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Health Care Executives: The Association between External Factors, Use, and Their Perceptions of Health Information Technology

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ABSTRACT

Over the past 30 years, researchers have demonstrated that health care information technology can improve patient safety and quality of care. More recently, attention has turned increasingly to the role of information and communication technology as a means to improve clinical decision-making, and organizational efficiency and effectiveness. Despite these streams of research, there is a lack of investigations that look at why and how health care executives leverage HIT. In this paper, the researchers investigate the factors, such as working in a JCAHO certified organization, that impact health care executives' degree of HIT use in their workplace. The analysis of data collected suggests that there are varying degrees of HIT use among health care executives. Further analysis of the data indicates that, even though the executives in general believe in usefulness of HIT for better service delivery, those beliefs are not a factor in their intent to use HIT in their workplace.

Keywords

Information technology use, JCAHO, health care

INTRODUCTION

The U.S. Government, in a study conducted by the Office of Technology Assessment, stressed the need for assessing the effect of technology on the delivery of health care services (U.S. Congress, Office of Technology Assessment, 1995). The changes that are taking place in the information technology environment have received special consideration by entities that are involved in health care services. For example, the Agency for Health Care Policy and Research (AHCPR, 1998) has emphasized one of the major concerns of the Government regarding health care delivery: to understand the influences of organizational factors on the adoption of new information technology by health care organizations.

Stemming from this concern, it has been argued that proper use of information technology would be instrumental in reducing the cost of delivery of health care, increasing the quality of service, and improving the overall performance of the health care organization. In the US, health care expenditures have always been major component of Gross Domestic Product: in 2001 national health expenditures were \$1,424.5 or 14.1 percent of GDP. These costs have continued to rise steadily without a cap in sight. In 1990, health care expenditures represented 12.0 percent of GDP, in 2000, 13.2 percent, and by 2010, the Center for Medicare and Medicaid Services (2001) actuaries project that national health care expenditure will represent 16.8 percent of GDP. However, despite clear benefits such as improved staff productivity and reduced error rates, health care information technologies (HIT) such as computerized physician order entry (CPOE) systems, electronic prescriptions, and disease management databases are not yet widely accepted in the medical community (AHRQ, 2003).

Hoping to improve in operational areas, many health care organizations have made large investments in information technology. However, despite intensely touted benefits of HIT, the information technology expenditures of health care organizations are drastically behind those made in other industries. While other industries average about 12% of their annual revenue on IT related expenses, health care organizations are allocating around 3 to 4 % of their annual revenues. This relatively limited investment in the HIT has been the result of misaligned financial incentives, the high cost of investing in HIT systems, the limited available data on how HIT improves important outcomes, potentially disruptive effects on clinical workflow, cultural barriers, and competing priorities. In addition, little is known about the relationship between HIT and financial or other economic aspects of health care.

PURPOSE OF THE STUDY

This paper, stemming from previous research and concerns expressed by various health care agencies, examines the association between certification provided by the Joint Commission on Accreditation of Health Care Organizations

(JCAHO) and health care organization executives' HIT use as well as their perceptions of HIT effectiveness. Even though JCAHO certification is not mandatory, it is a prestigious award that implies that the health care facility is in compliance with the standards set by the accrediting organization and is implementing required quality procedures in all functional areas of the organization, including management of information.

Financial considerations play a major role in HIT investments. Resource allocation for meeting the guidelines set forth by JCAHO is challenging for health care organizations. Since executives represent a major voice in the financial decision-making process in health care organizations, we investigated the underlying factors that can impact the attitudes of these key decision makers.

Thus, the primary research question is to study the perceived advantages of HIT adoption. Also we looked at the level of satisfaction of available HIT based on the rate of HIT use of health care executives in three different health care settings: 1) Hospitals, 2) Long term care facilities, and 3) Community health service facilities. The ultimate goal is to provoke enough interest among academicians to study the underlying factors why HIT has not been successfully implemented in health care organizations (AHRQ 2003).

PRIOR IT USAGE RESEARCH

Previous research done by Bretschneider and Wittmer (1993), Franz and Robey (1986), Igarria, Zinatelli, Cragg and Cavaye (1997), Thong and Yap (1995), and Yavas, Luqmani and Quraeshi (1992) demonstrate the multiplicity and the complexity of the issues related to information technology use. These researchers were able to identify, through their research, the varying impact of three major groups of factors on the adoption of information technology among different types of businesses. These factors were grouped as: a) External factors, b) Internal factors, and c) Individual factors.

Our model applies these factors to a health care setting (Figure 1).

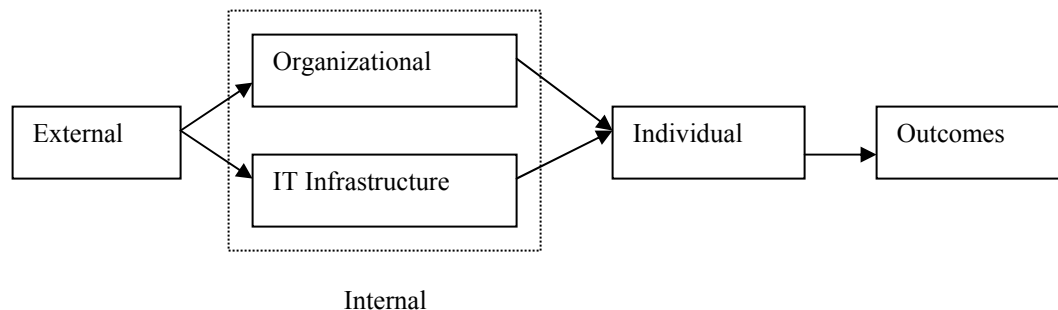


Figure 1. Research Model

Internal factors

There has been limited research on the adoption of information technology and dissemination of information in the health care sector despite a plethora of research in other types of organizations. Bretschneider and Wittmer (1993) concluded that the sector in which an organization operates has a major differential effect on the adoption patterns of microcomputer technology. Therefore, there is a need to reevaluate the applicability of the previously identified factors such as IT infrastructure, IT training and support, and management support for IT adoption as constructs for adoption and utilization of information technology in the health care environment.

Individual factors

Why people accept or reject information technology is an intriguing topic for academicians and has attracted a great deal of attention from a variety of disciplines. In an effort to understand the user acceptance of computer technology, researchers have studied the significance of users' beliefs and attitudes (Ginzberg 1981; Ives, Olson and Baroudi 1983; Robey 1979) and how these internal beliefs and attitudes are influenced by external factors.

Rogers' (1995) diffusion theory offers us some insight in understanding how adopting innovative changes is affected in organizations. Based on diffusion theory, the personal characteristics of the individual and the perceived characteristics of innovation have an impact on the individual's adoption of information technology. These individual factors such as perceptions, expectations, rate of HIT use, and attitudes can be critical in defining the success of information technology adoption in organizations. In this study, we use the HIT use rate as independent variable to identify if there is a relationship between HIT use and perceptions.

External factors

Health care organizations are subjected to various external pressures applied by various external stakeholders, such as governmental policy makers, third party payers, and accreditation agencies (e.g. JCAHO). The standards, rationales, elements of performance, and scoring requirements imposed by JCAHO have to be dealt with by the executives with due diligence in order to achieve and thereafter to maintain the accreditation requirements of JCAHO.

Management of information is one of the eleven areas of focus established by JCAHO for hospitals. Providing patient care is an extremely complex and critical process that is highly dependent upon information. Standards established by JCAHO and regulatory requirements established by the governmental agencies require health care organizations to gather, manage, and use information to improve patient outcomes as well as organizational performance. Therefore, a HIT is a critical facilitator for managing information. In this study, we use JCAHO certification as independent variable to identify if certification by an accrediting agency would have an impact on the healthcare executives' degree of HIT use and perception of HIT usefulness.

Thus we posit that:

H1a: Executives at JCAHO certified organizations are more satisfied with the available HIT systems than executives at organizations that are not certified.

H1b: Executives at JCAHO certified organizations are more satisfied with the support provided by the HIT staff than executives at organizations that are not certified.

H2: There is a significant difference between the perceptions of executives at JCAHO certified organizations regarding HIT as a necessary tool to improve their job performance than the perceptions of executives who are at non-JCAHO accredited facilities.

H3: There is a significant difference between the beliefs of executives at JCAHO certified organizations regarding management's understanding of the value of HIT than the beliefs of executives who are at non-JCAHO accredited facilities.

H4a: There is a positive relationship between executives' perceptions about the contributions of HIT to their job performance at the work place and their rate of HIT use.

H4b: There is a positive relationship between executives' perceptions about the contributions of HIT to their productivity at the work place and their rate of HIT use.

H5a: Executives at JCAHO certified organizations are more willing to increase their use of HIT for enhancing job performance than those at organizations that are not certified.

H5b: Executives at JCAHO certified organizations are more willing to increase their use of HIT for quality improvement than those at organizations that are not certified.

RESEARCH METHOD

Study Context and Sample

The sample used in this study included the name, address, phone number, and title of the subject. This information was paired with the facility name and type (hospital, long-term care, and community health center) for each subject. It was purchased from a list broker that specializes in health care mailing lists. A two-stage stratified sampling scheme was utilized.

The sample was selected by assigning each of the study population to a stratum based on the facility type, thus forming three strata (i.e. hospitals, long-term care facilities, and community health service facilities). The members of the strata consisted of administrative staff working in a health care setting (i.e. chief executive officers, presidents, managers, supervisors, and other information technology users), excluding the professional staff (i.e. physicians, nurses, technicians). The administrative staff was categorized as health care executives (CEO, CFO, COO, president, etc.) and other management (supervisors, managers, etc.). The sample then was randomly selected from the available names that were part of this defined stratum.

The stratified sample selection yielded 6,713 subjects. At the end of the first and second wave of data collection, 218 of these were determined as invalid addresses, resulting in 6495 usable addresses. At the end of the first and second waves of mailing of the surveys, a total of 557 questionnaires were received. There were 2 subjects who refused to answer any of the questions thus resulting in 555 usable questionnaires (a response rate of 8.54%).

In order to verify that the sample was representative of the population studied, a multinomial distribution test was performed using the prior known characteristics, i.e. facility type and administrative position, of the respondents against the

same characteristics of the sample data received. Chi-square analysis of the data was found to be not significant at p level 0.05 for facility type ($\chi^2=5.61$, $p=0.16$) and for user's position ($\chi^2=2.53$, $p=0.11$).

Based on these results, we could assume that among health care information technology users, non-respondents are not significantly different than respondents, and we can accept the responses as a reasonable representation of the population studied.

For the specific purpose of this study, we then parsed out the health care executives from the data set. This yielded 398 subjects for the category (Table 1). Out of these respondents 63.7 % were male and 36.3% were female subjects. Age and education related data is provided in Table 2. The survey instrument consisted of 7 item likert scale questions probing the HIT users' perceptions about HIT, level of satisfaction, self-efficacy, image, and outcome expectations. The subjects were also asked to report how many hours per month they spent on various HIT related tasks at work as well as home. Personal and organizational demographics were also captured with the survey instrument. In total the subjects were asked to respond to 129 survey items.

Facility	N	Percent	JCAHO Certified	Percent
Hospital	115	28.9	98	85.2
Long term care	232	58.3	58	25.1
Community health service	51	12.8	21	42.0
Total	398	100	177	

Table 1. Facility Types

Education	Some College	Associate Degree	College Degree	Graduate Degree	Other
Percent	4.8	5.3	35.6	53.0	1.3
Age	Less than 30	30 to 39	40 to 49	50 to 59	60 and over
Percent	2.8	13.8	39.4	39.4	4.7
Rate of HIT use	Non-User 0 hours per day	Light User 1 hour or less per day	Moderate User 1 hour to 2 hours per day	Heavy User Over 2 hours to 4 hours per day	Super User Over 4 hours per day
Percent	20.4	25.4	24.6	19.6	10.1

Table 2. Demographics of Respondents

DATA ANALYSIS AND RESULTS

Out of 398 facilities, 177 indicated that they were JCAHO certified (Table 1). The subjects were classified into 5 categories based on their rate of HIT use during the course of the day. The grouping is broken down as follows: 1) Non-Users - 0 hours per day, 2) Light Users - 1 hour or less per day, 3) Moderate User – over 1 hour to 2 hours per day, 4) Heavy User – over 2 hours to 4 hours per day, and 5) Super User – over 4 hours per day (Table 2). It should be noted that more than 70 percent of the executives spend 2 hours or less per day using the HIT available for them. This usage may include reading e-mail, evaluating reports, searching Internet for information, and other work related activities.

The data was analyzed by univariate statistics and one-way analysis of variance is used to identify group differences.

Hypothesis Testing

An analysis of variance (ANOVA) was conducted to test the means of JCAHO accredited or non-accredited facilities for the hypotheses set forth. The dependent variables were: 1) degree of satisfaction with the HIT services provided by the organization, 2) degree of satisfaction with the organization's response to the changing needs of HIT users.

We found strong support for both hypotheses 1a and 1b; executives at JCAHO certified organizations were significantly different than their counterparts at those at organizations that were not JCAHO certified. With regards to the satisfaction with the level of available HIT available at workplace and the satisfaction with the support received from HIT staff, JCAHO executives were significantly different than their counterparts (Table 3).

		Sum of Squares	df	Mean Square	F	Sig.
HIT Infrastructure * JCAHO	Between Groups	12.321	1	12.321	5.074	.025
	Within Groups	961.621	396	2.428		
	Total	973.942	397			
HIT Staff Relationship * JCAHO	Between Groups	24.590	1	24.590	9.781	.002
	Within Groups	995.584	396	2.514		
	Total	1020.173	397			

Table 3. JCAHO and Executives HIT Satisfaction

Executives of JCAHO certified organizations had higher levels of satisfaction with their HIT use compared to executives of facilities that were not JCAHO certified. There were no significant differences noted with the level of satisfaction based on the executives' rate of HIT use. The relationship between rate of HIT use and the type of organization was also tested and significance was detected. Further analysis of the data demonstrated that community health service executives were significantly different than both hospital and long term care facility executives. Community health service executives spent significantly more time using their HIT compared to their peers in hospitals and long-term care facilities (Tables 4 and 5).

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	17.344	2	8.672	5.543	.004
Within Groups	617.955	395	1.564		
Total	635.299	397			

Table 4. Rate of Use and Facility Type

Dependent Variable: RUSE -Tukey HSD

Facility (I)	Facility (J)	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
3	1	.4984(*)	.21043	.048	.0033	.9934
	2	.6428(*)	.19344	.003	.1878	1.0979

Table 5. Multiple Comparisons*

* The mean difference is significant at the .05 level.

Hypotheses 2 and 3 were also supported as demonstrated in Table 6. Analyses indicate that executives at JCAHO certified organizations perceived HIT to be a necessary tool to improve their job performance. Their perceptions were significantly higher than those of executives who are at non-JCAHO accredited facilities. Likewise, the beliefs of executives at JCAHO certified organizations about management's understanding of the value of HIT rated significantly higher than the beliefs of executives who are at non-JCAHO accredited facilities.

		Sum of Squares	df	Mean Square	F	Sig.
Increase productivity	Between Groups	5.860	1	5.860	5.512	.019
	Within Groups	421.014	396	1.063		
	Total	426.874	397			
Management provides adequate IT	Between Groups	15.594	1	15.594	5.852	.016
	Within Groups	1055.150	396	2.665		
	Total	1070.744	397			

Table 6. JCAHO and Executives HIT Beliefs

We also found significant support for hypotheses 4a and 4b. Perceptions of the usefulness of HIT in job related tasks were significantly different among the executives when analyzed based on their rate of HIT usage. Executives who indicated that they used HIT more than 4 hours per day (Super users) were significantly different than non-users and light users (Table 7).

		Sum of Squares	df	Mean Square	F	Sig.
Improve job performance	Between Groups	18.627	4	4.657	3.933	.004
	Within Groups	465.293	393	1.184		
	Total	483.920	397			
Increase productivity	Between Groups	18.281	4	4.570	3.521	.008
	Within Groups	510.184	393	1.298		
	Total	528.465	397			

Table 7. Perceived Usefulness of IT

To our surprise, we were not able to find any support for hypotheses 5a and 5b (Table 8). One would intuitively expect that executives from JCAHO accredited facilities are more willing to spend more time taking advantage of the benefits provided by adoption of a HIT. Furthermore this was expected based on the support offered to H2. This unexpected finding was upheld when we performed a paired samples test between the perceived usefulness of HIT and the intent to use HIT (Table 9a and 9b).

		Sum of Squares	df	Mean Square	F	Sig.
Would like to use HIT more for increased performance	Between Groups	1.137	1	1.137	.603	.438
	Within Groups	747.245	396	1.887		
	Total	748.382	397			
Would like to use HIT more for quality improvement	Between Groups	.401	1	.401	.204	.652
	Within Groups	780.272	396	1.970		
	Total	780.673	397			

Table 8. Intent to Further Use HIT

	Mean	N	Std. Deviation	Std. Error Mean
Pair 1 V12 Perceived Usefulness	6.31	179	1.256	.079
V56 Intent to further use	5.11	179	1.502	.112

Table 9a. Perceptions versus Intent

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pair 1 V12 - V56	1.20	1.489	.111	.98	1.42	10.791	178	.000

Table 9b. Perceptions versus Intent

DISCUSSION

The purpose of this paper was to draw attention to underlying factors that may be hindering or encouraging the successful adoption and implementation of HIT. Based on our results, we believe that it is not an accident that the number of successful implementations of HIT in US health care facilities has been reported to be approximately 10% (Kohn, et. al, 1999). We found that the majority of health care executives, who are the gatekeepers of funding resources of HIT infrastructure, use HIT in an extremely limited manner.

Key Findings

Our findings indicate that executives’ satisfaction levels of HIT at health care facilities that were JCAHO certified were higher than those of executives who managed non-certified organizations. This is an important indicator, since the JCAHO accreditation process requires the establishment of specific guidelines for management of information within the organization and establishment of performance measurements and controls to monitor that these guidelines are followed. JCAHO accreditation is not mandatory; it is a voluntary initiative that comes from upper management. This highlights the role that an executive may play in a crucial decision process where immediate outcomes such as patient safety and quality are not necessarily attributable directly to HIT investment.

Another important finding of the study is the difference between the executives of community health service facilities and the executives of hospitals and long-term care facilities. One may intuitively say that because they work in smaller organizations, the executives of health service facilities had to spend more time on computers than their counterparts in larger facilities. Based on this belief, we tested the sample taking in consideration the organization size (number of employees). There was no significant difference measured in the rate of executives’ use of HIT based on the facility size. These findings need to be further investigated to better understand why community health care service organization executives are more inclined to use HIT when compared to their peers.

The rate of HIT use among the executives is another significant finding. In many trade journals, the benefits of HIT are intensely touted, yet more than 70% of executives use the HIT at their work place for 2 hours or less a day. One would expect that with the better reporting capabilities of today’s systems there would be more information available for the executives for better decision making which would result in more time spent on the HIT. However, one may also argue that the current ill state of HIT in the health care organizations may be the reason why the executives are not as interested in using the available HIT. Perhaps this is the underlying reason that even though they believe in the usefulness of available HIT, they are not willing to use it more hours than necessary.

Perhaps the most compelling finding is the fact that JCAHO accredited health care organization executives lack motivation to increase their rate of use of HIT. These executives who have high perceptions of the usefulness of HIT in job related tasks are not inclined to further increase their HIT use to achieve those perceived values. We believe that this is a critical finding that requires further investigation.

CONCLUSION

The results presented here have demonstrated the need for a bottom up investigation of the contributing factors for health care organizations' adoption and use of HIT in an efficient manner.

Low response rate to the mail survey can be seen as a limitation of this study. However, careful bias tests demonstrated that the data was representative of the population studied. Also, the challenges in collecting data from health care executives on a national basis through mailed surveys could have contributed to the low response rate (Hikmet and Chen 2003).

REFERENCES

1. Agency for Health care Research and Quality. <http://grants.nih.gov/grants/guide/rfa-files/RFA-HS-04-012.html>
2. Agency for Health Care Policy and Research, (1998). "Effective Dissemination of Health and Clinical Information and Research Findings". U.S. Department of Health and Human Services.
3. Bretschneider, S. and Wittmer, D., (1993). "Organizational Adoption of Microcomputer Technology: The Role of Sector". Information Systems Research, v4, n1, 88-108.
4. Franz, C. R. and Robey, C., (1986). "Organizational Context, User Involvement, and the Usefulness of Information Systems". Decision Sciences, v17, 329-356.
5. Ginzberg, M. J., (1981). "Early Diagnosis of MIS Implementation Failure: Promising Results and Unanswered Questions". Management Science, v27, n4, 459-478.
6. Hikmet, N. and Chen, S.K., (2003). "An investigation into low mail survey response rates of information technology users in health care organizations". International Journal of Medical Informatics, v72, 29-34.
7. Igbaria, M., Zinatelli, N., Cragg, P. and Cavaye, A. L. M., (1997). "Personal Computing Acceptance Factors in Small Firms: A Structural Equation Model". MIS Quarterly, v21, n3, 279-305.
8. Ives, B., Olson, M. H. and Baroudi, J. J., (1983). "The Measurement of User Information Satisfaction". Communications of the ACM, v26, n11, 785-793.
9. Robey, D., (1979). "User Attitudes and Management Information System Usage". Academy of Management Journal, v22, 527-538.
10. Rogers, E. M., (1995). Diffusion of Innovation, 4th Edition. The Free Press, New York, NY.
11. Thong, J. Y. L. and Yap, C. S., (1995). "CEO Characteristics, Organizational Characteristics and Information Technology Adoption in Small Businesses". OMEGA, v23, n4, 429-442.
12. Yavas, U., Luqmani, M. and Quraeshi, Z. A., (1992). "Facilitating the adoption of information technology in a developing country". Information & Management, v23, 75-82.
13. U. S. Congress, Office of Technology Assessment, (1995). Bringing Health Care Online: The Role of information Technologies. Washington, DC, U.S. Government Printing Office.