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Critical Success Factors For The Implementation Of Integrated Healthcare Information Systems Projects: An Organizational Fit Perspective

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Abstract

Many healthcare reforms are to digitalize and integrate healthcare information systems. However, the disparity of business benefits in having an integrated healthcare information system (IHIS) varies with organizational fit factors. Critical success factors (CSFs) exist for hospitals to implement an IHIS successfully. This study investigated the relationship between the organizational fit and the system success. In addition, we examined the moderating effect of five CSFs -- information systems adjustment, business process adjustment, organizational resistance, top management support, and the capability of key team members – in an IHIS implementation. Fifty-three hospitals that have successfully undertaken IHIS projects participated in this study. We used regression analysis to assess the relationships. The findings of this study provide a roadmap for hospitals to capitalize on the organizational fit and the five critical success factors in order to implement successful IHIS projects.

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I. INTRODUCTION

New directives from governments have continuously exerted pressure on healthcare providers to stay lean. Information systems investment becomes an indispensible solution to cope with this pressure. Strategic use of such systems can ensure the continuing success of healthcare providers in today's competitive industry [Pegels, 1995]. Success in the strategic use of healthcare information systems (HISs) relies on the integration of all silo systems, such as patient records [Jensen, 2013], clinical decision support, transaction processing (TPSs), digital imaging, and information reporting (IRSs) [Kim and Mitchelman, 1990]. When diverse information systems are interoperable on a standardized platform, all stakeholders are able to streamline the implementation process, and improve the system quality [Gross and Ginzberg 1984]. Integrated healthcare information systems (IHIS), Integrated digital health systems (IDHSs), or total digital health systems (TDHSs) are an abstract concept to describe the efficient and effective delivery of coordinated and comprehensive healthcare services to hospitals, general practitioners, and citizens from inter-enterprise systems [Raghupathi and Amjuad, 2009; Raghupathi and Kesh, 2008]. A HIS can help a hospital gain competitive advantages [Kim and Mitchelman, 1990]. In the face of new healthcare-related governmental directives, hospitals have no choice other than to continuously improve their ability to compete. IHISs pose great opportunities for hospitals to improve and sustain competitiveness.

Organizational fit factors (e.g. size and structure) are important contextual contingencies for measuring the success of information systems [DeLone and McLean, 1992]. For instance, hospital size has a strong explanatory power for overall HIS adoption [Hikmet, Bhattacherjee, Menachemi, Kayhan and Brooks, 2008]. An IHIS is particularly useful for small and medium-sized hospitals because they cannot afford to invest in large-scale enterprise information systems for themselves [Lee, Olson and Lee, 2009]. Small hospitals also lack the financial resources and enough in-house IT talent to manage diverse information systems. Training internal employees and hiring external consultants to assist the implementation process are essential in small and medium-sized organizations [Koh, Gunasekaran and Cooper, 2009]. However, huge operational costs are associated with these additional tasks. Small hospitals do not usually have sufficient budget and can lose the ability to adopt and customize an IHIS in order to meet the diverse local needs of their business processes. An IHIS has the inherent structure of an Enterprise Resource Planning (ERP) system, with complicated parameter configurations, and can hardly meet the niche needs of smaller hospitals [Olsen and Saetre, 2007]. The inability to assimilate a customized IHIS can lower the agility of small hospitals in competing with large hospitals.

Large hospitals are natural advocates for IHISs because they employ IT professionals in their information systems department (ISD) and have the budget and capacity to adopt and customize an IHIS. They have the advantage of economies of scale and can share the system development cost with their subsidiaries, business partners, and customers. Some large hospitals make additional revenue out of small hospitals by becoming their IHIS solution provider. The successful implementation of IHISs in large hospitals can increase the entry barrier for small hospitals and the exit barrier for existing users.

The disparity of business benefits associated with an IHIS varies with hospital size. As a result, many small- and medium-sized businesses have dropped the consideration of adopting the propriety enterprise systems (e.g. Systems, Applications, Products [SAP] and Oracle). Many of these businesses have begun turning to alternative forms, such as Web 2.0 and service-oriented architecture (SOA) [Lee et al., 2009]. This observation poses an interesting research question, "Does the organizational fit matter for hospitals adopting an IHIS?"

This study investigates the best practices of hospitals that have successfully implemented an IHIS. Best practice thinking in the design of an IHIS needs to embrace the organizational fit concept [Hong and Kim, 2002; Iivari, 1992; Kanellis, Lycett and Paul, 1999]. Can the organizational-system fit affect system quality and project implementation outcomes? What kinds of critical success factors (CSFs) can moderate the relationship between organizational-system fit and project success? The five CSFs examined in this study include information systems adjustment, business process adjustment, organizational resistance, top management support, and the capability of key team members. These CSFs exhibit moderating effects on the relationship between the organizational fit factors and the system success. They are critical to the success of IHIS projects. Healthcare providers interested in deploying an IHIS can use them as a roadmap to replicate the best practice.

II. LITERATURE REVIEW

IHIS Success

An IHIS is a large-scale IT project requiring human and financial resources from the project management perspective. Although the immediate financial return from an IHIS investment is not often obtainable, delivering different modules of IHIS on time and within budget can ensure continuing support from top management. Stakeholders are also interested in knowing if they can deliver the expected benefits and system capability. Therefore, measuring the system success of an IHIS needs to take into consideration project management constructs: delivery of the IHIS within budget, on time, and with quality and benefits [Hikmet et al., 2008]. These constructs used to measure the project success are the adoption outcomes.

Information system success also refers to user satisfaction, system use, perceived usefulness and system quality [Sabherwal, Jeyaraj and Chowa, 2006]. These four constructs can directly influence the personal use of them. System quality (e.g. customizability) is a technical measure of the performance of an information system [Gable, Darshana and Chan, 2008]. It is particularly important in the healthcare industry because most caregivers do not have enough IT knowledge and training to use or customize it. A poorly integrated HIS can increase the frequency of medical errors, decrease operational efficiency, and reduce the quality of healthcare services [Themistocleous, Mantzana and Morabito, 2009]. The quality design of an IHIS can reduce the learning curve for caregivers and reduce problems associated with poor design. Caregivers are more likely to use an IHIS and obtain a higher degree of satisfaction from it if it is of high quality [Iivari, 1992]. So the quality of the system is another essential element for its success [Shin and Lee, 1996]. A hospital needs to measure IHIS success in these two critical areas: adoption outcomes and system quality when implementing an IHIS project.

Organizational Fit and IHIS Success

The organizational fit is an important contingence for the success of information system implementations [Hikmet et al., 2008; Kanellis et al., 1999; Markus and Robey, 1983]. New systems bring changes to the dynamics of an organization so it needs to adjust itself before successfully adopting a new one [Tyre and Orlikowski, 1994]. The concept of organizational fit is applicable to both off-the-shelf and customized software [Gross and Ginzberg, 1984; Lucas, Walton and Ginzberg, 1988]. Hospitals of different sizes and in different regions have varying business needs. Consequently, hospitals develop their own specific systems, such as electronic health records and clinical decision support systems to fit their operational needs. The design of an IHIS to meet the universal needs of the healthcare industry is virtually impossible. Therefore, the organizational fit becomes an important consideration for the successful adoption of an IHIS [Sumner, 2003]. For instance, a software development methodology (e.g. service oriented soft system methodology) needs to be adopted to help create a de-centralized IHIS in which functional and modular systems can fully inter-operate with each other [Raghupathi and Umar, 2009].

The organizational fit falls into two categories: the business process and the data fit. These two kinds of organizational fit are particularly pertinent to the study of IHIS success. Firstly, most healthcare information systems were designed to serve the in-house use of health care facilities. Therefore, most HIS are intra-enterprise applications that are not designed to inter-operate with the external systems used by other health care facilities. One major reason for the creation of silo systems is the rigid business process that has to be used to comply with different local regulations. Second, most healthcare facilities do not intend to share a patient's data with others because of privacy issues. As such, relational databases are often designed without considering the necessity of sharing information across healthcare facilities and among different stakeholders. The misfit of the business process and data has resulted in limited operational success and acceptance. Since the IHIS is an inter-enterprise system, these two factors may have a strong influence on the adaptability of internal systems to external systems. A holistic approach has to be taken to understand the inter-enterprise properties of an IHIS as an open, flexible and general information system [Kesh, 2009]. It is important to understand that the increase of the business process and the data fit can contribute to IHIS success, including adoption outcomes and system quality.

Business Process Fit and IHIS Success

Hospitals vary in their business processes, such as what information to capture as care is delivered, and how and what data are shared between subsidiaries [Hikmet et al., 2008]. Other commonly cited factors creating the misfit of the business process and limiting the potential of systems in smaller enterprises include imbalanced power relationships, inadequate integration of internal business processes and information, limited flexibility of internal business processes, and the lack of IT sophistication [Seethamraju, 2008]. The presence of these business process misfit factors can lead to data processing inefficiency [Trkman, 2010]. These factors also increase the scope of the IHIS project and the difficulty of achieving integration across the healthcare supply chain. Typical problems include scope creeping, exceeding budget, ambiguous user requirements, lack of strategic alignment, turnover of team members, poor communication, etc. [Chen, Chen and Yang, 2009]. On the contrary, increasing the business process fit can thus contribute to success in adoption outcomes.

H1a: Business process fit has a positive influence on IHIS adoption outcomes

An IHIS is a large-scale information system project embedded with the inherent features of an enterprise system. The concept of using a single monolithic system to integrate with business processes has failed many companies [Rettig, 2007]. Not only the system integration but also the customization of software grows in complexity and difficulty. Inability to integrate a HIS across the healthcare supply chain and customize an IHIS to fit its business processes can result in poor system quality or system failure.

Healthcare systems are intricately connected with healthcare work processes (Carayon et al. 2006). Both need to be constantly redesigned so that they can better align with each other in order to narrow the performance gaps (Donabedian, 1988; Shortell et al., 1994). HIS researchers have adopted the Structure-Process-Outcome (S-P-O) model to understand the effectiveness of healthcare administration in adopting a HIS [Donabedian, 1978]. The model asserts that the business process can affect system quality [Chiasson, Reddy, Kaplan and Davidson, 2007]. Hence, we assume that the business process can help improve system quality, thereby enabling medical service providers like hospitals to deliver quality care to patients.

H1b: Business process fit has positive influence on system quality of IHIS

Data Fit and IHIS Success

Healthcare data have different formats, vary in length and contain different patient identifiers. The data fit poses great concerns to the success of an IHIS, particularly in a developing country. In these countries, national health systems are often fragmented and lack the central standards necessary to manage independent health programs [Braa, Hanseth, Heywood, Mohammed and Shaw, 2007]. The uneven development of the local economy and infrastructure between and within regions has contributed to data heterogeneity and fragmentation. The absence of shared standards for data collection is related to inconsistencies in data definitions and reporting procedures. A common database is indispensible to the successful implementation of enterprise systems, including IHISs. Intercultural differences can create a fundamental misfit of data structure. The data misfit has been the downfall of many international enterprise systems [Xue, Liang, Boulton and Snyder, 2005]. Many project management problems, such as communication, quality and integration problems, are more likely to appear if a data misfit problem exists. Improving the data fit can increase the chance of adoption outcomes.

H1c: Data fit has a positive influence on IHIS adoption outcomes

The data fit is particularly important when organizations in different regions have varying business needs [Soh, Kien and Tay-Yap, 2000]. Poor data quality is prevalent in developing countries and these problems call for efforts to integrate IHISs [Sandiford, Annett and Cibulskis, 1992]. A poor data fit can result in inaccessibility, instability and use difficulty, thereby leading to a degraded system quality [Kim, Oh, Shin and Chae, 2009].Therefore, data misfit may confer the ineffectiveness of delivering core medical services across the healthcare supply chain. This ineffectiveness may be seen in areas such as information processing services, management of supporting functions, and patient-management services. When implementing an IHIS, a hospital needs to ensure the system has a high degree of data fit because this fit can substantially improve system quality and ease the process of system integration and customization.

H1d: Data fit has a positive influence on system quality

Critical Success Factors for IHIS Implementation

IHIS implementation is part of the continuous quality improvement of healthcare. Three key success factors are (1) reliable information (e.g. best practice), (2) engagement of all stakeholders in all phases of the improvement work, and (3) a robust infrastructure involving multidisciplinary teams [Brandrud et al., 2011]. The medical field is growing rapidly and contains a huge fragmented database that can hinder the delivery of quality healthcare services. In order to generate reliable information and produce useful knowledge, information systems across the healthcare industry have to be integrated across different service providers [D'Souza and Sequeira, 2011]. Therefore, information system adjustments become essential to the successful implementation of the IHIS. However, it is not an easy task for many healthcare institutions because they operate their businesses differently over time and have established different business processes in order to comply with local regulations. For instance, one study shows that an administrative HIS could be intrusive and interfering in doctor-patient relationships if they adversely affect the existing interpersonal care processes [Angst, Devaraj, and D'Arcy, 2012]. IHIS projects can be better achieved by considering the potential influence of information system adjustments and business process adjustments from a strategic IT perspective [Donabedian, 2005; Zuboff, 1988].

Although an IHIS can potentially streamline the medical service chain, its adoption is slow in the healthcare industry [Mantzana, Themistocleous, Irani and Khoumbati, 2008; Raghupathi and Tan, 2008]. There are many reasons for this. First, resistance to HISs is a natural response of physicians and other caregivers because the system only plays supportive roles in helping them perform their jobs. Second, most hospitals are structured along with medical specialties. The common structure of a hospital often results in the adoption of silo systems by different departments.

Not all stakeholders will agree to the benefits of an IHIS. Therefore, some degree of organizational resistance is unavoidable. In order to increase the buy-in from different stakeholders, top management support is necessary [Kaye et al., 2010]. Since an IHIS is an inter-enterprise information system, its implementation will involve team members of different healthcare facilities. Therefore, their capability in the implementing is also essential.

A comprehensive literature review on large-scale IT projects executed in 10 different countries/regions identified 18 frequently cited critical success factors (CSFs) for inter-enterprise systems implementations [Nagi, Law and Wat, 2008]. Five CSFs revealed from this study are the same as identified by the abovementioned IHIS studies. These CSFs are information systems adjustments, business process adjustments, organizational resistance, top management support, and the capability of key team members. The remaining literature review will center on the discussion of the moderating effect of these CSFs on IHIS implementation.

Information Systems Adjustment

Enterprise systems adopters often struggle with decisions on the extent of customization. Although packaged or standard applications are cost effective, they are not fit for a unique business process [Jessup and Valacich, 2008]. IHISs adopters need to cope with the unique needs of their medical departments and healthcare partners, and constantly make trade-off decisions between standard and customized applications. Therefore, an integrated HIS may be suitable for some hospitals, but not necessarily a good fit for others because of varying hospital practices.

If the organizational fit is weak, there is the need to reconfigure and customize the enterprise systems in order to meet/manage unique business processes [Hikmet et al., 2008]. System adjustment to an IHIS can potentially increase success in both adoption outcomes and system quality if the organizational fit is weak.

H2a: Information system adjustment has moderating effects on the relationship between the organizational fit and IHIS adoption outcomes.

H2b: Information system adjustment has moderating effects on the relationship between the organizational fit and system quality.

Business Process Adjustment

Many organizations cannot effectively assimilate Web technologies into their e-business initiatives because technological changes do not create corresponding changes to the existing business processes [Chatterjee and Segars, 2006]. If an enterprise system is unable to streamline its business processes to meet organizational requirements, it can disrupt a business' normal operations [Haines, 2009]. Adoption of an IHIS has the same challenges and requires a hospital to change its business processes in order to assimilate the IHIS [Bingi et al., 1999; Lucas et al., 1988]. Changes in business processes range from the organizational structure, and reward system, to corporate culture and training methods [Hammer and Stanton, 1999]. An effective IHIS also needs to cope with rapid changes in environmental factors, like business dynamics, customer preferences, and disruptive technologies. An IHIS has a long system development life cycle, as all enterprise systems do. User and business requirements are constantly changing. If IHISs are not flexible in configurations, hospitals cannot effectively use them to respond to business environmental challenges [Raghupathi and Umar, 2009; Gosain, Malhotra and El Sawyl, 2004]. However, the primary goal of an IHIS is to standardize the business process. Without this ability, IHIS adoption would be a failed project despite the presence of a good organizational fit.

H3a: Business process adjustment has moderating effects on the relationship between the organizational fit and project outcomes.

H3b: Business process adjustment has moderating effects on the relationship between the organizational fit and systems quality.

Organizational Resistance

Organizational resistance to enterprise system adoption can lower the chance of project success or cause system failure [Kamhawi, 2007]. Members of the United Network for Organ Sharing (UNOS) organization resisted the adoption of the Expedite system, an IHIS designed to integrate and streamline the collection, transfer, and exchange of information on available organs. Although the IHIS met members' performance expectations, organizational resistance resulted in the termination of its operation after 2 years of implementation [Beard, Keck and Peterson, 2005].

Many developing countries have institutionalized bureaucracies in order to cope with long periods of political instability. Introducing IHISs into these organizations can pose great challenges to the existing government bureaucracies. Such challenges include core beliefs and power distribution discrepancies as well as organizational structure and control system conflicts [Silva and Hirschheim, 2007]. The success of an IHIS implementation requires consideration of both the social and technical dynamics. For instance, the placement of training and reward systems can potentially reduce organizational resistance, and ease the adoption process.

H4a: Organizational resistance has moderating effects on the relationship between the organizational fit and project outcomes.

H4b: Organizational resistance has moderating effects on the relationship between the organizational fit and systems quality.

Top Management Support

Top management support is a salient success factor for technical and non-technical projects [Bingi et al., 1999; Laughlin, 1999; Somers and Nelson, 2001]. Depending on the project, this factor has varying effects. For instance, top management support has a stronger positive effect on novel projects than nondiscretionary projects (e.g. policy compliance). Those not related to core business processes may need more support from top management than those that are. A large-scale project like ERP requires years of implementation. A long-term commitment from top management is indispensible for the success of such projects [Sharma and Yetton, 2003]. It is probable that this factor also has a critical influence on the success of an IHIS because the system has a far-reaching effect on the way of doing business, a hospital's supply chain and business partnerships.

H5a: Top management support has moderating effects on the relationship between the organizational fit and project outcomes.

H5b: Top management support has moderating effects on the relationship between the organizational fit and systems quality.

Capability of Key Members

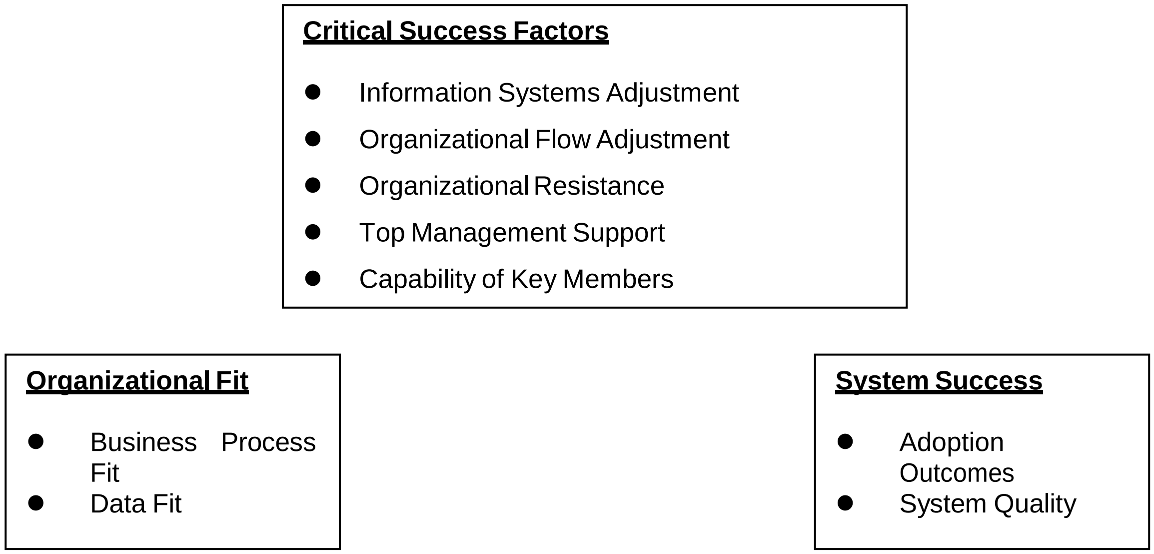
A hospital needs to have team members dedicated to IHIS projects through the system development life cycle. These key members need to possess a mix of capabilities. Their emotional capability can increase the project success rate [Turner and Lloyd-Walker, 2008]. Assuming leadership is another important capability [Bingi et al., 1999]. The cognitive capability of key members can further lead to its success [Yang, Kang and Mason, 2008]. It is particularly important for key members to understand the business processes and organizational needs because an IHIS can transform the way of doing business. Moreover, communication, problem solving, and decision-making are important capabilities for members to implement software projects effectively [Siakas and Siakas, 2008]. The presence of these capable key members throughout the project can increase the success rate of implementation.

However, stability of team members is rare because the composition and structure of the team changes with projects over time [Huckman, Staats and Upton, 2009]. Instability of an IHIS could be even higher because its uncertainty is associated with the size and long duration of implementation. High instability of an IHIS can result in the lost experience and poor performance of key members. Key members without the right mix of capabilities can lower the success rate of IHIS projects.

H6a: The capability of key members has moderating effects on the relationship between the organizational fit and project outcomes.

H6b: The capability of key members has moderating effects on the relationship between the organizational fit and systems quality.

Our literature review led us to derive a parsimonious research model (Figure 1) in order to explain the direct effect of organizational fit (data vs. business process fit) on IHIS success (system quality and project success). Five CSFs have a moderating effect on the relationship. These factors include system adjustment, organizational flow adjustment, organizational resistance, top management support, and the capability of key members. These key factors can help increase the success rate of IHIS adoption from the organizational fit perspective.



III. RESEARCH METHODOLOGY

The survey research method is an appropriate tool to examine the phenomenon in a natural setting where variables are not controllable or the control of variables is not desirable [Dillman, 1978; Fowler, 1984]. The survey research method can help address the central questions of this study.

Sample

The population of interest in this study is composed of information systems managers and senior managers who are responsible for business process management, information systems selection, and IHIS success. In addition, these managers play intermediary roles between top-level management and operational personnel. They interact with both parties and are actively involved in the implementation process. Learning about the perceptions of these subjects about IHIS success can help uncover answers to the proposed research questions.

Different from the U.S. adopting multi-payer system, Taiwan adopts the single payer insurance system with a single government fund to pay hospitals, physicians, and other health care providers. Patients only need to pay for a minimum of visits ($ 5 to 10 dollars each time) depending on how often a patient has used medical facilities within the year. The minimum charge is to avoid the misuse and abuse of limited healthcare resources, and protect the welfare of the public. The Ministry of Health in Taiwan archived a list of 532 hospitals that have adopted IHISs since 1999. This study randomly selected 152 hospitals as the subjects of this study. We sent information systems managers and senior managers of these hospitals a letter to invite them to participate in our survey. The letter included a link to our online survey. Our first invitation solicited 43 responses. We sent a follow-up invitation to non-respondents and received another 14. Two responses were invalid because a number of questions were unanswered. As a result, we were able to collect 55 valid responses, yielding an effective response rate of 34.8 percent.

Subjects have an average of 7-years of experience working in their hospitals. Local hospitals (54.72%) dominated the sample, followed by regional (33.96%) and national (11.32%) hospitals. Independent hospitals account for 75.47% of the sample, hospital subsidiaries account for 18.87%, and outsourcing hospitals for 5.66%. IHIS software vendors were the primary service providers (60.38%), followed by headquarter hospitals (24.53%), information systems development departments (9.43%), consultant firms (1.89%) and information system departments (3.77%). All hospitals in this study were required to spend at least 2 years in the system development process before each of their IHISs were considered a fully functioning system.

Measures

We conducted a cursory investigation on basic demographic data to examine if any statistically significant differences existed between samples collected before and after the follow-up invitation. These two groups of samples were not significantly different from each other at the 0.05 level in four areas: (1) subjects' years of experience working with their current employer (p=0.144), (2) IHIS project duration (p=0.172), (3) IHIS service providers (p=0.24), and (4) sourcing hospitals (p=0.354). These findings indicate that the follow-up invitation did not affect the analysis results.

All constructs are measured using pre-validated scales adapted from information systems-related literature. The organizational fit factor consisted of data fitness and the business process flow, measured using a seven-item Likert's scale [Hikmet et al., 2008]. The data fit measured data format and definition. The business process flow measured system and organizational flows. IHIS success consisted of individual and organizational perspectives of system success, measured using a seven-item Likert's scale [DeLone and McLean, 2003]. Individual system success consisted of four constructs: system quality, information quality, service quality and service usage [Shin and Lee, 1996]. On-time delivery, within budget and scope, and meeting user expectations were measures of organizational system success [Hikmet et al., 2008]. Six CSFs played moderating roles and included systems adjustment, business process adjustment, organizational resistance, top management support and the capability of key members. We used Hong & Kim's (2002) instrument to measure systems adjustment, organizational flow adjustment, and organizational resistance. Lee & Kim's (1992) instrument was used to measure the moderator of top management support. Yueh's (2003) instrument helped measure the construct of the capability of key members. Table 1 summarizes definitions of all constructs

Table 1: Definition of Constructs

Measure	Definition	Reference
Implementation success	The degree of deviation from project goal in terms of expected cost, time, system performance and benefits.	Hong & Kim, 2002
Software system quality	Software quality is one of the major challenges that face buyers of software systems in this decade; the perceived quality of a software system can be seen as a significant outcome. The degree of managerial effort devoted to the software system acquisition and implementation procedure will be a significant factor in the perceived quality of the acquired software system.	Shin & Lee, 1996
Organizational fit	The degree of alignment between IHIS model and organization needs in terms of data, process and user interface.	Hong & Kim, 2002
IHIS adaptation	The extent of efforts and time spent in IHIS alteration to align with organizational process needs except for IHIS customization.	Hong & Kim, 2002
Process adaptation	The extent of efforts and time spent in process change to align with IHIS.	Hong & Kim, 2002
Organizational resistance	The strength of negative organizational response to IHIS implementation.	Hong & Kim, 2002
Top management support	There can be a considerable difference between the MIS and user departments in their views and perceptions about the degree of top management concern for MIS development and operation. To cope with this potential hazard here, the top management concern was measured by issuing questionnaires to both MIS and the user department managers.	Lee & Kim, 1992
Key members' capability	The employees assigned to the project must be competent in understanding of the project needs and in being able to provide leadership and guidance to the project.	Yueh, 2003

Measurement Model Assessment

High reliability and validity of the measuring instruments were indispensible to the quality of data analysis results. The instruments adopted in this study contained fifty four items to measure seven constructs. The measurements of all items used a seven-point Likert's scale ranging from "strongly agree" to "strongly disagree." We performed Cronbach's test to assess the reliability of items used to measure each construct. The Cronbach's α value of each construct fell between 0.72 and 0.97 (Table 2). All values exceeded the recommended minimum level of at least 0.6

for exploratory research [Hair, Anderson, Tatham and Black, 1998]. This finding indicates that the adopted survey instruments have a relatively high reliability.

Table 2: Construct Reliability

Construct	Number of Items	Cronbach's α
Dependent Variable		
Adoption outcomes (AO)	4	0.82
System Quality (SQ)	11	0.72
Antecedent Variable		
Business Process Fit (BPF)	6	0.92
Data Fit (DF)	5	0.90
Moderating Variable		
System Adjustment (SA)	6	0.97
Business Process Adjustment (BPA)	5	0.94
Top Management Support (TMS)	7	0.85
Organizational Resistance (OR)	5	0.80
Capability of Key Members (CKM)	5	0.79
All Variables	54	0.86

Table 3: Rotated Principal Factor Analysis Results

	BPA	BPF	SA	DF	TMS	AO	OR	CKM	SQ
BPA 3	0.91								
BPA 5	0.90								
BPA 4	0.89								
BPA 6	0.80								
BPA 2	0.79								
BPF 9		0.83							
BPF 11		0.83							
BPF 10		0.77							
BPF 5		0.76							
BPF 6		0.74							
SA 2			0.94						
SA 4			0.90						
SA 1			0.90						
SA 3			0.90						
SA 5			0.89						
DF 4				0.84					
DF 3				0.82					
DF 2				0.82					
DF 1				0.73					
TMS 1					0.89				
TMS 2					0.81				
TMS 3					0.78				
TMS 4					0.73				
AO 3						0.84			
AO 1						0.74			
AO 2						0.73			
OR 3							0.82		
OR 4							0.80		
CKM 4								0.89	
CKM 5								0.82	
CKM 3								0.74	
SQ 11									0.79
SQ 9									0.79
SQ 10									0.78

We performed content and construct validity tests in order to assess the validity property of the measures. We first utilized the Principal Component Analysis method for factor extraction and then rotated the extracted factors through the Kaiser Varimax method (Table 3). The results enabled us to reduce the original 54 items to 34 items and derive 72.68% accumulated variance of the nine successive factors (Table 4). Another Cronbach's test was performed to assess the reliability of the reduced items. The Cronbach's α value of each construct was significantly increased, ranging between 0.832 and 0.970 (Table 5). All values far exceeded the recommended minimum level of at least 0.6 for exploratory research [Hair et al., 1998]. This finding indicates that the revised survey instruments have a much higher reliability than the original instrument.

Table 4: Eigenvalue and Extracted Variance

Value	Eigenvalue	% of total variance	Cumulated % of total variance
AO	9.005	16.676	16.676
SQ	8.042	14.892	31.568
BPF	6.343	11.746	43.314
DF	3.806	7.048	50.362
BPA	3.102	5.745	56.107
SA	2.766	5.123	61.229
TMS	2.478	4.588	65.817
OR	2.023	3.747	69.565
CKM	1.684	3.118	72.683
Note: Factor extraction method: Principal factor analysis; Rotation method: Kaiser Varimax method; Accumulated variance: 72.68%。			

Table 5: Construct Reliability of Reduced Survey Instrument

Construct	Number of Items	Cronbach's α
Adoption outcome	3	0.836
System quality	3	0.900
Business Data fit	4	0.912
Business process fit	5	0.906
Business flow adjustment	5	0.937
Systems adjustment	5	0.970
Top management support	4	0.860
Organizational resistance	2	0.869
Key capability of members	3	0.832

In order to maximize the number of observations per variable, a minimum of 5 and hopefully at least 10 observations per variable is recommended [Hair, Black, Babin, Anderson and Tatham, 2006]. In addition, the sample must have more observations than variables, and the minimum absolute sample size should be 50 observations [Hair et al., 2006]. This study used 9 variables and had 55 observations. This sample size exceeded all the minimum requirements of the validity test of confirmatory factor analysis and warrants further bivariate analysis.

Data Analysis

We first performed a bivariate analysis between variables under consideration for direct relationships and a moderated regression analysis for moderated relationships at the alpha level 0.1. The primary purpose of the bivariate analysis was to understand the direct effect of organizational fit on IHIS success. It allowed us to assess the extent to which organizational fit factors can predict a value for the IHIS success variable. We technically decomposed the antecedent and dependent variables into four constructs: data fit, business process fit, adoption outcomes and system quality. The organizational fit consisted of the data fit and the business process fit, whereas the IHIS project success consisted of adoption outcomes and system quality. The bivarate analysis resulted in the creation of an inter-correlation matrix [Sprinthall, 1990] to illustrate the relationships between the organizational fit and IHIS project success (Table 6). We have listed nine variables in the same order on both left and top sides of the inter-correlation matrix. Each value in the matrix is the correlation between each of the nine variables.

Table 6: Inter-correlation Analysis Matrix									
	BPA	BPF	SA	DF	TMS	AO	OR	CKM	SQ
BPA	1.000								
BPF	0.606**	1.000							
SA	0.246	0.096	1.000						
DF	-0.078	0.035	-0.197	1.000					
TMS	0.258	0.222	0.001	-0.182	1.000				
AO	0.300*	0.155	0.278*	-0.265	0.187	1.000			
OR	-0.090	-0.143	0.400**	-0.177	-0.067	0.207	1.000		
CKM	0.192	0.159	-0.040	-0.031	0.266	0.058	-0.189	1.000	
SQ	0.545**	0.850**	0.112	-0.057	0.232	0.259	-0.124	0.083	1.000
*: Significance at 0.05 (two tails); **: Significance at 0.01 (two tails)									

The correlation analysis allowed us to test Hypotheses 1a, 1b, 1c and 1d (Table 6). Only Hypothesis 1b; that BPF has a positive effect on the system quality of IHIS is supported. The correlation coefficient (R2) is 0.92 for the relationship between the business process fit and the system quality. This indicates that the business process fit can explain 92 percent of the variability in the system quality of the IHIS. This variability is statistically significant ($p=0.000 < 0.01$). The business process fit had a strong predictive power. It plays a more important role than the data fit in improving the system quality of an IHIS. This corroborates with Raghupathi and Umar's [2009] finding that the flexibility of configuring software to adapt to the business processes of different healthcare service providers can help develop a more inter-operable IHIS. However, neither the business process nor the data fit had a direct influence on the adoption outcomes of an IHIS. Data fit is not an important factor and does not have a direct influence on either the system quality or the adoption outcomes of an IHIS.

We employed a moderated regression model to investigate the moderating effect of CSFs on the direct relationships. The adjusted regression analysis can help assess to what extent the moderating factors have an effect on IHIS adoption outcomes. For this purpose, we used a multiple regression equation of the general form $Y = E + aX + bM + cXM$ where the dependent variable Y represents IHIS success. This variable is conceptualized as a formative construct with two subconstructs: system quality and adoption outcomes. X represents the organizational fit, consisting of the data fit and the business process fit. The M variable represents five moderating factors in this study. E is the constant or intercept. The coefficients of a and b represent the independent contributions of X and M to the prediction of IHIS success. The coefficient c measures the moderating effect of M on the relationship between the organizational fit and IHIS success.

We performed 12 moderated regression tests to assess if the moderating effects of the five CSFs exist between the organizational fit. This study used $p<0.10$ as the alpha value to assess the significance of the tested relationships because of the small sample size. These factors consisted of the business process fit and the data fit, and IHIS success, consisting of adoption outcomes and system quality. Only 4 out of the 12 tests showed that some CSFs exhibited a significant moderating effect on the direct relationship. Tables 7 to 10 detail the presence of these CSFs and their moderating effects.

Table 7: Regression Analysis of Capability of Key Members as a Moderating Variable					
Model	Unstandardized Coefficient		Standardized Coefficient	t	Sig
	B	Std. Error	Beta		
1(Constant)	5.570	1.173		4.749	.000
DF	-.333	.172	-.263	-1.933	.059
CKM	.062	.171	.050	.364	.717
2(Constant)	5.875	1.116		5.264	.000
DF	-.298	.164	-.236	-1.823	.074
CKM	-.032	.166	-.025	-.191	.850
DF X CKM	.380	.146	.346	2.610	.012*
Independent Variable: Data Fit Dependent Variable: Adoption Outcomes					
*: Significance at 0.05					

Table 7 shows that Capability of Key Members (CKM) has a significant moderating effect ($\beta= 0.346$, $p=0.012 <0.05$) on the relationship between the data fit and adoption outcomes. To further identify and affirm the moderating effect, the equation at the high and low level was plotted. Figure 2 presents the form of the joint relationship of data fit and CKM on adoption outcomes. This form indicates an increase in data fit is strongly associated with the improvement of adoption outcomes. This direct relationship was attenuated by the moderating factor CKM, as interpreted from

Figure 2. This finding supports Hypothesis H6a that CKM has a moderating effect on the direct relationship between the data fit and IHIS adoption outcomes.

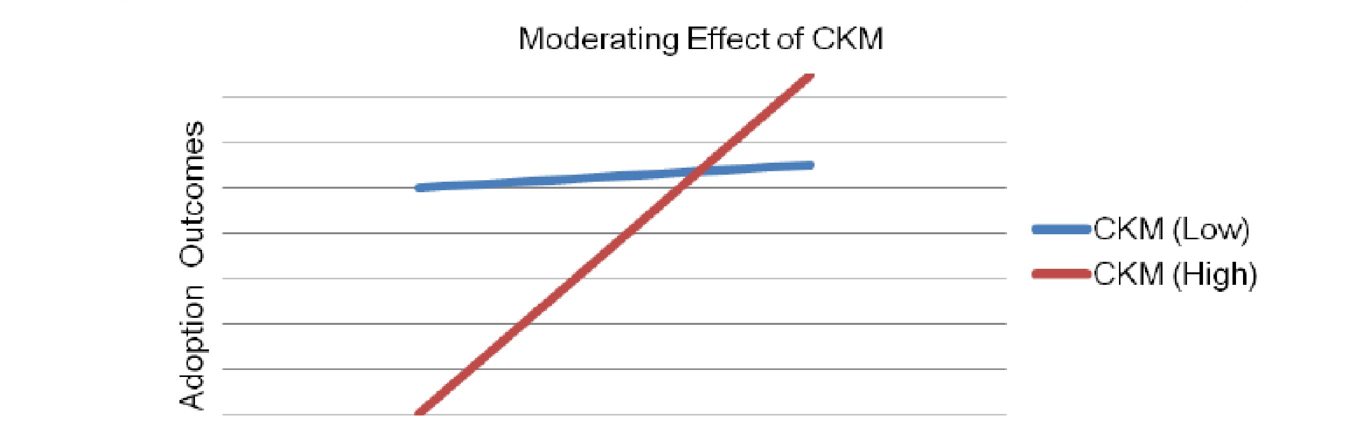


Figure 2. Moderating Effect of CKM

Table 8 shows that the BPA (Business Process Adjustment) has a significant moderating effect (β= -0.397, p=0.008 <0.05) on the relationship between the data fit and system quality. It is negative. To further identify and affirm the moderating effect, the equation at the high and low level was plotted. Figure 3 presents the form of the joint relationship of the data fit and BPA on system quality. This form shows that an increase in the data fit is strongly associated with the improvement of system quality. This direct relationship was negatively attenuated by the moderating factor BPA, as was interpreted from Figure 3. This finding supports Hypothesis H3a that BPA has a moderating effect on the direct relationship between the data fit and system quality.

Table 8: Regression Analysis of Business Process Adjustment as Moderating Variable

Model	Unstandardized Coefficient		Standardized Coefficient	t	Sig
	B	Std. Error	Beta		
3(Constant)	4.857	.932		5.212	.000
DF	-.032	.127	-.036	-.253	.801
BPA	.087	.119	.104	.729	.469
4(Constant)	3.852	.947		4.066	.000
DF	.101	.129	.114	.786	.435
BPA	.149	.114	.180	1.309	.197
DF X BPA	-.284	.102	-.397	-2.771	.008*
Independent Variable: Data Fit Dependent Variable: System Quality					
*: Significance at 0.05					

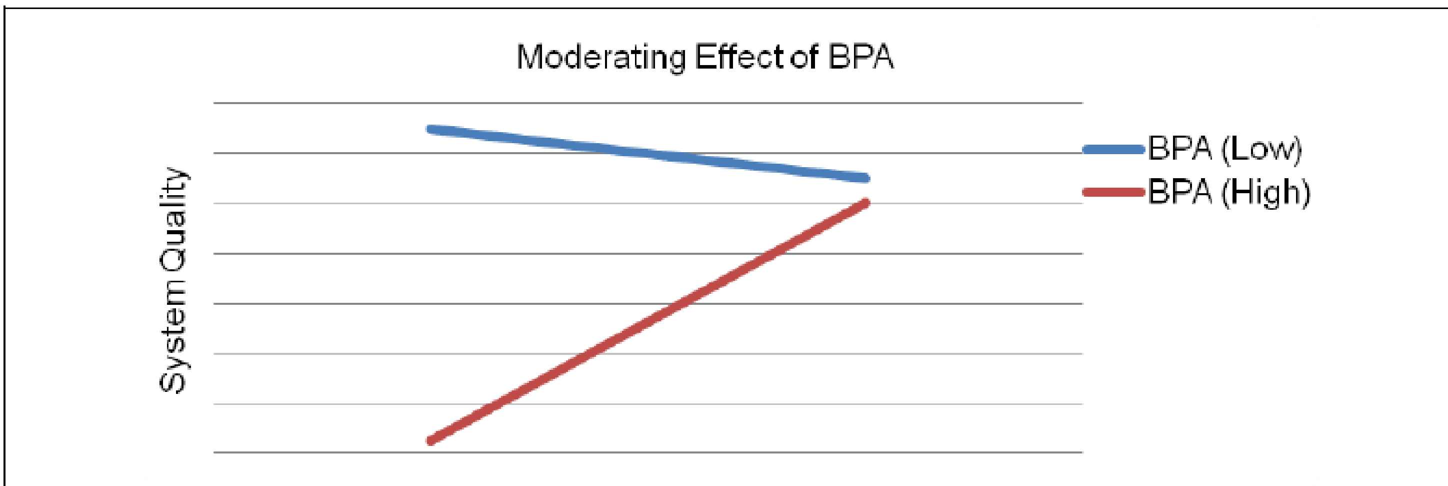


Figure 3. Moderating Effect of Business Process Adjustment on Data Fit

Table 9 shows that Organizational Resistance (OR) has a significant moderating effect (β= -0.255, p=0.073 <0.1) on the relationship between the data fit and system quality. It is negative. To further identify and affirm this, the equation at the high and low level was plotted. Figure 4 presents the form of the joint relationship of the data fit and OR on system quality. This form shows that an increase in the data fit is strongly associated with the improvement of system quality. This direct relationship was negatively attenuated by the moderating factor OR, as interpreted from Figure 4. This finding supports Hypothesis H4b that OR has a moderating effect on the direct relationship between the data fit and system quality.

Table 9: Regression Analysis of Organizational Resistance as Moderating Variable

Model	Unstandardized Coefficient		Standardized Coefficient	t	Sig
	B	Std. Error	Beta		
5(Constant)	5.866	.768		7.639	.000
DF	-.072	.126	-.081	-.572	.570
OR	-.099	.102	-.138	-.974	.335
6(Constant)	5.593	.765		7.310	.000
DF	-.029	.126	-.033	-.234	.816
OR	-.088	.100	-.123	-.887	.379
DF X OR	-.132	.072	-.255	-1.833	.073+
Independent Variable: Data Fit Dependent Variable: System Quality					
+: Significance at 0.1					

Table 10 shows that the Business Process Adjustment (BPA) has a significant moderating effect (β= -0.162, p=0.046 <0.05) on the relationship between the business process fit and the system quality. It is negative. To further identify and affirm this, the equation at the high and low level of BPA was plotted. Figure 5 presents the form of the joint relationship of the business process fit and the BPA on the system quality. This form indicates that an increase in the business process fit is significantly associated with the improvement of the system quality. This direct relationship is negatively attenuated by the moderating factor BPA, as interpreted from Figure 5. This finding supports Hypothesis H3b that the BPA has a moderating effect on the direct relationship between the data fit and the system quality.

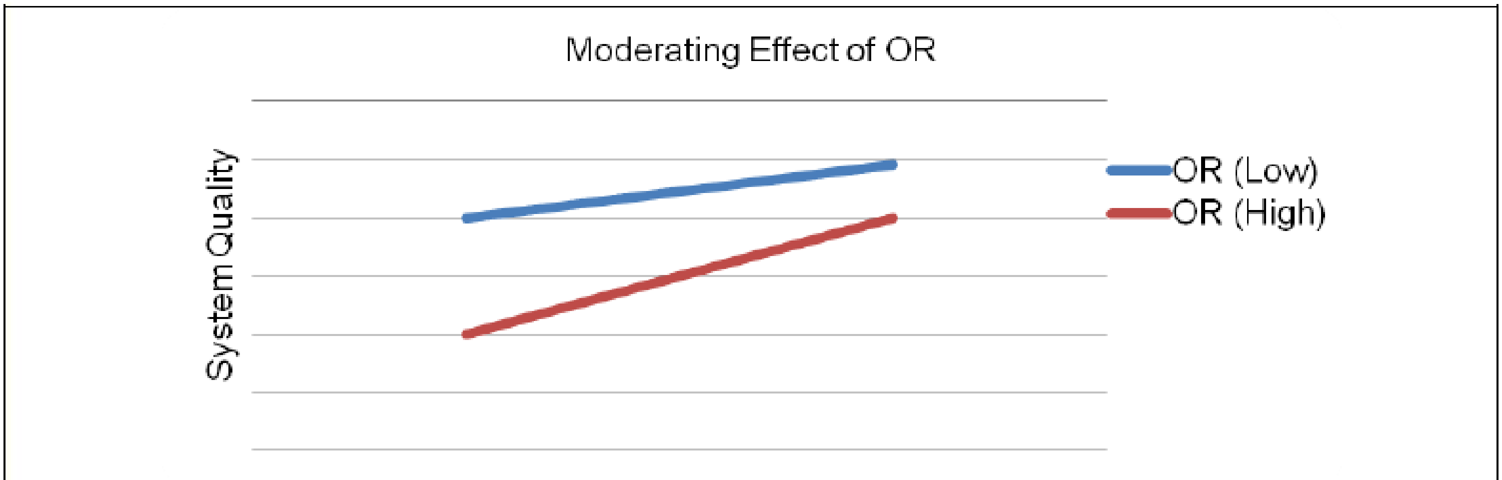


Figure 4. Moderating Effect of Organizational Resistance

Table 10: Regression Analysis of Business Process Adjustment as Moderating Factor

Model	Unstandardized Coefficient		Standardized Coefficient	t	Sig
	B	Std. Error	Beta		
7(Constant)	-.632	.570		-1.109	.273
DF	1.132	.100	.847	11.319	.000
BPA	.025	.062	.031	.411	.683
8(Constant)	-.768	.557		-1.380	1.74
DF	1.106	.098	.827	11.317	.000
BPA	.080	.066	.096	1.215	.230
DF X BPA	-.165	.081	-.162	-2.049	.046*
Independent Variable: Business Process Fit Dependent Variable: System Quality					
*: Significance at 0.05					

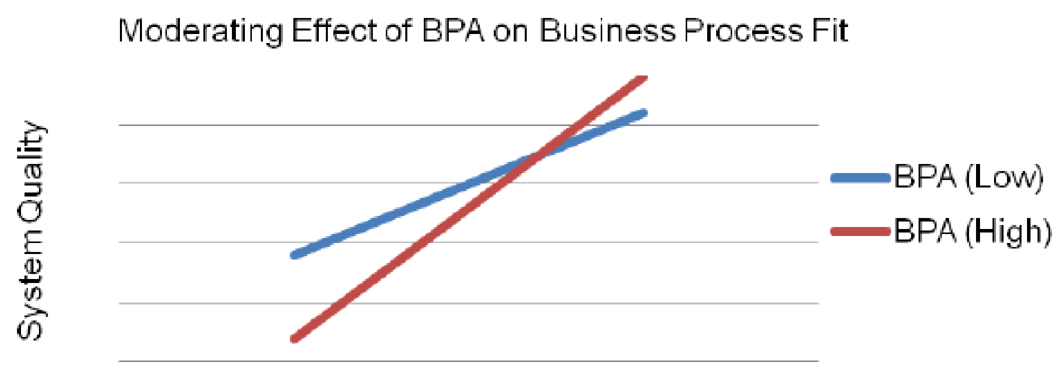


Figure 5. Moderating Effect of Business Process Adjustment on Business Process Fit

IV. DISCUSSIONS

Five of the proposed fourteen hypotheses are supported and the others are rejected. Neither the business process fit nor the data fit has a direct influence on the adoption outcomes of the IHIS. Although the data fit does not have a significant influence on the system quality of an IHIS, the business process fit has a positive influence. This finding contradicts the inter-enterprise systems literature that the data fit has a significant influence on both the system quality and the adoption outcomes of an IHIS. This finding first appears to be counterintuitive because medical data, presumably, is more complex than the transactional data of ERP systems in general. However, a deeper understanding of the healthcare industry in Taiwan can better help interpret the finding. The Taiwanese government mandates that all hospitals adopting IHISs should comply with the policy of the National Health Insurance Program. The single-payer healthcare insurance policy adopted in Taiwan includes the placement of a spending cap on annual medical expenses for all healthcare sectors, a budget worksheet, an annual report, etc. The standardized documentation process may result in the marginal influence of the data fit on adoption outcomes and the system quality of an IHIS.

Three CSFs exhibit moderating effects on the relationship between the organizational fit and an IHIS's success. The capability of key members has a positive moderating effect on the relationship between the data fit and adoption outcomes. In contrast, the business process adjustment and organizational resistance have a negative moderating effect on the relationship between the data fit and the system quality. In addition, the business process adjustment has a negative moderating effect on the relationship between the business process fit and the system quality. Along with the improvement of the business process fit or the data fit, increasing the capability of key members and reducing organizational resistance and business process adjustment can potentially increase the chance of IHIS implementation success. These findings are consistent with those of ERP literature [Hikmet et al., 2008].

V. IMPLICATIONS

The healthcare industry is infamous for its slow adoption of emerging technologies. Integrating various clinical solutions and legacy systems at an enterprise level can improve information transparency across the industry. IHIS implementation offers a solution to integrate disparate information systems. However, having hospitals successfully adopt an IHIS poses many organizational fit challenges. This study finds that some organizational factors are critical to helping hospitals overcome these challenges and these need to be integrated into the implementation process.

Although an integrated system can minimize or eliminate unnecessary delays and streamline processes for staff and patients, this system transforms how a hospital delivers care from the moment a patient arrives. Not only the patient, but also the family will experience the impact of the new business process transformation. Hospitals vary in size, characteristics, and infrastructure. Resultantly, business process adjustment is essential in order to improve the adoption of the healthcare information system [Cowen, Halasyamani, McMurtrie and Hoffman, 2008]. HIS-adopting hospitals have the ability to improve the fit between the information system and the organization, whereas non-adopters of HISs do not have this ability [Chang, Hwang, Hung, Lin and Yen, 2007]. Adjusting business processes to fit the needs of an IHIS is critical to the success of its adoption. Emerging technologies, such as open source software development methodology, may be able to help healthcare service providers adapt their business processes to the adopted IHIS. Healthcare service providers may want to capitalize on the capability of new technology to increase the chance of adoption success.

Effective assimilation of IHIS features requires corresponding changes in normal business processes. The mandated healthcare insurance policy further pressures the adopting hospitals into restructuring their business processes. To cope with these challenges, business process adjustment constantly occurs. It is important to note that too much adjustment can undermine the direct influence of the business process fit on the system quality. Another drawback of making too many business process adjustments is that it may create scope creeping, thereby resulting in poor adoption outcomes (e.g. user resistance, stakeholder dissatisfaction, project delay, over budget).

Many HISs, including the electronic medical record system, do not make adequate system adjustments. As a result, the analytic gap between user requirements and system functionalities results in poor management of clinical care and persistent medical errors [Coile, 2001]. Only about 40% of the hospitals in the U.S. have adopted the basic electronic health record system [Pelino, 2008]. Functional features of IHISs cannot meet 100% of the business requirements for all hospitals. When misfit occurs, the adopting hospital needs to make system adjustments. Making such adjustments to close the analytic gap can ensure the success of an IHIS's adoption. The success is as much a matter of the organizational fit as the technical design [Chiasson et al., 2007].

The low degree of involvement of clinicians in the development or selection of clinical applications has resulted in their slow adoption in hospitals. The success of an IHIS's adoption also depends on its acceptance by organizational leaders and managers. These stakeholders face unique challenges, such as reducing costs, providing quality customer service, ensuring patient safety and delivering high-quality care [Thielst and Gardner, 2008]. Interest conflicts among stakeholders can create organizational resistance if not managed effectively. Minimizing organizational resistance to IHIS adoption is critical to the adoption decision of users.

The success of HIS projects in hospitals depends on the capability of project members [Ondo and Smith, 2006]. If not trained properly, physicians, nurses, staff and other caregivers will not be ready to utilize the system and can confer system failure. The capability of project members is one kind of organizational asset that can strengthen or weaken the likelihood of adopting a HIS [Lee and Shim, 2007]. Our findings provide a guideline for hospitals in the process of adopting IHISs or hospitals considering adopting them. These hospitals can use this guideline to carefully assess the degree of their organizational fit and other factors that are important. Hospitals that have not decided if IHIS fits them can create an IHIS adoption plan based on the findings of this study.

This study offers insights into IHIS adoption by healthcare service providers at an organizational level. One strategic implication is that a technical data fit has little effect on IHIS adoption outcomes and the system quality unless the managerial business process fit is first addressed. Many organizational factors play critical roles in enhancing or decreasing the influence of the business process fit or the data fit on the adoption outcome and IHIS quality. Integrating silo systems that are designed to support different data formats requires that key stakeholders (e.g. users, software developers) be properly trained and equipped with the right capability to improve the data fit in order to achieve success. Too much business process adjustment should be discouraged because it can cause a negative influence of the business process fit and the data fit on the system quality. Minimizing organizational resistance to IHIS adoption can help users see the usefulness of the data generated by the IHIS thereby improving the system quality.

Although this study did not try to investigate the macro-level factors of IHIS adoption at the national level, many rejected hypotheses indicate that organizational level analysis cannot fully explain the complexity of slow IHIS adoption. Therefore, it is equally or more important to consider the potential influence of national level factors than organizational ones. A survey with key quality improvement experts in the healthcare system shows that professional organizations (e.g. medical and scientific societies) have the most influence on healthcare quality policies and strategies; patient and service user organizations have the least influence on the process [Spencer and Walshe, 2009]. IHIS as one of the important healthcare strategies to enhance healthcare quality is also susceptible to the influence of government and professional organizations. For instance, many governments in the European Union want performance indicators, such as incidents, complaints, and clinical trials to be reported. These national regulations are directly or indirectly affecting IHIS adoption by hospitals in different countries.

VI. LIMITATIONS

Enterprise systems adoption literature has been the primary contributor to the development of this study because an IHIS is an enterprise-wide system. However, this study does not consider factors not directly related to the adoption of a HIS in the healthcare industry. This inconsideration of HIS-related specific factors may be the major reason resulting in many insignificant relationships. IHIS adoption requires years of planning, implementing, controlling and collaboration among business partners. As the schedule stretches, many issues can arise to slow or jeopardize the adoption process. These issues may include a hospital's financial condition, politics, changes of business partners, and technological changes. This study does not assess the potential influence of these issues on IHIS adoption. Future research may want to consider HIS-related specific factors in order to understand the slow adoption of IHISs.

In addition, the hospitals studied are located in Taiwan. Generalizing the findings of this study to other countries requires careful interpretation of their societal, legal and geo-economic differences (e.g. universal healthcare system). This study investigates the critical success factors of IHIS adoption from the perspective of organizational fit. Many studies adopt the same approach to examine the CSFs of ERP adoption [Hikmet et al., 2008]. The primary findings of this study are consistent with those of ERP studies. The presence of an organizational fit is indispensible to the success of IHIS adoption. Other perspectives, such as technological-fit and business performance improvement (BPI), are readily available to examine ERP adoption. Future studies on IHIS adoption can incorporate these new perspectives when assessing their correlation with its success.

Three organizational factors, business process adjustment, the capability of key members, and organizational resistance, have moderating effects on the relationship between the organizational fit and IHIS success in this study. Other moderating factors, such as enterprise system experience, project size, organizational readiness, and project management skills, have an effect on enterprise system adoptions. Future studies can explore the potential influence of these additional moderating factors.

The findings warrant careful interpretation because this study assesses the perceived success of IS managers rather than measuring the actual success based on the objective measures of successful IHIS implementation. In addition, the sample used in the research is relatively small (152 out of 532), and so is the response rate (34.8%). Some of those unsupported hypotheses could be highly associated with the small sample size. In order to generalize the findings of this study to other IHIS projects, the sample would need to be extended.

VII. CONCLUSIONS

This research investigates the importance of five critical success factors of IHIS adoption from the organizational fit perspective: business process adjustment, systems adjustment, organizational resistance, top management support and key members' capabilities. These factors play moderating roles in the relationship between the organizational fit and the success of an IHIS. Unlike the major findings of the ERP literature, the data fit does not have any major influence on the system quality or adoption outcomes of an IHIS. Although the business process fit does not have a direct effect on the adoption outcomes of IHISs, the antecedent has a strong positive influence on its quality. With the inclusion of the five identified critical success factors, the hypothesized model can better explain the variability in IHIS adoption outcomes.

The conceptual model shown in this paper is largely applicable to IHISs in which hospitals are complying with a universal healthcare information system. Future works can direct efforts towards revealing the complex nature of IHIS adoption in the healthcare industry. It is an enterprise system and has the primary challenge of transforming and adjusting business processes in order to adapt to the standardized requirements of IHISs. Many other organizational factors have a direct influence on ERP adoption. Future research can explore those new CSFs and continuously improve the hypothesized model and its predictability for the success of IHISs.

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APPENDIX A: SURVEY INSTRUMENT

Part 1: Profile of Participant Hospitals

1. Which of the following hospital types best describes you?
   (a) Local Hospital (b)Regional Hospital (c)National Hospital
2. Who is responsible for IHIS implementations?1.independent, 2.branch, 3.outsourcing
   (a) Independent Hospital (b) Hospital Subsidiary (c) Outsourcing Hospital
3. Describe your department, your position and the number of years of experience working in IHIS implementations.
4. Who is the IHIS solutions provider for your company?
5. Who supports and maintains your IHIS after its implementation?
   (a)Primary Service Provider (b) Headquarter Hospital (c)IS Development Department (d) Consulting Firms
6. What year did your company begin it’s IHIS implementation project?
7. How long have you helped in the implementation of the IHIS project for your company?

Part 2: IHIS Success: Adoption Outcomes (Hong & Kim, 2002)
1.The cost of IHIS project greatly exceeded the expected budgets.
2.The IHIS project took significantly longer than expected.
3.The system performance of IHIS is significantly lower than the expected performance.
4.The IHIS project never achieved its anticipated benefits.

Part 3: IHIS Success：System Quality (Shin & Lee, 1996)
1.To what extent can your hospital operate IHIS without having technical issues? (Operational reliability)
2.To what extent has your IHIS provided reliable, precise, accurate and consistent information?（Functional reliability）
3.How easy is it for you to use your IHIS, prepare input data and interpret information processing results? (User friendliness)
4.To what extent can the IHIS handle problems associated with unauthorized access and modifications? (Integrity)
5.To what extent can your IHIS perform tasks exactly as defined by user requirements and specifications? (Correctness)
6.To what extent can the IHIS provide useful information and improve task-performance efficiency? (Usefulness)
7.To what extent can you understand the IHIS structure and its user functions? (Understandability)
8.Does your IHIS have enough computing resources to perform its required functions? (Efficiency)
9.How much effort is required to test the IHIS to ensure the system performs its intended functions? (Testability)
10.How much effort is required to correct errors and enhance the original IHIS? (Maintainability)
11.How much effort is required to adjust the IHIS to new conditions, demands and circumstances? (Flexibility)

Part 4: Organizational Fit: Data Fit (Hong & Kim, 2002)
1.The names and meanings of the IHIS data items correspond to those of documents used in our hospital.
2.The forms and formats of the IHIS data items correspond to those of documents used in our hospital.
3.The output data items of IHIS correspond to those of documents used in our hospital.
4.The input data items of the IHIS correspond to those of documents used in our hospital.

Part 5: Business Process Fit: Data Fit (Hong & Kim, 2002)
5.The business processes built into the IHIS meet all the needs required from the hospital's processes.
6.The business processes flow built into the IHIS support the flow of hospital's processes.
7.The business processes built into the IHIS accommodate the change required from the hospital's processes.
8.The business processes built into the IHIS correspond to the business practices of our hospital.
9.The user interface design of the IHIS structure can support the work processes required to conduct business in our hospital.
10.The user interface design of the IHIS can improve the capability of users in our hospital.
11.The user interface design of the IHIS can meet the business needs of our hospital.

Part 6: Information Systems Adjustment (Hong & Kim, 2002)
1.Significant time and effort have been required to alter IHIS data items to align with our hospital's process needs.
2.Significant time and effort have been required to add new IHIS data items to align with our hospital's process needs.
3.Significant time and effort have been required to alter IHIS processes to align with our hospital's process needs.
4.Significant time and effort have been required to append new IHIS processes to align with our hospital's process needs.
5.Significant time and effort have been required to alter IHIS input/output screens to align with our hospital's process needs.
6.Significant time and effort have been required to alter IHIS reports to align with our hospital's process needs.

Part 7: Business Process Adjustment (Hong & Kim, 2002)
1.Significant time and effort have been required to alter elementary processes to align with the IHIS.
2.Significant time and effort have been required to alter our process flow to align with the IHIS.
3.Significant time and effort have been required to standardize our hospital's processes to align with the IHIS.
4.Significant time and effort have been required to integrate our redundant hospital processes to align with the IHIS.
5.Significant time and effort have been required to alter our document and data elements to align with the IHIS.

Part 8: Organizational Resistance (Hong & Kim, 2002)
1.Many users have been resisting the IHIS implementation.
2.Many business problems related to IHIS implementation have occurred.
3.Many users have been reluctant to adopt the IHIS-enabled business process.

4.Many users have not replied to the request of the IHIS project team for user requirement acquisitions.
5.Many people did not want to see the success of IHIS implementation.

Part 9: Top Management Support（Lee & Kim, 1992）
1.Top management actively engages in the IHIS selection process.
2.Top management actively engages in recruiting IHIS team personnel.
3.Top management tries to encourage users to adopt the IHIS.
4.Top management is concerned with the operational performance of the IHIS.
5.Top management makes efforts to provide stable funding for the IHIS development and operational activities.
6.Top management tries to take part in prioritizing IHIS implementation activities.
7.Top management stresses the importance of effective control and management of the IHIS implementation.

Part 10: Capability of Key Members (Yueh, 2003)
1.Key members have the capability of training employees to use the IHIS.
2.Key members can dedicate enough time to tasks related to the IHIS implementation.
3.Key members clearly understand the operational processes for which they are responsible.
4.Key members are equipped with good communication skills.
5.Key members are equipped with effective problem-solving capabilities.

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