Communications of the Association for Information Systems

Volume 18 Article 34

3-21-2007

Information Systems and Healthcare XV: Strategic Fit in Healthcare Integrated Delivery Systems: An Empirical Investigation

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INFORMATION SYSTEMS AND HEALTHCARE XV: STRATEGIC FIT IN HEALTHCARE INTEGRATED DELIVERY SYSTEMS: AN EMPIRICAL INVESTIGATION

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ABSTRACT

This study employs 130 health care integrated delivery systems (IDSs) currently active in the U.S. to examine the quality and financial performance impacts of strategic fit for interorganizational networks. Using secondary data from HIMSS Analytics and the American Hospital Directory, this study classifies the IDSs into High-Maturity Organizations and Low-Maturity Organizations based on the corresponding levels of IT integration and organizational maturity achieved at the time of the study. A model of the relationship between strategic fit and both average length of hospital stay and operational cost is then tested for each group. With comparisons across the two levels of IDS development, the results suggest that IDSs that have achieved both high IT integration and organizational maturity exhibit greater improvements to both average length of hospital stay and operational cost than do IDSs at a lower level of IT integration and organizational maturity.

Keywords: integrated delivery systems, strategic fit, health care IT, IT value

* Lead author

I. INTRODUCTION

Interorganizational networks have been defined as “clusters of organizations that make decisions jointly and integrate their efforts to produce a product or service” [Alter and Hage, 1993, p.2]. Others have expanded this definition to include the interorganizational network’s primary goals as “efficiency, flexibility, and innovativeness” [Schumaker, 2002, p. 372] and describe them as “decoupled units developed because of rapid growth of knowledge and technology” [Schumaker, 2002, p. 372]. As such, the health care integrated delivery system (IDS) serves as a distinct and useful example of an interorganizational network. Defined as an interorganizational network of health care organizations joined for the common goals of clinical integration and an effective patient care continuum [Zucherman, Kaluzney, and Ricketts, 1995; Kilbridge, 1998; Young and

McCarthy, 1999; Deluca and Enmark, 2002], the IDS appears to be the prominent contemporary health care business model.

The anticipated value of interorganizational networks has been discussed for many years. A number of researchers have emphasized the ability to gain competitive advantage, improve financial performance for network participants, improve efficiency and effectiveness, and improve customer service [Borys and Jemison, 1989; Oliver, 1990; Schumaker, 2002; Straub, Rai, and Klein, 2004]. Yet, a lack of empirical research or well-developed models suggests this area of research is still evolving and developing and is in need of focused research attention [Schumaker, 2002; Melville, Kraemer, and Gurbaxani, 2004; Straub, et al., 2004].

Today, organizations in virtually every industry are facing increasing pressure to improve the quality of their services and products while simultaneously improving their financial performance. Thus, as organizations look to form partnerships and develop interorganizational linkages, they must consider partners with not only the potential to improve revenues, but also with a commitment to quality improvement [Page, 2003]. Organizations are also looking increasingly to information technology (IT) to further enhance and enable interorganizational network quality and financial performance. Despite the suggestions that IT should enhance an interorganizational network's ability to improve performance, the IT literature is void of empirical support for these claims [Straub et al., 2004].

One example of IT's enabling role in interorganizational network success is evidenced by the ability of networks to take on different forms – corporate ownership, contract arrangements, partnerships, alliances – because of the flexibility of IT to support these different structures. Often multiple distinct organizational forms may be present even within a single interorganizational network [Straub et al. 2004]. Another example of the potential role of IT in inter-organizational networks is the ability to use electronic information and resources to accommodate multiple needs within the network. For instance, the health care industry has embraced the use of electronic patient data and health information systems in recent years as a means to not only serve the patient, but also to evaluate physician performance, both of which represent critical applications of patient data and demonstrate the need for better data management. However, the value of IT to assist in managing this data has not been well established, particularly across networks of health care organizations [Page, 2003].

The creation and evolution of inter-organizational networks may result in additional complexities of structure, form, administration, and function not necessarily present at the firm level [Straub et al., 2004]. To that end, research that focuses only on the value of the IT resources employed inside an organization may be inadequate to fully capture the value-added aspects of inter-organizational network development. Thus, the current study proposes a strategic fit perspective of interorganizational network performance, a perspective lacking in the IT literature. As Venkatraman [1993] suggests, the ability of the interorganizational network to perform efficiently and effectively should be enhanced when strategic fit between organizational structure and IT resources is achieved.

RESEARCH MOTIVATION

Calls for IT research at the interorganizational network level of analysis and for empirical evidence of IT value in the health care industry motivate this research [Straub et al., 2004; Wilson and Lankton, 2004]. Specifically, this study investigates the strategic fit of IT maturity and organizational maturity and the impact of this fit on IDS performance, namely average length of hospital stay (ALOS) and operational cost. Additionally, this study compares the fit to performance relationships across two distinct levels of IDS development. This research focuses on the health care IDS as a distinct and useful example of an interorganizational network. IDSs may take a number of organizational forms, such as strategic alliances, contracted networks, or joint ventures and, in many cases, may be made up of multiple forms within a single network [Page, 2003]. The IDS lends itself well to an investigation of interorganizational networks because of the multiplicity of organizational structures and variance in the levels of IT integration

and sophistication across different IDSs. In addition, the intensity with which the health care industry has embraced the IDS as a contemporary business model and its distinction as a lateral network of stakeholders, all of whom provide direct service to the patient, also make the IDS an interesting example for the current study.

The goal of the current study is to use the health care IDS to empirically test a model of strategic fit that can then be further refined and extended across other industries. This study examines the potential differences in the nature and strength of the relationship between realized strategic fit and IDS financial and quality performance across two distinct levels or types of IDS development, namely High-Maturity IDSs and Low-Maturity IDSs. More specifically, strategic fit is measured as the alignment of IT maturity and organizational maturity among the participants within the IDS. In turn, the impacts of strategic fit on the average length of a patient's stay in the hospital (ALOS) and the operational costs of the IDS are tested. The model is tested for each of the two types of IDSs; then the results of these tests are compared across the two IDS types to investigate any significant differences. The proposed conceptual model is presented in Figure 1.

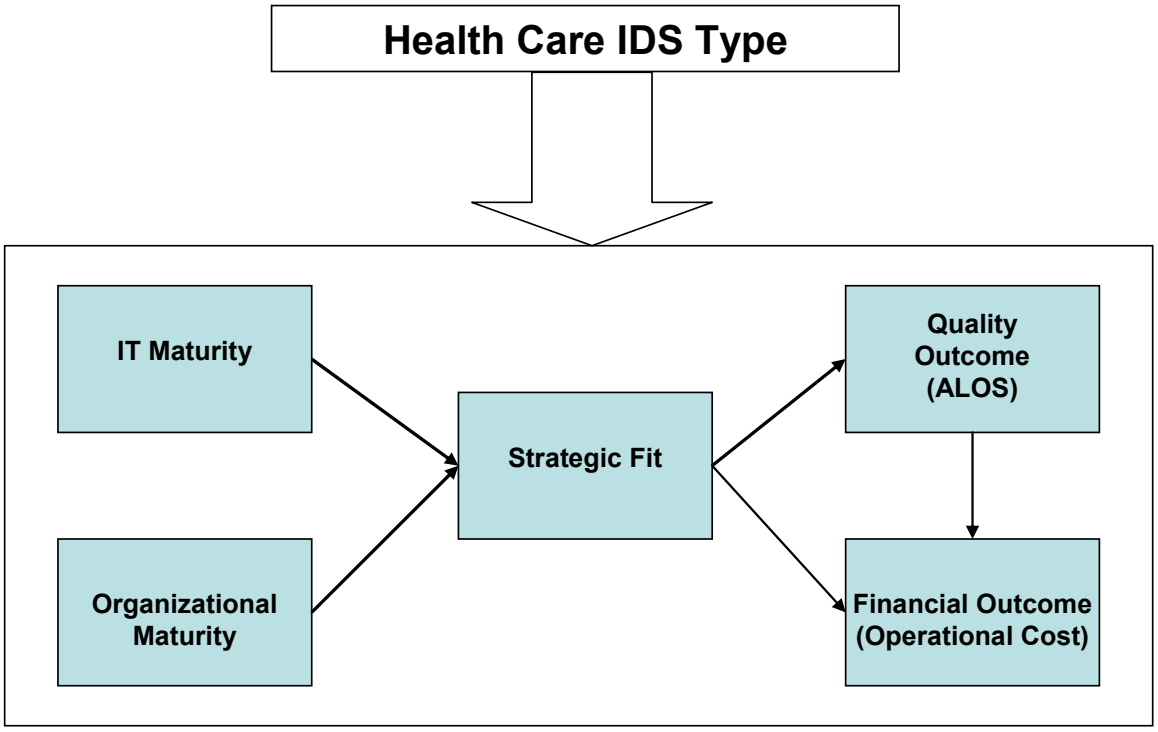


Figure 1. Conceptual Model of Strategic Fit for the Interorganizational Network

To test this model, the current study employs secondary data obtained from the Healthcare Information Management Systems Society (HIMSS) and the American Hospital Directory for 130 health care IDSs currently active in the United States. These sources contain extensive data regarding IT resources, organization, performance, and demographics for 1453 active IDSs in the United States. Using this data, we categorize the IDSs into two levels of development based on the alignment of IT maturity and organizational maturity; we label these High-Maturity Organizations (H-MOs) and Low-Maturity Organizations (L-MOs). An IDS with high IT maturity has IT that supports a vast array of business processes and functions, provides organization-wide electronic connectivity, compatibility, and modularity, and allows for immediate authorized access to all patient data anywhere and anytime within the IDS. An IDS with low IT maturity lacks many of these features. An IDS with high organizational maturity must be able to provide consistent high quality, cost-effective medical care across a wide geographic area, to a large population of potential patients, from multiple providers representing different medical entities [Parker, Charns,

and Young, 2001]. Additionally, an IDS with high organizational maturity has a wide range of specialties and, in turn, is able to reduce clinical variation and redundancy [Fischer and Coddington, 1998]. IDSs with low organizational maturity lack many of these attributes. H-MOs are IDSs that have both high IT maturity and high organization maturity. L-MOs are IDSs that have both low IT maturity and low organization maturity. Both H-MOs and L-MOs are strategically aligned. It is just that H-MOs are aligned with high IT maturity and high organization maturity and L-MOs are aligned with low IT maturity and low organization maturity. The relationship between strategic fit and IDS financial and quality performance is empirically tested with comparisons made across the two groups.

The current study makes two important contributions to the IT research literature in this area. First, we adopt an interorganizational network perspective rarely addressed in the IT literature, but noted as an area in need of focused research. Second, we extend theories of strategic fit to test and compare the relationship between strategic fit and interorganizational network performance across different levels of network development. This is important, as the interorganizational network brings with it increased complexity and variation of organizational structure. Unlike IT research at the firm level, an interorganizational network may be made up of multiple firms, each with its own organizational structure, administrative processes, and performance goals. In turn, investments in appropriate IT resources, support, and services are increased to support these new organizational structures and the variations across network participants. This complexity and variation of both the organization and its IT resources may lead to increased difficulty measuring IT value across different network structures and levels of maturity. Researchers and practitioners alike need a better understanding of how the relationship between strategic fit and interorganizational network performance differs across distinct levels of interorganizational network development.

II. RESEARCH MODEL AND HYPOTHESES

STRATEGIC FIT

Chan, Huff, Barclay, and Copeland [1997] define strategic fit as "the alignment between business unit strategic orientation and IT strategic orientation" [p. 132]. Similarly, Henderson and Venkatraman [1993] define strategic fit as a process of adaptation in which organizational changes must be supported by complimentary IT resources and integration. Inherent in this definition is the emphasis on strategic fit as a dynamic process, thereby complicating the measurement of strategic fit. Building on this definition, Henderson and Venkatraman's [1993] Strategic Alignment Model was founded on the argument that IT value for the organization should be greater when the business and IT strategies of the organization are appropriately aligned. The Strategic Alignment Model serves to illustrate the complexity of strategic fit. More specifically, this model suggests that merely aligning the business and IT strategies is insufficient. In support of these strategies, the functions, structures, and processes of both the organization and IT must also be aligned. Based on the definitions and discussion above, we define strategic fit for this study as the point of equilibrium at which the level of interorganizational network maturity is properly aligned with an equivalent level of IT maturity.

To emphasize and highlight the important new role of IT as an enabler of business transformation and strategic fit, Venkatraman [1994] developed the IT-Enabled Business Transformation Framework as an extension of the Strategic Alignment Model. In this framework, Venkatraman [1994] posits that IT is no longer simply an operational support resource, but rather a strategic tool with which to enable transformation of the organizational structure and business processes of the firm. He further proposes that this strategic role of IT emerges more readily as firms begin to establish and expand strategic alliances and partnerships, as is the case with interorganizational networks. In these more advanced stages of organizational development, the need for, and benefits from, strategic fit are also expected to increase as interorganizational networks form and expand into more complex organizational structures [Venkatraman, 1994]. However, little empirical evidence exists to support these suggestions. Much research in the area of strategic fit

has been conducted at the firm level of analysis [Chan, et al., 1997; Bergeron, Raymond, and Rivard, 2001], but research at the interorganizational network level of analysis is rare [Straub et al., 2004].

Strategic fit has received much attention at the firm level of analysis across a variety of different industries. The aim has been to examine the impact of strategic fit on business performance in terms of both quality and financial outcome measures [Henderson and Venkatraman, 1993; Chan and Huff, 1993; Chan et al., 1997; Sabherwal and Chan, 2001]. While consensus seems to exist regarding the importance of strategic fit, some studies of strategic fit and the link to organizational performance have produced mixed results. For instance, in Chan and Huff's [1993] study, strategic fit was found to have a significant positive influence on IS effectiveness but was not found to significantly influence the chosen financial performance indicators, which were largely profit-oriented. Further, Palmer and Markus [2000] obtained similar results in their study of the retail sales industry. They were unable to find support for a link between strategic fit and improved financial performance. Contrary results were found by researchers who have examined the differences in firm performance between organizations at different levels of strategic fit. Zajac, Kraatz, and Bresser [2000] demonstrated significant positive links between strategic fit and return on assets [ROA] in savings and loan organizations that achieved advanced levels of strategic fit. Their findings support the theory that greater benefit from strategic fit is realized when organizations respond in a timely manner to needed changes in strategy and then achieve fit at this new level of development. Zajac et al. [2000] and other researchers [Venkatraman, 1994] view strategic fit as a dynamic process of change and adaptation that, when pursued appropriately and in a timely manner, will enable financial performance improvements.

Similarly, in their study of small enterprises, Bergeron et al. [2001] found that only organizations who had reached a high level of strategic fit realized improved financial performance. They examined strategic fit through a number of different lenses, looking at profile deviation, moderation, matching, and other perspectives of strategic fit as a means of measuring the performance impacts of fit. Their results suggest that those organizations that are rated highly on both IT maturity and organizational maturity tend to outperform organizations that are rated low on both IT maturity and organizational maturity. These past studies lend support to the idea that a difference exists in how strategic fit relates to organizational performance, depending on the level of maturity achieved. These studies suggest that performance improvements should be more readily observed among highly integrated mature organizations that have successfully achieved strategic fit at this higher level of development.

AVERAGE LENGTH OF STAY

IDS quality outcomes are defined as intangible, value related measures of organizational service and performance [Li and Collier, 1999; Devaraj and Kohli, 2000]. Quality outcomes are of particular concern to IDSs because of the need for health care entities and networks to continually improve the quality of patient care [Snyder and Paulson, 2002]. Therefore, patient-centered measures are often chosen as quality outcomes in studies of organizational performance in the health care industry [Dowling, 1997; Devaraj and Kohli, 2000; Smith and Swinehart, 2001]. Measures such as mortality rate, patient satisfaction, average length of hospital stay [ALOS], and other similar patient-centered measures are appropriate quality performance outcomes for the health care IDS [Dowling, 1997; Devaraj and Kohli, 2000; Smith and Swinehart, 2001].

In the current study, we adopt ALOS as a measure of quality for the health care IDS. Initial formation and growth of IDSs in the early to mid-1990s resulted in reductions in ALOS. For instance, Kim [2000] examined the impact of IDS formation on ALOS in the 1990s and found that ALOS was shorter on average for those IDSs that had achieved a high degree of functional process integration across all IDS participants. The author determined that those IDSs that had successfully shortened ALOS had done so through the streamlining of patient care with expanded services and through reductions in the time associated with administrative tasks. However, contrary to Kim's [2000] findings, recent figures indicate that these reductions may have slowed

or stalled over the past few years [Rodgers and Lutz, 2003], suggesting that the simple formation of an IDS is not enough to ensure long-term quality improvements.

Li and Collier [2000] investigated the impact of IT on hospital quality and financial performance through a survey of hospital administrators. The results of their study indicate that IT has a significant positive impact on improvements to both the hospital's quality and financial performance by enhancing accuracy, timeliness, and effectiveness of patient care. Extending these findings, Schumaker (2002) suggests that as IT resources increase in complexity and sophistication, organizations face increasing pressure to pursue further business transformation in an effort to improve coordination and integration. Thus, as IDSs mature, IT's role appears to evolve from that of business process support to enabler of business transformation [Schumaker, 2002]. With IDS expansion, increasing differentiation of patient care services often results, thereby increasing the types of health care options available to the patient. These expanded health care offerings in turn lengthen the continuum of patient care services available within a single IDS. Therefore, IDSs are often forced to reevaluate and improve both IT and organizational maturity in order to maintain a streamlined and effective patient care continuum across all IDS participants [Schumaker, 2002].

Support exists for the suggestion that strategic fit has a more significant impact on financial and quality performance among interorganizational networks with high levels of IT maturity and organizational maturity than among those with lower levels of IT maturity and organizational maturity [Sabherwal and Chan, 2001; Smith and Swinehart, 2001]. For instance, in their study of defenders, prospectors, and analyzers, Sabherwal and Chan [2001] identified IT strategy profiles appropriate for these different levels of organizational structure. In turn, these researchers found empirical support for a greater degree of business performance improvement among more mature organizations with a focus on innovation and flexibility as opposed to immature organizations with an operational efficiency focus.

Through a review of the literature on quality performance benefits of strategic fit at the firm level of analysis, we extend these findings and theories to the interorganizational network level of analysis and propose the following hypothesis.

Hypothesis 1. Among IDSs who have achieved strategic fit, the negative relationship between strategic fit and average length of hospital stay will be significantly stronger in H-MOs than L-MOs.

OPERATIONAL COST

The desire for objective measures of organizational performance has led many researchers to include measures of financial performance in their studies [Bergeron et al., 2001]. We find that financial performance has been measured in various ways in the IT literature. Some researchers have examined profitability measures such as net profit, return on assets, and other similar indicators [Devaraj and Kohli, 2000]. Others have chosen to address the impact of IT on the reduction of cost, such as operational cost [Byrd, Thrasher, Lang, and Davidson, 2005]. While these measures have been commonly used in studies of IT impact, these same types of financial performance measures have also been used in studies more specifically targeted at the benefits of strategic fit [Chan and Huff, 1993; Chan et al, 1997; Palmer and Markus, 2000; Zajac et al., 2000].

The current study uses operational cost as a measure of IDS financial performance. Use of this measure in the context of health care satisfies two conditions. First, by exploring the impact of strategic fit on reduction of operational cost, the sample selected may include both for-profit and not-for-profit IDSs, as both types are concerned with reducing costs despite their differences regarding profit-centered measures. Second, the health care industry in particular is facing increasing pressure to reduce costs while continuing to improve the quality of patient care [Snyder and Paulson, 2002]; thus, it is important to examine the potential impact of strategic fit on cost measures. The very formation of health care IDSs represents one attempt to control costs

through the anticipated streamlining and improvement of the patient care continuum. Yet, the performance of IDSs has not historically supported this aim. Perhaps because of the organizational complexity associated with newly formed health care networks, researchers suggest that organizational changes alone may be insufficient to bring about financial performance improvements for the IDS [Coddington and Moore, 2001].

In recent years, IDSs have begun to look more closely at the benefits of IT integration in hopes of improving operational cost [Etchen and Boulton, 2000]. Prior evidence suggests that IT may have a significant influence on the reduction of operational costs through improved efficiency and effectiveness [Barua, Kriebel, and Mukhopadhyay, 1995; Coddington and Moore, 2001; Byrd et al., 2005]. For instance, a case study of 11 health care IDSs looked at steps taken to potentially reduce operational costs. In addition to the formation of the IDS and the streamlining of patient care within the IDS, all 11 stated that automation of clinical and administration processes through IT had resulted in significant operational cost reductions [Coddington and Moore, 2001].

Building on these past results, Barua et al. [1995] and Byrd et al. [2005] demonstrated support for the indirect cost benefits of IT associated with more direct improvements to quality outcomes. The premise behind these studies is that often the quality benefits of IT may be realized first and should, in turn, lead to financial performance improvements over time. Extending the firm-level evidence presented here to the interorganizational network level of analysis, we propose the following hypotheses.

Hypothesis 2. Among IDSs who have achieved strategic fit, the negative relationship between strategic fit and operational cost will be significantly stronger in H-MOs than L-MOs.

Hypothesis 3. Among IDSs that have achieved strategic fit, the positive relationship between average length of hospital stay and operational cost will be significantly stronger in H-MOs than L-MOs.

III. METHOD

SAMPLE

The population of interest in the current study is 1453 IDSs identified in the HIMSS Analytics database as of December 2004. These IDSs represent a broad spectrum of diversity, size, geographic reach, and comprehensiveness of patient care.

To select a representative stratified sample of both High-Maturity IDSs and Low-Maturity IDSs, a number of steps were taken. First, any IDS with incomplete HIMSS data was eliminated from the dataset, thereby leaving 1019 IDSs for consideration. Next, a process was completed to categorize the IDSs into the two categories of H-MO and L-MO. This classification process is described in greater detail in the next section. The classification process identified 95 IDSs as H-MO, while 907 were considered L-MO. The remaining 17 IDSs were determined to lack strategic fit and were, therefore, eliminated.

The 1002 IDSs determined to have achieved strategic fit were sorted within their separate categories, H-MO or L-MO, by IDS identification number, a number assigned at random to each IDS as data is gathered by HIMSS. Then, using a random number generator to select from the IDS identification numbers, 65 IDSs were selected from each of the categories to form the two samples for further investigation. 65 were chosen from each group for two reasons. First, 65 IDSs per group was sufficient to meet the PLS constraint of 10 observations for each path to the construct with the most paths (Chin 2001). Second, we wanted to maintain equal or similar sample sizes across the two groups, while still allowing for replacement for those in the sample having incomplete data in the American Hospital Directory. To that end, four IDSs had incomplete data in the American Hospital Directory. Each of these four IDSs was replaced in the sample by taking the next closest IDS in each category based on the observation number in the sample dataset. This allowed us to maintain a sample of 65 IDSs within each of the two groups.

IDS CLASSIFICATION PROCESS

The sample groups described in the previous section were identified and categorized using a classification process based on profile matching [Chan et al., 1997]. This process allowed us to determine those IDSs exhibiting both high IT maturity and high organizational maturity and those exhibiting both low IT maturity and low organizational maturity. Profile matching uses a rating system to assign a score to both the IT profile and the organizational profile of the entity. If the ratings for the organization are equal or very close within a very small, pre-determined range for both IT maturity and organizational maturity, the organization is deemed to have achieved strategic fit. If the ratings for both variables are determined to be too far apart, the organization is deemed to lack strategic fit. Profile matching can also be extended to indicate the level of both IT maturity and organizational maturity within the firm by using higher numbers for higher levels of maturity [Chan et al., 1997]. This is the approach taken in the current study, as we wanted to identify IDSs which had achieved strategic fit and determine the relative strategic fit rating of the IDS among all aligned IDSs.

Kilbridge [1998] identified the IT resources necessary for IDS success to be those that support a variety of functions, provide IDS-wide access to email, allow access to communication technology across the IDS, and allow for immediate access to hospital data from other entities within the IDS. Based on these needs, the classification process employs selected variables from the HIMSS Analytics Database (Table 1). IT maturity is represented by the total number of enterprise applications currently in use, the number of different types of enterprise applications currently in use, the number of network nodes available across the IDS, the number of PCs currently in use by the IDS, and the percentage of IDS personnel with Internet access.

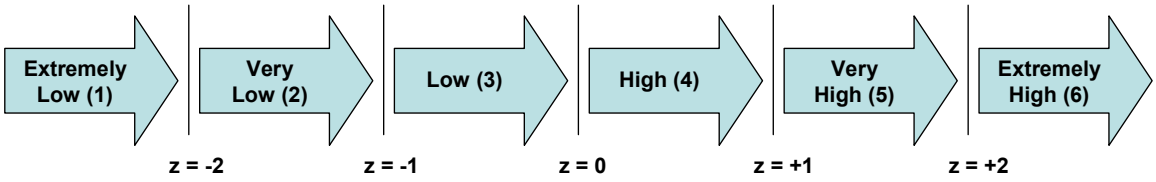
Table 1. Variables for IDS Classification

Construct	HIMSS Analytics Variables for the IDS
IT Maturity	Total number of enterprise applications currently in use by the IDS
	Number of different types of enterprise applications (i.e. ERP, Clinical Decision Support, Case Mix Analysis)
	Number of available network nodes
	Number of personal computers currently in use by the IDS
	Percentage of IDS desktops with internet access
Organizational Maturity	Number of facilities
	Number of different types of facilities (i.e. acute care, home healthcare, physician organization, insurer)
	Age (in years) of the IDS
	Number of hospital beds currently staffed
	Number of full-time IDS employees
	Service population

We measure organizational maturity using the total number of facilities currently active in the IDS, the number of different types of facilities currently active in the IDS, the age in years of the IDS, the hospital bed capacity of the IDS, the total number of full-time employees in the IDS, and the size of the service population served by the IDS. As Parker, Charns, and Young [2001] suggest,

a mature IDS must be able to provide consistent high quality, cost-effective care to a large population of potential patients from multiple providers representing different medical institutions. Further, Fischer and Coddington [1998] state that successful IDSs are those that address a wide range of specialties and, in turn, are able to reduce clinical variation and redundancy.

Each variable was standardized using z scores to place the sample mean at 0, allowing for more effective comparisons across the IDSs in the database. Once the data was standardized, a six-point rating scale was developed based on the resulting z scores, ranging from 1 (extremely low with a z score between -3 and -2) to 6 (extremely high with a z score between 2 and 3) (Figure 2). Each IT maturity attribute was rated; these ratings were averaged to form an overall IT maturity rating. The same procedure was used to determine organizational maturity. Finally, the IT maturity rating was compared to the organizational maturity rating. For those organizations with IT maturity and organizational maturity ratings both in the same category of either high or low, the lower of the two ratings was recorded as the overall strategic fit rating for the IDS. If one of the ratings was 4 or above (i.e., a positive z score), while the other was below 4, the IDS was determined to have not achieved strategic fit. Those scoring an overall rating of 4 or above on both IT maturity and organizational maturity were labeled as H-MOs; those with an overall score of 3 or below on both IT maturity and organizational maturity were labeled as L-MOs. Descriptive statistics of the sample and the associated ratings are provided in Table 2.



Rating ≤ 3.999 = Low

Rating ≥ 4.000 = High

Figure 2. IDS IT Maturity and Organizational Maturity Rating Scale

MEASUREMENT

IT maturity and organizational maturity were measured as formative constructs using factors extracted from the 2004 HIMSS Analytics Database, as summarized in Table 1. Strategic fit was measured using a categorical variable, strategic fit rating, resulting from the classification process. The dependent variables, ALOS and operational cost, were measured using data from the 2004 American Hospital Directory.

IV. RESULTS

Using the full sample of 130 IDSs, the variables of the formative measures, IT Maturity and Organizational Maturity, were examined for significance. As presented in Table 3, all variable weights were significant at $p<.01$, indicating that each variable contributed significantly to the formation of the constructs.

Table 2. Descriptive Statistics and IDS Rating

Criteria	H-MO Rating N=65		L-MO Rating N=65	
	Mean	**SD**	**Mean**	**SD**
Total Number of Enterprise Applications *(Mean=20.57, SD=23.26, Median=13)*	4.78	1.04	3.20	0.44
Number of Different Enterprise Apps *(Mean=6.60, SD=0.70, Median=7)*	3.94	0.24	3.40	1.04
Number of Available Network Nodes *(Mean=1744.35, SD=2460.84, Median=905)*	4.89	0.87	3.28	0.52
Number of PCs Currently in Use *(Mean=1272.42, SD=1809.48, Median=600)*	4.98	0.93	3.22	0.41
Percentage of Personnel with Internet Access *(Mean=76.85%, SD=26%, Median=90%)*	3.75	0.66	3.35	0.89
Overall IT Maturity	4.47	0.38	3.29	0.35
Number of Currently Active Facilities *(Mean=14.92, SD=17.24, Median=10)*	4.78	0.91	3.15	0.40
Diversity of Active Facilities/Services *(Mean=3.72, SD=1.02, Median=4)*	4.72	0.91	3.72	0.93
IDS Age in Years *(Mean=56.79, SD=38.22, Median=52)*	2.94	1.04	3.66	1.05
Hospital Bed Capacity *(Mean=431.63, SD=490.38, Median=269)*	5.28	0.78	3.28	0.48
Number of Full-Time IDS Employees *(Mean=2256.95, SD=2903.53, Median=1300)*	5.22	0.80	3.26	0.44
Size of the Population Served by IDS *(Mean=1157848.28, SD=9172584.12, Median=270000)*	3.72	0.57	3.23	0.42
Overall Organizational Maturity	4.44	0.30	3.38	0.23
Overall Strategic Fit Rating	4.06	0.24	2.97	0.17

***Descriptive statistics for sample are in italics.**

HYPOTHESIS TESTING

Partial Least Squares (PLS) was used to analyze the model, appropriate given the number of observations in each of the two samples [Sambamurthy and Chin, 1994; Byrd et al., 2005]. Then, t-tests were used for cross-group comparisons of path relationships. Because our hypotheses suggest a stronger relationship for H-MOs, one-tail significance levels were used [Hair, Anderson, Tatham, and Black, 1998].

Table 3. Measurement Model Weights

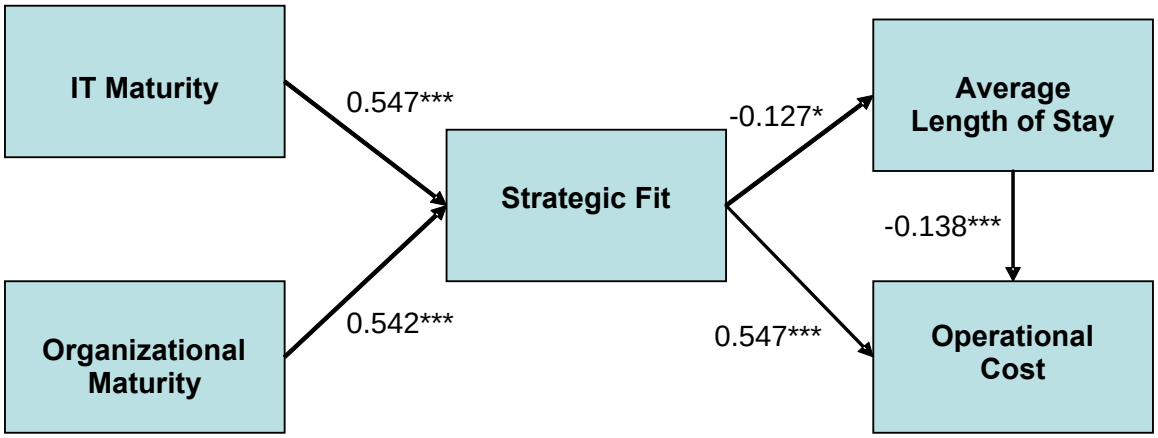
Construct	Items	Weights	Standard Error	t-Statistics
IT Maturity	Enterprise Apps	0.275	0.019	14.431
	Types of Enterprise Apps	0.178	0.025	6.835
	Network Nodes	0.367	0.016	23.027
	PCs in Use	0.369	0.016	23.252
	Percent Internet Access	0.143	0.034	4.238
Organizational Maturity	Number of Facilities	0.257	0.010	24.668
	Types of Facilities	0.168	0.018	9.557
	IDS Age	0.166	0.021	7.890
	Hospital Bed Capacity	0.284	0.013	21.273
	Number of FTEs	0.287	0.013	22.460
	Service Population	0.168	0.018	9.332

Hypothesis 1, which states that strategic fit will have a stronger negative influence on ALOS for H-MOs than for L-MOs, was partially supported (b_H= *-.127,* b_L= *.017, t=.947*). Although the results of the t-test showed no significant difference between the two groups, the statistically significant negative path in the H-MOs and the statistically insignificant positive path in the L-MOs point to a difference between the two groups in this relationship. Partial support for hypothesis 1 is also suggested by recent work in which the significance versus insignificance of the path relationships across groups was used as a determining factor in assessing group differences [Bradley, Pridmore, and Byrd, 2006]. Hypothesis 2 states that strategic fit will have a stronger negative influence on operational cost for H-MOs than for L-MOs. Although neither sample demonstrated a negative link between strategic fit and operational cost, H-MOs did demonstrate a weaker positive relationship than did L-MOs (b_H= *.547,* b_L= *.903, t=2.657, p<.01*). Hypothesis 3 states that the relationship between ALOS and operational cost will be more significantly positive for H-MOs than for L-MOs. H-MOs demonstrated a significant negative relationship between ALOS and operational cost, while L-MOs demonstrated an insignificant positive relationship, thus, the hypothesis was not supported (b_H=*-0.138,* b_L=*0.042, t=2.247, p<.05*). These results are summarized in Table 4. The empirical models of Strategic Fit for the two samples are presented in Figures 3 and 4.

Table 4. Hypotheses Test Results

	Path Coefficient			
Hypothesis	H-MOs	L-MOs	t-Statistic for Difference	Result
H1: Strategic Fit to ALOS	-0.127*	0.017	0.947	Partially Supported
H2: Strategic Fit to Operational Cost	0.547***	0.903***	2.657***	Supported
H3: ALOS to Operational Cost	-0.138***	0.042	2.247**	Not Supported

*p<.10; **p<.05.; ***p<.01.

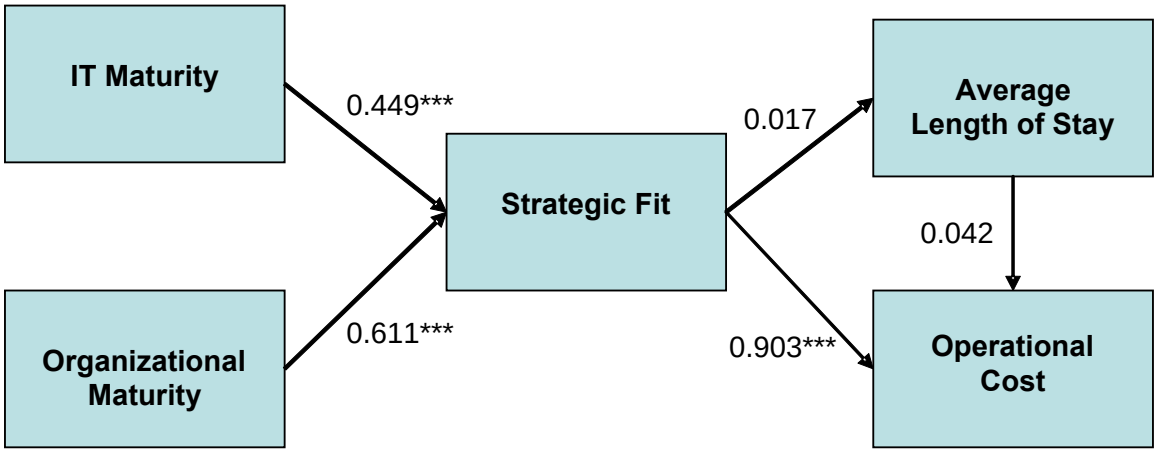


*p < 0.10

**p < 0.05

***p < 0.01

Figure 3. Strategic Fit Model for H-MOs



*p < 0.10

**p < 0.05

***p < 0.01

Figure 4. Strategic Fit Model for L-MOs

V. DISCUSSION

Using data from HIMSS Analytics and the American Hospital Directory, the current study has demonstrated empirical support for a difference in the impact of realized strategic fit across two levels of interorganizational network development. The proposed model examined the relationship between strategic fit and both quality and financial performance outcomes at the interorganizational network level of analysis, a perspective rarely addressed in the IT literature.

Consensus among researchers suggests that achieving strategic fit between the IT and organizational strategies and structures of the firm is important for improved performance. Yet, mixed results have been demonstrated across studies of strategic fit value. Closer inspection of these studies seems to point to the need to examine the relationship between strategic fit and performance across different levels of IT maturity and organizational maturity. Perhaps differences in strategic fit value may depend upon the level of organizational development at which strategic fit has been achieved.

Hypothesis 1 was partially supported, suggesting that IDSs that have achieved strategic fit with a higher level of IT maturity and organizational maturity should see a reduction in the patient's average length of time in the hospital as a result. On the contrary, a patient's average length of time in the hospital may actually be increased when IDSs achieve strategic fit but at a lower level of IT maturity and organizational maturity. Researchers attribute increased efficiency and effectiveness, as well as improved knowledge sharing, to high levels of IT maturity and effective business processes. Perhaps it is these benefits that contribute to the improvements in ALOS seen in H-MOs. As Kim [2000] and Li and Collier [2000] noted, strategic fit and higher levels of IT and organizational maturity may contribute to improvements in administrative processes and the effectiveness of clinical care, thereby resulting in shortened hospital stays.

Hypothesis 2 was supported. Although the relationship between strategic fit and operational cost was positive for both H-MOs and L-MOs, we note that the relationship was weaker for H-MOs. Thus, these results suggest that the impact to operational cost may be improved in IDSs that have obtained a higher level of IT maturity coupled with an appropriate level of organizational maturity. Past IT research suggests that often the financial benefits of IT and strategic fit may not be readily apparent for a few years beyond the initial changes and investments. The push toward IDS development began only in the mid-1990s; therefore, many of these interorganizational networks may have only recently made large investments in IT initiatives. Thus, future research should consider the inclusion of two to three years of operational cost data to better address the time lag issues of IT investments [Barua et al., 1995; Byrd et al., 2005]. Yet, even with the cross-sectional design and the use of only one year of data in the current study, initial results suggest improvements in the impact to operational cost in H-MOs as opposed to L-MOs.

Hypothesis 3 was not supported. H-MOs demonstrated a significant negative relationship between ALOS and operational cost, while this same relationship was insignificant and positive for L-MOs. One possible explanation for these results is that as a patient's length of time in the hospital is shortened, more frequent patient turnovers may actually result in an increase in the operational costs of the IDS, at least in the short term. Another possibility relates to the proposed indirect effects of IT on financial performance through more direct improvements to quality performance and satisfaction [Barua et al., 1995; Byrd et al., 2005; Currie and Guah, 2006]. As the relationship between strategic fit and ALOS continues to improve, we might also expect to see subsequent improvements in the relationship between ALOS and operational cost over time. As was noted previously, the use of multiple years of cost data in future research should provide better insight into the effects of IT investment and strategic fit on operational cost, both directly and indirectly through quality performance improvements [Barua et al., 1995; Byrd et al., 2005].

Interestingly, the IDSs in the H-MO group tended to be younger on average than those in the L-MO group. One possible explanation for this finding may lie in the nature of IDS establishment over the years. Many IDSs were formed under the corporate ownership of an existing hospital, with the hospital acquiring other healthcare providers as a part of the IDS formation and

expansion. In those cases, the reported age of the IDS may be based on the age of the hospital. It is also possible that younger IDSs were formed with an initial strategy and goals for greater IT and organizational integration, as opposed to older IDSs who were formed primarily to meet organizational needs with little thought for IT. As the mean age of 56.72 years suggests, many IDSs were formed long before IT played a significant role in the healthcare industry. As such, these older established IDSs may not have reached the levels of both IT and organizational maturity demonstrated among the H-MOs. The implications of IDS ownership type and governance on maturity and strategic fit is an interesting topic for additional research.

IMPLICATIONS FOR PRACTITIONERS

Concern exists among IDS administrators and participants that the anticipated benefits of higher quality care and reduced costs will not come to fruition based on IDS performance in recent years [Parker et al., 2001]. The lack of quantifiable evidence of performance improvement has resulted in a hesitancy among many IDS administrators to make additional expensive investments in IT given the pressures to control costs; and, in fact, some have even considered the dissolution of the IDS alliances and partnerships. However, as the current study has demonstrated, those IDSs that have achieved strategic fit with a high level of IT maturity and organizational maturity should expect improved performance in terms of reducing the length of a patient's hospital stay. The results of the current study should lend support and justification to a continued emphasis on IDS expansion and increased IT maturity in support of the goals of the IDS, particularly in light of potential adoption of standardization for data architecture based on Health Level 7 recommendations [van den Hoven, 2004].

The results of the current study also suggest that those IDSs that have achieved a higher level of IT maturity and organizational maturity are beginning to see some relief on the impact to their operational costs. Remembering that the push for IDS formation and IT integration is still a relatively new concept in the health care industry, it is probable that those who have reached the level of H-MOs have done so only in recent years. Thus, the time lag effect of IT investment would suggest that significant improvements to operational cost may not have had time to materialize fully [Barua et al., 1995; Byrd et al., 2005]. Yet, our results suggest that improvements are occurring, as the relationship between strategic fit and operational cost is weaker among H-MOs than among L-MOs.

IDSs must continually manage and adjust their strategic focus. With new expansion possibilities, new services, and new options for patient care, the IDS must continue to work toward strategic fit between the organizational structure and goals of the IDS and the necessary levels of IT maturity needed to support these organizational changes [Korenchuk, 1997]. While the current study compares those IDSs that have achieved strategic fit across two levels of development, future research should consider a comparison between those who have achieved strategic fit and those who have not.

CONSIDERATIONS FOR FUTURE RESEARCH

Common across most industries are the performance goals of higher quality and reduced costs. The current study provides a good initial exploration of the benefits of strategic fit in these interorganizational network arrangements, particularly in those with high levels of IT maturity, coupled with a mature well-developed organizational structure. In addition, the current study serves to highlight the added complexities encountered as we move IT research to the interorganizational network level. To build a rich body of knowledge around the interorganizational network, further exploration of the proposed model and hypotheses is needed within the health care industry and across other industries and contexts. The addition of primary data and perceptual measures should be considered as a means to gain additional detailed insight into IT maturity and organizational maturity. While the current study examined realized strategic fit at a point in time, a longitudinal design might serve to capture the dynamic nature of strategic fit and the subsequent performance impacts. Further, an examination of the relationship between IT maturity and organizational maturity may also be considered in future research.

Finally, continued refinement of the model and investigations across a broader spectrum of interorganizational arrangements will lend to the generalizability of the current study's findings. We suggest that the results of the current study should serve as a foundation upon which to build a research agenda around the interorganizational network, a level of analysis in need of focused research attention.

VI. CONCLUSION

Interorganizational networks come in a variety of forms, sizes, strategic arrangements, and ownership structures. The current study used the IDS, an interorganizational network arrangement prevalent in the health care industry, to empirically test a model of strategic fit across two different levels of network development. The results suggest that a difference exists regarding the benefits of strategic fit at different levels of organizational development. In addition, the results of the study serve to further illuminate the complexities associated with taking IT research to the interorganizational network level of analysis. Even within a single industry, tremendous variation may be present regarding the form, structure, goals, and management of these networks. This variation may increase the difficulty of empirical studies of IT value for the interorganizational network. Yet, on the other hand, this level of analysis brings with it the potential for a very rich body of knowledge around the issues of complexity, interorganizational structure, variance of scope and strategy, and other similar phenomena. This study has laid the groundwork for a research agenda centered on the complexities and nuances of the interorganizational network, an area of focus lacking in the IT literature.

LIST OF ACRONYMS

IDS	Integrated Delivery System
HIMSS	Healthcare Information and Management Systems Society

LIST OF REFERENCES

Alter, C. and J. Hage. (1993). *Organizations Working Together.* Newbury Park, CA: Sage Publications.

Barua, A., C. H. Kriebel, and T. Mukhopadhyay. (1995). "Information Technologies and Business Value: An Analytic and Empirical Investigation." *Information Systems Research.* 6(1), pp. 3-23.

Bergeron, F., L. Raymond, and S. Rivard. (2001). "Fit in Strategic Information Technology Management Research: An Empirical Comparison of Perspectives." *Omega.* 29*,* pp. 125-142.

Borys, B. and D. B. Jemison. (1989). "Hybrid Arrangements as Strategic Alliances: Theoretical Issues in Organizational Combinations." *Academy of Management Review.* 14(2), pp. 234-249.

Bradley, R. V., J. L. Pridmore, and T. A. Byrd. (2006). "Examining the DeLone and McLean Model of Information Systems Success in the Context of Different Corporate Cultural Types: An Empirical Investigation." *Journal of Management Information Systems.* 23(2), pp. 267-294*.*

Byrd, T. A., E. H. Thrasher, T. Lang, and N. Davidson. (2005). "A Process-Oriented Perspective of IS Success: Examining the Impact of IS on Operational Cost." *Omega.* 34(5), pp. 448-460*.*

Chan, Y. E. and S. L. Huff. (1993). "Investigating Information Systems Strategic Alignment." *Proceedings of the International Conference on Information Systems.* pp. 345-363.

Chan, Y. E., S. L. Huff, D. W. Barclay, and D. G. Copeland. (1997). "Business strategic orientation, information systems strategic orientation, and strategic alignment." *Information Systems Research.* 8(2), pp. 125-150.

Chin, W. W. (2001). *PLS Graph User's Guide: Version 3.0.* Soft Modeling, Inc.

Coddington, D. C. and K. D. Moore. (2001). "The Right Strategy and Perseverance Can Make an IDS Profitable." *Healthcare Financial Management.* pp. 35-39.

Currie, W. L. and M. W. Guah. (2006). "IT-Enabled Healthcare Delivery: The U.K. National Health Service." *Information Systems Management.* 23(2), pp. 7-22.

Deluca, J. M. and R. Enmark. (2002). *The CEO's Guide to Health Care Information Systems.* San Francisco, CA: John Wiley and Sons, Inc.

Devaraj, J. M. and R. Kohli. (2000). "Information Technology Payoff in the Health-Care Industry: A Longitudinal Study." *Journal of Management Information Systems.* (16)4, pp. 41-67.

Dowling, W. L. (1997). "Strategic Alliances as a Structure for Integrated Delivery Systems" in Conrad, D. (ed.) *Integrated Delivery Systems: Creation, Management, and Governance.* Chicago, IL: Health Administration Press.

Etchen, L. L. and J. L. Boulton. (2000). "Designing the IDS Business Portfolio." *Healthcare Financial Management*. pp. 29-33.

Fischer, E. A. and D. C. Coddington (1998) "Integrated Health Care: Passing Fad or Lasting Legacy," *Healthcare Financial Management.* 52(1), pp. 42-48.

Hair, J. P., Jr., R. E. Anderson, R. L. Tatham, and W. C. Black. (1998). *Multivariate Data Analysis.,* Upper Saddle River, NJ: Prentice-Hall.

Henderson, J. C. and N. Venkatraman. (1993). "Strategic Alignment: Leveraging Information Technology for Transforming Organizations." *IBM Systems Journal.* 28(2,3), pp. 472-499.

Kilbridge, P. M. (1998). "The Role of Information Systems in IDS-Physician Relationships." *Healthcare Financial Management.* 52(6), pp. 31-34.

Kim, Y. K. (2000). "An Impact of Integrated Delivery System on Hospital Financial and Quality Performance under Managed Care." *Dissertation.*

Korenchuk, K. M. (1997). "Six Steps to Successful Network Integration.," *Healthcare Financial Management.* 51(5), pp. 38-41.

Li, L. X. and D. A. Collier. (2000). "The Role of Technology and Quality on Hospital Financial Performance: An Exploratory Analysis." *International Journal of Service Industry Management.* 11(3), pp. 202-224.

Melville, N., K. Kraemer, and V. Gurbaxani. (2004). "Information Technology and Organizational Performance: An Integrative Model of IT Business Value." *MIS Quarterly.* 28(2), pp. 283-322.

Oliver, C. (1990). "Determinants of Interorganizational Relationships: Integration and Future Directions." *Academy of Management Review.* 15(2), pp. 241-265.

Page, S. (2003). "Virtual Health Care Organizations and the Challenges of Improving Quality." *Health Care Management Review.* 28(1), pp. 79-92.

Palmer, J. W. and M. L. Markus. (2000). "The Performance Impacts of Quick Response and Strategic Alignment in Specialty Retailing." *Information Systems Research.* 11(3), pp. 241-259.

Parker, V. A., M. P. Charns, and G. J. Young. (2001). "Clinical Service Lines in Integrated Delivery Systems: An Initial Framework and Exploration." *Journal of Healthcare Management.* 46(4), pp. 261-275.

Rodgers, J. and S. Lutz. (2003). "Cost of Caring: Key Drivers of Growth in Spending on Hospital Care." *PricewaterhouseCoopers.* pp. 1-19.

Sabherwal, R. and Y. E. Chan. (2001). "Alignment between Business and IS Strategies: A Study of Prospectors, Analyzers, and Defenders." *Information Systems Research.* 12(1), pp. 11-33.

Sambamurthy, V. and W. Chin. (1994). "The Effects of Group Attitudes toward GDSS Designs on the Decision-Making Performance of Computer-Supported Groups." *Decision Sciences.,* 25(2), pp. 215-242.

Schumaker, A. M. Winter (2002). "Interorganizational Networks: Using a Theoretical Model to Predict Effectiveness of Rural Health Care Delivery Networks." *Journal of Health and Human Services Administration*. pp. 372-406.

Smith, A. E. and K. D. Swinehart. (2001). "Integrated Systems Design for Customer Focused Health Care Performance Management: A Strategic Service Unit Approach." *International Journal of Health Care Quality Assurance.* 14(1), pp. 21-28.

Snyder, K. D. and P. Paulson. (2002). "Healthcare Information Systems: Analysis of Health Care Software." *Hospital Topics: Research and Perspectives on Healthcare.,* 80(4), pp. 5-12.

Straub, D., A. Rai, and R. Klein. (2004). "Measuring Firm Performance at the Network Level: A Nomology of the Business Impact of Digital Supply Networks." *Journal of Management Information Systems.* 21(1), pp. 83-114.

Van den Hoven, J. (2004). "Data Architecture Standards for the Effective Enterprise," *Information Systems Management.* 21(3), pp. 61-64.

Venkatraman, N. (1993). "IT-Induced Business Reconfiguration," in Morton, S.M. (ed.) *The Corporation of the 1990s: Information Technology and Organizational Transformation.* Oxford University Press, New York, NY, pp. 122-158.

Venkatraman, N. Winter (1994). "IT-Enabled Business Transformation: From Automation to Business Scope Redefinition." *Sloan Management Review.* pp. 73-87.

Wilson, E. V. and N. K. Lankton. (2004). "Interdisciplinary Research and Publication Opportunities in Information Systems and Healthcare." *Communications of the Association for Information Systems*. 14, pp. 332-343.

Young, D. W. and S. M. McCarthy. (1999). *Managing Integrated Delivery Systems: A Framework for Action.* Chicago, IL: Health Administration Press.

Zajac, E. J., M. S. Kraatz, and R. K. F. Bresser. (2000). "Modeling the Dynamics of Strategic Fit: A Normative Approach to Strategic Change." *Strategic Management Journal.* 21(4), pp. 429-453.

Zucherman, H. S., A. D. Kaluzny, and T. C. Ricketts. (1995). "Alliances in Health Care: What We Know, What We Think We Know, and What We Should Know." *Health Care Management Review.* 20(1), pp. 54-64.

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Communications of the Association for Information Systems

ISSN: 1529-3181