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Managers' Use of Return on Investment during Information Technology Implementation in Florida Hospitals.

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Abstract

This report is an examination of healthcare technology implementation in Florida hospitals. Surveys sent to all 285 Florida hospitals yielded 93 responses. This research centers on the implementation of information technology (IT) and the impact of two important constructs – performance measurement, decision making, and return on investment (ROI). The survey focused on managers responsible for IT such as IT Department Director, Chief Information Officer, Finance Department Director, Chief Financial Officer, Business Unit Executive, Chief Executive Officer, or a specific other. The determining factors for selecting a manager for the study were: 1) supervision of IT usage, 2) instrumental in the decision-making for the purchase of IT, and 3) active in the implementation of newly purchased IT.

Introduction

This research centers on ROI as it relates to IT and the impact of two important constructs – decision making and implementation. Searching for value in information technology is something that has been measured and analyzed at various levels. However, few managers or theorists are satisfied that the search for value has produced viable outcomes. Rarely are the variables that are most valuable for quantifying uncertainty such as performance measurement and processes included in the cost-benefit spreadsheets.

The dichotomy in the area of IT and ROI lies in how senior management in public and private healthcare sells IT expansion to their governing Board of Directors compared to what actually happens once the system is approved. As organizations expand their technology assets in hope of improving productivity, it becomes increasingly important that the investment is justified.

According to Lucas (1999), there are many dimensions to the value of IT. IT produces value in many different ways, some tangible and others intangible. Therefore, measuring the competitive advantages of IT creates a reliable framework for success in today's organizations. The tangible benefit of lower operational costs and increased revenues and cash flows are the hallmark of traditional ROI models. However, to realize value from IT procurement, the intangibles such as increased customer satisfaction and enhanced decision making capabilities must be considered.

Why organizations invest and the planning process involved in the investment are ideas that are paramount to the success of the investment. Lucas (1999) is quick to point out that private sector organizations may invest in IT because others in the industry invest and they do not

want to be left behind, or that IT measurement of ROI may be a fad such as reengineering or total quality management. Researchers agree that the organizations that invest wisely and measure their productivity will be successful in the 21st century.

Problem Statement

There are several research questions that are worthy of empirical study in an effort to improve decision making in organizations. These questions specifically pertain to managers' ability to select a system and then successfully implement that system. Research questions addressed by this study include:

1. Was an analysis of the current system accomplished prior to preparing the Request for Proposal (RFP)?
2. What organizational divisions and personnel should be involved in the implementation and decision making for new systems?
3. Are managers capable of understanding the choices?
4. Are the hospital managers hands-on computer users?
5. Were processes built into the implementation phase to ensure measurement of ROI?
6. Do control and feedback processes exist?
7. Are results of ROI analysis used for decision making?

The research questions are not inclusive. However, as this research indicates it is extremely difficult to begin the process after the system has been purchased. However, the manager must start somewhere and beginning late is better than ignoring the problem.

Research Hypothesis

H1: There is a significant relationship among the indicators of managers' usage of ROI for IT included as independent variables in the study.

H2: There is a significant relationship among the indicators of managers' usage of ROI for IT included as demographic variables in the study.

H3: There is a significant relationship among the indicators of managers' usage of ROI for IT and managers' use of ROI for IT decision-making.

H4: There is a significant relationship among the indicators of Managers' usage of ROI for IT and managers' inclusion of ROI for IT in the implementation process.

Literature Review

In the healthcare, information systems are not commodities that are sold to the patient. There are no billable services and therefore no direct income. The inherent benefit of an information system is indirect – it is a tool and only a tool to improve and record patient care. The value of any tool lies in its ability to help accomplish a desired task. In this case that task is the delivery of the highest quality care for the lowest cost, while meeting all regulatory and third party payer requirements (Dunbar, 2000).

New technology is expensive, and the skills to run the equipment are not necessarily available in some public agencies. As much as 80% of businesses expect their document management costs to rise in the next five years. Of the respondents, 24% felt that expenses would rise by more than 61%, while 25% felt that costs would increase between 21% and 40%. However, despite this, the respondents rated easy document sharing, time critical document access, and improving staff efficiency as major concerns for this decade ("Document Management", March, 2000).

ROI in Business

The decision to purchase new equipment in the manufacturing industry has always been based upon the ROI calculation, or in other words determining mathematically if a new machine pays for itself in terms of reduced expenses and/or increased profits. In healthcare, the purchase of an electronic medical record (EMR) has been subjected to the same cost scrutiny as other new equipment (Dunbar, 2000).

Many healthcare organizations are still investing significant time and effort in complex measurement processes in an attempt to track returns. However, some are now beginning to question the value of the entire exercise. For many, ROI for the IT investment is a pointless question with no meaningful answer. The reason for this change of perspective is the ever-increasing integration between technology and the core business processes and operations. "The pervasive impact of technology now means that in many cases IT is so inextricably intertwined with people and processes that the identification of specific technology-related benefit streams is of marginal value" (Axson, 2001).

A secondary influence has been the realization that many technology investments have failed to deliver the expected returns, not because of technology failures, but because of poor process design or inadequate training or education. Too many investments have simply automated inefficient processes or have delivered incredible functionality that no one fully understands how to leverage the IT investment. It is only the combination of the judicious use of technology, optimized business processes, and suitably trained and motivated people that in

concert deliver the true value of a technology investment. As such, isolating a single input and attempting to measure its impact is akin to assessing the direct contribution of cheese to a pizza.

Several researchers have studied ROI and its use in business without a definitive answer as to how it is considered. Vernon Pertelle, writing for *Home Care Magazine*, examined the breadth of outcomes of a decision specifically as they related to the home care industry. He writes about evaluating new technology as it affects three areas: clinical, cost, and patient satisfaction. Pertelle (2004) states, "When improving healthcare, it is inevitable that by changing one outcome variable, another will be impacted."

Even the banking industry experiences tremendous instability in reconciling the benefits of its customer relationship management programs with the cost to achieve such. Research performed by the Tower Group, a leading advisory research and consulting firm that focuses on the banking industry, indicates that benchmarking standards are lacking, and consequently, measuring the benefits of customer relationship management programs is a real challenge. *Financial News* reports, "As talk of customer relationship management's failures accelerated into 2002, it became quickly apparent that the problem with most implementations was one of poor planning and lack of established metrics" (Anonymous, 2004).

The research continues to conclude that *eagerness* to begin a project often cuts out other activities including goal-setting, definitions for project success, and a reference ground for appropriate metrics.

Banking regulators are speaking up because they want to see more documentation on the actual decision-making process itself in order to determine how decisions were made. The conclusion that there is a benefit of XYZ when a technology is implemented is not enough. The

fact that regulators are entering this arena, albeit the banking industry, is sufficient to suggest that bodies of investors or other leaders are placing more scrutiny on how a conclusion to implement a decision on a process is drawn.

Processes affect any industry, any organization or business. The dynamic of the activities within a process affects the value of subsequent process. Cutting operational costs is often seen as a method of remaining competitive. But simply automating processes, as Mark Smith points out, is not the answer. He takes a step back and suggests that processes need improvement. Smith (2004) states, "Before you can automate processes, you have to assess them to see what is and isn't [sic] working in order to determine where you will get the biggest return on your investment."

The idea behind Smith's writing is that management simply should not assume that automating or other new technology in itself will achieve benefits or successes. Rather, taking a step back to look at the context of the business as a whole to identify well functioning processes and those that are not is crucial to the implementation of automation or new technology.

David Rowlands, VP of Lean Six Sigma at Xerox, as reported in an *Info World* article, says that two types of measurement must be considered in forming a process. Those are "…business metrics (inventory, cost, level of service, and customer satisfaction) and process metrics (time-related and quality-related events). Both are crucial to assessing change management" (Gincel, 2004). The idea that introduction of a new technology, automation, or other element that affects a larger process affects many metrics is clear. There is no paradigm representing exclusively one variable; the degree to which many variables are interdependent is a subject for any manager considering an improvement that comes attached with a cost.

Measurement of ROI for IT

So, how should researchers measure and evaluate ROI of information systems? We have examined many aspects on clinical process improvements through the use of technology; however, we cannot call all of these an *IT project in itself*, but a project targeted at developing new or improved activities, more productive workers or more efficient services. The best method to measure the ROI is through three areas: people, process and technology, and then translating these into quantifiable returns related to utility of the products and services offered and the cost of delivering them (Axson, 2001).

If we used an example of an Orders Management System, we could expect the benefits in terms of better worker productivity, a decrease and elimination of duplicated tests, online access to test information, improved customer satisfaction, and so on. However, implementing the new system is only one element of ensuring the full value realized. Having every order accurately inputted and processed through the system cannot be done without adequate training and education of the workers. Creating a system that is not user friendly and does not correlate with the department's workflow objectives will not be used by the workers and does not add value. Better customer service is not generated if the workers are frustrated by the system and comment to the patients about this frustration.

Axson (2001) indicates an investment evaluation would address the following:

1. Training workers to work effectively on the system and have experts close by when there is an issue for assistance (people).

2. Getting worker input on the design of the product. Having a work group to continually review the system and make recommendations and changes to the system (process).
3. Returns to be gained from implementing a new order management system (technology).

Once investments are viewed in this context, it becomes easier to define expected benefits and subsequently measure those returns. One other crucial consequence is that this explicitly demands the creation of a multi-skilled, cross-functional team with shared accountability and responsibility for success. No longer can users point fingers at IT and vice versa, because the degree of mutual dependency for success is explicit (Axson, 2001).

Remenyi (2000) indicates that the measuring and managing of IT benefits is a difficult challenge that has plagued the IT industry, IT professionals, consultants, academics, CEO's, Boards of Directors, CIO's and other managers for many years. Remenyi (2000) contends that the main reason for this is that despite the considerable amount of research conducted by academics and consultants so far, no comprehensive or rigorous economics of information has been developed. Economics of information means a systematic series of concepts and theories that explain the role which information and information systems play in assisting individuals or organizations in their conception, production and delivery of goods and services both in private and public services.

ROI Methodologies

Traditional ROI methodologies for deciding if one investment will enable the organization to successfully implement another initiative in the future include a variety of models.

Organizations utilize a variety of methods to evaluate payback. These include economic value added (EVA) to measure the after-tax operating profits, a standard cost/benefits analysis to measure ROI, and historical analysis such as data warehousing. However, the most common method is still the net present value (NPV) method to determine if the initiative justifies the investment (Violino, 2000).

Uncertainty still clouds the methodology when using ROI methods such as net present value (NPV). Static valuation models such as NPV and discounted cash flow (DCF) tend to undervalue investments made under uncertain conditions. Analysts then resort to instinctive methods such as synergy or strategic importance to compensate for the uncertainty. In these cases, analysts call for real options such as a call option. By using the call option, the analyst gets flexibility often missed by DCF and NPV methods. The value of the call option increases as the value of the stock increases (Latimore, 2000).

Other traditionally utilized financial applications to measure ROI include the payback method, accounting rate of return on investment, and a cost benefit analysis. Historically, measuring the time required to pay for the purchase or calculating a rate of return for the investment that includes depreciation and income earned by the investment was sufficient to measure the return to stakeholders. The vast, but hard to measure intangible benefits of IT, create a unique challenge for managers.

Potential value, as described in research by Davern and Kauffman (2000), is the ability to assess the theoretical framework of potential value with some certainty in order to realize a return on the organization's IT investments. Traditional financial modeling is deemed biased by some researchers when measuring intangible benefits. IT creates an immediate financial expenditure,

but the payback is over a considerably longer period of time than traditionally reviewed in a typical financial model (Laudon, 2000).

Limitations of traditional financial models include consideration of the political position in the organization. While the political position has very little to do with IT, it usually affects the period of time allowed for ROI. Additionally, traditional ROI models assume that costs and benefits are known and expressed in a common metric such as money (Laudon, 2000). This is not always the case when measuring ROI for IT.

According to Davern and Kauffman (2000), the firm's realization of value is influenced by complementary assets such as human capital and business process design. The research considers potential value for information technology investment by examining the relationship among potential value, conversion contingencies, and realized value. It is understood that IT purchases have value at project selection and post investment evaluation in addition to the actual production required of the system. Therefore, the attitudes and opinions of those managers responsible for IT purchase, implementation, and control become extremely important to the success of the overall project.

Subdivision of ROI for IT

Davern and Kauffman (2000) divided ROI for IT into three distinctive categories; (1) potential value, (2) conversion contingencies, and (3) realized value. The premise was to measure ROI at separate phases of the process to ensure processes were in place to increase the success of receiving a return for the technology investment. Many managers go directly for the potential value and forget the contingency impacts on the project. This affects the organization's ability to

realize potential from the investment. Additionally, there are a variety of issues that can affect the value once an application or infrastructure has been built.

Managers are behind the power curve when it comes to measuring the impact of their IT purchases and productivity. In fact, there are those who feel that the size of the budget is sometimes the sole determining factor in the purchase and use of computer systems. Another point is that ROI for technology management is an evolving process. It is still relatively expensive and more technology is being developed as this is written. Issues such as digital paper, imaging, workflow management, wireless technology, bandwidth, and web-based companies are emerging to create a relatively new industry. The implications of these changes are still in question resulting in reluctance among companies and governmental agencies to move quickly (Gingrande, 1999)

Performance Measurement

Management demands performance measures to improve operations and productivity. Van de Ven (1986) describes four problems relating to management that should be addressed by performance measures: (1) the human problem of managing attention; (2) the problem of managing ideas; (3) the problem of managing a part-whole, or managing an idea as it develops over time; and (4) the problem of institutional leadership, where management must create a structure conducive to measurement. In short, the managers' inability to cause employees to think outside of the box, or innovatively, is a major problem that must be addressed through performance measurement.

Poister (1999) indicates that performance measurement is becoming a major issue with public sector organizations. Contemporary management is examining how to integrate the

holistic approach of utilizing performance measurements to create efficiency and productive work environments. The Internal Revenue Service (IRS) recently underwent massive changes spearheaded by improved performance measurement with outstanding results. Three elements now comprise performance measuring under the new IRS plan: (1) customer satisfaction, (2) employee satisfaction, and (3) business results. The focus of the IRS will continue to be ease of filing. They plan to use performance measurement of their three key elements to reach this goal (Jones & Luscombe, 2000).

Many times the budget drives the change. Managerial innovation is a key to creation and evaluation of performance measures that will ensure efficiency and effectiveness in the use and purchase of computer assets. Managers must know exactly what they want to get from the system they have or propose. Yet, they listen to sales personnel, other managers, their own technical personnel, and any other source of information they have and fail to begin with a basic problem statement prior to jumping into the purchase or use of information technology.

Today's managers must supervise personnel, providing computer utilization guidance to achieve and demand maximum output. However, individual managers may lack the knowledge required to determine efficient computer information system utilization. The level of innovativeness may determine if managers effectively influence change in organizations. Downs and Mohr (1976) contended that technical innovations require a completely different decision process than administrative decisions. Management of end-user computing falls into the technical category and prompts managers to examine the process from a different angle than to what they are accustomed (Kimberly, 1981).

Hebert (2001) goes on to say DeLone and McLean's work in identifying six variables used to measure success from the Management of Information Services (MIS) perspective were: System, Quality, Information Quality, System Use, User Satisfaction, Organizational Impact and Individual Impact. DeLone & McLean's work in identifying MIS success measures assists in conceptualizing the structure-process-outcome variables in a technology context as well as contributes to developing a framework useful for accumulating results.

Return on investment of the technology used for patient care goes one step further and asks not only if the technology works, but at what cost and whether it is a good replacement for current practice. An analysis may consider a number of elements: specification; performance measures (time, quality, cost); outcomes (safety, efficacy, effectiveness); summary measures (cost comparisons); operational considerations (access, acceptability); and other issues (confidentiality, legal) (Hebert, 2001).

Research Methodology

Sample and Data Collection

This study was based on data obtained from a sample of managers in Florida hospitals directly responsible for the purchase and implementation of information technology. The sample population selected for this research was all 285 hospitals in Florida. Demographic questions on the survey separate each hospital. A list of question topics is included as Appendix A.

This research focused on managers responsible for information technology such as IT Department Director, Chief Information Officer, Finance Department Director, Chief Financial Officer, Business Unit Executive, Chief Executive officer, or a specific other. The determining factors for selecting a manager for the study were: 1) supervision of the use of IT, 2) instrumental

in the decision making for the purchase of IT, and 3) active in the implementation of newly purchased IT.

Under the criteria established for the study, 285 hospitals were identified and surveys were mailed to the MIS Director with instructions to have the responsible individual complete the survey. Demographics indicate the manager responsible for survey data input. Based on the list of names obtained from the Florida Hospital Association each participant received a package containing the research questionnaire and cover letter for administration. Instructions for completing the survey were included in the packet. The final survey was administered to 93 managers.

Instrument

The questionnaire used in this study contained questions measuring the variables described in the problem statement. The questionnaire analyzed each variable using a Likert type scale.

Data Analysis

H1 – ROI and independent variables

The first and most significant finding of this research is that 28% of respondents reported that their institution does not measure ROI for IT. Additionally, the primary reason to measure ROI on IT is because it is required. The secondary reason is because the respondent believes it is a good way to analyze investments.

The reason for the apathy for measurement of ROI in over one quarter of the institutions responding could be attributed to the fact that 64% (59/93) of respondents are from public

healthcare or nonprofit hospitals. However, this research does not provide enough information to justify this conclusion.

Additionally, of those who did measure ROI, 48% of respondents represented MIS/IT personnel and13% are from planning or finance or purchasing departments. While 72% (51/70) used ROI for a most recent IT purchase, 60% (46/77) of respondents report that the IT department/CIO and/or the finance department/CIO is responsible for setting the criteria for measuring IT ROI. Also, an overwhelming majority of respondents, 79% (53/67) said that CFO/CIO finance department is responsible for performing post-implementation ROI analysis.

The majority of respondents reported the costs for this recent IT purchase was between $10K and $50K. Over 75% (52/69) of respondents use either NPV, Black-Sholes, or a Breakeven Analysis (BEA) to measure ROI. Of those who measure ROI, 82% (55/67) said that the time period for ROI calculations is 1-5 years. Additionally, 75% (54/72) of respondents have purchased IT within the last 12 month period (at survey date).

As stated before, MIS/IT director and CIO make up the majority of respondents to this survey. An overwhelming majority of respondents have a college bachelor's degree or a master's degree. A cursory look at the spread sheets indicates that the great majority of respondents remain at their posts for longer than three years.

When looking at measurement, 70% believe it is extremely likely or highly likely that they would measure ROI when an IT investment is aimed at cutting costs. Over 57% of respondents are extremely likely or highly likely to measure ROI when an IT investment is aimed at keeping pace with competition. Of those who do measure ROI, 59% (39/66) said it was extremely likely or

highly likely that they review the initial ROI calculation for accuracy to see if the project is on track.

Table 1. Correlations Q12a and Q20.

	Q4	Q9	Q10	Q11	Q12A
Q12A Sig. (2-tailed)			.294* .017	.253* .040	
Q20 Sig. (2-tailed)	.311* .011	.265* .032			.325** .008

N = 66
** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

The following information was determined by a correlation analysis as indicated in the Table 1:

1. Q20 is related to Q4; ROI can be measured and helps managers decide on priorities for IT projects.
2. Q20 is related to Q9; ROI can be measured and the expected return time period is 2 - 5 years.
3. Q10 is related to Q12A; ROI is used to evaluate projects with a value range of $50,000 to $500,000.
4. Q11 is related to Q12A; during the past six months to one year, the most recent IT purchase fell in the $50,000 to $500,000 range.
5. Q20 is related to Q12A; ROI was important in the decision to execute the most recent IT project.

H2 – Demographics

Table 2. Correlations Q14 – Q35.

	Q13	Q15	Q15A	Q16	Q17	Q18	Q19
Q14	-.263*						
Sig. (2-tailed)	.003						
Q15A		.656**					
Sig. (2-tailed)		.000					
Q16	.273*						
Sig. (2-tailed)	.027						
Q17		.385**		.365**			
Sig. (2-tailed)		.001		.003			
Q18		.270*	.309*				
Sig. (2-tailed)		.028	.003				
Q19		.365**			.288*	.341**	
Sig. (2-tailed)		.003			.019	.005	
Q19A		.298*				.310*	.782**
Sig. (2-tailed)		.015				.011	.000
Q35						.691**	
Sig. (2-tailed)						.000	

N = 66

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Table 2 presents several observations regarding the data collected. Results include:

1. Question 19 and 19A predicts question 15; the size of the department and organizational budgets predicts the number of employees.
2. Question 13 predicts question 14; education level is related to title. Some graduate work is necessary to reach the title of CIO.
3. Question 15 predicts question 15A; the number of full-time employees predicts the number of part-time employees. 941 full time employees to 233 part time employees.
4. Question 16 predicts Q13; tenure predicts position in the organization. It takes an average of 7.4 years to reach CIO.

5. Question 16 predicts question 15; tenure in the MIS department predicts the number of employees under the leader answering the question. The average tenure of 7.4 years to CIO relates to an average of 941 employees under their supervision.
6. Question 17 predicts question 16; tenure in MIS predicts tenure in the organization. The average tenure of 7.4 year to CIO relates in an average of 7.4 years in the organization.
7. Question 15 and 15A predicted question 18; the higher the number of employees the more IT devices in the organization.
8. Question 19 and 19A predicted question 18; the bigger the budget the more information technology devices in the organization.
9. Question 19A predicted Q19; organizational budget predicted departmental budget.
10. Question 35 predicted question 18; the number of beds in the hospital predicted the number of devices.

H3 – Decision-making

- 62% (40/65) believe that ROI projections have an extremely high or high impact on organizational decisions to proceed with IT projects. The balance (38%) say ROI projections have moderate, little or no impact on decisions.
- 70% believe it is extremely likely or highly likely that they would measure ROI when an IT investment is aimed at cutting costs.
- Over 57% of respondents are extremely likely or highly likely to measure ROI when an IT investment is aimed at keeping pace with competition.

- 23% (15/66) said that in cases where actual results are less than the initial ROI projections, they would be highly likely to suspend or cancel the project until the benefit can be shown. No respondent said they would be extremely likely. The balance (77%) said that was moderately likely, somewhat likely or unlikely.
- 33% (22/66) said that in cases where the actual results are less than the initial ROI projections, they would be extremely likely or highly likely to scale the project back.
- 66% (47/71) of respondents said that in cases where the actual results are less than the initial ROI projections, they would be extremely likely or highly likely to take remedial action to rectify the situation.
- 62% of respondents said that in cases where actual results are less than the initial ROI projections, they are extremely likely or highly likely to refine the process for the next time.
- Almost half of the respondents reported that they are extremely likely or highly likely to *note it for posterity* if actual results are less than the initial ROI projections.
- 59% of respondents (40/68) said that they are extremely likely or highly likely to determine the current state of their existing technology on a routine basis.

H4 - Implementation

- 75% (54/72) of respondents said ROI was built into the implementation phase of their last IT purchase.

- 59% (39/66) said it was extremely likely or highly likely that they review the initial ROI calculation for accuracy to see if the project is on track.
- 54% of respondents (35/65) said that when implementing ROI for IT, they are extremely likely or highly likely to include ROI processes in implementation.

Summary

As stated in the beginning, this research paper is one in a series in the process of conducting an analysis of the usage of ROI for IT expansion in Florida's healthcare industry. ROI is critical to the budget process and strategic planning. Further study of this issue is dictated by the costs of technology and the failure of organizations in healthcare to implement processes that take advantage of the full potential of technology.

The significance of this research to the hospital industry is contained more in what is not happening rather than what is happening. Based on results from this survey, 28% percent of the hospitals in Florida do not measure ROI. This finding, along with management practices for decision-making and implementation, will help establish a model for future measurement and uses for ROI in relation to IT.

The study was limited by the ability of researchers to get the survey into the hands of the best individual to answer the questions. This created some diminished confidence in the data received. This was especially true when reviewing responses requiring financial data such as budgets and IT expenses.

Future research on this topic will include focus groups including interviews with the individuals indicating on the survey that they were interested and would participate in follow-up

research. Additionally, the hospital industry's transition into electronic medical records offers a generic opportunity to study ROI for IT on technology for each hospital.

Conclusion

ROI for IT in the healthcare (hospital) industry to achieve quality of care is an important issue for patients, healthcare workers and hospital managers. IT is needed in this industry to provide access to information and save patients lives each and every day. However, there is no specific formula or rule of thumb which is able to measure the effectiveness from a return of the dollar investment alone. Computer based products are needed to eliminate the paper. Connectivity to the system is needed for the healthcare workers to access the system in a confidential and secure manner. Reliable and redundant systems need to be in place for continuous accessibility to the information at any time for the care of the patient.

These systems are expensive and necessary. They are also needed to streamline productivity of the patient's care. Automation of drug entry systems can prevent medication and medical errors which are made each day due to handwriting errors and human error at a savings of $4,700 per admission is one aspect of ROI for an Electronic Medical Records (EMR) (Graham & Snowe, 2001). Also adding to the value of the system and the ROI are: the reduction of duplicated tests, worker productivity gains, better patient satisfaction survey results, reduction in over-time costs, reduction in paper and form costs, employee satisfaction, physicians satisfaction, length of stay, reductions, risk reductions from better tracking of slips and falls, etc.

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Appendix

Instrument

This section provides a diagram of each question and the individual association.

- Independent Variable (Managers' use or ROI for IT)
- Dependent Variables
    1. Use of ROI for IT for Decision-Making
    2. Inclusion of ROI in the Implementation of ROI for IT.
- Demographic Data

Listed below are the scales used to calculate control, independent and dependent variables for this research.

Demographic Data

-Organization Type	:Q1
-Department	:Q2
-Location	:Q3
-Responders Title	:Q13
-Responders Education Level	:Q14
-Number of Employees	:Q15
-Respondents Tenure with Hospital	:Q16
-Respondents Tenure with Department	:Q17
-Number of Technology Devices	:Q18
-Annual Budget	:Q19
-Number of Beds	:Q35

Hypothesis # 1:(ROI vs. Other variables)

-Is ROI Measured	:Q4
-ROI Payback Time Period	:Q9
-Method Used for ROI	:Q10
-Most Recent Purchase (Time)	:Q11
-Most Recent Purchase (Price)	:Q12
-Can ROI be measured	:Q20

Hypothesis # 2(ROI vs. Demographics)

-ROI Compared to Demographics	:Q2, Q3, Q13, Q14, Q15 & Q16, Q17, Q18, Q19, Q20

Hypothesis # 3:(Decision Making)

-Who establishes criteria for measurement :Q7
-Who performs Post-implementation ROI Analysis :Q8
-Which projects do you measure :Q21
-Decision to Proceed :Q22
-Is ROI used to cut costs :Q23
-Measured to keep pace with competition :Q24
-Is ROI measured to cut employees :Q25
-Is ROI reviewed after implementation :Q27
-Will ROI cause suspension of project :Q28
-Do you scale back due to ROI :Q29
-Does ROI cause action :Q30
-Does the Process change due to ROI :Q31
-Do you record ROI results for the future :Q32
-Do you analyze technology routinely :Q34

Hypothesis # 4:(Implementation)

-ROI built in to Implementation :Q5
-Was Current System analyzed prior to :Q26
-Is ROI reviewed after implementation :Q27
-Is ROI included in Implementation :Q33