance, compromise, and satisfaction was determined by a Pearson product-moment correlation (see Table 5). There was a low relationship between the number of beds and the level of importance ($r = -0.187$). There was also a negligible relationship between the number of beds and the level of compromise ($r = 0.039$). The relationship between the number of beds and level of satisfaction was, however, low to moderate positive with a correlation coefficient of 0.214.

Length of Healthcare Experience

The length of time the respondent had been working in the healthcare industry at the time the HIS evaluation took place was ascertained in this study (see item 5 in Part 1 on the survey in Appendix A). The length of time was asked for in years and months, then converted to months for the purposes of analysis.

Statistics reported for this variable are stated in months. The length of healthcare experience ranged from a minimum of 40 months (3 years, 4 months) to a maximum of 312 months (26 years). The frequency distribution of these data appears in Table 2.

The mean, median, and mode for this variable were 195.83, 219.00, 240.00, respectively. The standard deviation was 69.98 (see Table 3).

The relationship between the length of healthcare experience and the levels of importance, compromise, and satisfaction were analyzed using the Pearson product-moment correlation coefficient. A low, inverse relationship between the level of satisfaction and length of healthcare experience was found; the correlation coefficient was -0.073 . A low relationship between the level of compromise and the length of experience within the

healthcare industry was found—the correlation coefficient was found to be 0.201. A moderate relationship between the level of importance and the length of healthcare experience was found: $r = 0.414$ (see Table 5).

Length of DP/IS Experience

Also ascertained in this study was the length of data processing/information systems (DP/IS) experience the respondent had at the time the system evaluation took place. DP/IS experience ranged (in months) from 0 to 360 (30 years). (Table 2 reports the frequency distribution of this data.) Zero months indicated the respondent had no prior experience with DP or IS prior to participating with the systems evaluation process.

Table 3 denotes the measures of central tendency (in months) for this variable. The median was 30.00, the mode was 0, and the mean was 67.13 with a standard deviation of 97.26. Fourteen (47%) out of 30 responses had zero experience with either IS or DP.

The relationship between the length of DP/IS experience and the levels of importance and compromise were low. They were measured by a Pearson product-moment correlation coefficient. For the relationship between the level of importance and length of DP/IS experience, $r = -0.049$; for the relationship between the level of compromise and length of DP/IS experience, $r = 0.062$. There was, however, a low relationship between length of DP/IS experience and the level of satisfaction ($r = 0.207$).

Other Variables

The respondents gender, position at the facility where the evaluation was conducted, and the type of facility where the evaluation took place (items 3, 2, and 4, respectively) were data obtained on the survey.

In order to determine the relationship between the levels of importance, compromise, and satisfaction of these variables, the data were transformed so that a Pearson chi-square analysis could be conducted. The facility where the evaluation took place was either classified as a multi-hospital or standalone facility (an explanation of these types of facilities is provided in the Methodology Section). The position the respondent held at the time of the systems evaluation process was classified as either being within the financial areas of the facility (Business Manager, Controller, Director of Finance, etc.) or in the Clinical or other nonfinancial areas of the facility (Clinical/Nursing, Data Processing, or Medical Records).

Results of the chi-square analysis of these variables indicated there was no statistical significance in the relationship between them and their levels of importance, compromise, or satisfaction. Table 6 presents these results.

Chapter Summary

The levels of importance of a HIS, compromise during the selection of a HIS, and the satisfaction with the HIS selected were determined and reported statistically in this Chapter. The Chapter that follows summarizes these findings, emphasizes the practical significance of these findings, and makes recommendations on how these results could be used to benefit the healthcare industry.

Table 6. Relationship Between Gender, Facility, Position, and Levels of Importance, Compromise, and Satisfaction

| Gender and level of satisfaction | | | |
|--|---------------------------|----------------------------|--------------------------|
| | Low level of satisfaction | High level of satisfaction | Total |
| Male | 11 | 6 | 17 |
| Female | 7 | 6 | 13 |
| Total | 18 | 12 | 30 |
| | | | χ^2 obs = 0.362 |
| | | | χ^2 crit = p < 0.05 |
| Gender and level of compromise | | | |
| | Low level of compromise | High level of compromise | Total |
| Male | 7 | 10 | 17 |
| Female | 8 | 5 | 13 |
| Total | 15 | 15 | 30 |
| | | | χ^2 obs = 1.22 |
| | | | χ^2 crit = p < 0.05 |
| Facility type and level of compromise | | | |
| | Low level of compromise | High level of compromise | Total |
| Standalone facility | 10 | 10 | 20 |
| Multihospital facility | 5 | 5 | 10 |
| Total | 15 | 15 | 30 |
| | | | χ^2 obs = 3.84 |
| | | | χ^2 crit = p < 0.05 |
| Position within the financial area of a hospital and the level of compromise | | | |
| | Low level of compromise | High level of compromise | Total |
| Position in nonfinancial area | 8 | 5 | 13 |
| Position in finan. area | 7 | 10 | 17 |
| Total | 15 | 15 | 30 |
| | | | χ^2 obs = 1.22 |
| | | | χ^2 crit = p < 0.05 |
| Position within the financial area of a hospital and level of satisfaction | | | |
| | Low level of satisfaction | High level of satisfaction | Total |
| Position in nonfinancial area | 7 | 6 | 13 |
| Position in finan. area | 11 | 6 | 17 |
| Total | 18 | 12 | 30 |
| | | | χ^2 obs = 0.362 |
| | | | χ^2 crit = p < 0.05 |

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The concluding chapter of this research study summarizes the statistical and practical significance of the findings on the evaluation of a Hospital Information System (HIS). Conclusions are drawn, based upon these findings, and recommendations for future study are offered.

The Sample

The response rate from the first group of surveys was excellent. The success in receiving the second and third sets of questionnaires administered did not achieve such a

level of results, but the difference between how the population was chosen for each of these phases may have been the cause of this difference.

Respondents from the first group were selected specifically by their business acquaintances or friends within the industry. The name of the individual who recommended them was either told to them on the telephone by the researcher or mentioned in the cover letter that was affixed to the questionnaire (see Appendix A). The response rate may have been high with these individuals because of the professional and/or personal relationship that existed between the parties involved.

A possible explanation for the lack of responses from the second group of individuals might be that all of these individuals were referred by co-workers. Since the names of the referees were included in the cover letter attached to the survey instrument, the recipients of the survey may have been concerned over confidentiality primarily because of the relationship that may have existed between these co-workers. They may have also mistakenly perceived the purposes of this research as being specifically related to the facility where they were currently employed.

A successful response on the third group of individuals administered was not expected because of the random method in which they were selected. The purpose of this random selection, however, was served: three additional responses were received from this group which brought the sample to a total of 30.

The Importance of HIS

This research study examined how important a Healthcare Information System (HIS) was to the healthcare professional. Results indicated healthcare professionals believed a HIS was important to their operation and to the success of their facility.

Physicians graduating from medical school today have been exposed and trained with sophisticated computer technology. This undoubtedly provided an impetus for healthcare professionals to equip their physicians and facilities with the most advanced computerization and also led them to recognize the importance of a HIS.

This study also found that the more experience an individual had working in the healthcare industry, the more important they rated a HIS. The reason or reasons for this are unknown. They can, however, be speculated.

Research has produced evidence, as noted in the Introduction of this study, that the hospital industry over the last several years has experienced changes so dramatic that healthcare providers have found it necessary to make major changes in their business philosophy and operational procedures. Healthcare information services have not kept pace with these changes.

More seasoned healthcare professionals might consider HISs important because of the changes in the industry they have experienced. They may recognize, from a broader perspective and at a deeper level of understanding that more automated tools will help streamline the operational processes of their facility and strategically guide them toward increased profitability and competitiveness in the marketplace.

Compromise and Length of Healthcare Experience

How much compromising was perceived as required during the system evaluation and selection process was examined in this study. It was found that the longer an indi-

vidual had been working in the healthcare industry, the more compromising they considered was required in the selection of a HIS. Although there was only a low correlation or relationship between these two variables, the explanation for this might be the same as stated for the relationship between healthcare experience and importance.

Larger Facilities Are More Satisfied

This research study revealed that larger facilities were more satisfied with the system selected than smaller sized facilities. Larger sized facilities generally have a greater budget to acquire an information system. As research indicates, systems with the greatest flexibility and computing power generally run on mainframes which are prohibitively expensive to the smaller facility.

The length of healthcare experience also influenced the satisfaction expressed toward the system that was chosen. The reason individuals with more healthcare experience are more satisfied with the system they chose compared to individuals with less experience may be due, in part, to how comprehensive the evaluation of the system was performed. The possibility that healthcare professionals with greater experience in the healthcare field have a better idea of what is needed to serve their needs in comparison to their contemporaries with less experience exists. A more comprehensive evaluation of available systems may positively impact the level of satisfaction achieved with the system chosen.

Less Compromise Yields Greater Satisfaction

The primary purpose of this study was to evaluate whether the level of compromise required in the systems evaluation process had an impact upon the level of satisfaction achieved with the system chosen. This research study revealed there was a moderate relationship between these two variables. The more the facility compromised during this process, the less satisfied they were with the system they eventually chose.

This finding may indicate several things, none of which can be firmly concluded without further research. The results of this study in conjunction with earlier research, however, may infer that healthcare providers should be concerned with their negotiations with vendors and co-workers when selecting a HIS. Standing firm and demanding HIS meet their needs may be important in achieving the level of satisfaction necessary for a facility to function at maximum efficiency.

Recommendations

With the influx of changes the healthcare industry has experienced in the last several years, information on the industry's present status is critical in helping guide the future. This study has only opened the doors to numerous studies that could ultimately help healthcare providers procure more advanced and satisfactory HISs. Healthcare information system vendors as well could greatly benefit from information relating to the healthcare provider marketplace.

Another direction further studies could take would be to evaluate the level of compromise being done by system vendors. Perhaps there is an inverse correlation between the level of compromise required by healthcare providers and the level of compromise required by system vendors.

Examining what type of system was evaluated is another dimension recommended for further research. Four (6%) of the survey's returned contained comments from respondents about the type of system they had evaluated and installed. From the healthcare professional's perspective, these data were important enough to volunteer and perhaps should not have been overlooked in this research. Evaluating what impact this variable might have upon the level of importance, compromise, and satisfaction with the system chosen is recommended for further research.

Since the size of the facility was shown to have an impact upon the level of satisfaction achieved with the system chosen, further research to explore the reason for it is recommended. Is this, in fact, due to the budget a large hospital has to spend on a system, as speculated earlier in this chapter? This research should also include the name of the system chosen, since HIS companies usually target a particular marketplace.

Recommendations to expand or refine this research would be to sample a larger share of the population, sample more healthcare professionals with data processing/information systems (DP/IS) experience, and include healthcare system vendors in this research. With the limited sample of 30, some statistical analysis was prohibited and outlying responses from any one of the 30 may have skewed the results.

The availability of subjects who had primarily a healthcare background, not a DP/IS background, and the familiarity of these subjects to the researcher were reasons why the years of experience in one profession far outweighed the other. Further research on the selection of a HIS should consider gaining a larger sample of DP/IS experienced personnel.

Any research study would not be complete without recommendations on the usefulness of the data it collected. With the current uncertainty, financial instability, and eclectic nature of the healthcare industry, information on how healthcare providers can get more of what they need is valuable. It is recommended that healthcare professionals use the data collected from this study when they are considering acquiring a HIS. It is recommended they focus on those areas that have been found important to achieving satisfaction; arranging some job tasks and shifting or adding emphasis in these areas seem to be insignificant changes in comparison to the rewards that may be gained from doing so. Healthcare vendors, particularly from the marketing, research, and development entities, might consider focusing on those factors which also may have an impact on client satisfaction. It is in the best interest of healthcare providers as well as healthcare vendors to satisfy the computer automation needs of hospitals, even if that means increasing negotiations and yet reducing the compromises.

APPENDIX A

Survey

QUESTIONNAIRE

Directions

This questionnaire contains two (2) parts. Part I asks you some descriptive information about you and the facility where you were involved in the selection of an information system. Part II asks you to rate your agreement or disagreement on a variety of issues.

Please answer the questions based upon the job and the hospital where you were working at the time of the system selection.

Thank you very much for your opinion. Please be assured this information will remain strictly confidential.

PART I

1. How long had you been employed at the hospital when the system selection process began?

_____ year(s) _____ month(s)

2. Type of facility? (check one or more as appropriate)

- | | |
|-------------------------------|---------------------|
| _____ 1. Investor owned | _____ 6. District |
| _____ 2. Not for profit | _____ 7. Teaching |
| _____ 3. Community | _____ 8. Government |
| _____ 4. County | _____ 9. Religious |
| _____ 5. Multi-hospital chain | _____ 10. Other |
| | (specify): _____ |

3. What is your sex?

_____ 1. Male _____ 2. Female

4. What was your position at the hospital at the time the system selection began?

- _____ 1. Business Office Manager/Director
 _____ 2. Data Processing Manager/Director
 _____ 3. Admitting Manager/Director
 _____ 4. Chief Financial Office/Director of Finance
 _____ 5. Other (specify): _____

5. How long have you been working in the healthcare field?

_____ year(s) _____ month(s)

6. How long have you been working in the information systems/data processing field?

_____ year(s) _____ month(s)

7. What is the number of acute care licensed beds at the facility where you were involved in the evaluation of a new system?

_____ beds (licensed acute)

PART II

Directions

On a scale of 1 to 4, rate how strongly you agree or disagree with each statement. Circle one number for each statement.

| 1 Strongly Agree | 2 Agree | 3 Disagree | 4 Strongly Disagree |
|--|------------|---------------|------------------------|
| 1. An efficient computerized information system is an important mean toward achieving the goals of all hospitals today. | 1 | 2 | 3 4 |
| 2. The increased demand upon more efficient hospital operations has caused the need for more technically advanced software. | 1 | 2 | 3 4 |
| 3. The quality of medical care and the quality of information systems are of equal importance. | 1 | 2 | 3 4 |
| 4. Adequate time was spent in the selection and decision process of the new system. | 1 | 2 | 3 4 |
| 5. Getting the best system available was far more important than how much it cost. | 1 | 2 | 3 4 |
| 6. All parties impacted by the new system were adequately represented during the system evaluation process. | 1 | 2 | 3 4 |
| 7. The evaluation process was organized: all parties involved knew what to do, and the time frames were well established. | 1 | 2 | 3 4 |
| 8. In pursuit of finding the ideal system, the hospital's requirements, conditions and objectives were found to be realistic and realizable. | 1 | 2 | 3 4 |
| 9. The people involved in the decision making process did not have diverse needs and perspectives. | 1 | 2 | 3 4 |
| 10. The final decision was a joint one that came with ease because we were all in agreement of which system to choose. | 1 | 2 | 3 4 |
| 11. So many software vendors offered such efficient, state-of-the-art systems, I knew that whichever system was selected, quality would not be compromised. | 1 | 2 | 3 4 |
| 12. The computer software vendor(s) I worked with was/were willing to alter the cost of their product because of the hospital's budget constraints. | 1 | 2 | 3 4 |
| 13. I know that when I evaluate software, I will get exactly what I want and will not need to compromise. | 1 | 2 | 3 4 |
| 14. Learning and understanding the full scope of the system's functions during the evaluation process was not handicapped by communication difficulties between technically oriented and non-technically oriented persons. | 1 | 2 | 3 4 |
| 15. When I first began to evaluate information systems, I had a good idea of what to do and considered myself a good decision maker with high information capacities. | 1 | 2 | 3 4 |
| 16. Although cost is a significant factor in making the final decision, our hospital found no reason to negotiate price with the vendor. | 1 | 2 | 3 4 |
| 17. It became obvious during the evaluation process that the systems available to choose from offered all the flexibility and versatility the hospital needed. | 1 | 2 | 3 4 |
| 18. The hospital's budget enabled us to acquire all of the system's features and options that would be very useful to our facility. | 1 | 2 | 3 4 |
| 19. Everyone was pleased with the final decision. | 1 | 2 | 3 4 |

- | | | | | |
|--|---|---|---|---|
| 20. From my evaluation experience, I have found Hospital Information Systems to be uncomplicated, precise and clearly understandable. | 1 | 2 | 3 | 4 |
| 21. Although I was involved in the evaluation process, the system chosen was not of my own personal choice based upon the specific needs of my department. | 1 | 2 | 3 | 4 |
| 22. The parties who made the final decision were well qualified to do so. | 1 | 2 | 3 | 4 |
| 23. The system we chose so closely meets/met our level of needs that we will/did not need to expend resources on upgrades, enhancements or interfaces. | 1 | 2 | 3 | 4 |
| 24. Although cost is a significant factor in making the final decision, our hospital adequately budgeted for the expense and found no reason to justify the additional expense or reevaluate the necessity or timeliness of the acquisition. | 1 | 2 | 3 | 4 |
| 25. I am currently satisfied with the new system. | 1 | 2 | 3 | 4 |
| 26. After installation of the new system, I found it to be responsive and flexible enough to respond to the future demands of the hospital. | 1 | 2 | 3 | 4 |
| 27. Although the system selection and decision making process could have been more timely and/or more efficient, I am satisfied with the final decision that was made. | 1 | 2 | 3 | 4 |
| 28. Overall, the system meets the current needs of the hospital and the decision to acquire it was a good one. | 1 | 2 | 3 | 4 |

THANK YOU FOR YOUR PARTICIPATION

ADDENDUM TO QUESTIONNAIRE

IS THERE ANYONE ELSE YOU KNOW OF THAT MAY BE ABLE TO PARTICIPATE IN THIS RESEARCH?

If so, would you please provide the information needed to contact them?

Name: _____

Phone #: _____

Employer: _____

Address (if available)

Name: _____

Phone #: _____

Employer: _____
Address (if available)

THANK-YOU!

COVER LETTER TO QUESTIONNAIRE

Date

Return Address

**Forwarding Name
and Address**

Dear

I understand from a colleague of ours that you have had experience within the last five years with the analysis, selection, and installation of a Healthcare Information System. If my understanding is correct, I would appreciate it if you would complete the enclosed questionnaire and return it to me within 7 days of the date of this letter. A self-addressed, stamped envelope is enclosed for your convenience.

Just a few guidelines to help you complete this form: It is unimportant whether your system selection experience was with one or more modules or parts of a standalone system, or whether it was with a fully integrated system. It is also unimportant whether you currently work at the facility where your experience occurred, or whether you had direct experience with all parts of the selection and installation process. What is important is that you keep in mind one particular system selection process you were involved in and answer the questions in response to that experience. Your perspective on the process that took place at your facility is what I am looking for.

Please be assured your personal responses to this survey will be held in the strictest of confidence. As you will note on the Questionnaire, you are not asked to divulge what facility you are referring to, what system was chosen, or your name.

Thank-you kindly for your time.

Sincerely,

REFERENCES

1. Sneider, R.M., and Abrami, P.F., Choosing the right information system for your hospital. *J. Healthcare Fin. Manag.* 39(6):44-46, 1985.
2. Coulter, G., CFO's role changes in systems planning and operations. *J. Healthcare Fin. Manag.* 40(2):54-55, 1986.
3. Dorenfest, S.I., Current computerized financial systems don't meet hospitals' expectations. *Mod. Healthcare* 36, 1988, February.
4. Dorenfest, S.I., Hospitals are ripe for replacing many patient accounting systems. *Mod. Healthcare* 56-58, 1988, September.
5. Dorenfest, S.I., Despite interest, nation's hospitals slow to buy patient care systems. *Modern Health.* 40-42, 1987.
6. Ginsberg, D.A., and Caretta W., Selecting an automated patient accounting system. *J. Healthcare Fin. Manag.* 42(6):58-62, 1986.
7. Manfredi, M.J., & Peterson, D.M., Software: a team approach to investigating the options. *J. Healthcare Fin. Manag.* 43(3):68-80, 1989.
8. Mazzoni, R., Hospitals need to be selective when picking patient accounting systems. *Modern Healthcare* 81-82, 1985.
9. Krantz, G.M., Doyle, J.J., and Stone, S.G., Costs, needs must be balanced when buying computer systems. *J. Healthcare Fin. Manag.* 43(6):50, 1989.
10. Savage, G.T., and Blair, J.D., The importance of relationships in hospital negotiation strategies. *Hosp. Health Serv. Admin.* 34(2):231-253, 1989.
11. Lefort, P.F., Health information systems: creating the competitive edge. *J. Health. Fin. Manag.* 39(6):32-40, 1985.
12. Jensen, J., and Miklovic, N., Half of hospitals plan to purchase software; 40% will buy hardware. *Mod. Healthcare* 86-88, 1985.
13. Hurwitz, M., The multiple vendor supplier: what are the advantages? *J. Healthcare Fin. Manag.* 39(11):78, 1985.
14. Packer, C.L., Vendor performance rated fair by hospitals. *Hospitals* 72, 1987.
15. Kennedy, O.G., and Collignon, S., Selecting patient accounting systems: what are the key criteria? *J. Healthcare Fin. Manag.* 42(2):46-48, 1988.
16. Benbasat, I., and Taylor, R.N., Behavioral aspects of information processing for the design of management information systems. *IEEE Transactions on Systems, Man, and Cybernetics* 12(4):439-450, 1982.
17. Yaverbaum, G.J., and Sherr, D.M., Experimental results toward customization of information systems. *Hum. Relat.* 39(12):117-134, 1986.
18. Gardner, E., Vendors likely will need to compute savings if they want to make a sale. *Mod. Healthcare* 42-44, 1988.
19. Morris, D.C., Information systems: the direction of things to come. *J. Healthcare Fin. Manag.* 40(5):30-37, 1986.
20. Lemon, R.B., and Meier, J.A., Transition strategies: moving systems from old to new. *J. Healthcare Fin. Manag.* 41(6):56-65, 1987.
21. Alexander, J.A., and Fennell, M.L., Patterns of decision making in multihospital systems. *J. Health Social Behav.* 27(1):14-27, 1986.
22. MYSTAT: A Statistical Package (1988). [Computer program], Systat, Inc., Evanston, Ill.