

STRATEGIC VALUATION OF ENTERPRISE INFORMATION TECHNOLOGY
ARCHITECTURE IN HEALTHCARE ORGANIZATIONS

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STRATEGIC VALUATION OF ENTERPRISE INFORMATION TECHNOLOGY
ARCHITECTURE IN HEALTHCARE ORGANIZATIONS

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Randy V. Bradley

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Randy V Bradley, a native of Stockton, AL, and a current resident of Knoxville, TN, earned both the Bachelor of Computer Engineering and the Master of Management Information Systems (MIS) degrees from Auburn University. After obtaining his Bachelors degree, he worked for Southwire Company as a Systems Engineer/Database Analyst. After a brief stint with Southwire, he joined Computer Sciences Corporation (CSC) as a Database Administrator (DBA). While with CSC, he worked on several large-scale national and international contracts as a DBA and consultant. During his time with CSC, he started pursuing his Masters degree while maintaining his duties as a DBA and consultant. Prior to completing his Masters degree, he was promoted to senior DBA at the rank of Computer Scientist. Shortly after this promotion, he completed his Masters and decided to pursue a Ph.D. in Management of Information Technology and Innovation. While in the Ph.D. program, he accepted a position at Troy University – Phenix City as Assistant Professor and Program Director of MIS.

DISSERTATION ABSTRACT

STRATEGIC VALUATION OF ENTERPRISE INFORMATION TECHNOLOGY
ARCHITECTURE IN HEALTHCARE ORGANIZATIONS

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The knowledge and skills required to manage information technology (IT) resources are obtained, driven, and dictated by a firm's information technology architecture (ITA). IT resources are assets and capabilities that are available and useful in detecting and responding to market opportunities or threats. Given the need for firms to be able to achieve and sustain competitive advantage in the midst of a dynamic and uncertain environment, it is important to identify IT resources that can facilitate superior performance. The IT resources realized as a result of employing an ITA are believed to enable firms to acquire and sustain a competitive advantage. Therefore, it should come as

no surprise that the implementation and utilization of an ITA has become an urgent priority for many firms. It is expected that appropriate leveraging of IT resources will provide firms with competencies that are congruent with their competitive needs rather than existing patterns of usage within the firm.

This study seeks to contribute to the literature on strategic IT management by pursuing three specific goals. First, it provide further insights into the strategic value, to firms, of ITA by assessing the influence of the ITA maturity on IS success and firm performance. Second, it evaluates the nature of these influences through the mediation of IT resources, specifically IT infrastructure flexibility (ITIF), and strategic alignment. Finally, the study employs a contingency variable, corporate culture, as a moderator to all of the relationships in the study in an effort to provide a better understanding of these relationships.

The findings of the present study suggest that along certain dimensions the level of ITA maturity is paramount when determining the level of IT infrastructure flexibility and strategic alignment. In addition, the findings indicate that the corporate culture exhibited by an organization moderates the nature of the influence of the elements of ITA maturity on both IT infrastructure flexibility and strategic alignment. As it relates to IS success and firm performance, the findings of the present study suggest that the corporate culture exhibited by an organization and the level of ITA maturity along certain dimensions are also critical when determining the level of IS success and firm performance.

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CHAPTER 1: INTRODUCTION

Better management of information technology (IT) resources can be facilitated by the implementation and utilization of an organizational architecture, specifically an IT architecture (ITA). Briefly speaking, an ITA is a plan or set of plans that guides the identification and utilization of the technical and human IT resources at the disposal of an organization (Curle 1993; Hildebrand 2000) that enabling the organization to successfully accomplish its business objectives. The ITA is not to be confused with the information systems (IS) or IT plan. Although the three are similar in nature, there are significant differences.

The focal point of the IS plan is the enablement of the identification and development of independent applications and stand-alone systems. One contributing factor is that the depth of the IS plan is, in most cases, limited to a specific functional area within a business unit, totally ignoring the needs of other business units and the enterprise as a whole (Galliers, Swatman, and Swatman 1995; Goodhue, Kirsch, Quillard, and Wybo 1992a; Goodhue, Quillard, and Rockart 1988; Kim and Everest 1994b; Zachman 1982). Furthermore, even in cases where the IS plan is designed from an "enterprise" point of view, it's focus is still limited to data sharing and systems integration across functional areas in a limited number of business units (Brancheau, Janz, and Wetherbe 1996; Goodhue et al. 1992a; Niederman, Brancheau, and Wetherbe 1991; Segars and Grover

1998; Sowa and Zachman 1992). Although a high quality IS plan can lead to highly developed applications and systems, for all practical purposes it results in the development of systems whose processes are limited to a subset of the enterprise in a particular geography (Goodhue et al. 1992a; Ross 2003; Zachman 1982). Conversely, the ITA serves as the organizing logic for enterprise-wide data sharing, systems integration, and application development across business units and throughout the enterprise regardless of geography. In addition, whereas the IS plan treats the data architecture and applications architecture as two related, but disjointed pieces (Periasamy and Feeny 1997), the ITA views them as one cohesive unit.

The IT plan is more exhaustive than the IS plan and more closely resembles the ITA. The IT plan results from the process of considering and formally asserting the IT development strategies, the overall purpose for IT, the priorities of IT, and, possibly, a coordination of the IT resources with business strategy and structure (Sabherwal 1999; Sabherwal and Chan 2001). The IT plan is a fundamental guide for the development and acquisition of IS, IT infrastructure, data, and networks in an organization. A major differentiator between the IT plan and the ITA is the level of focus. Whereas the IT plan primarily focuses on the technical component and physical aspects of the IT platform, the ITA focuses on the human component in addition to the technical component, the physical and logical aspects of the IT platform (Manwani 2002), and mitigation of social and technical risk factors (Earl 1989; Raghu-Nathan, Raghu-Nathan, Tu, and Shi 2001). Furthermore, the ITA encompasses the IT plan and extends it so as to help establish standards that will affect the connectivity, compatibility, and modularity of the IT platform

within an organization (Byrd and Turner 2000). Additionally, the ITA makes inter-organizational communication and collaboration possible by enabling the creation of reusable modules that are available for selection by various stakeholders and allies. In essence, an ITA can help prevent organizations from drifting to the point of developing and acquiring IT resources, characterized by a hodge-podge collection of incompatible technological resources, that can not connect to or easily co-operate¹ with other systems within and beyond organizational boundaries (Ross 2003). Therefore, it should come as no surprise that the implementation and utilization of an ITA has become an urgent priority for many firms (Lopez 2002; Ross 2003; Sauer and Willocks 2002).

This study seeks to contribute to the literature on strategic IT management by pursuing three specific goals. First, it seeks to provide further insights into the strategic value, to firms, of ITA by assessing the influence of the ITA maturity on IS success and firm performance. Second, it evaluates the nature of these influences through the mediation of IT resources, specifically IT infrastructure flexibility (ITIF), and strategic alignment. Finally, the study will employ the contingency variable, corporate culture, as a moderator to all of the relationships in the study in an effort to provide a better understanding of these relationships.

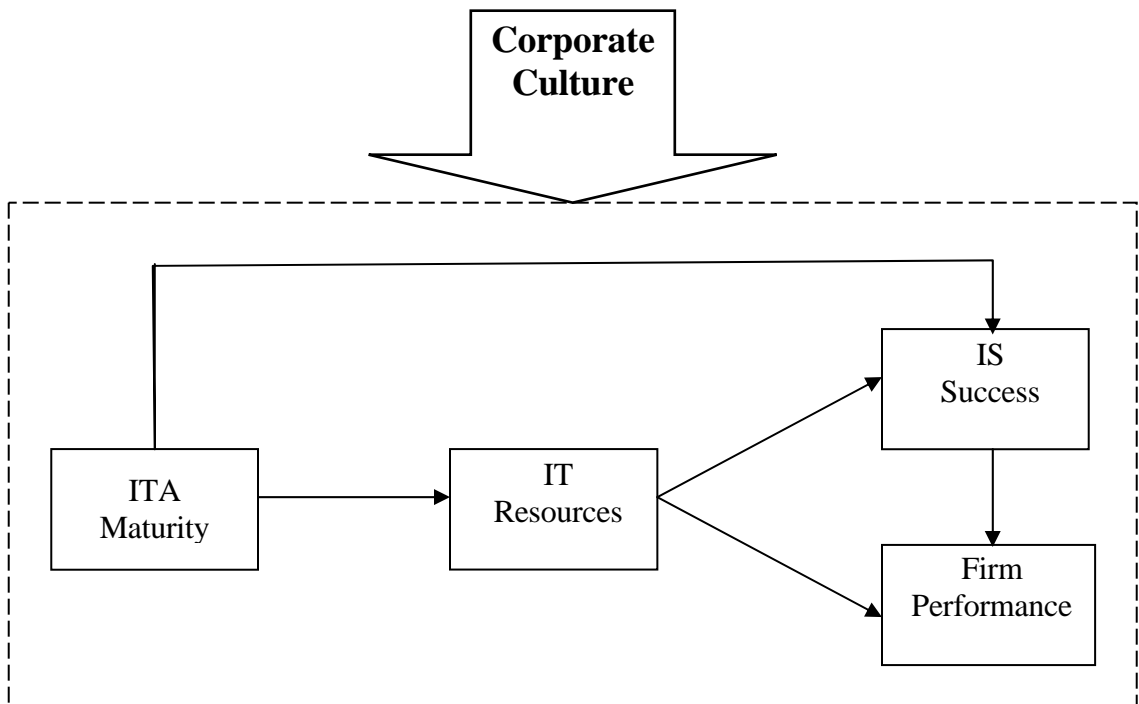
The Research Model and Constructs

Figure 1.1 conceptualizes the research model underlying this study. This model depicts one over-arching concept that has been implicitly and explicitly discussed in

¹ This refers to the simultaneous existence and independent operation of systems

the strategic IT management and strategic information systems planning (SISP) literature -- ITA maturity. Additionally, the model includes a mediating variable, IT resources, which is believed to provide a greater understanding of the effect of the maturity of the ITA on IS success and firm performance. Furthermore, the model captures a contingency variable, corporate culture, which helps to specify the conditions under which the aforementioned effects will hold. The primary constructs of interest, ITA maturity and IT resources, are presented in subsequent sections.

Figure 1.1 Conceptual Research Model



ITA Maturity

ITA maturity is based on the level of involvedness and intensity with regards to the degree that elements of an ITA are addressed. Primarily based on the characteristics of the

architectural stages identified by Ross (2003), these elements include IT capability intent, risk mitigation (Carr 2003; Jiang, Klein, and Discenza 2001; Keen 1991), business case for IT, locus of control of IT resources (Gibson 1994; Keen 1991), and key IT governance initiatives.

IT Capability Intent

IT capability intent focuses on the IT capability being developed. A clear articulation of the intended IT capability in the ITA better positions firms to set the IT investment priority needed to build that capability. Complex and sophisticated IT capabilities are usually indicative of a mature ITA. This construct assesses the level of sophistication of the intended IT capability. The IT capability articulated in the ITA can range from the intent to serve isolated business needs, facilitate firm-wide technology standards, and identify the firm's core processes and the data that drives them, to the intent to enable extensions of the business model.

Risk Mitigation

To put the concept of risk into perspective, one should allow that "only the threat of negative outcomes is considered a risk" (Wallace, Keil, and Rai 2004, pg. 291). Based on this concept, risk factors are conditions that can pose a serious threat to the successful completion or accomplishment of a specific task (Jiang et al. 2001; March and Shapira 1987; Wallace et al. 2004). The risk attitudes addressed/mitigated by the ITA can primarily be divided into two categories, social subsystem risk and technical subsystem risk. Social subsystem risk entails an organizational environment context "that may be unstable or

highly politicized, causing reductions in commitment and resources needed” to successfully complete a task (Jiang et al. 2001; Wallace et al. 2004). Technical subsystem risk involves the risk posed when "new or unfamiliar technology," in the context of its intended use, adds to the complexity of the technical subsystem (Wallace et al. 2004).

Business Case for IT

Addressing this element in the ITA provides information about how and why IT can be leveraged to solve a specific business problem or satisfy a specific business need. Some business cases for IT might include the need to improve the return on investment (ROI) of existing and new applications, and the desire for interoperability for the purpose of generating cost savings with regards to IT operations costs. Additionally, business case for IT can range from the need for systems and data integration for the purpose of improving IT efficiency and business performance to the desire for strategic agility for the purpose of improving speed to market of the firm's products and services.

Locus of IT Decision-Making

The locus of IT decision-making is believed to vary with ITA maturity. An ITA addresses where and with whom the locus of IT decision-making resides. The varying levels of locus of IT decision-making include control by local departments and business units, control by CIO (supported by senior business management), combined control by IT leadership, senior business management, and process owners, and combined control by IT leadership, senior business management, process owners, and local departmental and business unit leadership.

Key IT Governance Initiatives

The key IT governance initiatives addressed by the ITA indicate the quality of the IT management of the firm. The key IT governance initiatives, which vary depending on the quality of the ITA, include the joint estimation, measurement, and communication of the value of IT-enabled business processes by IT and business managers, and the development of executive committees to establish IT standards at the appropriate organizational level and to establish funding processes for both new infrastructure development and replacement of the existing infrastructure. In addition, the key IT governance initiatives addressed by a higher quality ITA include the determination of core processes and strategic IT and funding priorities.

IT Resources

Prior research suggests that various capabilities, competencies, and resources can be derived from an ITA (Earl 1989; Gibson 1994; Hagel and Brown 2001; Keen 1991; Periasamy and Feeny 1997; Ross 2003; Ross and Westerman 2004; Sauer and Willocks 2002). However, there has been some confusion about the definition of these three terms. In an attempt to delineate between these terms and provide a clear basis for applying the resource-based view in IS research, Wade and Hulland (2004) provided a definition of resources that encompasses capabilities, competencies and assets. They defined resources as assets and capabilities that are available and useful in detecting and responding to market opportunities or threats. Furthermore, they argue that competencies are capabilities, and that assets and capabilities define the set of resources available to the firm. Based on this definition and the clarity provided by Wade and Hulland's (2004) review of the resource-

based view, this study categorizes the capabilities, competencies, and resources derived from the ITA as IT resources.

The IT resources derived from the ITA are believed to enable the firm to achieve a competitive advantage. It is expected that appropriate leveraging of the IT resources will provide the firm with competencies that are congruent with the firm's competitive needs rather than existing patterns of usage within the firm (Richardson and Jackson 1990; Segars and Grover 1998). Given the need for firms to be able to achieve and sustain competitive advantage in the midst of a dynamic and uncertain environment, it is important to identify IT resources that can facilitate superior performance. Two IT resources, in particular, have been frequently cited in the strategic management and IS literature as facilitators of competitive advantage and superior performance -- IT infrastructure flexibility (ITIF) and strategic alignment.

Table 1.1 Typology of IS Resources (adapted from Wade and Hulland 2004)

Outside-In	Spanning	Inside-Out
<ul style="list-style-type: none"> • External relationship management • Market responsiveness 	<ul style="list-style-type: none"> • IS-business partnerships • IS planning and change management 	<ul style="list-style-type: none"> • IS infrastructure • IS technical skills • IS development • Cost effective IS operations

Table 1.1 presents an IS resource typology that was initially based on the work of Day (1994), and later extended by Wade and Hulland (2004). Based on this typology, ITIF is representative of an "inside-out" capability (i.e. capability deployed from inside the firm in response to market requirements and opportunities). Strategic alignment is representative

of a "spanning" capability (i.e. capability needed to integrate the firm's inside-out and outside-in capabilities). The "outside-in" capabilities relevant to this study will be discussed in an impending section.

IT Infrastructure Flexibility (ITIF)

IT infrastructure is considered by many to be a major catalyst for competitive advantage and sustained competitive advantage (Armstrong and Sambamurthy 1999; Broadbent and Weill 1997; Broadbent, Weill, and Neo 1999; McKay and Brockway 1989; Weill and Vitale 2002). One of the more common capabilities of IT infrastructure cited in the IT literature is flexibility (Allen and Boynton 1991; Byrd and Turner 2000; Duncan 1995; Kumar 2004; Monteiro and Macdonald 1996; Sauer and Willocks 2002). Duncan (1995) initially characterized ITIF as the ability of a firm's IT infrastructure to enable it to quickly and adequately respond to innovative moves by its competitors in order to "mitigate" the competitors initial advantage. Byrd and Turner (2000) later characterized the flexibility of the IT infrastructure as the ability of a firm's IT infrastructure to enable it to rapidly respond to changes in the market while providing for future integration without significant cost increases. In accordance with the work of Duncan (1995) and Byrd and Turner (2000), the definition of ITIF used in this study is as follows: the ability of a firm's IT infrastructure to enable it to easily, rapidly, and adequately respond to changes in its internal and external environments through the deployment and diffusion of the firm's technical and human components without suffering significant increases in cost.

Strategic Alignment

The IS literature contains various surveys and reports that list the issue of strategic alignment as a major concern of IS managers and business executives (Barlow 1990;

Brancheau et al. 1996; Burn, Saxena, Ma, and Cheung 1993; Henderson and Venkatraman 1999; Kearns and Lederer 2000; McFarlan 1984). Additionally, many researchers have attempted to identify and investigate the relationship between strategic alignment and other variables such as firm performance (Cragg, King, and Hussin 2002; Croteau and Bergeron 2001; Kearns and Lederer 2000; Papp 1999; Sabherwal, Hirschheim, and Goles 2001). Chan (2002) states that the goal of strategic alignment is for priorities, capabilities, decisions, and actions pertaining to IT to support those objectives of the entire enterprise. However, she defines strategic alignment at the business unit level and considers it to be the fit between priorities and activities of the IS function and the business unit. Although her articulation of the primary goal of strategic alignment appears to be consistent with other studies (Henderson and Venkatraman 1993a; Luftman, Lewis, and Oldach 1993), the definition appears to be limited and inconsistent with the stated goal of strategic alignment. Given that this study is interested in assessing strategic alignment at the enterprise level, and the scope of the previous definition is limited to the business unit, it is necessary to provide a definition of strategic alignment in accordance with this study. Therefore, in the context of this study, strategic alignment is defined as the degree to which the IT priorities, activities, and objectives support and are supported by the business priorities, activities, and objectives throughout the enterprise.

IS Success

There's a need to identify factors that are indicative of superior performance. One of which is the success of the information systems (DeLone and McLean 1992; DeLone and McLean 2003; Molla and Licker 2001; Rai, Lang, and Welker 2002; Sabherwal 1999; Seddon 1997; Seddon and Kiew 1994b; Seddon, Staples, Patnayakuni, and Bowtell 1998)

within the firm and the other being the overall performance of the firm (Bharadwaj 2000; Byrd and Davidson 2003; Cragg et al. 2002; Hansen and Wernerfelt 1989; Li and Ye 1999; Weill 1992). In this study, the success of information systems within the firm will be assessed by measuring the operational and strategic impact of their use. Viewing IS success in this manner provides greater insight about the IT-enabled performance of the firm. Based on Wade and Hulland's (2004) categorization of IT resources, assessing IS success involves the examination of the impact of its use on the firm's market responsiveness (i.e. strategic flexibility and agility) and management of external relationships, both of which are representative of "outside-in" capabilities (i.e. capability that is externally oriented, placing an emphasis on anticipating market requirements, creating durable customer relationships, and understanding competitors).

Corporate Culture

One must be cautioned that when evaluating the use of IT resources, conclusions about such use might be deemed premature and inappropriate if the type of use is not considered in conjunction with the corporate culture of the organization. Corporate culture is defined as a system of socially transmitted behavior patterns that serve to relate human communities to their ecological settings in which the individual and collective assumptions, beliefs, and values strongly shape the firm's competencies and rigidities. The current study will specifically focus on two corporate cultures often contrasted in the IS and strategic management literature – Entrepreneurial and Formal. Entrepreneurial firms have a leading edge and first to market culture. Firms that fit this cultural type are often viewed as agents through which a creative new product, process, or service is brought into the marketplace (Miles and Snow 1978; Russell 1989; Sabherwal and Chan 2001). Formal firms have a

culture of continually demonstrating cost-effectiveness operating rigidity. They also tend to be less entrepreneurial, more bureaucratic, and possess an organizational structure that is more routinized, specialized, and formalized (Miles and Snow 1978; Russell 1989; Sabherwal and Chan 2001).

Theoretical Development

In viewing the strategic value of ITA, this study employs a theory-driven approach that incorporates and builds upon prior knowledge and is therefore able to contribute to the cumulative stream of research in this area. Several studies have focused on ITA, and were instrumental in helping academicians and practitioners view the ITA as a vital asset to the firm (Curle 1993; Gibson 1994; Ross 2003; Ross and Westerman 2004; Sauer and Willocks 2002). For instance, Curle (1993) makes a case for the importance of developing an ITA, and outlines the contents of the ITA as well as the need for cooperation between various individuals and departments. The theoretical nature of his study provides a basis for the argument that implementation and utilization of an ITA can add value by supporting the firm's strategic objectives. This, in turn, helps to solidify the theoretical foundation of this study, and helps to substantiate the empirical testing of the thesis that the ITA adds strategic value.

Gibson (1994) intimates that an ITA provides some strategic value to the firm. For instance, he concludes that a high quality ITA, which enables firms to embed IT in their core business processes to achieve the flexibility needed to adapt to new, dynamic environments and to elevate the governance of IT resources to top managerial levels in the firm, provides firms with the improved ability to identify strategic opportunities created by

IT capabilities. The empirical nature of the study lends credibility to the premise that the ITA, based on its characteristics, can be distinguished by its maturity. Additionally, this further provides an opportunity for the current study to build upon Gibson's (1994) work by empirically investigating how variations in ITA maturity affect the extent of the strategic value added by the ITA.

Sauer and Willocks (2002) discuss the strategic implications of employing an ITA. Although their study primarily focuses on the need for a competent IT architect and the synergy between IT planning and business planning, they also imply that the ITA has strategic value to the firm. In their survey of chief executive officers (CEO) and chief information officers (CIO) at 97 companies in the US, Europe, and Australia, there was a consensus that the future success of the organization relies heavily on the quality of the ITA.

Drawing from 11 IT outsourcing cases and prior research in the area of IT outsourcing, Ross and Westerman (2004) present the ITA as a tool that enables firms to generate value from IT outsourcing. This provides support for examining the influence of the ITA on Wade and Hulland's (2004) external relationship management (outside-in capabilities), which will be discussed later in this study. Ross and Westerman (2004) also found that an ITA of appropriate quality facilitated the firms' ability to capitalize on the strategic agility offered by utility computing. Their study provides a theoretically sound platform from which the propositions set forth in the study can be empirically tested. For instance, a major premise of their study is that the ITA enables an organization to make use of utility computing and potentially transform IT from a fixed cost to a variable cost (Ross

and Westerman 2004). If such a proposition can hold up under empirical scrutiny, it could provide clarity about how the ITA might help improve IT investments and firm performance -- two issues that are encapsulated in the business case of IT element of ITA maturity.

Ross (2003) takes a learning-in-stages approach to discuss the ITA. Her study focuses on the need for firms to develop organizational competencies in ITA. She suggests that organizational competencies are needed to develop synergy between business strategy and ITA. The implications and conclusions of the study are drawn from the author's experience with 40 case studies pertaining to the development and implementation of ITAs. Based on these case studies, Ross (2003) develops a conceptual framework for the maturation of an ITA. In addition to the framework, she outlines strategic implications of IT associated with IT architectural maturity. The study provides great insight into the strategic value of the ITA to the firm and provides a solid foundation for future inquiries about the strategic value of the ITA to the firm. In addition, the study mentions IT capabilities a firm can derive from its ITA, depending on its maturity. Extension of Ross' (2003) study could help to provide insight as to how IT capabilities that are derived from an ITA influence IS success and firm performance. Therefore, the current study aims to building upon and empirically test the theoretical foundations set forth by Ross (2003).

Problem Identification

The US healthcare industry continues to experience major transformations in its application of IT (Al-Nashmi 2003; Wilson and Lankton 2004). Given that healthcare is the largest single industry worldwide (Wilson 2004), the transformations experienced by

organizations in the healthcare industry are expected to be widespread. This expectation is partly due to a federal regulation, the Health Insurance Portability and Accountability Act of 1996 (HIPAA).

HIPAA requires the healthcare industry to exchange information electronically when carrying out administrative practices (e.g. billing and payment activity related to the provision of medical services) (Department of Veterans Affairs Health Administration Center 2004). Furthermore, HIPAA mandates the use of standardized electronic transactions by healthcare organizations (HCO) when exchanging healthcare information electronically (Department of Veterans Affairs Health Administration Center 2004). The law also requires HCOs to adopt privacy, data and medical information security standards to protect personally identifiable health information.

The mandates brought about by HIPAA and other federal laws and regulations can place significant burdens on IT departments in HCOs. The burdens are primarily in the areas of data and systems standardization and integration, especially since HIPAA is credited with motivating the development and implementation of standardized information systems in HCOs. Wilson and Lankton (2004) cite several other “major forces” that are transforming the way HCOs apply IT:

- Laws and regulations are motivating development of standardized healthcare systems.
- Financial motivations and various types of inter-organizational relationships (e.g. acquisitions and mergers).

- Pressure from patients who want healthcare providers to meet patients' needs by supporting technology that would enable healthcare providers to "supply more resources electronically, including healthcare information, medical consultation, and instrumentation for diagnosis, monitoring, and treatment of medical conditions."

The abovementioned forces, in addition to HIPPA regulations, have created unprecedented demands on IT workers and administrators to design, implement, and manage new healthcare information systems, and carry out large-scale IT integration projects (Wilson and Lankton 2004). The demands are further complicated given that the healthcare industry lags behind other industries in the utilization of IT (Hutton 2003).

With the intense pressure placed on HCOs to provide more access to medical information and better quality and service to patients at lower costs, many hospitals have created initiatives to integrate formerly disparate technologies (McQuiston 2004). As McQuiston (2004) goes on to state, "the amalgamation of different technologies is the future. It is not one technology but rather how these new technologies will come together that will make people realize just how powerful IS can be in healthcare." Integration and standardization efforts that can potentially support these claims are dependent on the implementation and utilization of an ITA that can guide such efforts (Goodhue et al. 1992a; Goodhue et al. 1988; Gottschalk, Graham, Kreger, and Snell 2002; Kim and Everest 1994b). Implementation and utilization of an ITA can empower firms by providing a "plan" or "set of plans" that can guide and direct the arrangement, development, and accessibility

of technical and human resources intended to enable the accomplishment of organizations' business objectives.

Development of Research Questions

Once a strategy is championed within a firm, an infrastructure emerges to support it (Lei and Slocum 2005). This particular approach to planning can potentially be a proliferation of the existing quandary and become an impetus toward disaster and failure on many accounts. For instance, all efforts are concentrated on putting in place an infrastructure to support a stable strategy (thought to be complete); however, when there is a shift or major change in the industry it can dramatically reshape the industry structure and define the context of the competitive strategies used by organizations to build new sources of competitive advantage (Lei and Slocum 2005). It is of utmost importance that managers understand the rate of technological change within and outside their industries and its impact on strategies. As such, the traditional strategic planning approach does not lead to the development of business and IT strategies well-suited for dynamic and uncertain environments such as those faced by firms in an information intensive industry (Kelly and Kennedy 2000; Papp 1999). Therefore, it is important that information intensive firms be presented with a more suitable alternative that will allow them to develop more robust and agile strategies that can better enable them to proactively manage IT resources for the sake of achieving and sustaining competitive advantage. It has been suggested in the literature that an ITA is a viable alternative for firms operating in turbulent environments.

Studies on ITA suggest that the quality of the ITA can vary (Goodhue et al. 1992a; Goodhue et al. 1988; Kim and Everest 1994b; Ross 2003). This causes one to wonder

about how different levels of ITA maturity might affect the realization of IT resources, IS success and firm performance. This leads to the first set of research questions that will be addressed in this study:

RESEARCH QUESTION #1: How do variations in ITA maturity affect its influence on IS success and firm performance?

RESEARCH QUESTION #2: To what degree does variation in ITA maturity affect the realization of IT resources?

Both the organizational theory and organizational behavior literature indicate that corporate culture can influence a firm's ability to change as well as the degree of that change (Hatch 2004; Quinn and Spreitzer 1991). Due to the dynamics of corporate culture, it would appear that even if the firm possesses the IT resources that would enable it to change, corporate culture can be the basis for an impetus towards change or an impediment to change. Such dynamics causes one to wonder about the role corporate culture plays when the firm is facing decisions about how, whether, and to what degree IT resources will be committed and leveraged to bring about IT-enabled and overall firm performance. This leads to the final two research questions that will be addressed in this study:

RESEARCH QUESTION #3: What effect does a firm's corporate culture have on the ability of its ITA to influence IS success and firm performance?

RESEARCH QUESTION #4: What effect does a firm's corporate culture have on the ability of its ITA to influence the realization of IT resources?

Expected Contribution to the Field

Significance of Proposed Study

The primary purpose of this study is to empirically investigate the effect of the maturity of the ITA on the realization of IT resources, ITIF and strategic alignment, and their corresponding effects on IS success and firm performance. The purpose is also to provide a greater understanding about the conditions under which the above-mentioned relationships will hold. This purpose will be accomplished by investigating the direct effect ITA maturity has on IS success and the realization of ITIF and strategic alignment, and by investigating the mediating effect of ITIF and strategic alignment on both IS success and firm performance. The relationships between the constructs of interest will be viewed in the context of the corporate culture exhibited by the firm at the enterprise level.

Expected Contributions

The contributions expected to be derived from this study are in direct proportion to the accomplishment of the two purposes outlined above. This study is expected to provide some clarity as to the strategic value of the ITA to the firm. The strategic valuation will be accomplished by empirically evaluating the relationship between ITA maturity and both IS success and firm performance. Additionally, the relationship between ITA maturity and both ITIF and strategic alignment will be examined. Furthermore, the current study will examine the mediating effects of ITIF and strategic alignment on both IS success and firm performance, and the mediating effect of IS success on firm performance. The entire model will then be examined separately for each of the two corporate cultural types under investigation -- Entrepreneurial and Formal. This study positions ITA as a concept that

provides convergence of a variety of frameworks related to IT and strategic flexibility and IT and business alignment.

The empirical assessment of the strategic value of ITA will be accomplished by administering a survey instrument containing items derived from prior studies, including, but not limited to, Duncan's (1995) and Byrd and Turner's (2000) studies of ITIF, Segars and Grover's (1998) study of SISP, Henderson and Venkatraman's (1993a; 1999) studies of strategic alignment, DeLone and McLean's (1992; 2003) studies of IS success, Wade and Hulland's (2004) conceptualization of the IS resource typology, and Quinn and Spreitzer (1991) of corporate culture.

The literature review in the subsequent chapter is divided into three sections, each with a purpose in the conceptual development of this study. First, prior studies related to organizational architectures (i.e. information architecture, IS architecture, and ITA) are reviewed to develop the thesis of the proposed study: implementation and utilization of an ITA can provide firms with a thorough understanding of their IT objectives and resources and provide strategic value by enabling firms to leverage IT resources to accomplish its business objectives. Second, various studies and theoretical models are reviewed that address ITIF, strategic alignment, and IS success. Third, various studies that focus on corporate culture will be reviewed to help define the topic area, to identify their contributions to the field, to make sense of the accumulated knowledge on the topic, to identify and establish the contingency variable to be used in this study, and to identify opportunities for this study to build upon and extend the work of previous researchers.

CHAPTER 2: LITERATURE REVIEW

In this chapter, I conduct a review of past research regarding organizational architectures, ITIF, strategic alignment, and their context domains to develop support for the current study. The chapter is divided into three sections, each with a purpose in the conceptual development of the current study. First, prior studies related to organizational architectures (i.e. information architecture, IS architecture, and ITA) are reviewed to help define the topic area, to identify their contributions to the field, to make sense of the accumulated knowledge on the topic, and to identify opportunities for the current study to build upon and extend previous studies. Second, a review of various studies and theoretical models that address the other primary constructs of interest in this study, ITIF, strategic alignment, and IS success, and their impact on firm performance, is conducted. Finally, prior studies pertaining to corporate culture are reviewed to help identify, define, and establish it as the contingency variable to be used in this study.

Because the overarching goal of this study is to evaluate the strategic value of ITA to the firm by way of its influence on ITIF and strategic alignment and their ensuing influence on IS success and firm performance, the literature review focuses on relevant work within the scope of obtaining this objective. Therefore, this chapter examines the relevant IS and strategic management literature to solidify the theoretical foundation for the ITA maturity, ITIF, and strategic alignment constructs. This is followed by a review of the

literature relevant to IS success and corporate culture, as operationalized in this study. Lastly, the hypotheses of this study are developed and presented.

Review of Organizational Architectures

The topic of organizational architectures has received attention in the IS literature for more than two decades. A review of this literature indicates a paradigm shift concerning the type and sophistication of organizational architectures discussed in the IS literature. A review of the IS literature, spanning a period of 20 years, revealed a paradigm shift from functional- and business unit-level architectures to enterprise-level architectures. The review indicated an increase in complexity, intensity, and detail with regard to organizational architectures. This study is primarily interested in the ITA; however, a brief discussion of its predecessors --IS architecture and information architecture-- is conducted to provide a better understanding of the value of the ITA and to develop the ITA maturity construct.

IS Architecture (ISA): A Systems Development-focused Architecture

In 1987, when the subject of ISA was beginning to receive a great deal of attention, Zachman (1987) set out to define a framework that would facilitate better systems development. Given the "increased scope of design and levels of complexity" of IS implementations, the timing of this endeavor was critical (Zachman 1987). The primary purpose of the development of this framework was to rationalize the various architectural concepts and specifications to allow for improving and integrating systems development approaches and to establish credibility and confidence in the investment of system resources (Zachman 1987). Further, Zachman (1987) stressed that the difficulty in

answering the question "What is an information systems architecture?" was partly due to the misconception that there exists a single architecture. He suggested that there existed a set of architectural representations. He further suggested that this set of architectural representations were additive and complementary. Zachman's (1987) assertions were supported by Goodhue et al. (1988), whose study implied the existence of multiple architectural foundations.

Drawing from 31 data management case studies in 20 firms, Goodhue et al. (1988) concluded that there was no single dominant approach to improving the management of data. Rather, they found that firms used multiple approaches that differed with regard to business objective, scope, planning methodology, and product. Goodhue et al. (1988) made it clear that the architectural foundations primarily serve as guides for future systems development. Although the architectural foundations lead to well-developed systems, there was still the issue of a lack of data standardization and integration that needed to be addressed. Failure of the architectural foundations to address such concerns could lead to the development of fragmented systems that are not conducive to supporting the business objectives of the firm. Therefore, Hackathorn and Karimi (1988) attempted to address these issues by constructing the overall ISA for the organization. As part of this construction, they compared 26 widely-cited methods for information engineering and concluded that the evolution to more effective methods of information engineering were needed to align future IS requirements to firms' strategic goals and objectives. Additionally, they saw this evolution as necessary in order to exploit the current IS environment for competitive advantage (Hackathorn and Karimi 1988).

Information Architecture (IA): An Information Management-focused Architecture

The IA accounted for part of the evolution towards more effective measures of information engineering. The IA is a high-level map of the information requirements of an organization aimed at identifying major information categories in use within an organization and their relationships to the business processes and functions that support the organization (Brancheau, Schuster, and March 1989; Brancheau et al. 1996). A well-developed IA is vital to the successful development of integrated information systems. The purpose of the IA was to facilitate successful implementation of the IS plan (Periasamy and Feeny 1997; Richardson and Jackson 1990). Periasamy and Feeny (1997), found that, in most cases, successful implementation of the IS plan led to fulfillment of the IS strategy, which is primarily concerned with aligning IS development with business needs and with seeking strategic advantage from IS applications (Earl 1989; Raghu-Nathan et al. 2001).

Earl (1989), Sowa and Zachman (1992), and Periasamy and Feeny (1997) all argued that the IA consists of two components -- the data architecture and the application architecture. The data architecture is, in essence, the organization's corporate data model (CDM). The CDM graphically depicts the major entities within the organization and the relationships that exist among these entities. Periasamy and Feeny (1997) states that this component of the IA is essential for long-term and cost-effective data management. The application architecture graphically depicts the applications that make up an organization's integrated information systems and the data that flows between the applications (Allen and Boynton 1991; Evernden and Evernden 2003; Farnum 2002; Niederman et al. 1991; Periasamy and Feeny 1997; Pervan 1998). Periasamy and Feeny (1997) state that the data

architecture component of the IA serves management communication needs during IS planning and, later, enables the development of applications in an integrated manner.

Based on their experience working with various organizations over a three year period, Allen and Boynton (1991) presented two approaches towards the development of an organizational architecture in which flexibility and efficiency is made possible through systems and data integration. They referred to the two approaches as the “low road” and the “high road.” With the low road approach, IS and the management of IS are dispersed throughout the firm. They argue that although IS becomes the responsibility of every operating manager, the approach is more than just one-step beyond decentralization of the corporate IS organization. Additionally, the low road approach views standards as impediments to progress; thus, the role of standards is limited to ensuring the integrity of the internal data exchange processes. With the high road approach, the role of the senior IS executive is expanded as core IS activities are centralized. Applications are designed to be organizationally independent with the expectation of enabling applications to continue meeting the needs of the firm even if the organizational structure changes. The expectations of the high road approach were that it would provide IS efficiency and that centrally managed, well-integrated IS would enable quick response to strategic challenges. However, the findings were contrary to the expectations and beliefs. For instance, Allen and Boynton (1991) found that IS had to be tailored and modified to respond efficiently to local and changing demands. They concluded that even if the high road approach is fulfilled it might never meet the changing expectations of the firm. Although, the two prong approach towards the management of IS resources appears to have some viability, there is still the

issue of implementing an organizational architecture that will enable firms to be competitive at any given level. The organizational architecture believed to provide such a capability is the ITA.

IT Architecture (ITA): An Enterprise Resource Management Architecture

Whereas the predecessors of the ITA tend to focus more on systems development, data sharing, and systems integration efforts within the organization, this particular organizational architecture tends to focus more on the governance of IT resources within the organization. If implemented as specified, an ITA specifies (a) how and why the pieces of the IT infrastructure fit together as they do; (b) where the pieces of the IT infrastructure go and at what time they are needed; and (c) why and how changes in the IT infrastructure will be implemented. In the context of this study, the detailed definition of ITA is as follows: the plan (or set of plans) that serves as the organizing logic for decisions that pertain to data, applications, IT infrastructure (technical and human), and management responsibilities and strategies (IT and business), captured in a set of policies, procedures, and technical choices that guide and direct the arrangement, development, and accessibility of those elements with the intent to achieve desired business and technical standardization and integration to enable the accomplishment of a firm's business objectives (Allen and Boynton 1991; Gibson 1994; Ross 2003).

As indicated by the comprehensive definition of ITA, an ITA encompasses and extends the ISA and IA. Furthermore, an ITA, as defined in this study, is indicative of the synergy between the ISA and IA. An ITA serves as the "pulling together" and extension of two often separate and disparate organizational architectures to form one overarching enterprise IT resource management architecture. Additionally, an ITA, depending on its

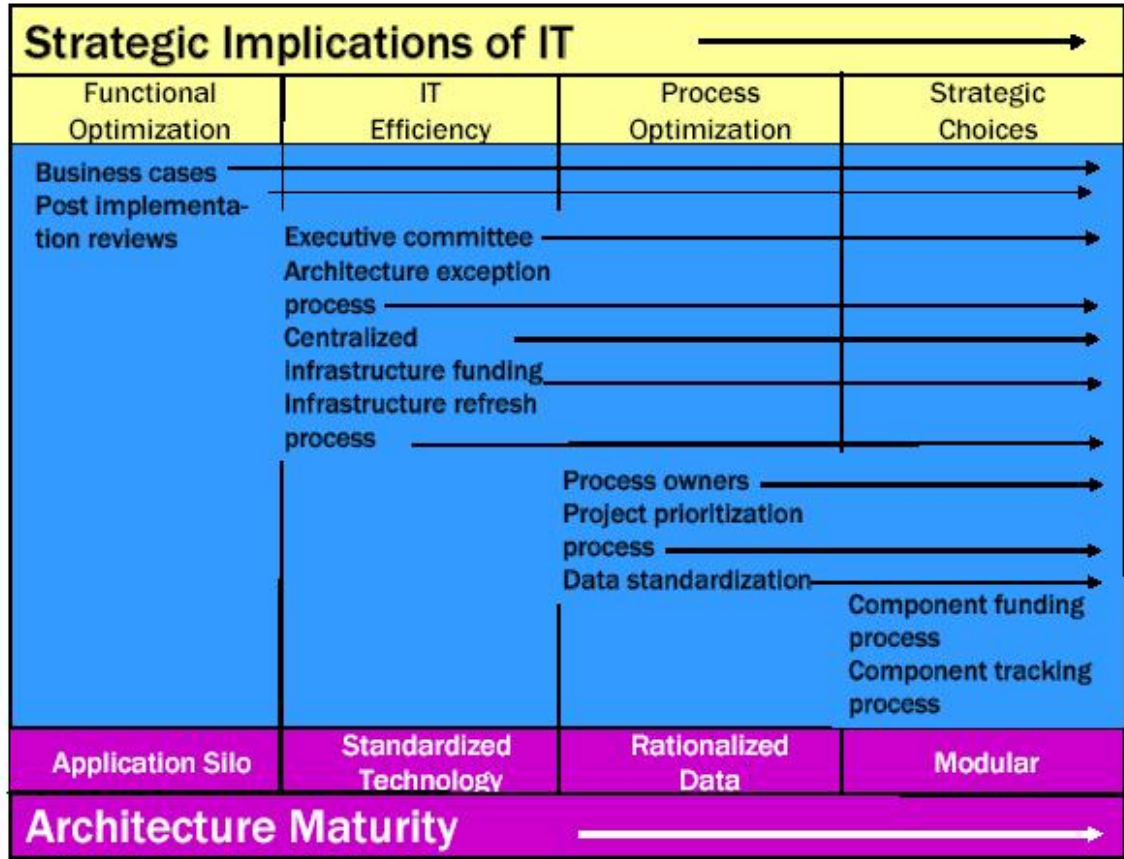
maturity, expands the scope of the previously mentioned organizational architectures to include resources and relationships external to the organization. Thus, at the heart of the consolidation of the ISA and IA into the ITA still lies the issue of the maturity of the ITA. Just as multiple architectural representations and foundations exist, there are variations in the representation of the ITA. Gibson's (1994) testing and validation of four architectural types and Ross' identification of four distinct stages of architectural maturity appears to lend credibility to this notion.

Gibson's (1994) research of ITA centered around the empirical testing and validation of four generic architectural types. He explicated that the four generic types would mature over a period and that they would eventually demonstrate some strategic impact on the firm. Each type of architectural types identified by Gibson (1994) had a greater or similar level of maturity. However, these generic architectural types were not treated as linear growth stages, rather, Gibson (1994) suggested that a single architectural type is most appropriate for a given situation.

Ross (2003) takes a learning-in-stages approach to discuss ITA. She concluded that there were four stages of architectural maturity – the application silo stage, the standardized technology stage, the rationalized data stage, and the modular stage (see Figure 2.1). Firms in the application silo stage focus their resources on developing individual applications. Firms in the standardized technology stage focus their efforts and resources on the development of a shared infrastructure. Firms in the rationalized data stage, focus their efforts and resources on data management and infrastructure development. Firms in the modular stage focus efforts and resources on attaining strategic agility.

Ross (2003) found that for firms to develop and implement architectures representative of the various stages, they were required to have organizational competencies in ITA. She suggests that organizational competencies are needed to develop synergy between business strategy and ITA. She outlines strategic implications of IT associated with ITA maturity, and reveals IT capabilities a firm can derive from its ITA, depending on its maturity.

Figure 2.1 ITA Maturity Model (adapted from Ross 2003)



Development of the ITA Maturity Construct

The maturity of an ITA is measured by its level of involvedness and intensity with regard to the degree to which it addresses a common set of characteristics of an ITA. These characteristics include the IT capability intent, risk mitigation (Carr 2003; Jiang et al. 2001; Keen 1991), business case for IT, locus of IT decision-making (Gibson 1994; Keen 1991), and key IT governance initiatives. With the exception of risk mitigation, these elements were chosen because they were consistently found, in 40 case studies pertaining to the development and implementation of ITAs, to be characteristics of ITA.

IT Capability Intent

IT capability intent focuses on the degree to which the ITA articulates and enables the firm to meet its business objectives, and the sophistication of the intended IT capability. IT capability intent can range from situations where the intent is to serve isolated business needs, facilitate firm-wide technology standards, identify the firm's core processes and the data that drives them, to situations where the intent is to enable extensions of the business model. The particular IT capability intent outlined and addressed in the ITA, as well as the degree to which it is addressed, is indicative of the sophistication of IT capability intent and the impending maturity of the ITA.

Risk Mitigation

The types of risk addressed by an ITA can primarily be divided into two categories, social subsystem risk and technical subsystem risk. Social subsystem risk entails an organizational environment context "that may be unstable or highly politicized, causing reductions in commitment and resources needed" to successfully complete a task (Jiang et

al. 2001; Wallace et al. 2004). Technical subsystem risk involves the risk posed when new or unfamiliar technology, in the context of its intended use, adds to the complexity of the technical subsystem (Wallace et al. 2004). The maturity of the ITA is dependent upon whether or not these risk factors are accounted for and the degree to which they are addressed in the ITA.

Business Case for IT

Addressing this element in the ITA provides information about how and why IT can be leveraged to solve a specific business problem or satisfy a specific business need. Some business cases for IT might include the need to improve the ROI of existing and new applications and the desire for interoperability for the purpose of generating cost savings with regard to IT operations costs. Additionally, business cases for IT can range from the need for systems and data integration for the purpose of improving IT efficiency and business performance, to the desire for strategic agility for the purpose of improving speed to market of the firm's products and services. An ITA with a high level of maturity will provide more sophisticated and advanced business cases for IT than an ITA with a lower level of maturity.

Locus of IT Decision-Making

The locus of IT decision-making is believed to vary with the level of maturity of the ITA. The ITA addresses where and with whom the responsibility for making decisions pertaining to defining applications, defining IT personnel requirements, and defining hardware/software requirements resides. The varying levels of locus of IT decision-making

includes (a) business unit leaders only; (b) senior IT management (any combination of IT director, CTO, and CIO) only; (c) senior business management only; (d) business unit leaders in conjunction with senior IT management; (e) business unit leaders and senior IT management, all in conjunction with senior business management; and (f) business unit leaders, senior IT management, and senior business management, all in conjunction with industry leaders.

Key IT Governance Initiatives

The key IT governance initiatives addressed by the ITA are indicative of the sophistication of the IT management capability of the firm. IT governance is concerned with IT project selection and prioritization issues and how the authority for resources and the responsibility for IT is shared between business partners, IT management, and service providers (Luftman, Papp, and Brier 1999; Weill and Woodham 2002). The key IT governance initiatives addressed by the ITA will vary depending on the maturity of the ITA. For instance, an ITA with a low level of maturity may address key IT governance initiatives such as the joint estimation, measurement, and communication of the value of IT-enabled business processes and the establishment of standard setting, exception, and funding processes. An ITA with a high level of maturity is more inclined to address key IT governance initiatives such as the development of executive committees, the determination of core processes and funding priorities for both new infrastructure development and replacement of the existing infrastructure, in addition to the introduction of new governance mechanisms to encourage component reuse.

IT Infrastructure Flexibility

Researchers and practitioners alike have taken note of the potential value of an organization's IT infrastructure (Brancheau et al. 1996; Byrd and Turner 2000; McKay and Brockway 1989). In fact, the growing strategic value of an integrated IT infrastructure is almost undeniable. IT infrastructure expenditures account for nearly 60 percent of a firm's IT budget (Broadbent and Weill 1997; Byrd, Lewis, and Bradley 2006). Some view the IT infrastructure as being crucial to attaining and sustaining competitive advantage (Boar 1997; Byrd and Turner 2000; Davenport and Linder 1994).

The IT foundation has been called the enabling foundation of shared IT capabilities upon which the entire business depends (McKay and Brockway 1989). An IT infrastructure is the basis of facilitating capabilities across business units and functional areas (Weill 1993). It is the part of the information's capacity intended to be shared among all departments (Davenport and Linder 1994). Furthermore, it is the cornerstone upon which specific business activities and IS applications are built. As indicated by these statements, an IT infrastructure is arguably one of the most important aspects of managing IT resources.

To further elaborate, IT infrastructure typically refers to the physical components (e.g. networks, servers, etc.) that reside or will reside in the organization (Byrd and Turner 2000; Duncan 1995; Kumar 2004; Turban, McLean, and Wetherbe 1996). This has been referred to as the technical component of IT infrastructure (Broadbent and Weill 1997; Henderson and Venkatraman 1995; Kumar 2004). The technical component also includes the decisions and choices that pertain to the aforementioned physical components (Byrd and Turner 2000; Kumar 2004).

IT infrastructure can also be expanded to include the human component (Broadbent and Weill 1997; Byrd and Turner 2000; Henderson and Venkatraman 1999; Neumann 1994). The human component involves the knowledge and skills required to effectively manage IT resources, whether technical or human, within the firm (Byrd and Turner 2000; Henderson and Venkatraman 1999; Kumar 2004; Weill, Subramani, and Broadbent 2002). The decisions and choices that pertain to the technical component, as well as the repository from which the knowledge and skills required to manage IT resources are obtained, are driven and are dictated by the firm's ITA (Allen and Boynton 1991; Ross 2003).

Many firms operate in turbulent environments, where the pace of change is steadily increasing, and where business risk is compounded by unaligned strategies and rigid IT infrastructures (Lopez 2002; Lopez 2003). Such conditions require the IT infrastructure to be flexible to the point that the enterprise can easily adjust to shifts in the marketplace. When a firm's IT infrastructure is not flexible, potential of the IT infrastructure as an enabler can be greatly diminished. In order to avoid implementing an IT infrastructure that lacks flexibility, it is important to know the elements that constitute ITIF.

In an effort to develop a comprehensive measure of ITIF, Byrd and Turner (2000) empirically examined Duncan's (1995) ITIF construct to further define and elaborate on the dimensions and factors contained within the construct. Byrd and Turner (2000) suggested that the technical component of ITIF can be defined in terms of two dimensions, integration and modularity (Byrd and Turner 2000; Duncan 1995; Keen 1991), whereas the human component of ITIF can be defined as personnel flexibility. Integration consists of connectivity and compatibility. Duncan (1995) states that connectivity, which has

sometimes been referred to as reach (Keen 1991), is the ability of an element of the IT infrastructure to connect to any other element whether inside or outside of the organizational environment. Duncan (1995) further defines compatibility as the ability of the IT infrastructure and IT services to interoperate and share data with other elements of the IT infrastructure regardless of the IT platform. Modularity is the ability to add, modify, or remove any hardware, software, or data components from the IT infrastructure with relative ease and minimal trouble. Collectively, integration and modularity determine the flexibility of the technical component of IT infrastructure.

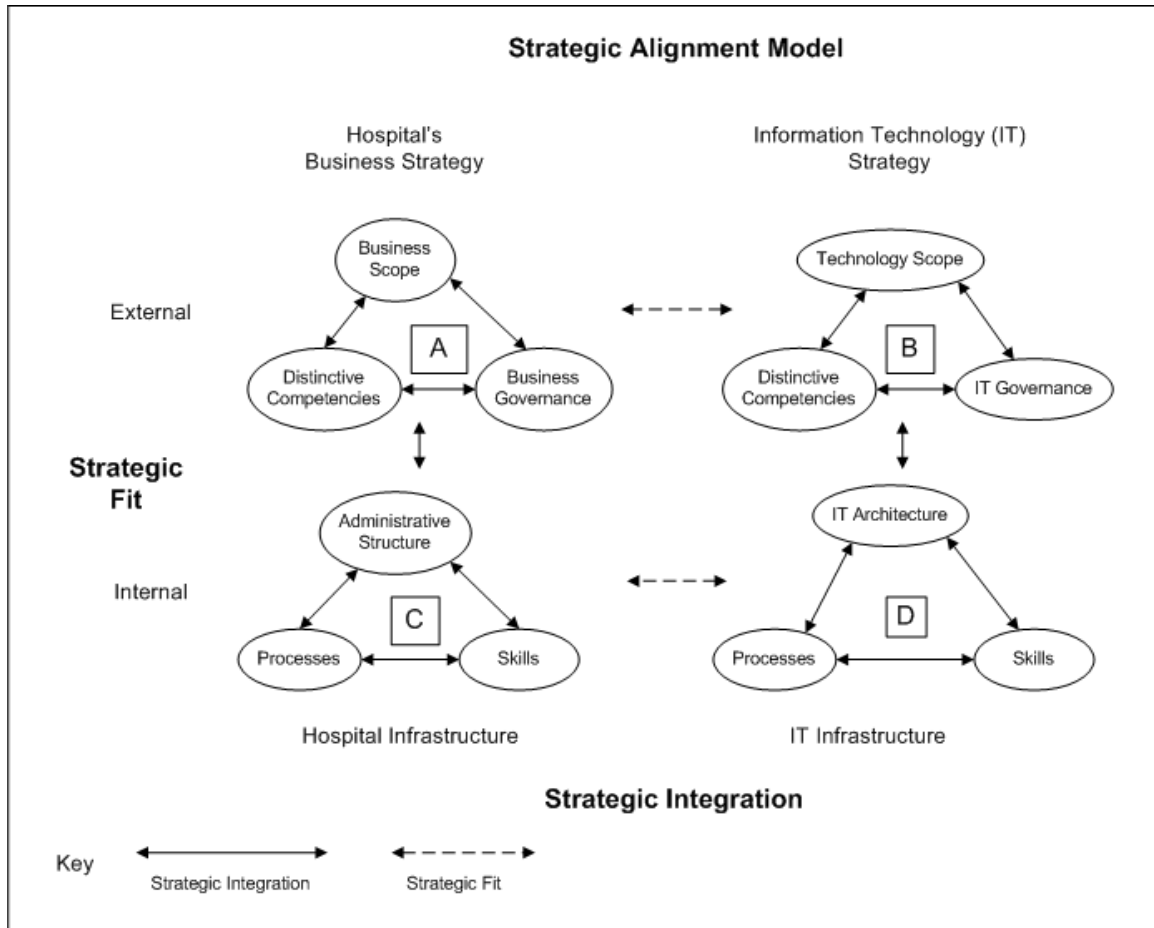
The human component of IT infrastructure includes human and organizational skills, expertise and competencies, knowledge, commitments, values, norms, and organizational structures (Broadbent, Weill, and St.Clair 1999). Lee et al. (1995), in their quest to determine the critical knowledge and skills required of IS professionals, found that four types of knowledge and skills are needed for the human component of the IT infrastructure to be effective. The four types are the ability to manage technology, business functional knowledge and skills, interpersonal and management skills, and technical knowledge and skills.

Strategic Alignment

The challenges of aligning the IT function with the rest of the business have been highlighted in a number of studies (Broadbent and Weill 1993; Chan 2002; Chan, Huff, Copeland, and Barclay 1997b; Henderson and Venkatraman 1995; Henderson, Venkatraman, and Oldach 1996). The numerous definitions of strategic alignment have been a major impetus towards the further proliferation of the challenges of attaining it. For instance, Reich and Benbasat (1996) defined alignment as the degree to which the IT

mission, objectives, and plans are supported by the business mission, objectives, and plans. Others have defined strategic alignment somewhat differently. Henderson and Venkatraman (1993b) defined strategic alignment as the fit between an organization and its strategy, structure, processes, technology and environment (see Figure 2.2). Chan et al. (1997b) defined strategic alignment as the fit between business strategic orientation and IS strategic orientation. Furthermore, Chan et al. (1997a; 1997b) argued that alignment is a state or outcome. Additionally, Reich and Benbasat (2000) stated that processes, communication, and planning are determinants of alignment.

Figure 2.2 The Strategic Alignment Model



Many firms have been faced with attempting to align IT and business strategies. The challenges of such alignment have been highlighted in a number of studies (Chan 2002; Luftman 2000; Luftman et al. 1993; Luftman et al. 1999). However, regardless of the challenges, many firms endeavor to attain strategic alignment. This is partly due to the ever-increasing benefits that are believed to be awaiting those firms that are able to balance their IT and business functions.

IS Success (ISS)

In 1992, DeLone and McLean developed a six-factor model of ISS based on empirical and theoretical research of ISS measures used by a number of researchers in the 1970's and 1980's. The six categories of the model of ISS are SYSTEM QUALITY, INFORMATION QUALITY, IS USE, USER SATISFACTION, INDIVIDUAL IMPACT, and ORGANIZATIONAL IMPACT. The ISS model is a multidimensional and interdependent construct that provides a clearer picture as to what constitutes ISS by studying the interactions along the dimensions of the model. Thus, the primary purpose of the DeLone and McLean (1992) model of ISS was to provide guidance for future research. Furthermore, since the development their model of ISS, nearly 300 articles in refereed journals have referred to and made use of it (DeLone and McLean 2003).

Seddon and Kiew (1994a) partially tested the model of ISS, and their results provided substantial support for the constructs tested. Their study was followed by Seddon's (1997) re-specification and extension of the model of ISS. In an attempt to clarify the model of ISS, and through the integration of core theoretical relationships adopted from the ISS literature, Seddon (1997) reduced the model developed by DeLone and McLean (1992) to five constructs (Rai et al. 2002). The five constructs include SYSTEM QUALITY, INFORMATION QUALITY, PERCEIVED USEFULNESS, USER SATISFACTION, and IS USE.

There seems to be a consensus among researchers that the dependent variable of ISS is IS use. However, one difficulty in the model of ISS, cited by Seddon (1997), is the multi-faceted meaning of IS use (i.e. benefits from use, future IS use, impact of use, etc.). The implication of this difficulty is that, when investigating ISS or when using it as a

foundation for study, researchers must explicitly express their definition of IS use. That is, researchers should state whether IS use means the benefits from use, future IS use, the impact of use, or some other connotation of IS use. In measuring ISS, the current study focuses on the "impact of use" because this connotation of IS use appears to give a more direct consequence of using IS than most other measures of IS use.

Additionally, the current study separates the impact of IS USE into two types of use: operational and strategic (Weill 1992). Both are based on Wade and Hulland's (2004) "outside-in" categorization of IS resources. This categorization includes external relationship management and market responsiveness/strategic agility. External relationship management represents the firm's ability to manage linkages between the IT function and stakeholders outside the firm (Wade and Hulland 2004). These outside stakeholders are classified based on the context of the relationship. For example, managing relationships with vendors, suppliers and customer is deemed operational in nature, and therefore, will be considered when measuring the impact of operational IS use element of ISS. Similarly, managing relationships with outsourcing partners or strategic allies is deemed strategic in nature, and therefore, will be considered when measuring the impact of strategic IS use element of ISS. Market responsiveness "involves the collection of information from sources external to the firm as well as the dissemination of a firm's market intelligence across departments, and the organization's response to that learning" (Wade and Hulland 2004). This is deemed operational in nature, and therefore, will be considered when measuring the impact of operational IS use element of ISS. In addition, market responsiveness includes the firm's strategic agility, which enables it to develop and manage

projects rapidly and to respond quickly and accurately to changes in market conditions. These capabilities are deemed strategic in nature, and therefore, will be considered when measuring the impact of strategic IS use element of ISS.

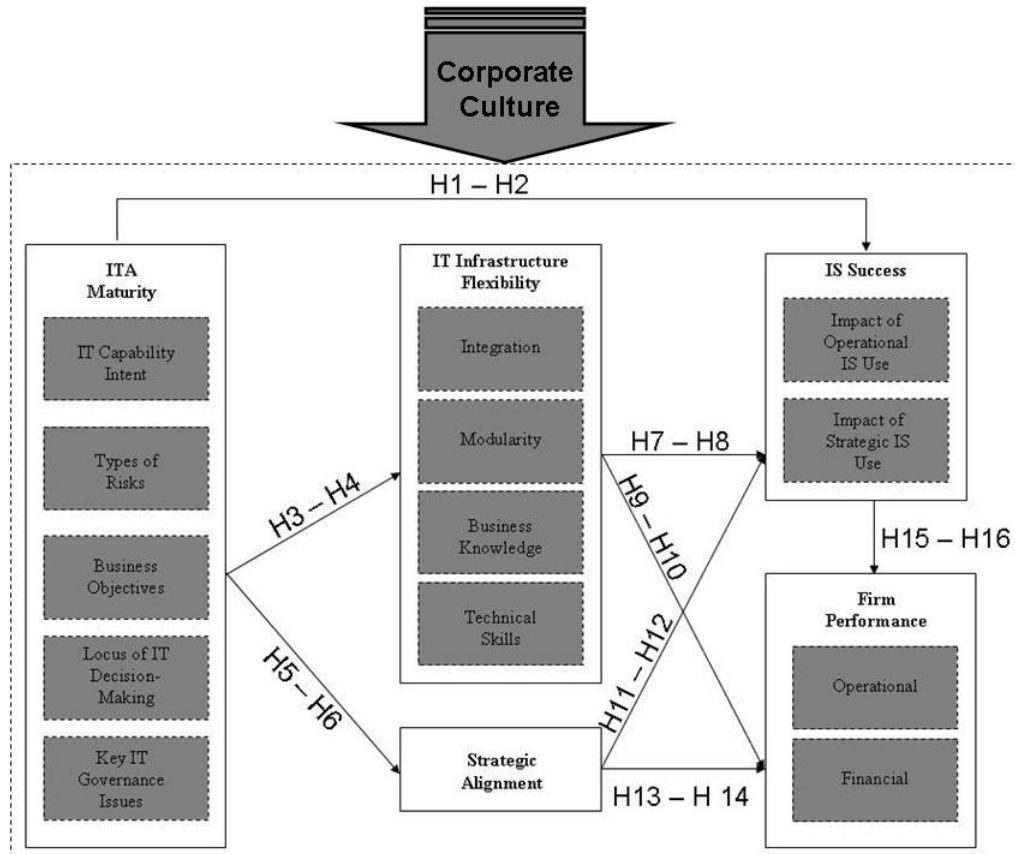
Corporate Cultural Types

Culture is defined as “a system of knowledge, of standards for perceiving, believing, evaluating and acting,” and as a “system of socially transmitted behavior patterns that serve to relate human communities to their ecological settings” (Allaire and Firsirotu 1984). Culture is believed to be based on internally-oriented beliefs concerned with how to manage, and externally-oriented beliefs concerned with how to compete (Davis 1984). The classification of organizations into identifiable corporate cultural types is important for examining issues surrounding varying corporate cultural types and to meaningfully capture the complexity of corporate culture (Quinn and Spreitzer 1991). When classifying organizations into cultural types or when distinguishing between types of organizational culture, two main classifications or cultural types are commonly cited in the organizational culture literature. The first classification, sometimes referred to as entrepreneurial (Eisenhardt and Schoonhoven 1996; Russell 1989), represents organizations with an emphasis on spontaneity, flexibility, and individuality (Cameron and Freeman 1991; Jung 2003; Russell 1989). Entrepreneurial organizations have a culture of being on the leading edge and being first to market. Organizations that fit this cultural type are often viewed as “agents through which a creative new product, process, or service is brought into the marketplace” (Russell 1989). The second classification, sometimes referred to as formal (Russell 1989), represents firms with an emphasis on control, stability, order, and

bureaucracy (Cameron and Freeman 1991; Jung 2003; Russell 1989). Formal firms have a culture of continually demonstrating cost-effectiveness, and being consistently rigid. They also tend to be less entrepreneurial, more bureaucratic, and possess an organizational structure that is more routinized, specialized, and formalized (Russell 1989).

Corporate cultural types are contingencies that have been shown to affect relationships between organizational variables in planning and also in other domains (Hoffman and Klepper 2000; Kampas 2003b; Quinn and Spreitzer 1991). For example, Veliyath and Shortell (1993) studied the difference in strategic planning in entrepreneurial firms and formal firms and found that entrepreneurial firms were better at implementing their planning strategy. Additionally, Quinn and Spreitzer (1991) found that differing corporate cultural types impact individuals' quality of life, which includes their perceptions of managerial, work, and job satisfaction. Cameron and Freeman (1991) found that corporate cultural types affect the effectiveness of organizational change. Corporate cultural types have also been associated with firm performance (Denison 1996; Kampas 2003b). Furthermore, corporate cultural types' influence on the success of new technology has often been overlooked and underestimated (Hoffman and Klepper 2000). As a result of the limited attention given to corporate cultural types' influence on strategic management of IT and the success of new technology, this study will employ corporate culture as a lens to examine the research model depicted in Figure 2.3.

Figure 2.3 Research Model



Development of Hypotheses

ITA Maturity and ISS

The ITA serves as a major catalyst in the prioritization, selection, and management of systems development projects. Prior studies have implied that the maturity of the ITA influences systems success (Doll 1985; Goodhue et al. 1992a; Goodhue et al. 1988; Henderson and Sifonis 1988; Kim and Everest 1994a; Lederer and Sethi 1996; Raghunathan and Raghunathan 1994; Sabherwal 1999). For instance, Doll (1985) reported that organizations with successful information systems were three times more likely to

have and use formal plans for systems development. Sabherwal (1999) reported on a study of 36 companies, where 16 of 18 successful users of IS had formal IT plans. Raghunathan and Raghunathan (1994) found that IT planning success predicted improvement in systems' capabilities. Goodhue et al. (1992a) suggested that an ITA provides a framework of standards for new systems. Furthermore, Goodhue et al. (1992a; 1988) concluded that an ITA can facilitate better management of systems development projects and improved productivity in systems development and maintenance. In addition, it was reported that the process of deploying an ITA leads to an increase in communication between users, developers, and top management (Goodhue et al. 1992a; Sauer and Willocks 2002). The increase in communication in turn leads to increased top management support, facilitates better definition of scope and requirements of systems development projects, and more efficient management and allocation of human and technical resources (Goodhue et al. 1992a; Goodhue et al. 1988; Hagel and Brown 2001; Kim and Everest 1994b). Based on these findings and assertions, the following is posited:

H1: A high level of ITA MATURITY leads to a high level of IS SUCCESS.

Entrepreneurial firms are likely to have decentralized management structures (Greiner 1972; Quinn and Cameron 1983). To get the quick agreements needed to consider new products, services, technologies, and markets constantly in such firms, some guiding force is required to keep entrepreneurial firms operating properly. It seems plausible that in such firms the maturity of an ITA would be extremely important, especially since it can potentially serve as that guiding force.

On the other hand, the management structure is likely to be more centralized in formal firms (Greiner 1972; Quinn and Cameron 1983). Additionally, the product-market mix is relatively simple and structured in these firms. Elements of an ITA are not as likely to be addressed in as much detail, nor is the focus or level of intent of an ITA expected to be comparable to that of entrepreneurial firms for at least two reasons. First, the centralized management in formal firms can make decisions about their stable product-market mix without benefits of an enterprise IT plan because they have probably made very similar decisions in the past. It has been suggested that managers of formal firms may be inclined to take their ITA for granted for this very reason (Veliyath and Shortell 1993). Second, the structured and stable product-market will likely generate essentially the same plans every planning period, except in cases where there are discontinuities in the marketplace, and thus, have very little effect on the firm (Veliyath and Shortell 1993).

The same is probably true of an IT plan in its relationships with IS success when comparing the effects of an ITA in the two different types of organizations. Similar to the empirical findings cited and the arguments above, it seems that the maturity of an ITA would have a greater effect on IS success in entrepreneurial firms because of the innovation and experimental nature of these organizations. Therefore, the following hypothesis is presented:

H2: The strength of the relationship between ITA MATURITY and IS SUCCESS will be substantially greater in entrepreneurial firms than in formal firms.

ITA Maturity and ITIF

An ITA should provide IT capabilities within the firm. Additionally, an ITA should provide firms with the knowledge to utilize and leverage these capabilities in a manner that

would enable the firm to gain and sustain competitive advantage and quickly adapt to changes in technology, their respective organization, their respective industry, and their inter-organizational relationships and alliances (Allen and Boynton 1991; Ross 2003). Firms that do not employ a mature ITA may find it difficult to adapt quickly and appropriately to changes that can occur as a result of shifts in the marketplace or strategic restructurings. It is possible to minimize, if not avoid, this likely inability by implementing and utilizing a mature ITA. Exploiting the usefulness of a mature ITA can potentially curb the occurrence of a quagmire of inflexibility and rigid business processes, as it relates to organizations' independent, mission critical systems and applications (Hagel and Brown 2001; Ross 2003). Therefore, the next hypothesis is as follows:

H3: A high level of ITA MATURITY leads to a high level of IT INFRASTRUCTURE FLEXIBILITY.

The purpose of an ITA is to help firms identify new strategic opportunities and directions, and to position firms to be able to seize the opportunities and move in the appropriate direction at the proper time. The overall purpose, in most cases, will be moderated by the corporate culture exhibited by a firm (Bradley, Pridmore, and Byrd Forthcoming). For instance, when there is a conflict between a firm's strategic intent and its corporate culture, culture will almost always prevail (Kolb and Henchey 2000; Miles and Snow 1994; Tidd, Bessant, and Pavitt 2001). If the intent of the firm is to be flexible, the culture must support it if flexibility is to be achieved. This is not to say that the initiative will be successful if it is supported by the culture, rather, it is to say that the initiative will more than likely fail or be derailed if it is not supported by the culture. Therefore, a firm whose culture fosters the ability and willingness to adapt to change, will be more likely to

achieve flexibility than a firm whose culture defends itself against and resists change (Miles and Snow 1994). Given that entrepreneurial firms are more likely to embrace flexibility than a formal firm is, it is expected that entrepreneurial firms will better plan for flexibility, in this case IT infrastructure flexibility, and, in most cases, have better success in attaining it. Based on these arguments, the following is posited:

H4: The strength of the relationship between ITA MATURITY and IT INFRASTRUCTURE FLEXIBILITY will be substantially greater for entrepreneurial firms than for formal firms.

ITA Maturity and Strategic Alignment

Competitive advantage and sustained competitive advantage continues to be sources of concern for many firms. One means by which this can be accomplished is by the alignment of a firm's IT strategy with its business strategy (Barlow 1990; Burn et al. 1993; Henderson and Venkatraman 1993a; Ives and Learmonth 1984; Kearns and Lederer 2000; Reich and Benbasat 2000; Segars and Grover 1998). The IS literature contains various surveys and reports that list the issue of strategic alignment between IT and organizational objectives as a major concern of IS managers and business executives (Brancheau et al. 1996; Galliers, Merali, and Spearing 1994; Niederman et al. 1991; Reich and Benbasat 2000). However, before such a task can begin, organizations need to have a thorough understanding of their IT objectives and the IT resources (human and technical) at their disposal. This understanding can be facilitated by the implementation and use of a mature ITA. Furthermore, an ITA is believed to position the firm to be able to strategically exploit IT to achieve and sustain competitive advantage. Thus, the following is posited:

H5: A high level of ITA MATURITY leads to a high degree of STRATEGIC ALIGNMENT.

Past research contrasting the outcome of organizational planning in entrepreneurial and formal organizations has shown differences between the two types of firms. Veliyath and Shortell (1993) argued that formal firms would be better at implementing strategic plans than entrepreneurial organizations. They, in addition to Miles and Snow (1978; 1994), reasoned that entrepreneurial firms used an evaluate-act-plan sequence with an emphasis on problem finding rather than problem solving. Veliyath and Shortell (1993) reported that entrepreneurial firms are prone to be ad-hoc and experimental in their plan implementation procedures. Therefore, the planning process is likely to be novel and distinctive each time. Contrary to this position, they maintained that formal firms followed a plan-act-evaluate sequence and were oriented towards problem solving rather than problem finding. They noted that the simple and stable product-market domain present in formal firms would facilitate planning goals that are structured, well defined, and of mutual consent. Veliyath and Shortell (1993) deduced from this logic that the effectiveness of plan implementation is likely to be greater in formal firms than in entrepreneurial firms.

Although Veliyath and Shortell (1993) hypothesized that formal firms would be more effective at implementing their strategic plans than entrepreneurial firms, their empirical test of that hypothesis showed the exact opposite. Based on the results of their analysis, entrepreneurial firms were more effective at implementing their strategic plans than formal firms. Although this was a surprising development in their study, it is not unique when considering planning with respect to these two types of firms. For example, a study conducted by Odom and Boxx (1988) showed that formal organizations emphasize

an informal planning methodology, whereas entrepreneurial organizations emphasize a more sophisticated planning process. Based on these findings the following is posited:

H6: The strength of the relationship between ITA MATURITY and STRATEGIC ALIGNMENT will be substantially greater in entrepreneurial firms than in formal firms.

ITIF and ISS

Choices pertaining to the IT infrastructure can significantly enable or impede business initiatives (Weill et al. 2002). Managers must continually scan the environment, anticipate strategic moves, and assess how the infrastructure must change to enable the firm to adjust to changing market conditions (Tidd et al. 2001; Weill et al. 2002). The goal is to create a unified architecture that is flexible and enables the entire enterprise to adjust with ease.

Implementation of a flexible IT infrastructure is dependent upon collaboration between IT and business leaders within the firm. I previously articulated that ITIF consists of two components, technical and human. Flexibility of the technical component implies that the IT platform will have a high level of system and data integration and will adhere to data standards (Byrd and Turner 2001; Duncan 1995; Goodhue, Wybo, and Kirsch 1992b). It is also believed that the elements of a flexible platform will be interoperable, providing interconnectivity to other systems and compatibility regardless of the platform base (Byrd and Turner 2000; Byrd and Turner 2001; Keen 1991).

Sabherwal (1999) found that an increase in a firm's IT capability leads to an increase in ISS. Similarly, Weill et al. (2002) found that firms with a high-capability infrastructure had a greater level of IS success. Because a key component of a high-capability IT infrastructure is flexibility (Allen and Boynton 1991; Byrd and Turner 2000;

Duncan 1995; Kumar 2004; Monteiro and Macdonald 1996; Sauer and Willocks 2002), I posit the following:

H7: A high level of IT INFRASTRUCTURE FLEXIBILITY leads to a high degree of IS SUCCESS.

Prior research has shown that a strong relationship exists between the corporate culture of an organization and the effectiveness of an organization and its attributes (Cameron and Freeman 1991; Sorensen 2002). For instance, entrepreneurial organizations desire flexibility and innovation, whereas formal organizations stress cost containment and efficiency (Miles and Snow 1994; Sabherwal and Chan 2001; Zahra and Pearce 1990). An entrepreneurial firm may not employ or use technology in the same manner as a firm that is driven by cost efficiency (Bradley et al. Forthcoming; Sabherwal and Chan 2001). It is imperative that firms be able to fully and predictably use and leverage their IT infrastructure to be successful. If, however, shifts in the firm's environment and variations in the efficient utilization of resources occur, the firm can prove to be inflexible and costly to operate (Miles and Snow 1994).

Formal firms focus on economies of scale and pride themselves on cost containment, and thus, are less likely to make frequent changes or investments in IT (Sabherwal and Chan 2001). These types of firms tend to invest in what they consider to be a few cost effective, core technologies. Because formal firms typically have these technologies deeply rooted in their firms, they are able to succeed by being efficient. On the other hand, entrepreneurial firms are driven by flexibility and improvisation, and are innovative in developing new technologies and products (Miles and Snow 1994). As such, I expect entrepreneurial firms to make investments in IT infrastructure that would make it

more flexible (Kumar 2004). Based on these arguments, it is conceivable that the effect of ITIF on IS success will be greater in entrepreneurial firms than in formal firms. Therefore, the following hypothesis is presented:

H8: The strength of the relationship between IT INFRASTRUCTURE FLEXIBILITY and IS SUCCESS will be substantially greater for entrepreneurial firms than formal firms.

ITIF and Firm Performance

In dynamic product markets, there are no specific tangible resources that can provide sustainable competitive advantage (Worren, Moore, and Cardona 2002). However, a superior ability to leverage existing competencies to take advantage of emerging customer needs may lead to temporary advantage (Worren et al. 2002). Such ability is believed to be inherent to an IT infrastructure that facilitates knowledge sharing and reuse, hence a flexible IT infrastructure.

One of the more common capabilities of IT infrastructure cited in the IT literature is flexibility (Allen and Boynton 1991; Byrd and Turner 2000; Duncan 1995; Kumar 2004; Monteiro and Macdonald 1996; Sauer and Willocks 2002). The concept of flexibility broadly denotes firms' abilities to respond to rapidly changing market conditions and customer demands (Sanchez 1995; Worren et al. 2002). In addition to enabling organizations to better adapt to expected changes in their internal and external environments, ITIF is believed to influence firm performance (Byrd and Davidson 2003; Byrd and Turner 2001; Lang 2003; Papp 1999). Therefore, the following is posited:

H9: An increase in IT INFRASTRUCTURE FLEXIBILITY leads to an increase in FIRM PERFORMANCE.

Entrepreneurial firms possess a culture based on responsiveness and innovation. Such firms typically focus on results rather than structured bureaucratic procedures (Miles and Snow 1994). The IS literature suggests a firm that is reluctant to invest in improving the IT infrastructure that supports its strategic initiatives is less productive and profitable than their industry rivals who are not as reluctant (Kettinger, Grover, Subashish, and Segars 1994; Melville, Kraemer, and Gurbaxani 2004). Furthermore, these studies suggest that structural characteristics (technical or cultural) of a firm are important determinants of firm performance. Recalling that entrepreneurial firms invest in a variety of technologies to achieve flexibility and that formal firms are reluctant to invest heavily in a variety of technologies, I posit the following:

H10: The strength of the relationship between IT INFRASTRUCTURE FLEXIBILITY and FIRM PERFORMANCE will be substantially greater for entrepreneurial firms than formal firms.

Strategic Alignment and ISS

The effective and efficient utilization of IT requires the alignment of the IT and business strategies (Luftman et al. 1993). This requires a partnership between the IT function and the business function. The nature of the relationship between IT stakeholders and the rest of the organization is considered a key determinant of IS success (Avital and Vandenbosch 2002). The literature suggests that in order for strategic alignment to occur, managers must coordinate and interconnect IT and business processes from the start (Chan 2002). Researchers assert that when there is mutual understanding of and commitment to IT and business goals, incentives, and approaches, the likelihood of IS success is much higher (Avital and Vandenbosch 2002; Chan et al. 1997b; Reich and Benbasat 1996). In light of these arguments, the following hypothesis is presented:

H11: A high degree of STRATEGIC ALIGNMENT leads to a high degree of IS SUCCESS.

Reich and Benbasat (1996) found that the level of mutual understanding of and commitment to the business and IT agenda was strong in firms where the shared knowledge about the business and IT along with shared beliefs about the importance of IT were the norm. It is conceivable that the effect of strategic alignment on IS success is greater in a firm that embraces a culture of shared domain knowledge. Studies conducted by Miles and Snow (1978; 1994) suggest that formal firms are more centrally planned and managed than entrepreneurial firms. The implication is that a centrally managed firm is more likely to embrace and exhibit characteristics of shared domain knowledge. Thus, I posit the following:

H12: The strength of the relationship between STRATEGIC ALIGNMENT and IS SUCCESS will be substantially greater for formal firms than entrepreneurial firms.

Strategic Alignment and Firm Performance

Proper alignment of IT goals, strategies and objectives with business goals, strategies and objectives is consistently emphasized in the IS and strategy literature (Chan 2002; Chan and Huff 1992; Chan et al. 1997b; Ives and Learmonth 1984; McFarlan 1984; Porter and Millar 1985). This is further evidenced by the number of methodologies developed for the purpose of conducting and improving strategic planning (Segars and Grover 1998). Although there are various methods used to conduct strategic planning, the expected result is, in most cases, the same. Whether strategic planning is conducted for the purpose of identifying opportunities to leverage IT for competitive advantage (Ives and Learmonth 1984; McFarlan 1984; Porter and Millar 1985) or analyzing business processes

and patterns of data throughout the firm (Goodhue et al. 1992a; Zachman 1987), it is expected that the attainment of strategic alignment will improve overall firm performance.

Therefore, the next hypothesis is as follows:

H13: A high degree of STRATEGIC ALIGNMENT leads to a high degree of FIRM PERFORMANCE.

Firms are better able to attain alignment if and when they view it as a fluid process that requires occasional adjustments (Chan 2002). An underlying assumption of this view is that the firm is capable and willing to change and implement change in order to maintain alignment. Formal firms are less likely to change as often as necessary to maintain alignment, as compared to entrepreneurial firms. The distinct difference in behavior suggests that the relationship between strategic alignment and firm performance may vary with the culture exhibited by the firm. Based on this rationale, I posit the following:

H14: The strength of the relationship between STRATEGIC ALIGNMENT and FIRM PERFORMANCE will be substantially greater for entrepreneurial firms than formal firms.

ISS and Firm Performance

Several studies link IS success and firm performance. For instance, Segars and Grover (1998) found that the systems were more likely to be successful if and when the strategic planning is sophisticated. DeLone and McLean (1992), in addition to Seddon (1997; 1994b) cite the dependent variable for IS success as IS USE and NET BENEFITS OF USE, respectively. Bradley et al. argue that it is not the use of IS itself that is the measure of IS success but the implied impact of that use on the organization, and its ensuing impact on firm performance, that is important. These arguments and findings lead to the next hypothesis:

H15: A high level of IS SUCCESS leads to a high level of FIRM PERFORMANCE.

Bradley et al. empirically examined the relationships among constructs in the model of IS success in the context of different corporate cultural types – entrepreneurial and formal. The results of their study provide strong support for the notion that variations in IS success can be partially explained by the culture exhibited by the firm that deployed the systems. Furthermore, the findings of their study suggests that the impact of IS success on performance is greater in firms that exhibit an entrepreneurial corporate culture than those that exhibit a formal corporate culture. The final hypothesis is, therefore, presented as follows:

H16: The strength of the relationship between IS SUCCESS and FIRM PERFORMANCE will be substantially greater for entrepreneurial firms than formal firms.

In this chapter, I reviewed relevant research related to ITA and the elements of the research model. Based on a review of the literature, relationships between the elements of the research model were established. I also developed and presented hypotheses based on these relationships. Table 2.1 contains a complete list of the hypotheses tested in this study. In the next chapter, I provide details about methodology, measures used to assess each construct, and testing of the hypotheses for the current study.

Table 2.1 Summary of Study Hypotheses

H1: A high level of ITA MATURITY leads to a high level of IS SUCCESS.
H2: The strength of the relationship between ITA MATURITY and IS SUCCESS will be substantially greater in entrepreneurial firms than in formal firms.
H3: A high level of ITA MATURITY leads to a high level of IT INFRASTRUCTURE FLEXIBILITY.
H4: The strength of the relationship between ITA MATURITY and IT INFRASTRUCTURE FLEXIBILITY will be substantially greater for entrepreneurial firms than for formal firms.
H5: A high level of ITA MATURITY leads to a high degree of STRATEGIC ALIGNMENT.
H6: The strength of the relationship between ITA MATURITY and STRATEGIC ALIGNMENT will be substantially greater in entrepreneurial firms than in formal firms.
H7: A high level of IT INFRASTRUCTURE FLEXIBILITY leads to a high degree of IS SUCCESS.
H8: The strength of the relationship between IT INFRASTRUCTURE FLEXIBILITY and IS SUCCESS will be substantially greater for entrepreneurial firms than formal firms.
H9: An increase in IT INFRASTRUCTURE FLEXIBILITY leads to an increase in FIRM PERFORMANCE.
H10: The strength of the relationship between IT INFRASTRUCTURE FLEXIBILITY and FIRM PERFORMANCE will be substantially greater for entrepreneurial firms than formal firms.
H11: A high degree of STRATEGIC ALIGNMENT leads to a high degree of IS SUCCESS.
H12: The strength of the relationship between STRATEGIC ALIGNMENT and IS SUCCESS will be substantially greater for formal firms than entrepreneurial firms.
H13: A high degree of STRATEGIC ALIGNMENT leads to a high degree of FIRM PERFORMANCE.
H14: The strength of the relationship between STRATEGIC ALIGNMENT and FIRM PERFORMANCE will be substantially greater for entrepreneurial firms than formal firms.
H15: A high level of IS SUCCESS leads to a high level of FIRM PERFORMANCE.
H16: The strength of the relationship between IS SUCCESS and FIRM PERFORMANCE will be substantially greater for entrepreneurial firms than formal firms.

CHAPTER 3: RESEARCH METHODOLOGY

Context

In the two previous chapters, I presented and discussed several IT and organization factors, thus solidifying the focus and intent of this study. The factors of ITA maturity, ITIF, and strategic alignment frame the context from which the strategic value of enterprise architecture is examined in this study - the effect of ITA maturity on IS success and firm performance. First, the direct effect of ITA maturity on IS success is examined. Next, I analyze the effect of ITA maturity on IT resources, ITIF and strategic alignment, and their ensuing effect on both IS success and firm performance. Lastly, I assess the nature of the relationships between all of the abovementioned factors in the context of two corporate cultural types, entrepreneurial and formal.

Research Domain and Participants

Research Domain

Questionnaire-based data was collected from healthcare organizations in the United States (US). This particular industry was selected for several reasons. First, the healthcare industry is the largest, single industry worldwide. Second, healthcare significantly lags behind other industries in the utilization of IT (Hutton 2003). Third, the US healthcare

industry continues to experience major transformations in its application of IT (Al-Nashmi 2003; Wilson and Lankton 2004).

The population of interest is 2337 US hospitals, as identified in the 2006 Health Information and Management Systems Society (HIMSS) Analytics Database. These hospitals represent a broad spectrum of diversity, size, geographic reach, and comprehensiveness of patient care. The population was determined by identifying hospitals, both independent hospitals and hospitals that are part of a conglomerate, that have a CIO or IT Director at the hospital level. I further reduced the target population by eliminating hospitals that had the same CIO. For example, if four hospitals in the target population had the same CIO listed, even if the CIO was at the hospital level, I eliminated all four hospitals from the population.

I took this approach of reducing the population for several reasons. First, I took this approach to minimize the risk of the CIO reporting the same data for multiple hospitals, thus affecting the variance of the data reported. Second, I hoped to reduce the chance that the CIO would inadvertently report the wrong information for a hospital. Third, I took this approach to avoid deceptively inflating the study's response rate by having one individual complete the same survey for multiple hospitals.

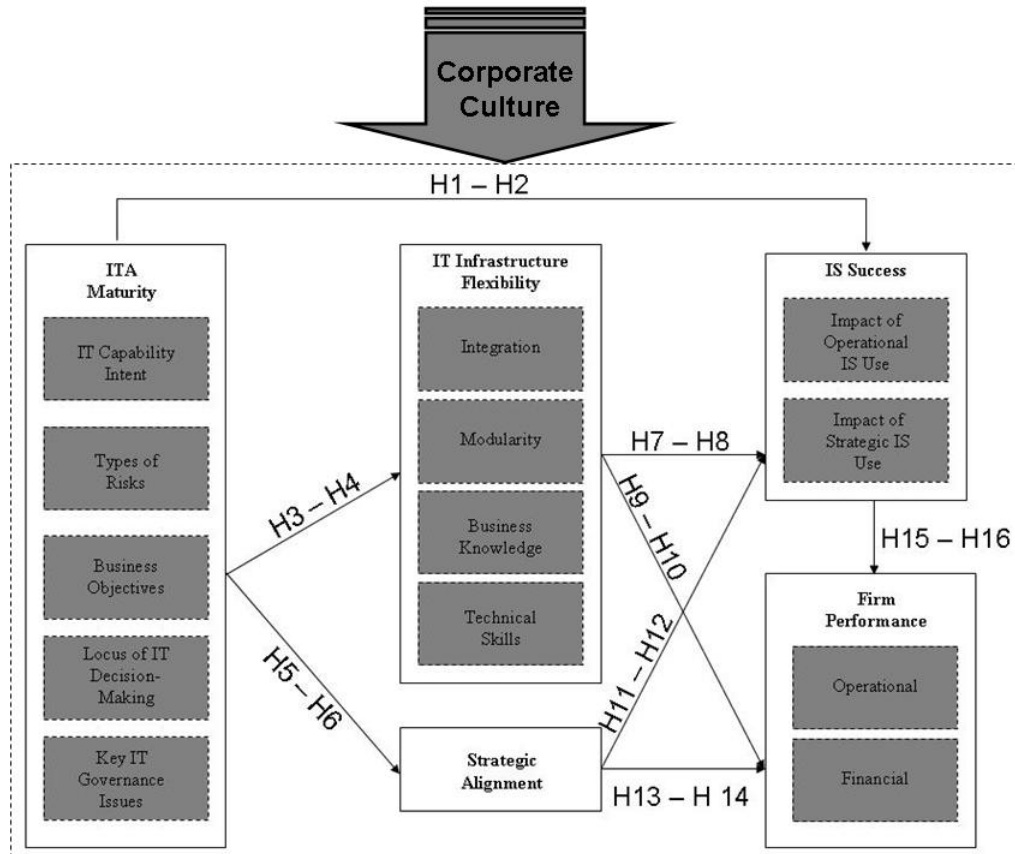
After identifying the study's population, I used the hospitals' profit status to divide the data into two strata, for-profit and not-for-profit. I then generated random numbers for the hospitals in each stratum and sorted the data in ascending order. While maintaining consistency between the sample and population, relative to the ratio of not-for-profit to for-

profit hospitals, I proceeded to choose 1000 hospitals from the population. The 1000 hospitals chosen serve as the targeted sample for the current study.

Participants

Due to the nature of this study, I employed a multiple respondent research technique when collecting the data. Because of the tendency for wide variations in responses between members of the same team, it is suggested that the use of multiple respondents provides for more reliable conclusions and implications than that of single respondents (Bowman and Ambrosini 1997; Pinsonneault and Kraemer 1993). Additionally, due to the nature of this study, it is necessary to have multiple respondents "because people function in different roles, at different levels of the hierarchy and, consequently, have differing experiences and perceptions" of the phenomena studied (Pinsonneault and Kraemer 1993, p. 84). Therefore, depending on the objective of a particular measurement instrument, I targeted the CIO (or IT Director if no CIO is present) or the IT Manager in each hospital.

Figure 3.1 Research Model



Research Model and Measurement Instruments

Research Model

As previously explained, this study assesses the strategic value of ITA in hospitals. The assessment is operationalized by examining the effect of ITA maturity on the realization of IT resources, ITIF and strategic alignment, and their corresponding effects on IS success and firm performance. Figure 3.1 is an illustration of the underlying research model.

Measurement Instruments

The model contains six constructs: (1) factors of ITA maturity, (2) factors of ITIF, (3) strategic alignment, (4) factors of IS success, (5) factors of firm performance, and (6) corporate culture. Each of these constructs were developed based on prior studies in the IS and organizational behavior literature (see Table 3.1 for summary). Furthermore, all of the constructs are measured using multi-item scales, with the exception of firm performance, which is based on data from secondary sources, and are comprised of measurable indicators.

Items to Measure ITA Maturity

Ross (2003) developed a framework for the maturation of an ITA. The framework consists of four architectural stages whose characteristics include IT capability intent, business case for IT, locus of IT decision-making, and key IT governance initiatives. I developed items to capture the essence of these characteristics. Additionally, I adapted items from the several studies pertaining to technical and social risks of IT projects (Jiang et al. 2001; Wallace et al. 2004). The items I adapted from the two studies make up the last characteristic, risk mitigation, used in this study to measure ITA maturity. The items used to assess the factors of ITA maturity were all measured on a seven-point Likert scale, with the exception of the locus of IT decision-making factor. The locus of IT decision-making factor is comprised of three questions related to three primary of areas of IT decision-making. Those areas are (1) who defines IT applications, (2) who defines IT personnel requirements, and (3) who defines hardware/software requirements. Respondents were given six predefined choices and a seventh option labeled "other."

Items to Measure ITIF

Duncan (1995) developed a framework for capturing the flexibility of an organization's IT infrastructure. Byrd and Turner (2000; 2001) later developed and refined and ITIF instrument based on Duncan's work. The items used to measure ITIF in this study were modified to eliminate indicators used in Byrd and Turner's previous studies that had weak loadings. As a result, four sets of questions are present in the study that relate to the technical and human components of IT infrastructure. One set of questions related to the technical component measures the level of integration in a firm. The second set of questions related to the technical component measures the modularity of the IT infrastructure. For example, these questions include items pertaining to a firm's ability to reuse software modules and its ability to add functionality to mission critical applications quickly. Questions related to the human component of IT infrastructure pertain to the flexibility and expansiveness of the IT personnel technical skills and knowledge of the firm's business domain and environment. The items used to assess ITIF were all measured on a seven-point Likert scale.

Items to Measure Strategic Alignment

Items to measure to strategic alignment were derived from Chan's (2002) study on the importance of the informal organizational structure. The items chosen were based her assessment of the preconditions of IS strategic alignment in the best performing companies (relative to her case studies in eight firms). The items chosen from Chan's study are the result of a series of modifications by other researchers (Chan et al. 1997b; Henderson and

Venkatraman 1993a; Luftman 2000; Reich and Benbasat 2000). The items used to assess strategic alignment were measured on a seven-point Likert scale.

Items to Measure IS Success

The DeLone and McLean (1992) model of IS success is especially significant in this study because it provides an opportunity to examine intermediate IS impacts (Barua, Kriebel, and Mukhopadhyay 1995; Bradley et al. Forthcoming; Brandyberry, Rai, and White 1999; Rai, Patnayakuni, and Patnayakuni 1996; Rai, Patnayakuni, and Patnayakuni 1997). Barua et al. (1995) noted that the value or success of IS could best be identified through a “web of intermediate level contributions” (p. 6). With this approach, IS effects are analyzed at lower levels in the firm instead of at an aggregate level as in Brynjolfsson and Hitt (1996).

One difficulty in the DeLone and McLean model of IS success, cited by Seddon (1997), is the multi-faceted meaning of IS use (e.g. benefits from use, future IS use, impact of use). I have chosen the impact of IS use. With this designation, it is not the use of IS itself that is the measure of IS success but the implied impact of that use on the organization that is important (Seddon 1997).

I separate the impact of IS use into two levels: strategic and operational. The impact of IS use at the strategic level focuses on overall organizational goals, such as market responsiveness, strategic agility, and external relationship management (Bradley et al. Forthcoming; Wade and Hulland 2004; Weill 1992). The impact of IS use at the operational level focuses on directing resource use and the performance of tasks to yield

labor productivity and efficiency (Bradley et al. Forthcoming; Wade and Hulland 2004; Weill 1992). The indicators of each factor were measured on a seven-point Likert scale.

Items to Measure Firm Performance

The indicators of firm performance used in the current study are objective in nature. The objective measures of firm performance are divided into two categories, operational performance and financial performance. The data use to compute the operational and financial measures were obtained from two secondary data sources, the HIMSS Analytics Database and the American Hospital Directory.

Measures of operational performance include adjusted patient days, average length of patient stay, and outpatient visits. Measures of financial performance include operating revenue (net patient revenue) and adjusted operating expense (total operating expense/staffed beds). These measures of operational and financial performance are commonly used as indicators of the financial health and efficiency of healthcare organizations (Clement, McCue, Luke, Bramble, Rossiter, Ozcan, and Pai 1997; Mobley and Magnussen 1998).

Items to Measure Corporate Culture

Two main classifications of culture are commonly cited in the organizational culture literature. The first classification, sometimes referred to as entrepreneurial (Eisenhardt and Schoonhoven 1996; Russell 1989), represents organizations with an emphasis on spontaneity, flexibility, and individuality (Cameron and Freeman 1991; Jung 2003; Russell 1989). The second classification, sometimes referred to as formal (Russell

1989), represents organizations with an emphasis on control, stability, order, and bureaucracy (Cameron and Freeman 1991; Jung 2003; Russell 1989). Corporate culture has been shown to affect the relationships between organizational variables, including those in IT (Hoffman and Klepper 2000; Kampas 2003a; Quinn and Spreitzer 1991).

The items used to assess the corporate culture exhibited by a firm were derived from Quinn and Spreitzer's (1991) psychometric analysis of the competing values culture instrument. Eight questions were selected from Quinn and Spreitzer's developmental and hierarchical constructs. The developmental construct pertains to the behavioral characteristics of the organization and its leader, whereas the hierarchical construct pertains to the governance of the organization. The questions from these two constructs were chosen because they more closely reflect the contextualization of corporate culture in the current study. Furthermore, the instrument from which the questions were derived was also served as a refinement of the work of other scholars in the area of corporate culture (Cameron and Freeman 1991; Denison 1996; Denison and Mishra 1995; Zammuto and O'Connor 1992). One major deviation from the measures outlined in Quinn and Spreitzer's study is the switch from ipsative measures to measures on a seven-point Likert scale.

Table 3.1 Theoretical Foundation for Construct and Factors Measured

Construct/Factor	Items	Literature Support	Survey	
<u>ITA Maturity</u>	(30)	(Ross 2003)	Q1	
• IT Capability Intent	4			
• Business Case for IT	5			
• Locus of IT Decision-Making	3			(Brown and Grant 2005; Ross 2003; Sambamurthy and Zmud 1999)
• Key IT Governance Initiatives	10			(Brown and Grant 2005; Ross 2003; Sambamurthy and Zmud 1999)
• Risk Mitigation	8	(Jiang et al. 2001; Wallace et al. 2004)		
<u>Strategic Alignment</u>	(7)	(Chan 2002)		
<u>IS Success</u>	(11)	(Bradley et al. Forthcoming; DeLone and McLean 1992; Wade and Hulland 2004; Weill 1992)		
• Impact of Operational IS Use	3			
• Impact of Strategic IS Use	8			
<u>Corporate Culture</u>	(8)	(Quinn and Spreitzer 1991)		
<u>ITIF</u>	(24)	(Byrd and Turner 2000)	Q2	
• Integration	9			
• Modularity	4			
• Technical Skills	4			
• Business Knowledge	7			
<u>Firm Performance</u>	(5)	(Clement et al. 1997; Mobley and Magnussen 1998)	N/A	
• Operational/Clinical	3			
• Financial	2			

Procedures

To conduct this study, I developed two measurement instruments, Q1 and Q2. Each instrument targeted a different respondent based upon the individual most familiar with the given constructs of interest in the instrument (see Table 3.2). For instance, Q1 included measures for four of the six constructs (ITA maturity, strategic alignment, IS success, and corporate culture). CIOs were asked to complete Q1 because they are the most appropriate individuals to answer questions related to IT strategic initiatives and IT-enabled performance. Q2 contained measures for the ITIF construct. IT managers were asked to complete Q2 for two reasons. First, IT managers are more inclined to be familiar with and responsible for the day-to-day operations of the IT unit and personnel. Second, IT managers are the most appropriate individuals to respond to questions related to the ITIF construct because of their understanding of the management and flexibility of the technical and human components of the IT infrastructure. Copies of Questionnaire 1, the CIO survey, and Questionnaire 2, the IT manager survey, can be found in Appendix A and Appendix B, respectively.

Table 3.2 Targeted Respondents for Measurement Instruments

Construct Measured	Targeted Respondent/Data Source
ITA Maturity	CIO
Strategic Alignment	
IS Success	
Corporate Culture	
ITIF	IT Manager
Firm Performance	<i>HIMSS Analytics Database</i> <i>American Hospital Directory</i>

Preliminary Testing

Prior to starting the data collection process, 14 CIOs, three academicians knowledgeable about IT and strategic planning in healthcare organizations, and an expert in the area of ITA reviewed Q1 and Q2 for understandability of the questions being asked, clarity of the questions, consistency of the terminology used in the questions with that used in industry. After several rounds of this process, the questions were deemed clear and understandable and the terminology was deemed consistent with that used in industry. Lastly, there was a consensus among the participating CIOs that they, as well as their counterparts, would prefer to receive the surveys in a Web-based format rather than the traditional paper-based format. As a result, the surveys were Web-based and, therefore, were distributed and collected electronically.

Statistical Analysis

Partial least squares (PLS), a latent structural equation modeling (SEM) technique, is the primary methodology employed to test the hypothesized relationships in this study. PLS has been used in many studies and it has consistently been cited for its robustness in conducting causal-predictive analysis and its ability to handle deviations from normality (Argawal and Karahanna 2000; Chin, Marcolin, and Newsted 1996; Majchrzak, Beath, Lim, and Chin 2005; Pavlou 2006). PLS is a second-generation path analysis technique that utilizes a correlational, principal component-based approach to estimation (Majchrzak et al. 2005). PLS is also recommended above ANOVA and regression, especially in research situations involving moderator analysis (Chin, Marcolin, and Newsted 2003). Regression typically utilizes interaction terms to conduct moderator analysis. PLS allows for

subsequent assessment of this error, thereby providing more accurate estimates of the interaction effects (Chin et al. 2003).

I also use k-means cluster analysis, a non-hierarchical clustering technique, to classify the organizations surveyed in a way that would meaningfully capture the complexity of their organizational culture. Cluster analysis is a popular classification methodology used in this stream of research (Ketchen and Shook 1995). Cluster analysis takes a sample of elements and groups them in a way that minimizes the statistical variance among elements. Specifically, cluster analysis permits the inclusion of multiple variables as sources for classification; therefore, cluster analysis provides a very rich description without over specifying the model (Ketchen and Shook 1995).

Summary

In addition to outlining the procedures and methodology used in the current study, I discussed the structure of the questionnaires used and the targeted respondents for each questionnaire. I also provided a discussion of the items that make-up the first-order and second-order factors in the research model. Lastly, I provided an explanation of the primary and secondary statistical techniques used to test the hypotheses presented in Chapter 2.

CHAPTER 4: ANALYSES AND RESULTS

In Chapter 3, I identified the procedures, methodology, and statistical techniques used in this study. Thus this chapter, Chapter 4, serves to explain the data collection, the data analysis, and the results of the analyses. The discussions in this chapter are presented in three sections. This first section explains the data collection procedures and discusses the general characteristics of the data and its respondents. The second section provides the results of statistical tests performed to verify validity and reliability of the data and its instruments. Finally, the third section presents the final analysis of the data and the models under investigation, testing the significance of the hypothesized paths.

Data Collection

Survey Administration

I obtained contact information for individuals identified as CIOs from the HIMSS Analytics Database. Request for participation in the study and instructions for completing the surveys were sent via e-mail to CIOs of the hospitals in the targeted sample pool (see Appendix C for a copy of the e-mail information sheet). The e-mail included an explanation of the study, its purpose, its anticipated contribution, and a link to the sponsor letter from HIMSS Analytics CEO, Dave Garets (see Appendix D for a copy of the sponsor letter). The e-mail also provided assurance of confidentiality and a declaration that neither names of participants nor names of associated hospitals would be included in any current or

future manuscripts or oral presentations. Links to the electronic surveys were included in the e-mail so that interested participants could complete the surveys at their chosen time and place. Finally, as an incentive to participate in the study, I offered a complimentary copy of the summarized results of the study to all participants.

As indicated in Chapter 3, I asked the CIO to complete Q1 and forward the link for Q2 to the IT Director. In the event that the IT Director and CIO were one in the same, this individual was instructed to forward the link for Q2 to an IT Manager that was knowledgeable about the day-to-day operations of the IT unit and the skills of the IT personnel. The IT Manager chosen was also supposed to be knowledgeable about the technical skill set and business knowledge of the IT personnel.

To increase the study's response rate, I sent two follow-up emails over a period of seven weeks. I sent the first follow-up email two weeks after the initial request for participation. The second, and final, follow-up email was sent four weeks after the first follow-up email was sent. Copies of the first and second follow-up emails are in Appendix E and Appendix F, respectively.

I received 243 responses out of the 1000 CIOs contacted, resulting in a response rate of 24.3 percent. Out of the 243 responses, I discarded six because they were improperly completed. Two Hundred Thirty-Seven useable surveys remained after the discard. I was able to match the data for 78 hospitals from the two sets of surveys. The 78 matched surveys served as the sample for the current study. Table 4.1 contains demographics and descriptive statistics of the organizations that returned surveys.

The breakdown of not-for-profit (NFP) and for-profit (FP) organizations that returned both surveys was 84.6% and 15.4%, respectively. The ratio of NFP to FP organizations in this study is comparable to the general population, which is 82% NFP and 18% FP. The relative comparability between the sample and the population makes it more likely that the results derived from the current study are generalizable to the population. Furthermore, the hospitals in this study, on average, have 822 non-IT full-time equivalents (FTE), 35 IT FTE, 151 staffed beds, and net operating revenues of \$121.72 million. These numbers indicate that the hospitals in the sample are of sufficient size to assess the relationships between the factors in the research model.

Table 4.1 Descriptive Statistics and Demographics of Responding Organizations

Demographic		Overall		
Full Time Equivalents	Non-IT	1 to 500	47.3%	
		501 to 1000	21.6%	
		1001+	31.1%	
	Average Non IT		822.4	
	IT	0 to 25	76.9%	
		26 to 100	15.4%	
		101+	7.7%	
Average IT		98.3		
Profit Status	Not-For-Profit		84.6%	
	For Profit		15.4%	
#Staffed Beds	1 to 100		45.3%	
	101 to 200		29.4%	
	201+		25.3%	
Net Operating Revenue (in millions)	\$1 to \$45		40.5%	
	\$46 to \$100		25.7%	
	\$101+		33.8%	
	Avg. Net Operating Revenue (in millions)		\$121.72	

In addition, 92% of the individuals who completed Q1 report to a member of the executive team. This suggests that these individuals have some knowledgeable of the strategic initiatives of the organization and the IT unit, and are appropriate to answer questions pertaining to such things. The breakdown of the reporting status of CIOs is provided in Table 4.2. The percentages in Table 4.2 are indicative of the fact that CIOs overwhelmingly report to CFOs, as compared to other members of the executive team.

Table 4.2 CIO Reporting Structure

Position	Percentage
CEO	32.5%
CFO	55.7%
COO	3.9%
Other	7.9%

Data Analyses

I modeled each multi-item construct as reflective (vs. formative) of the latent variable (Chin 1998a). There is a significant difference between constructs made up of reflective indicators and those made up of formative indicators. Reflective indicators are expected to be correlated and dropping an indicator does not alter the meaning of the construct, whereas this line of reasoning is not true for formative indicators (Jarvis, Mackenzie, and Podsakoff 2003). All of the items for first-order constructs in the research model easily meet this criterion.

Limiting my model to no more than five structural paths to any one construct allowed me to meet Chin's (1998a; 1998b) sample size recommendation of 5 to 10 times

the largest number of structural paths to any one construct (assuming the construct is measured with reflective indicators). The second-order factor, ITIF, was also constructed as a principal factor with reflective indicators of first-order constructs integration, modularity, technical skills/domain knowledge, and business knowledge. Representing ITIF in this manner is akin to its representation in prior studies (Byrd and Turner 2000; Byrd and Turner 2001).

Measurement Model

Reliability and Validity

To assess factorial validity, I first examined the convergent validity of each first-order construct. Convergent validity is demonstrated when a construct's item loadings are significant at $p < .05$. The first-order constructs in the research model demonstrated convergent validity, as all item loadings were significant at $p < .05$.

Cronbach's alpha and composite reliability estimates for the multiple item scale are reported in Table 4.3. Reliability estimates for each construct, with the exception of locus of IT decision-making, exceeds the minimum acceptable level of .70 recommended in prior studies (Nunnally and Bernstein 1994). I dropped locus of IT decision-making from the research model, due to its lack of reliability and internal consistency, and it is, therefore, not included in Table 4.3.

I used the measure of average variance extracted (AVE) to assess discriminant validity. All first-order constructs, with the exception of business case for IT (.47), risk (.45), and integration (.44), were above the recommended threshold of .50 (Chin et al. 2003; Chin 1998b). I compared the square root of the AVE of each construct to the inter-

construct correlations. Table 4.4 contains the inter-construct correlations and the square root of the AVE for each first-order construct. The square root of the AVE for each construct was greater than their respective inter-construct correlations with the exception of the correlation between IT governance and strategic alignment. This result indicates that all of the constructs are independent of each other, and, therefore, are distinct measures (Chin 1998b; Gefen and Straub 2005; Gefen, Straub, and Boudreau 2000).

Table 4.3 Reliability Estimates

Construct (# of items)	Cronbach's Alpha	Composite Reliability
ITCAP (4)	.79	.87
RISK (8)	.84	.86
BCIT (5)	.70	.81
ITGV (10)	.90	.91
SA (7)	.86	.90
INTG (9)	.84	.88
MOD (2)	.71	.87
TS (4)	.78	.86
BK (7)	.93	.95
SIU (8)	.85	.89
OIU (2)	.86	.90

Legend:

ITCAP: IT Capability Intent; **RISK:** Risk Mitigation;
BCIT: Business Case for IT; **ITGV:** Key IT Governance Initiatives;
SA: Strategic Alignment; **INTG:** Integration; **MOD:** Modularity;
TS: Technical Skills/Domain; **BK:** Business Knowledge;
SIU: Strategic Impact of IS Use; **OIU:** Operational Impact of IS Use

Table 4.4 Inter-Construct Correlations

Construct (# of items)	ITCAP	RISK	BCIT	ITGV	SA	INTG	MOD	TS	BK	SIU	OIU
ITCAP	.79										
RISK	.29	.67									
BCIT	.25	.28	.69								
ITGV	.30	.64	.38	.71							
SA	.22	.66	.45	.79	.75						
INTG	.32	.21	.18	.40	.30	.66					
MOD	-.27	-.13	-.33	-.33	-.13	-.63	.88				
TS	.34	.18	.22	.32	.19	.62	-.50	.79			
BK	.13	.04	.12	.17	.08	.41	-.42	.55	.85		
SIU	.28	.49	.53	.63	.62	.33	-.34	.31	.23	.71	
OIU	.13	.36	.32	.55	.63	.50	-.22	.21	.08	.43	.91

Legend:

ITCAP: IT Capability Intent; **RISK:** Risk Mitigation; **BCIT:** Business Case for IT;
ITGV: Key IT Governance Initiatives; **SA:** Strategic Alignment; **INTG:** Integration;
MOD: Modularity; **TS:** Technical Skills/Domain; **BK:** Business Knowledge;
SIU: Strategic Impact of IS Use; **OIU:** Operational Impact of IS Use

Cluster Analysis Results

The items used in the cluster analysis to distinguish entrepreneurial and formal firms were derived from Quinn and Spreitzer's (Quinn and Spreitzer 1991) model of corporate cultural types, the so-called competing values model. I performed hierarchical clustering on the eight items used to assess the culture exhibited by the firms to determine the number of clusters. The results of hierarchical clustering indicated that the items should result in two clusters. I performed K-means cluster analysis, using SAS, to classify the organizations into two clusters. Firms classified as entrepreneurial had high values on entrepreneurial items and low values on formal items. Firms classified as formal had high values on formal items and low values on entrepreneurial items. As presented in Table 4.5,

the number of organizations in each cluster was as follows: Cluster 1 (N=47) fit the profile of entrepreneurial; Cluster 2 (N=24) fit the profile of formal. SAS discarded and did not classify seven observations because the data for the eight items were either incomplete or missing.

Table 4.5 Cluster Analysis Results

	Cluster 1 (Entrepreneurial) N=47	Cluster 2 (Formal) N=24
Item	Mean (1-Strongly Disagree...7-Strongly Agree)	
My firm is a very dynamic and entrepreneurial place.	4.89	3.29
Your firm is a very formal and structured place.	4.28	4.65
My firm's CEO is an innovator or risk taker.	5.37	3.25
My firm's CEO is a coordinator or organizer who avoids taking risks.	2.69	5.0
The glue that holds your firm together is commitment to innovation and development.	4.61	3.29
The glue that holds your firm together is formal rules and policies.	3.82	4.63
My firm emphasizes growth and the acquisition of new resources.	4.65	3.08
My firm emphasizes permanence and stability.	4.7	5.43

Control Variables

The control variables used in this were non-IT FTE, IT FTE, number of staffed beds, and profit status of the firm. The non-IT FTE and staffed beds variables were chosen as proxies for the size of the firm. The IT FTE variable was chosen as a proxy for the size

of the IT unit. Additionally, the profit status variable was chosen to account for differences in profit motives among firms. These variables have been used consistently in prior studies related IT strategic planning and implementation and healthcare informatics (Bradley et al. Forthcoming; Byrd and Davidson 2003; Liang, Xue, Byrd, and Rainer 2004). The effects of all control variables on the latent variables in the research model were tested. I found none of the effects to be significant; therefore, the control variables were dropped from the research model.

Structural Model

The combined research model and the research models for entrepreneurial and formal organizations were tested using PLS-Graph (version 3.00, build 1060), a path modeling tool that is well-cited for highly complex predictive path models (Chin 1998a; Chin 1998b). PLS-Graph has several strengths that make it appropriate for this study, including its ability to accommodate models in which the ratio of observations to indicators is considered too low for traditional covariance-based SEM packages such as LISREL and AMOS. I used the bootstrap resampling technique with 1000 samples to estimate the significance of the path coefficients. Furthermore, I used multigroup analysis² to test the

² Because this method is not automated in PLS-Graph, the following was used to approximate the t-distribution with m+n-2 degrees of freedom, where m and n are the number of observations in sample_1 and sample_2, respectively:

$$t = \frac{Path_{sample_1} - Path_{sample_2}}{\left[\sqrt{\frac{(m-1)^2}{(m+n-2)} * S.E.^2_{sample_1} + \frac{(n-1)^2}{(m+n-2)} * S.E.^2_{sample_2}} \right] * \left[\sqrt{\frac{1}{m} + \frac{1}{n}} \right]}$$

For more information see Chin (2000).

hypotheses pertaining to differences in structural relationships between constructs across corporate cultural types. The multigroup analysis method of model comparison has been used in other studies that made use of path analysis and SEM (Chin 2000; Grace and Pugesek 1998; Lavee and Ben-Ari 2003).

I analyzed the research model using three data sets in this study. The first analysis tested the combined research model (see Figure 4.1), which consisted of the full dataset of 78 matched pairs (see Figure 4.1). The second analysis tested the research model in the context of organizations classified as entrepreneurial (see Figure 4.2), which consisted of a dataset of 47 matched pairs. The third analysis tested the research model in the context of organizations classified as formal (see Figure 4.3), which consisted of a dataset of 24 matched pairs. I present the results of the hypothesis testing in subsequent sections.

Results of Hypothesis Testing

Due to the complexity of the research model, I will present the results of the research model in sections by hypothesis. Each section and the corresponding figures will include only the constructs that are the focus of a particular hypothesis. I summarize the results of the study at the conclusion of this chapter.

Figure 4.1 Combined Model Results

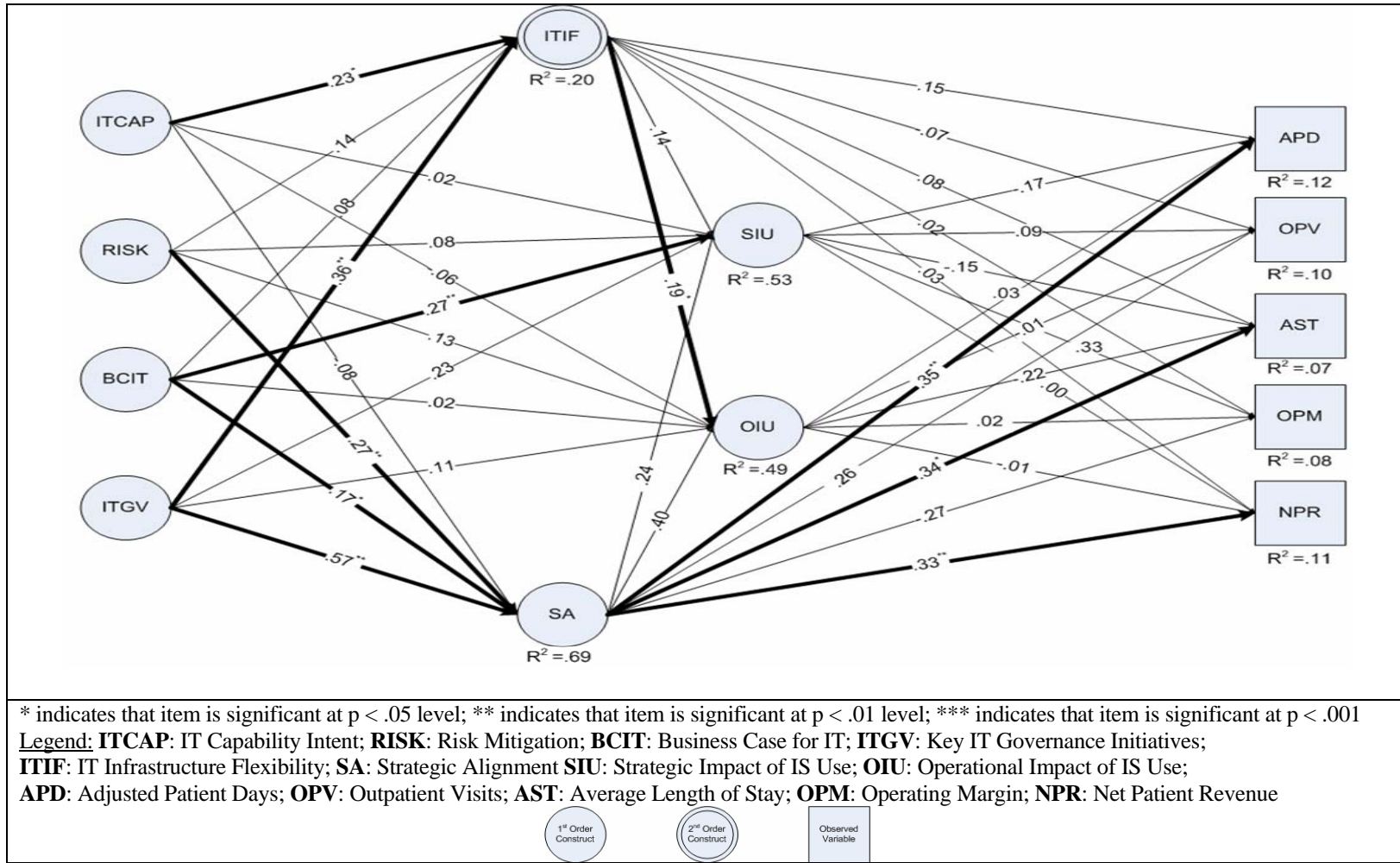


Figure 4.2 Model Results for Entrepreneurial Organizations

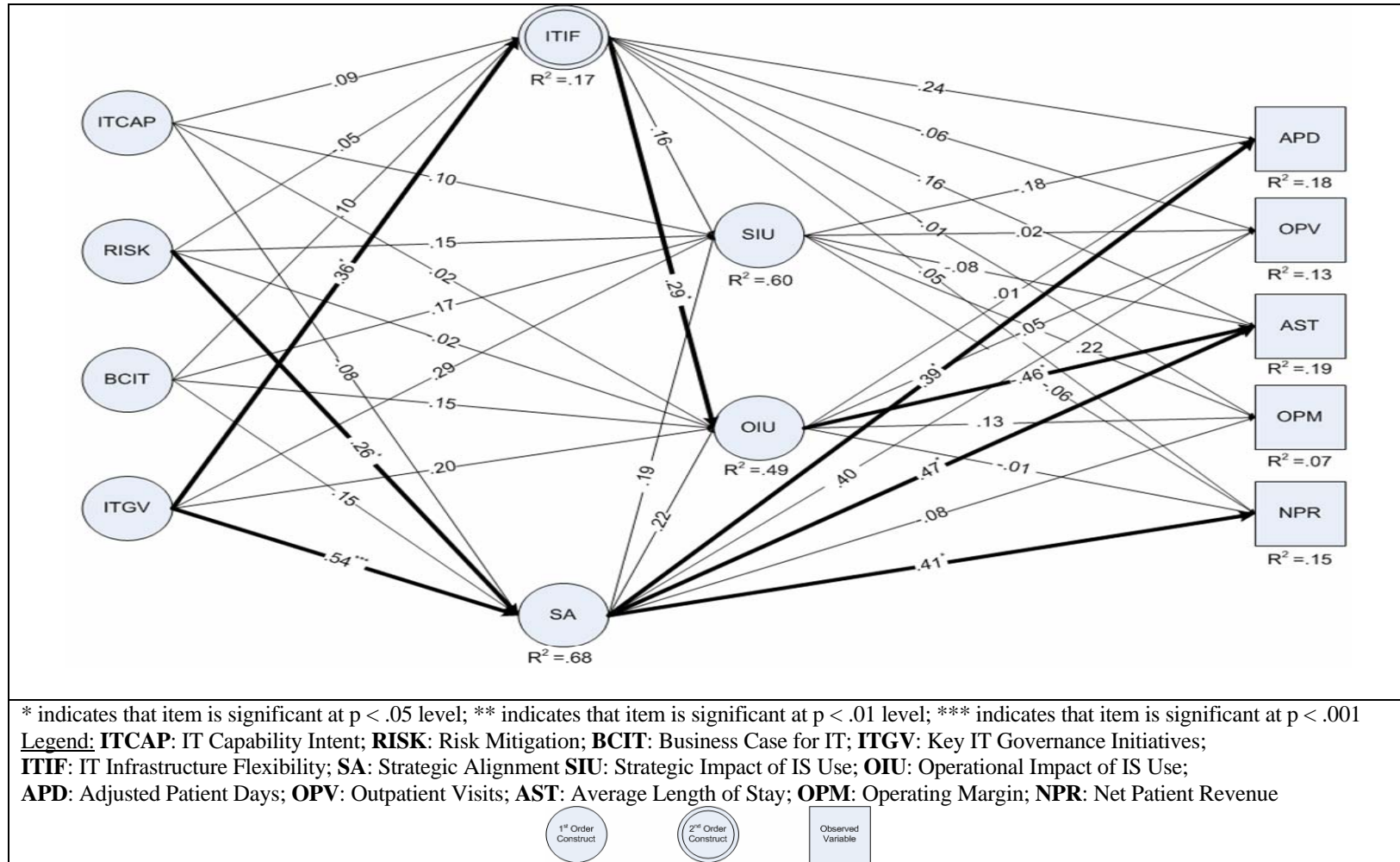
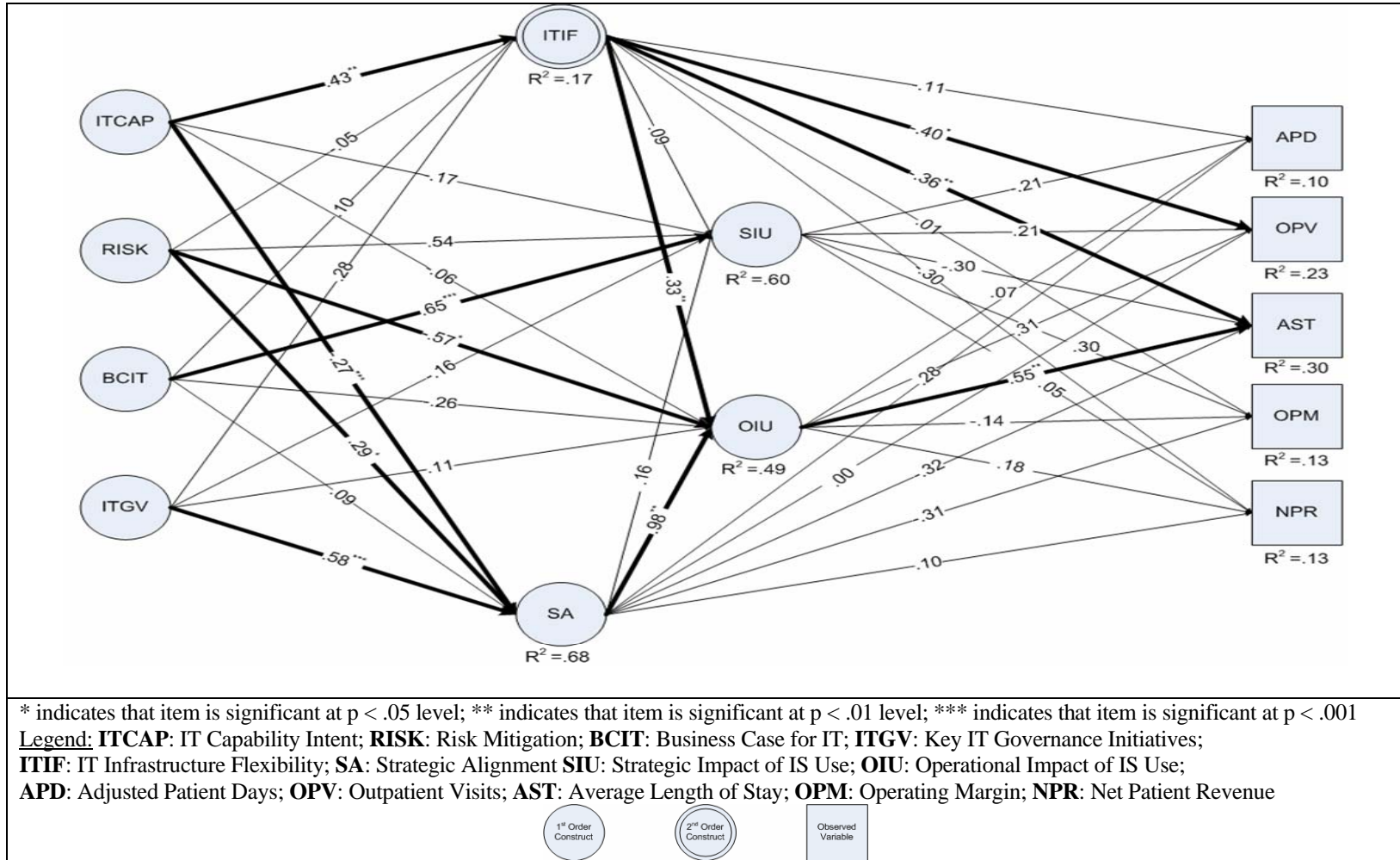


Figure 4.3 Model Results for Formal Organizations

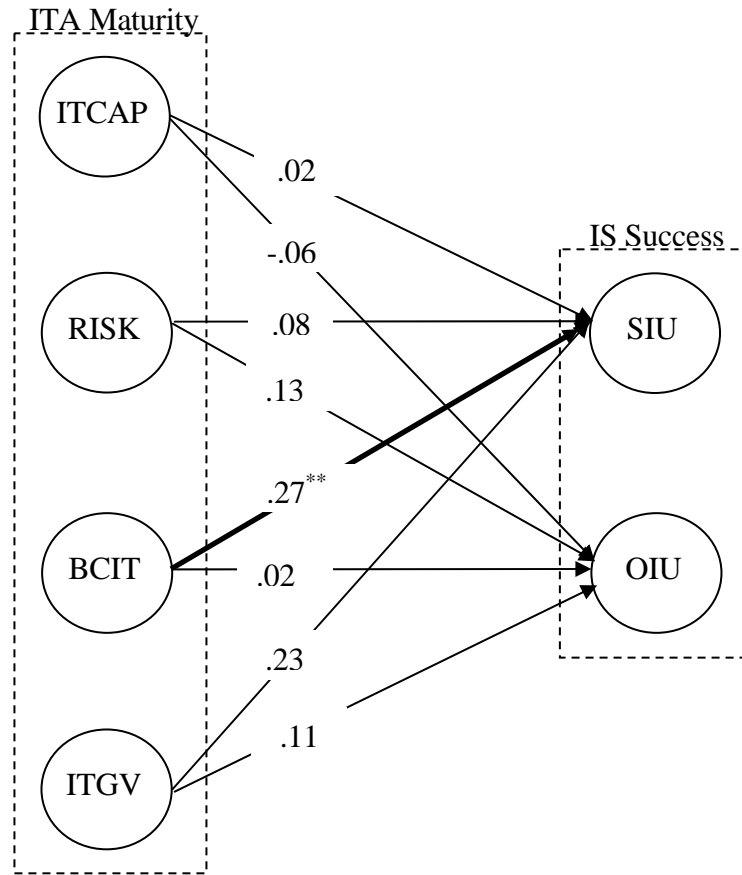


Hypotheses 1 and 2

Hypothesis 1, which states that a high level of ITA maturity leads to a high level of ISS, is partially supported. The business case for IT element of ITA maturity has a significant, positive effect on the strategic impact of IS use element of ISS when all organizations are considered (see Figure 4.4). When only entrepreneurial organizations are considered, the results indicate that the effects of the elements of ITA maturity on elements of ISS are all nonsignificant (see Figure 4.5). When considering only formal organizations, an increase in business case for IT leads to an increase in strategic impact of IS use (see Figure 4.6).

The results depicted in Figures 4.5 and 4.6 are opposite Hypothesis 2, which states that the strength of the relationship between ITA MATURITY and IS SUCCESS will be substantially greater in entrepreneurial firms than in formal firms. Therefore, Hypothesis 2 is not supported; as such, the strength of the relationship between ITA maturity and ISS is substantially greater in formal organizations than in entrepreneurial organizations. This is specifically true for the relationship between business case for IT and strategic impact of IS use and the relationship between risk mitigation and operational impact of IS use.

Figure 4.4 Combined Model Results Pertaining to Hypothesis 1

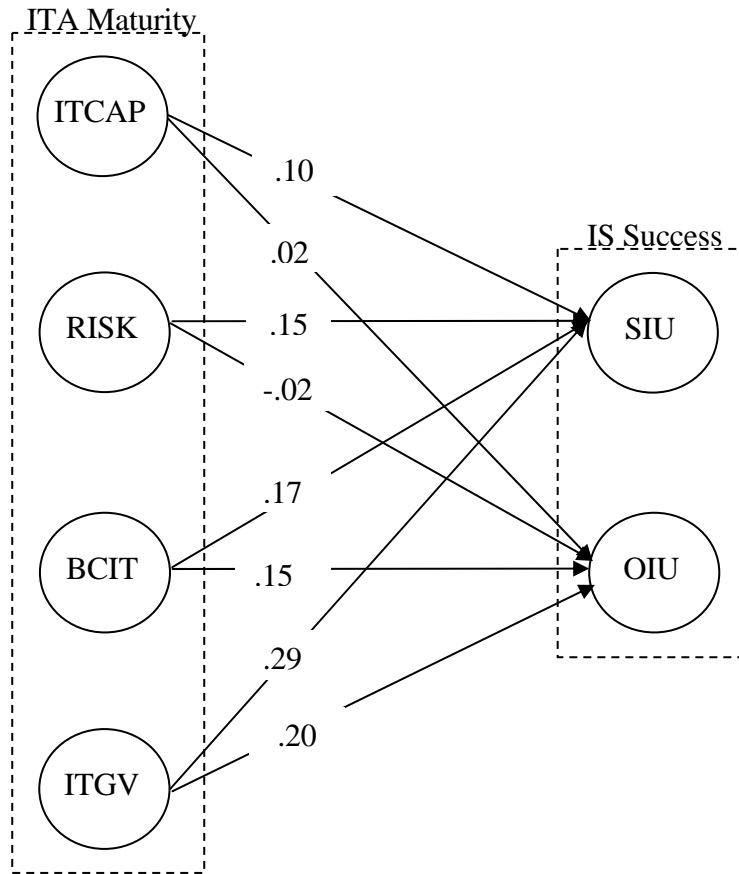


* indicates that item is significant at $p < .05$ level
 ** indicates that item is significant at $p < .01$ level
 *** indicates that item is significant at $p < .001$ level

Legend:

- ITCAP:** IT Capability Intent
- RISK:** Risk Mitigation
- BCIT:** Business Case for IT
- ITGV:** Key IT Governance Initiatives
- SIU:** Strategic Impact of IS Use
- OIU:** Operational Impact of IS Use

Figure 4.5 Entrepreneurial Model Results Pertaining to Hypothesis 2

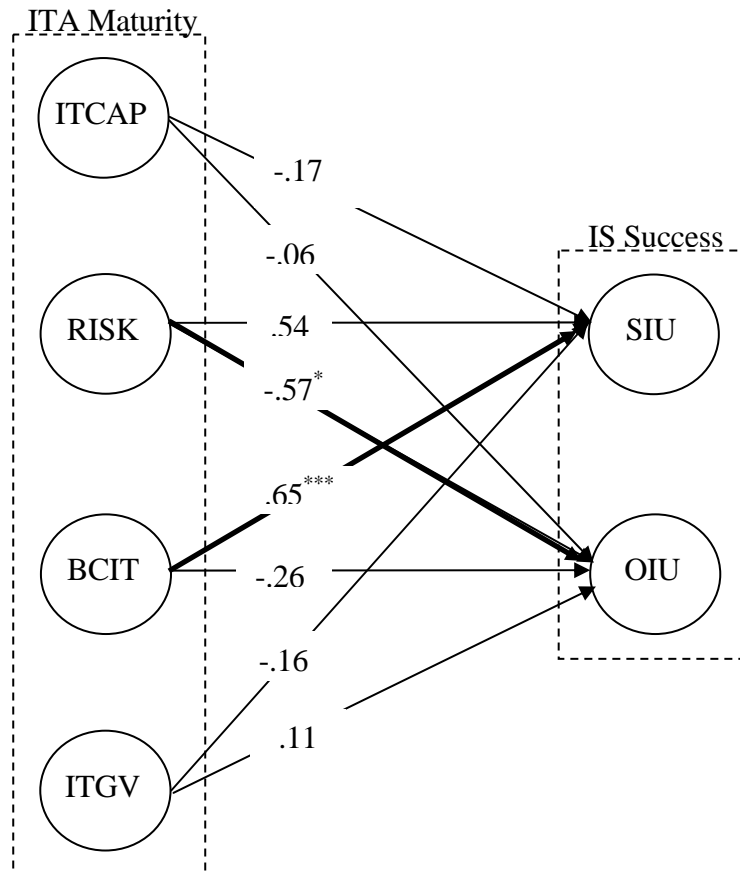


* indicates that item is significant at $p < .05$ level
 ** indicates that item is significant at $p < .01$ level
 *** indicates that item is significant at $p < .001$ level

Legend:

- ITCAP:** IT Capability Intent
- RISK:** Risk Mitigation
- BCIT:** Business Case for IT
- ITGV:** Key IT Governance Initiatives
- SIU:** Strategic Impact of IS Use
- OIU:** Operational Impact of IS Use

Figure 4.6 Formal Model Results Pertaining to Hypothesis 2



* indicates that item is significant at $p < .05$ level
 ** indicates that item is significant at $p < .01$ level
 *** indicates that item is significant at $p < .001$ level

- Legend:**
- ITCAP:** IT Capability Intent
 - RISK:** Risk Mitigation
 - BCIT:** Business Case for IT
 - ITGV:** Key IT Governance Initiatives
 - SIU:** Strategic Impact of IS Use
 - OIU:** Operational Impact of IS Use

Hypotheses 3 and 4

Hypothesis 3, which states that a high level of ITA maturity leads to a high level of ITIF, is partially supported. Two of the four elements of ITA maturity have significant, positive effects on ITIF (see Figure 4.7). Specifically, the effects of IT capability intent and key IT governance initiatives on ITIF are significant and positive when all organizations are considered.

When only entrepreneurial organizations are considered, only the key IT governance initiatives element of ITA maturity has a significant effect on ITIF (see Figure 4.8). When analyzing the research model in the context of formal organizations the corresponding path is nonsignificant (see Figure 4.9). On the other hand, the IT capability intent element of ITA maturity has a significant effect on ITIF in formal organizations, whereas the corresponding path is nonsignificant in entrepreneurial organizations. These results conflict and thus lend no support for Hypothesis 4, which states that the strength of the relationship between ITA maturity and ITIF will be substantially greater for entrepreneurial firms than for formal firms.

Figure 4.7 Combined Model Results Pertaining to Hypothesis 3

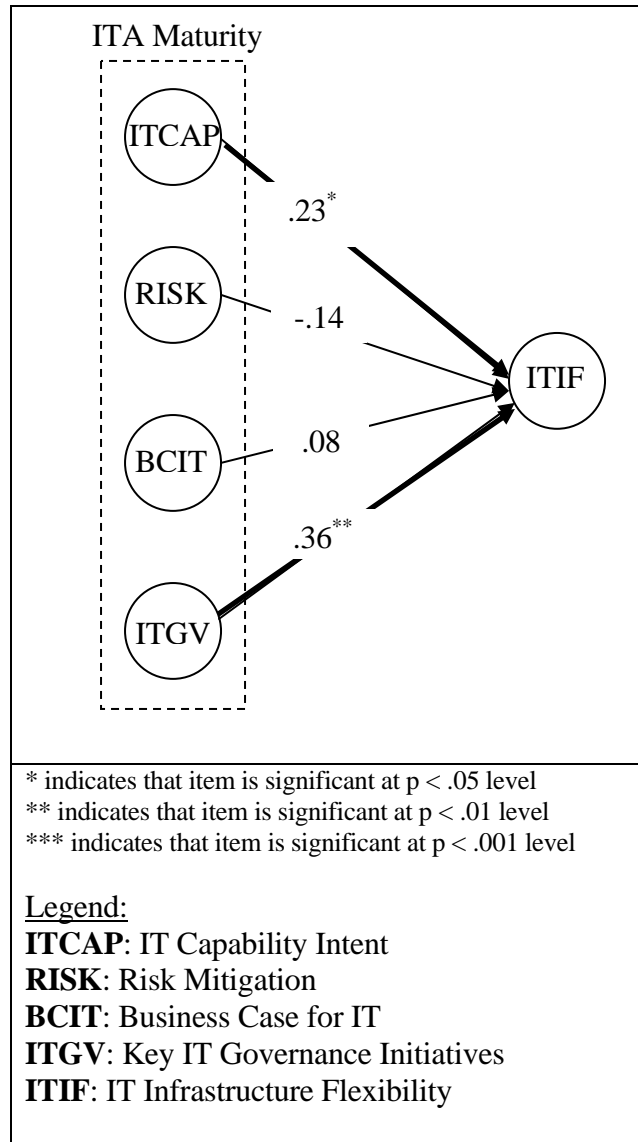


Figure 4.8 Entrepreneurial Model Results Pertaining to Hypothesis 4

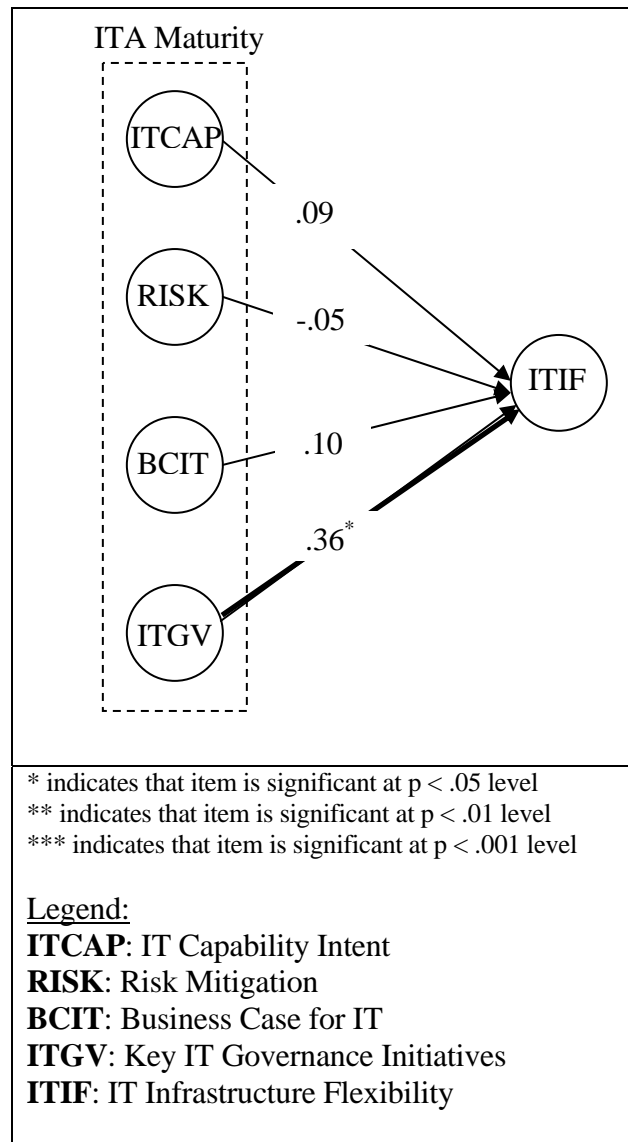
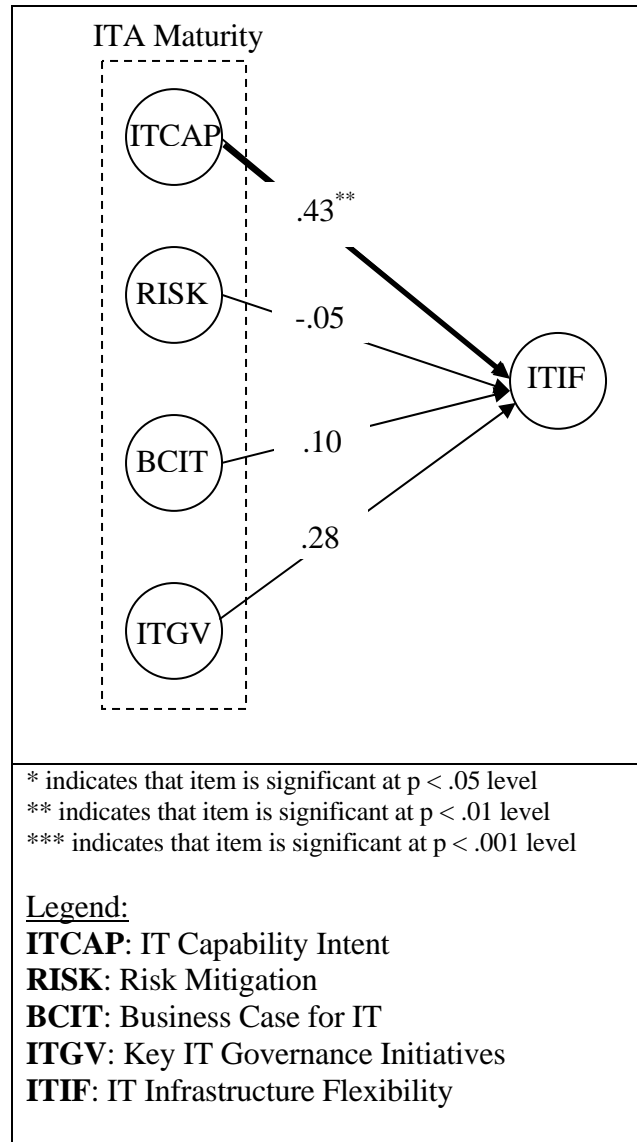


Figure 4.9 Formal Model Results Pertaining to Hypothesis 4



Hypotheses 5 and 6

Hypothesis 5, which states that a high level of ITA maturity leads to a high degree of strategic alignment, is partially supported. Three of the four elements of ITA maturity have significant, positive effects on strategic alignment. Specifically, risk mitigation,

business case for IT, and key IT governance initiatives all have significant, positive effects on strategic alignment (see Figure 4.10).

Hypothesis 6, which states that the strength of the relationship between ITA maturity and strategic alignment will be substantially greater in entrepreneurial firms than in formal firms, is not supported. The multigroup analysis results indicate that the strength of the paths between elements of ITA maturity and strategic alignment that are significant in entrepreneurial organizations are not substantially greater than the corresponding paths in formal organizations. Specifically, the strength of the path between risk mitigation and strategic alignment and the strength of the path between key IT governance initiatives and strategic alignment are .26 and .54, respectively, in entrepreneurial organizations (see Figure 4.11). The strengths of the corresponding paths when considering only formal organizations are .29 and .58, respectively (see Figure 4.12). Furthermore, the path between IT capability intent and strategic alignment is significant in formal organizations and nonsignificant in entrepreneurial organizations. This provides further evidence that the strength of the relationship between ITA maturity and strategic alignment is not substantially greater in entrepreneurial firms than in formal firms.

Figure 4.10 Combined Model Results Pertaining to Hypothesis 5

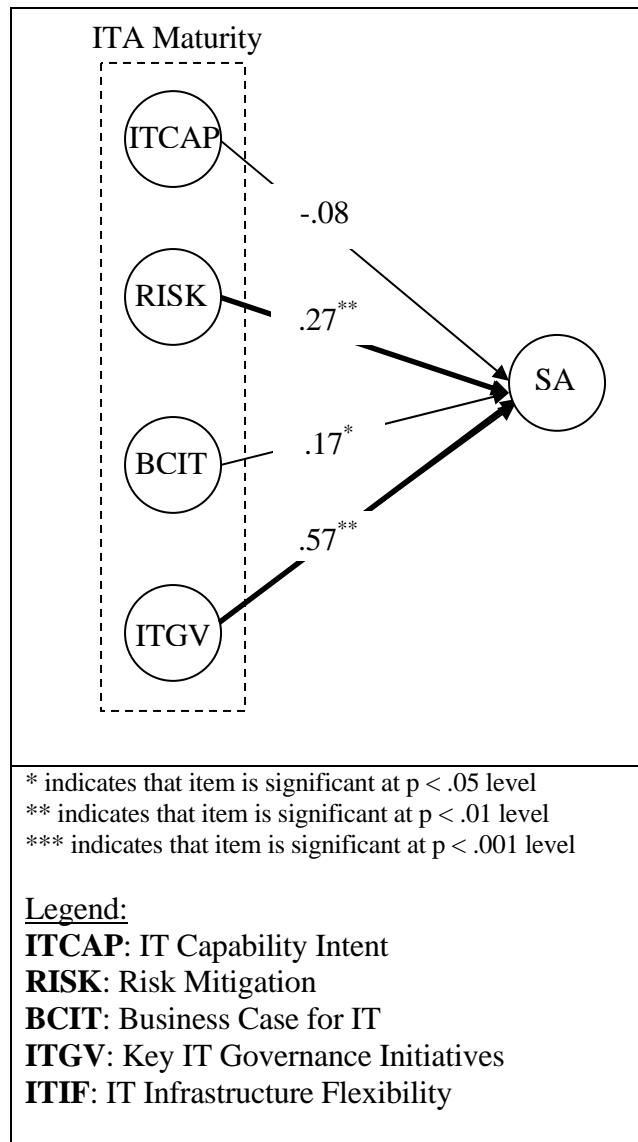


Figure 4.11 Entrepreneurial Model Results Pertaining to Hypothesis 6

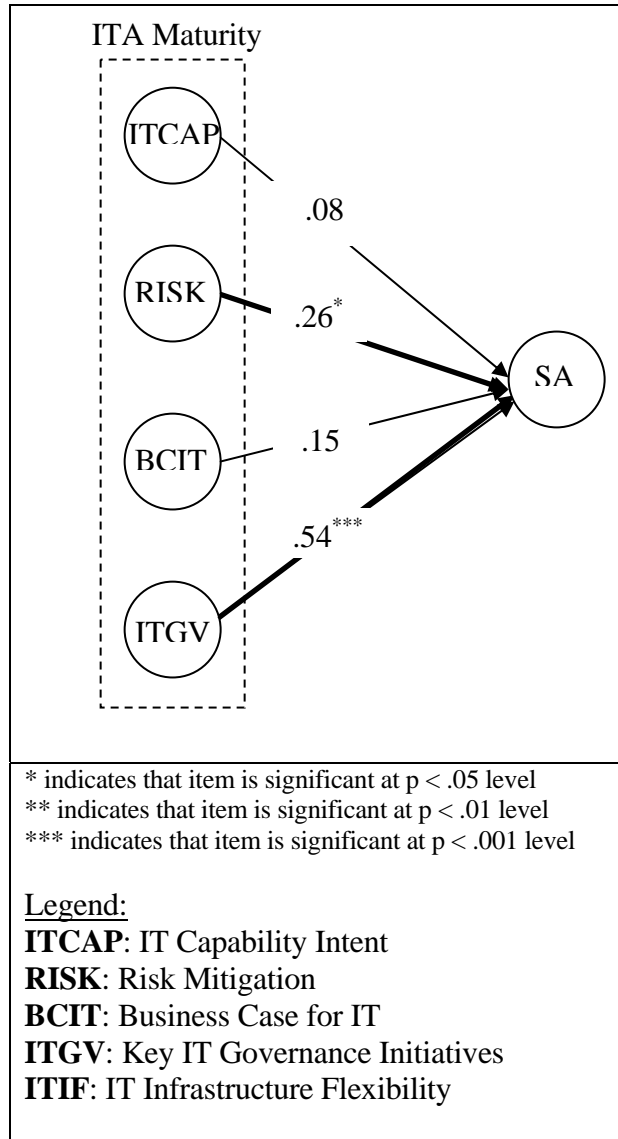
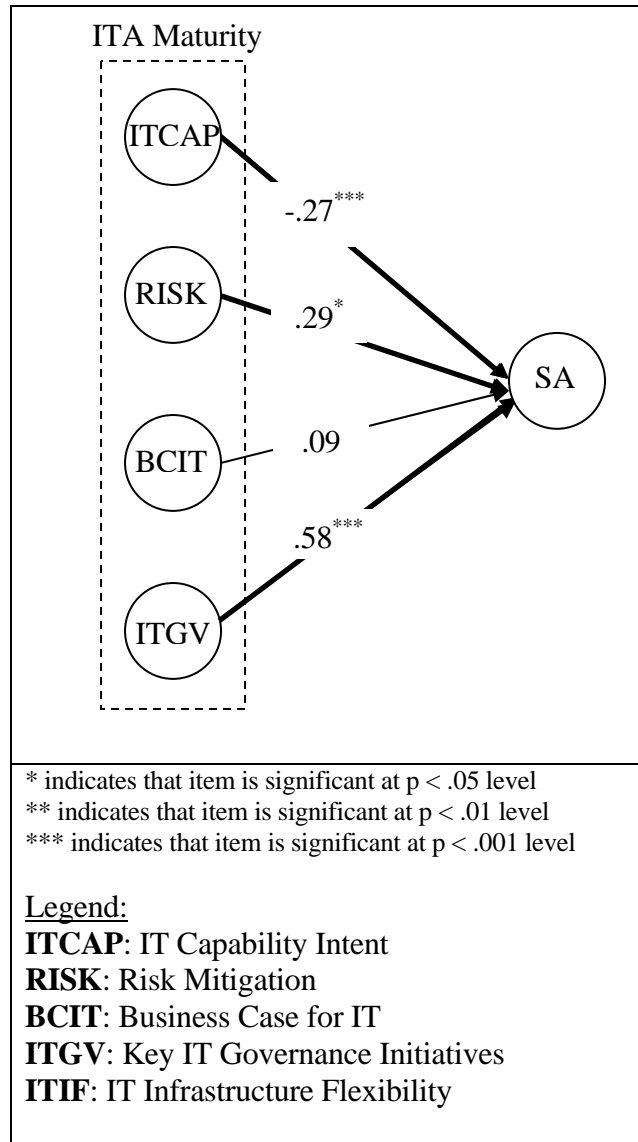


Figure 4.12 Formal Model Results Pertaining to Hypothesis 6



Hypotheses 7 and 8

Hypothesis 7, which states that a high level of ITIF leads to a high degree of ISS, is partially supported. ITIF has a significant, positive effect on one of two elements of ISS. As such, ITIF has a significant effect on operational impact of IS use (see Figure 4.13).

Whereas the strength of the lone significant path between ITIF and elements of ISS (i.e., the path between ITIF and operational impact of IS use) in entrepreneurial organizations is .29 (see Figure 4.14), the corresponding path in the model for formal organizations is .33 (see Figure 4.15). This result provides evidence that Hypothesis 8, which states the strength of the relationship between ITIF and ISS will be substantially greater for entrepreneurial firms than formal firms, is not supported.

Figure 4.13 Combined Model Results Pertaining to Hypothesis 7

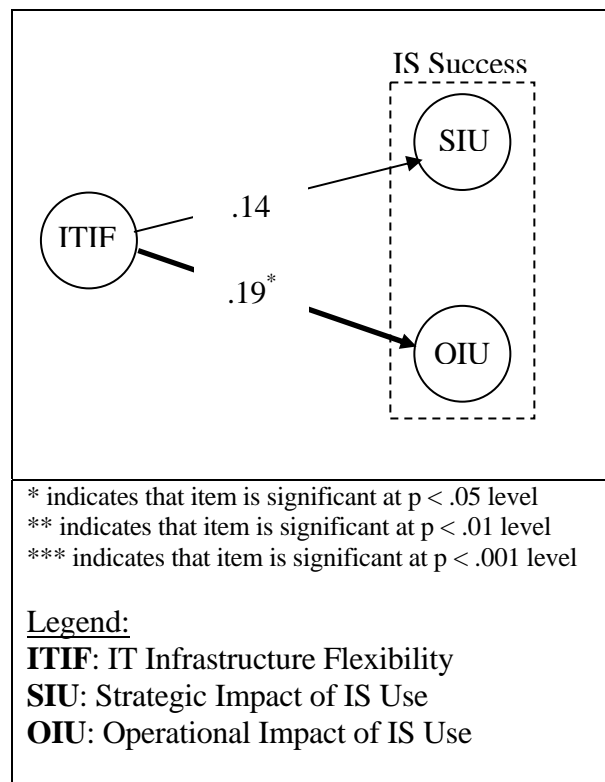


Figure 4.14 Entrepreneurial Model Results Pertaining to Hypothesis 8

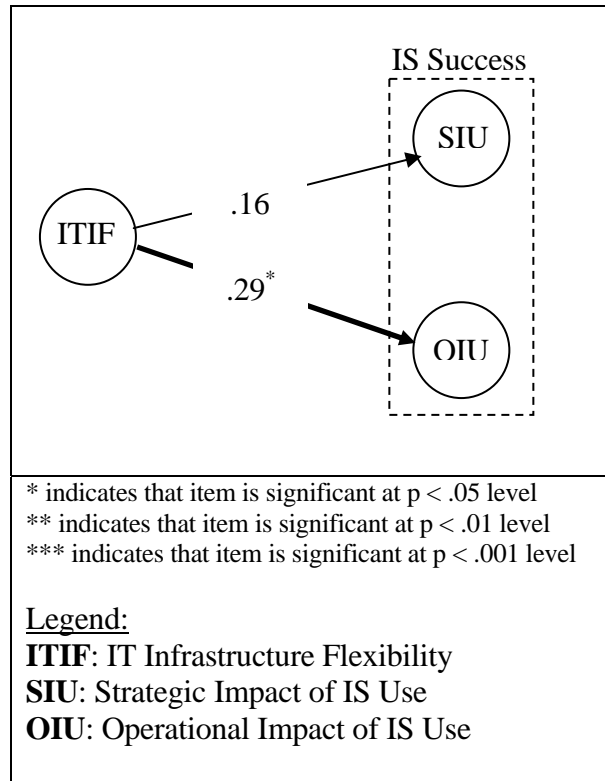
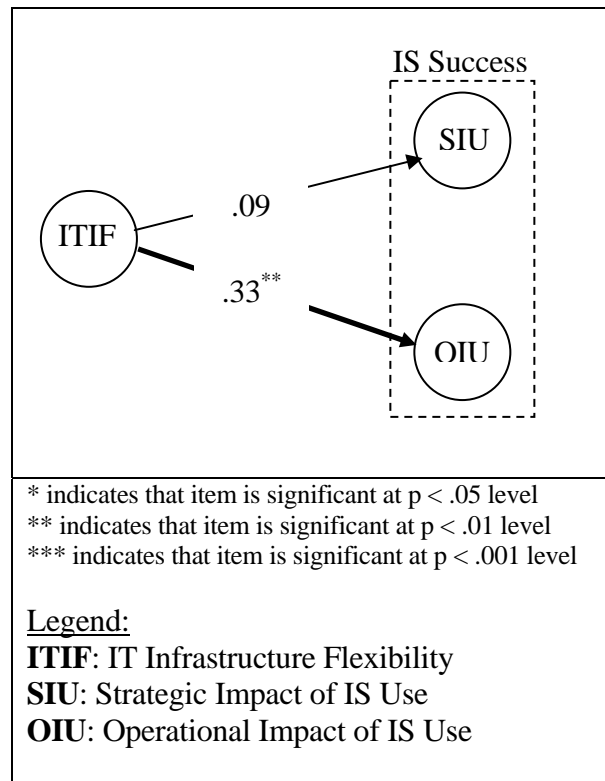


Figure 4.15 Formal Model Results Pertaining to Hypothesis 8



Hypotheses 9 and 10

Hypothesis 9, which states that an increase in ITIF leads to an increase in firm performance, is not supported. ITIF has no significant effect on any of the five elements of firm performance when considering all organizations (see Figure 4.16). The same is true when considering only entrepreneurial organizations (see Figure 4.17). The effects of ITIF on the five elements of firm performance are nonsignificant in entrepreneurial organizations. Conversely, ITIF has significant effects on two of five elements of firm performance in formal organizations (see Figures 4.18). For instance, ITIF has significant

effects on both number of outpatient visits and average length of patient stay. These results provide evidence that Hypothesis 10, which states the strength of the relationship between ITIF and firm performance will be substantially greater for entrepreneurial firms than formal firms, is not supported.

Figure 4.16 Combined Model Results Pertaining to Hypothesis 9

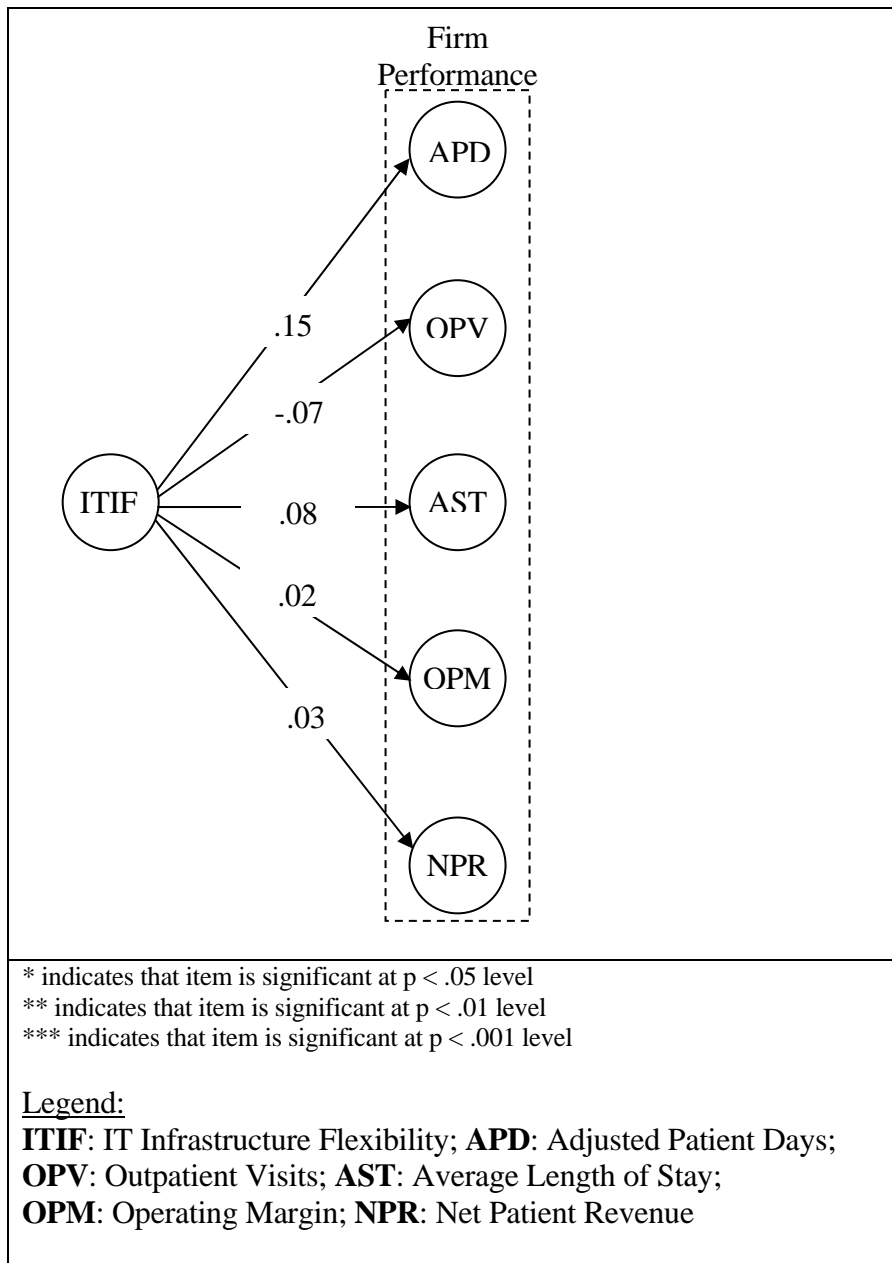


Figure 4.17 Entrepreneurial Model Results Pertaining to Hypothesis 10

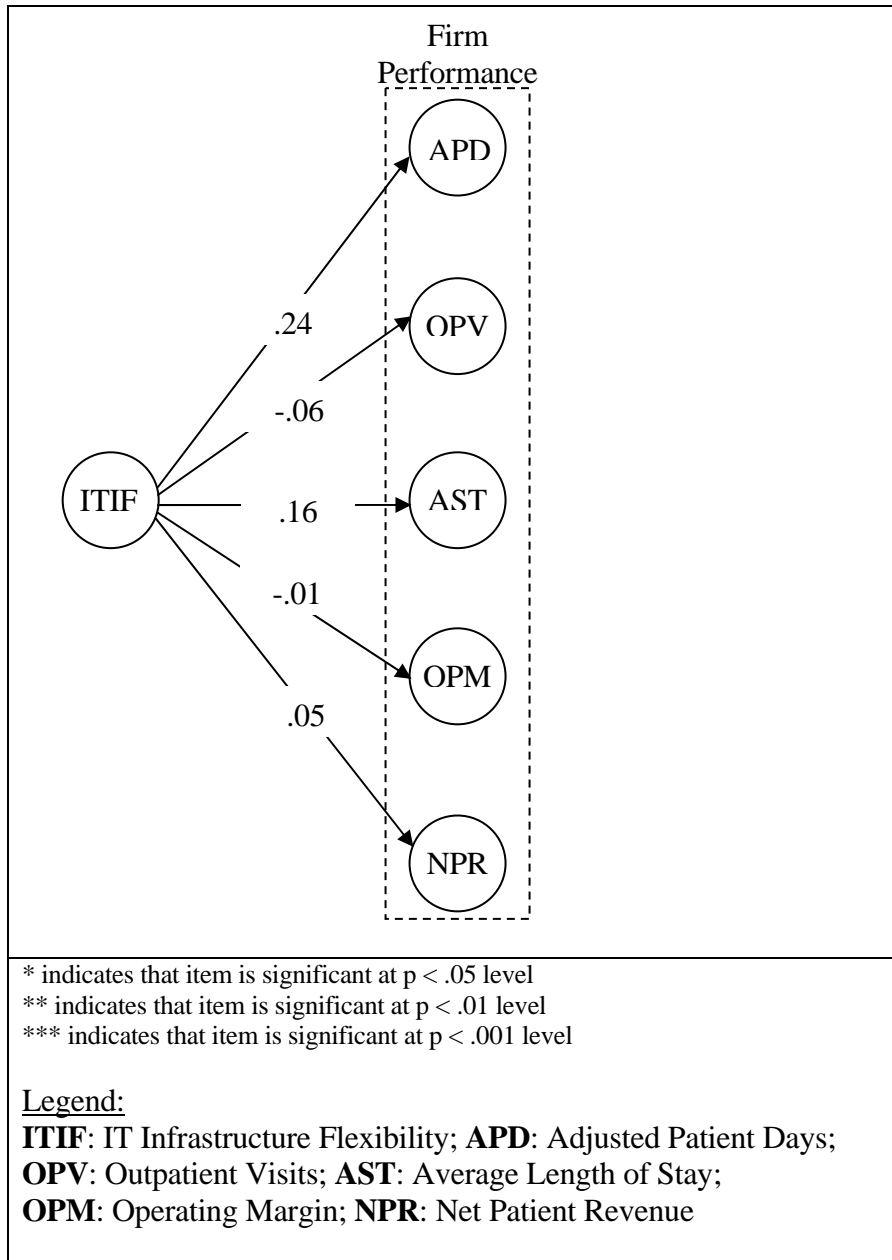
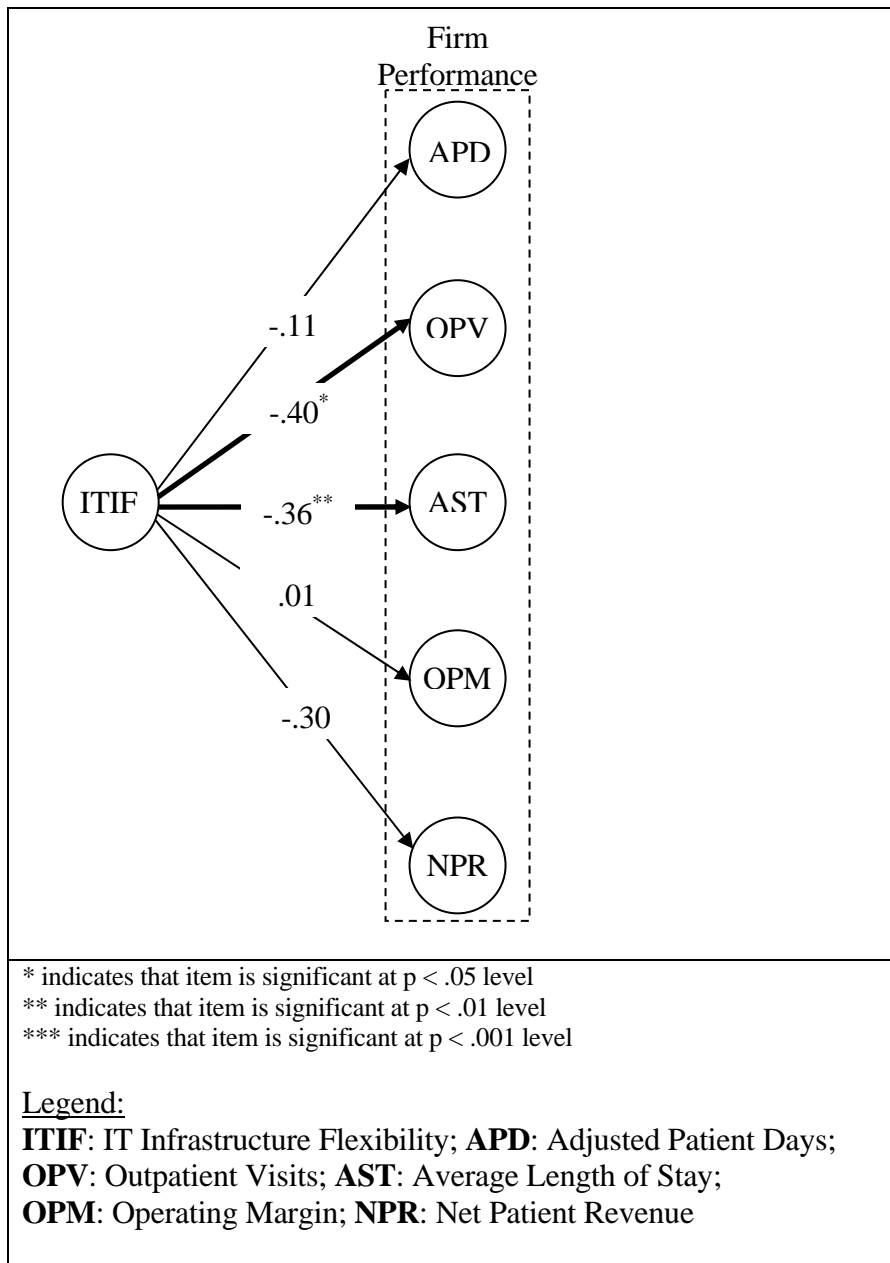


Figure 4.18 Formal Model Results Pertaining to Hypothesis 10



Hypotheses 11 and 12

Hypothesis 11, which states that a high degree of strategic alignment leads to a high degree of ISS, is not supported. Strategic alignment has no significant effect on either of the two elements of ISS when considering all organizations (see Figure 4.19). When considering only entrepreneurial organizations, strategic alignment has no significant effect on elements of ISS (see Figure 4.20). Conversely, strategic alignment has a significant effect on the operational impact of IS use element of ISS when considering only formal organizations (see Figure 4.21). This result provides partial support for Hypothesis 12, which states the strength of the relationship between strategic alignment and ISS will be substantially greater for formal firms than entrepreneurial firms.

Figure 4.19 Combined Model Results Pertaining to Hypothesis 11

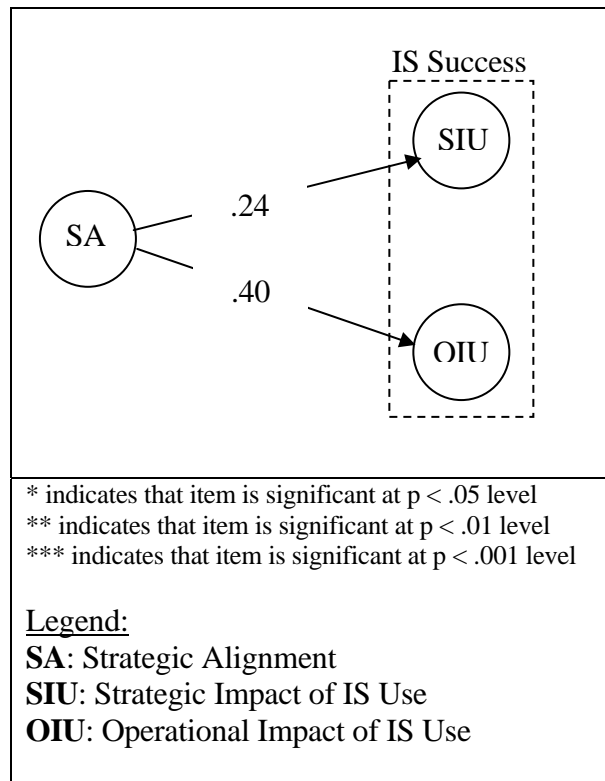


Figure 4.20 Entrepreneurial Model Results Pertaining to Hypothesis 12

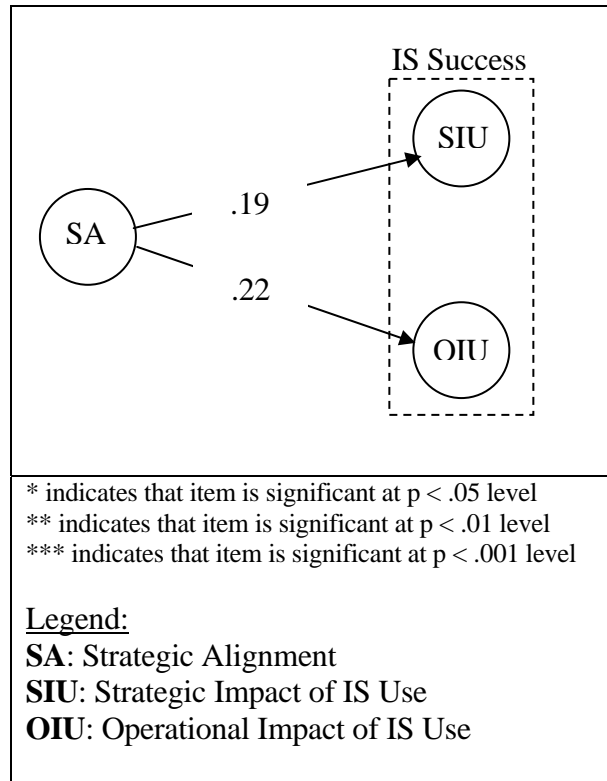
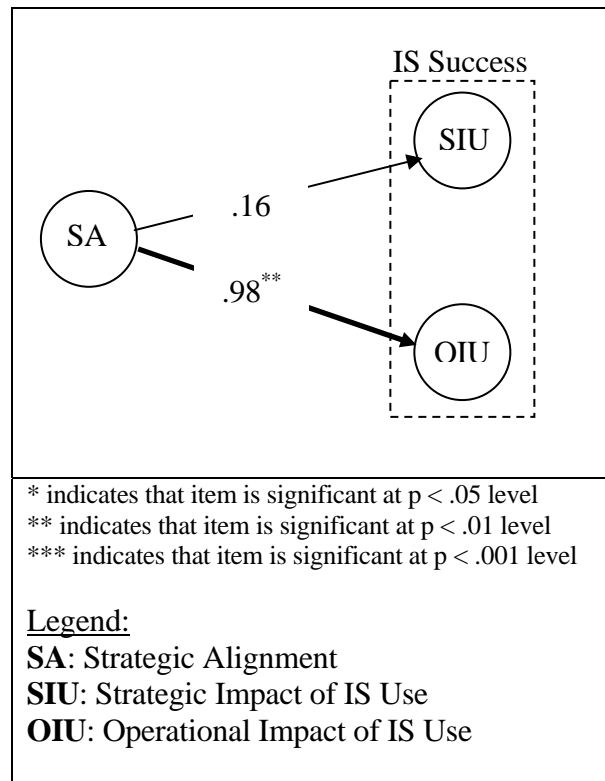


Figure 4.21 Formal Model Results Pertaining to Hypothesis 12



Hypotheses 13 and 14

Hypothesis 13, which states that a high degree of strategic alignment leads to a high degree of firm performance, is not supported. ITIF has significant effects on three of five elements of firm performance when considering all organizations (see Figure 4.22). Strategic alignment has significant effects on adjusted patient days, average length of patient stay, and net patient revenue. However, the direction of the effect of strategic alignment on average length of patient stay should be negative for firm performance to increase, but it is positive instead. The effects of strategic alignment on the aforementioned elements of firm performance are all significant when considering only entrepreneurial

organizations (see Figure 4.23), whereas the corresponding paths are all nonsignificant when considering only formal organizations (see Figure 4.24). These results provide support for Hypothesis 14, which states that the strength of the relationship between strategic alignment and firm performance will be substantially greater for entrepreneurial firms than formal firms.

Figure 4.22 Combined Model Results Pertaining to Hypothesis 13

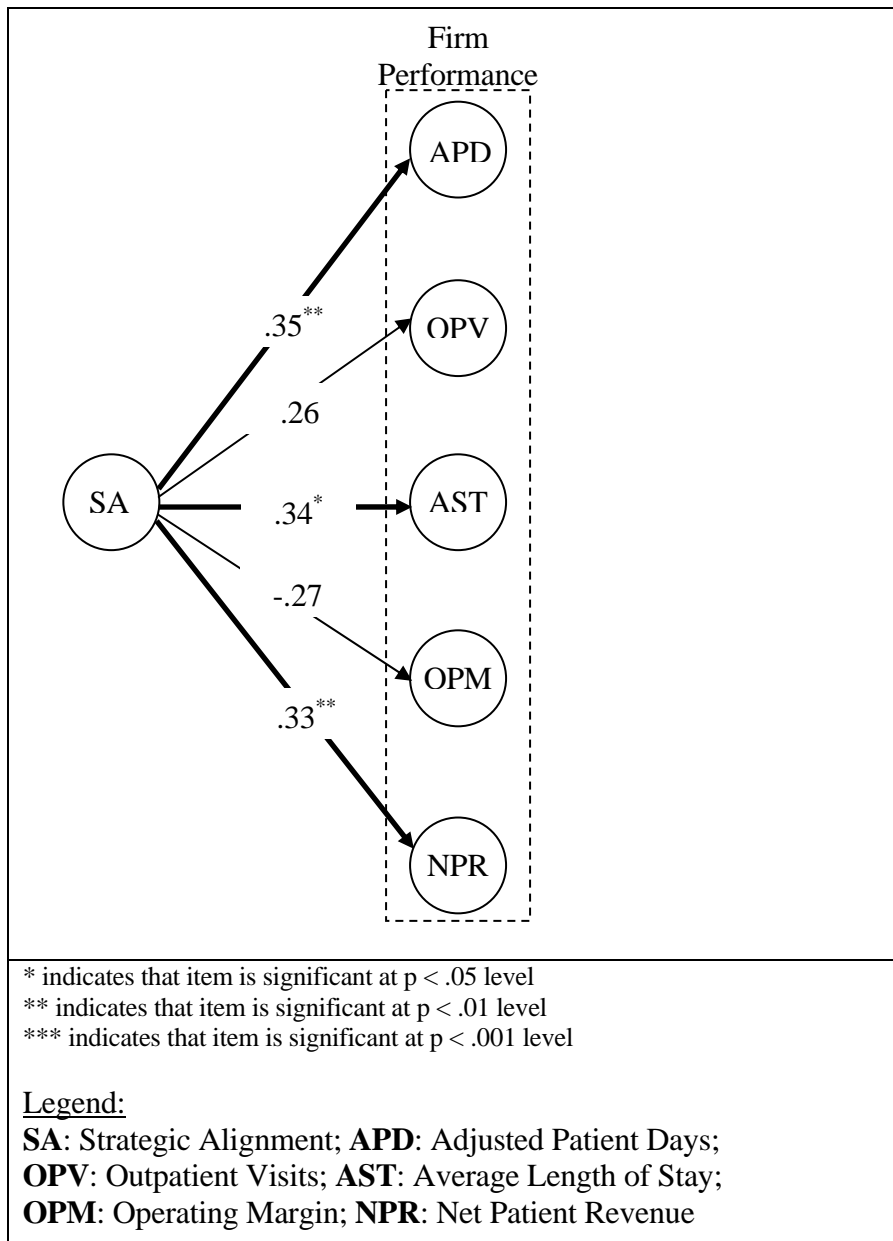


Figure 4.23 Entrepreneurial Model Results Pertaining to Hypothesis 14

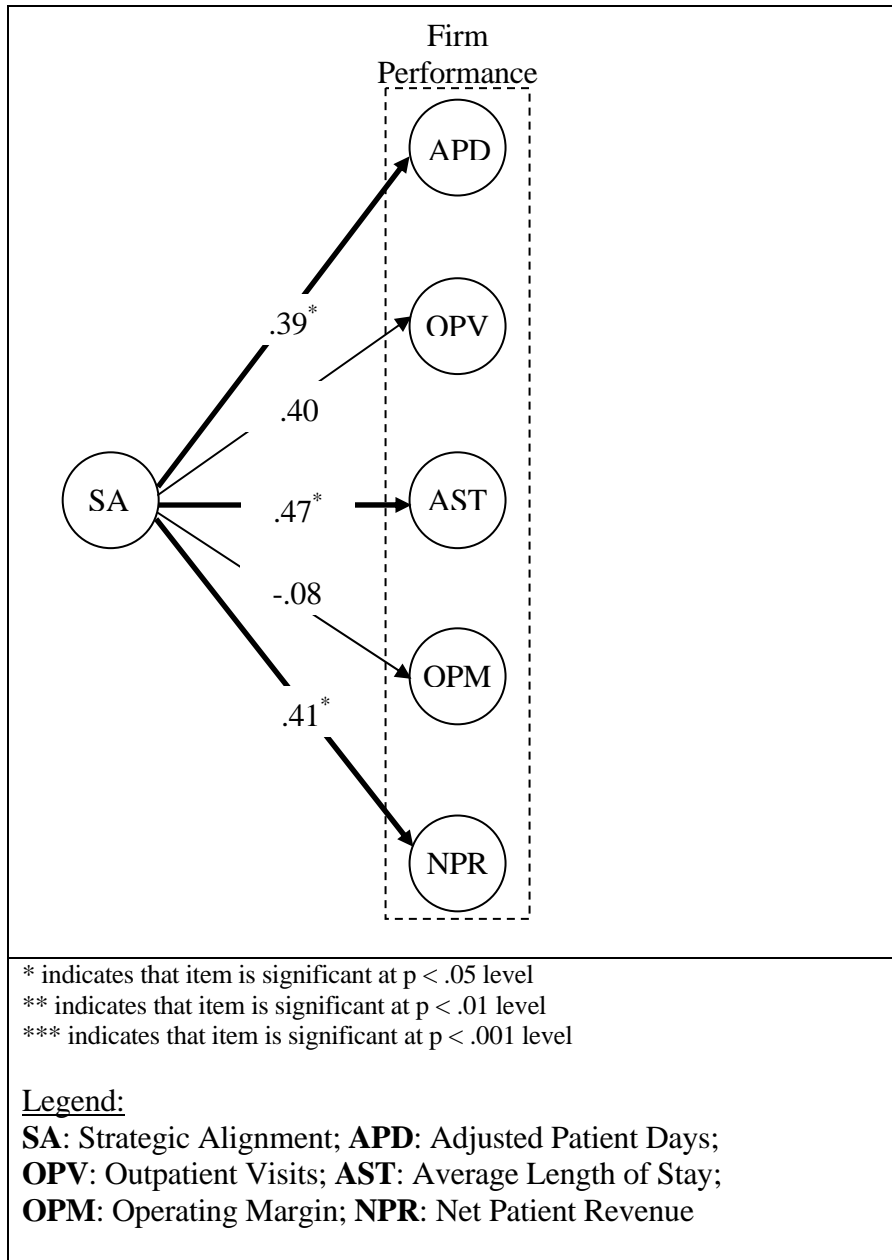
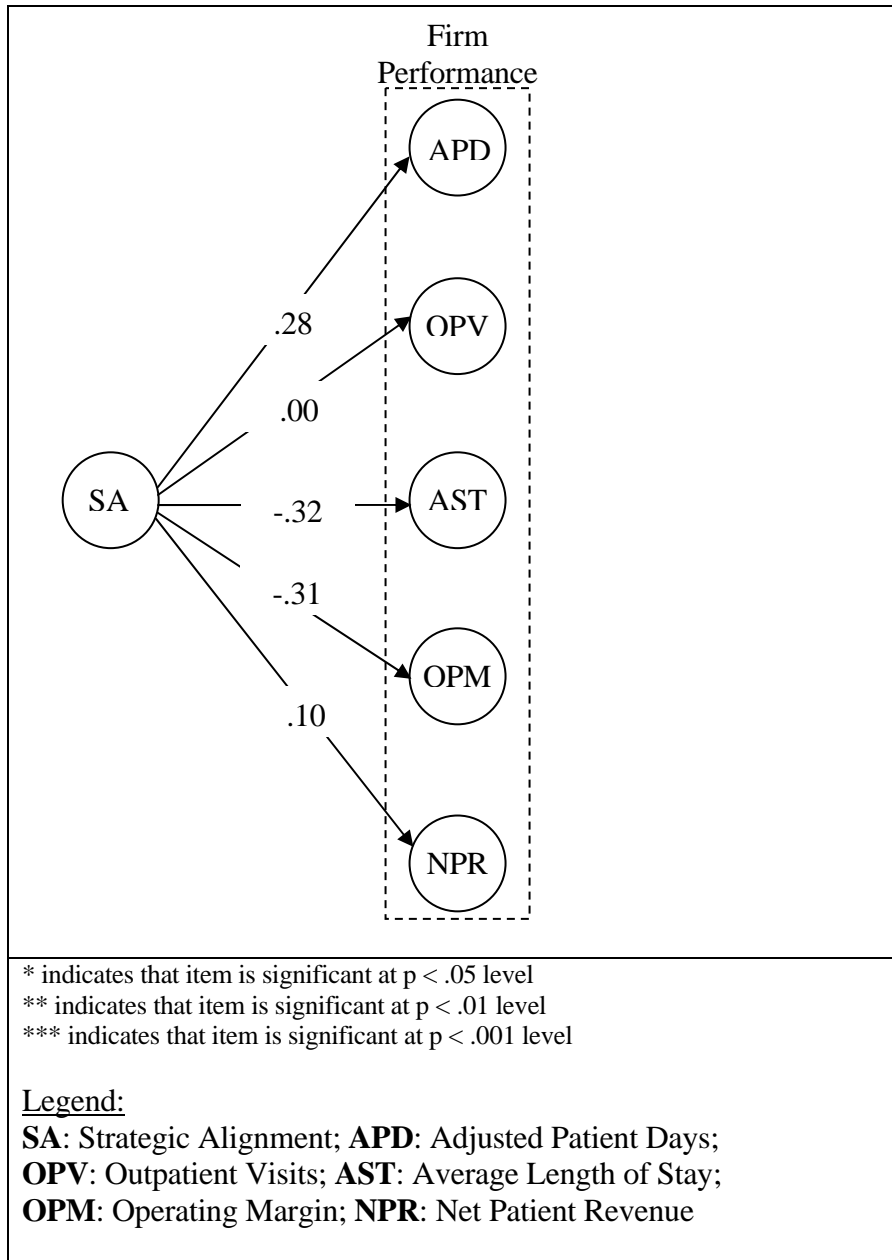


Figure 4.24 Formal Model Results Pertaining to Hypothesis 14



Hypotheses 15 and 16

Hypothesis 15, which states that a level of ISS leads to a high level of firm performance, is not supported. ISS has no significant effect on any of the five elements of firm performance when considering all organizations (see Figure 4.25). One element of ISS has a significant effect on one element of firm performance when considering only entrepreneurial organizations (see Figure 4.26). Specifically, operational impact of IS use has a significant effect on average length of patient stay in entrepreneurial organizations. The same is true for formal organizations. Operational impact of IS use has a significant effect on average length of patient stay in formal organizations (see Figure 4.27). Although the result of multigroup analysis indicates that the strength of aforementioned path is significantly different for entrepreneurial organizations, as compared to formal organizations ($p < .01$), the path coefficient is greater for formal organizations (.55) than it is for entrepreneurial organizations (-.46). Based on this finding, Hypothesis 16, which states that the strength of the relationship between strategic alignment and firm performance will be substantially greater for entrepreneurial firms than formal firms, is not supported.

Figure 4.25 Combined Model Results Pertaining to Hypothesis 15

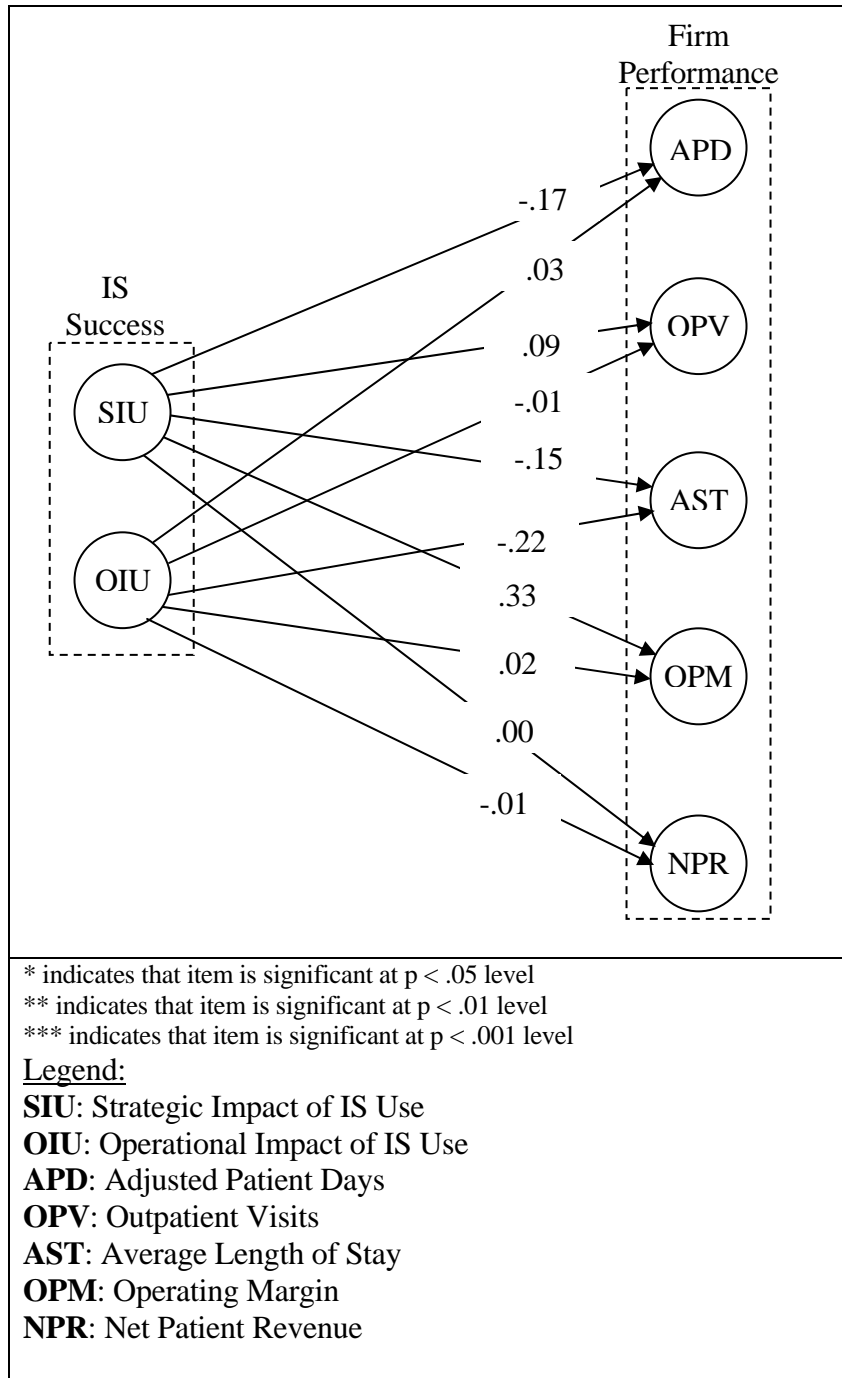


Figure 4.26 Entrepreneurial Model Results Pertaining to Hypothesis 16

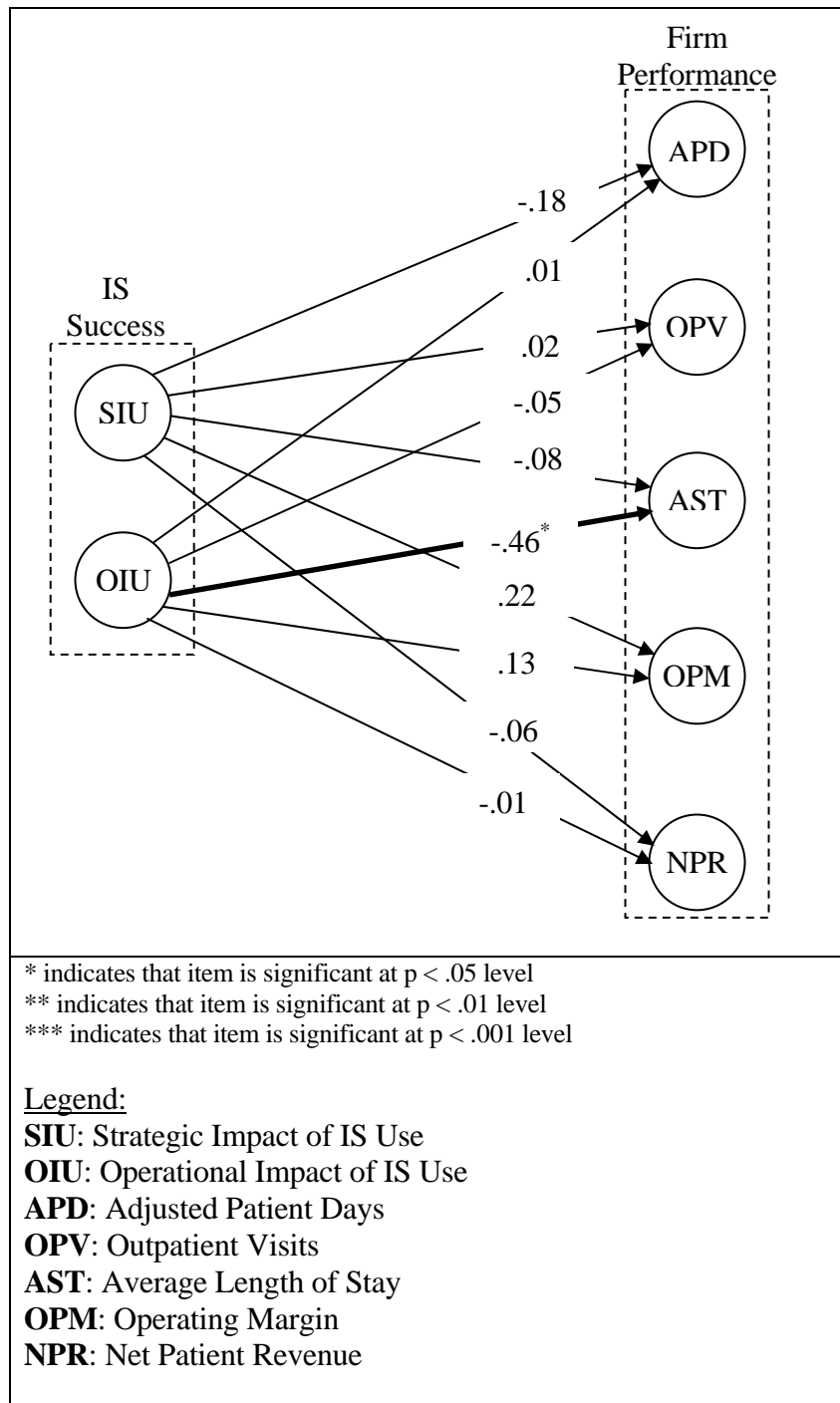
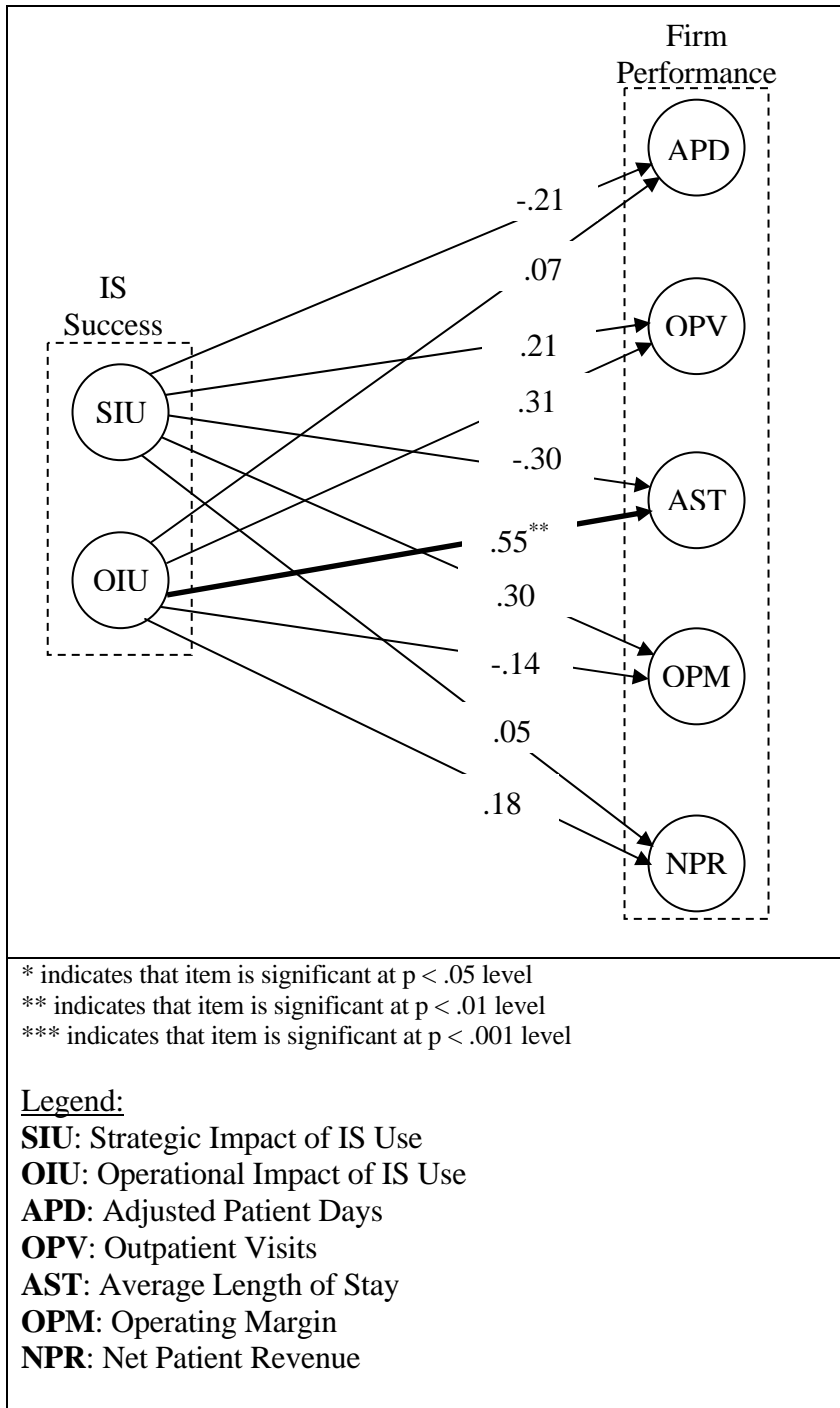


Figure 4.27 Formal Model Results Pertaining to Hypothesis 16



Summary

In this chapter, the results of the underlying research model for the present study were presented. The research model was analyzed in three contexts. First, the research model was analyzed without distinguishing between corporate cultures. Secondly, it was analyzed in the context of entrepreneurial organizations. Thirdly, the research model was analyzed in the context of formal organizations. Lastly, multigroup analysis was conducted to determine if significant differences existed in the strength of the paths that were significant for both entrepreneurial and formal organizations. Results of the analyses provided full or partial support for several hypotheses. A summary of the hypothesis testing results are provided in Table 4.6. These results and their implications will be discussed in the next chapter. Limitations of the present study and suggestions for future research are also explicated in the subsequent chapter.

Table 4.6 Summary of Study Hypotheses

Hypothesis	Result
H1: A high level of ITA MATURITY leads to a high level of IS SUCCESS.	Partially Supported
H2: The strength of the relationship between ITA MATURITY and IS SUCCESS will be substantially greater in entrepreneurial firms than in formal firms.	Not Supported
H3: A high level of ITA MATURITY leads to a high level of IT INFRASTRUCTURE FLEXIBILITY.	Partially Supported
H4: The strength of the relationship between ITA MATURITY and IT INFRASTRUCTURE FLEXIBILITY will be substantially greater for entrepreneurial firms than for formal firms.	Not Supported
H5: A high level of ITA MATURITY leads to a high degree of STRATEGIC ALIGNMENT.	Partially Supported
H6: The strength of the relationship between ITA MATURITY and STRATEGIC ALIGNMENT will be substantially greater in entrepreneurial firms than in formal firms.	Not Supported
H7: A high level of IT INFRASTRUCTURE FLEXIBILITY leads to a high degree of IS SUCCESS.	Partially Supported
H8: The strength of the relationship between IT INFRASTRUCTURE FLEXIBILITY and IS SUCCESS will be substantially greater for entrepreneurial firms than formal firms.	Not Supported
H9: An increase in IT INFRASTRUCTURE FLEXIBILITY leads to an increase in FIRM PERFORMANCE.	Not Supported
H10: The strength of the relationship between IT INFRASTRUCTURE FLEXIBILITY and FIRM PERFORMANCE will be substantially greater for entrepreneurial firms than formal firms.	Not Supported
H11: A high degree of STRATEGIC ALIGNMENT leads to a high degree of IS SUCCESS.	Not Supported
H12: The strength of the relationship between STRATEGIC ALIGNMENT and IS SUCCESS will be substantially greater for formal firms than entrepreneurial firms.	Partially Supported
H13: A high degree of STRATEGIC ALIGNMENT leads to a high degree of FIRM PERFORMANCE.	Not Supported
H14: The strength of the relationship between STRATEGIC ALIGNMENT and FIRM PERFORMANCE will be substantially greater for entrepreneurial firms than formal firms.	Supported
H15: A high level of IS SUCCESS leads to a high level of FIRM PERFORMANCE.	Not Supported
H16: The strength of the relationship between IS SUCCESS and FIRM PERFORMANCE will be substantially greater for entrepreneurial firms than formal firms.	Not Supported

CHAPTER 5: DISCUSSION AND IMPLICATIONS

The knowledge and skills required to manage IT resources are obtained, driven, and dictated by a firm's ITA. IT resources are assets and capabilities that are available and useful in detecting and responding to market opportunities or threats. Given the need for firms to be able to achieve and sustain competitive advantage in the midst of a dynamic and uncertain environment, it is important to identify IT resources that can facilitate superior performance. The IT resources realized as a result of employing an ITA are believed to enable firms to acquire and sustain a competitive advantage. It is expected that appropriate leveraging of IT resources will provide firms with competencies that are congruent with their competitive needs rather than existing patterns of usage within the firm.

Two IT resources that have been frequently cited in the strategic management and IS literature as facilitators of competitive advantage and superior performance are IT infrastructure flexibility and strategic alignment. Many firms, especially those in the healthcare industry, operate in turbulent environments, where the pace of change is steadily increasing and where unaligned strategies and rigid IT infrastructures compound business risk. Such conditions require the IT infrastructure to be flexible to point that the enterprise can easily adjust to shifts in the marketplace. When a firm's IT infrastructure is not flexible, the infrastructure's potential as an enabler can be greatly diminished. The added uncertainty in turbulent environments places an additional burden on organizations in the

healthcare industry to ensure that their business and IT priorities and strategies are consistently aligned. Consistent alignment requires firms to have a thorough understanding of their business and IT priorities and objectives, and the IT resources at its disposal. Lack of such an understanding can lead to strategies that are misaligned or aligned and ineffective.

The primary objective of this study was to provide further insights into the strategic value of ITA by assessing the direct and indirect influence of ITA maturity on IS success and the indirect influence of ITA maturity on firm performance. Given that the realization of IT infrastructure flexibility and strategic alignment appear to be dependent on the maturity of a firm's ITA, the second objective of this study was to evaluate the nature of the abovementioned influences through the mediation of IT infrastructure flexibility and strategic alignment. One must be cautioned that when evaluating the use of IT resources, conclusions about such use might be deemed premature and inappropriate if the type of use is not considered in conjunction with the corporate culture of the organization. This study, therefore, focused on two corporate cultures often contrasted in the IS and strategic management literature – entrepreneurial and formal. The purpose of employing corporate culture as a contingency variable was to provide better understanding of the nature of the relationships between variables in the current study.

Data for this study were collected from 78 hospitals throughout the United States. A multiple respondent technique, in which both hospitals' CIO and IT Director/IT Manager completed separate surveys, was employed. The healthcare industry was chosen because of the unprecedented demands on healthcare organizations to implement and manage new

healthcare information systems, and to carry out large-scale IT integration projects in turbulent environments.

The results of the data analysis and hypothesis testing were presented in Chapter 4. In this chapter, Chapter 5, the results are interpreted, the findings outlined in Chapter 4 are explained, and the implications of the findings are discussed. This chapter concludes with explications of the study's limitations, suggestions and direction for future research, and closing remarks.

Findings

The current study proposed that better management of IT resources could be facilitated by the implementation and utilization of an ITA. Furthermore, the study proposed that greater maturity of an ITA would lead to the realization of IT resources and their ensuing effect on IS success and firm performance. The results of the present study are interesting in that they provide intricate details about the nature of the relationships among constructs examined in the study. The following research questions were presented earlier in this study:

- To what degree does variation in ITA maturity affect the realization of IT resources?
- What effect does a firm's corporate culture have on the ability of its ITA to influence the realization of IT resources?

- How do variations in ITA maturity affect its influence on IS success and firm performance?
- What effect does a firm's corporate culture have on the ability of its ITA to influence IS success and firm performance?

The subsequent sections address the aforementioned research questions and discuss the findings related to each of these questions.

ITA Maturity and IS Success

The results of the present study indicate that ITA maturity directly influences the realization of IS success when corporate culture is not considered. Specifically, the results show that as the business case for IT element of ITA maturity increases so does the strategic impact of IS use element of IS success. In other words, as organizations are better able to address and justify their IT investments in terms of business cases/objectives, the strategic impact of organizations' use of IS increases. An explanation for this result is that as organizations better address and justify their IT investments, from the standpoint of business cases, they are taking into consideration and providing information about how and why to leverage IT to solve specific business problems or satisfy specific business needs. Making decisions based on specific business problems or needs keeps organizations from drifting to the point of investing in technology for the sake of technology. Furthermore, considering most business cases for IT investments are strategic in nature (e.g. the need to improve the return on investment (ROI) of existing and new applications, the desire for strategic agility for the purpose of improving speed to market of the firm's products and

services, the desire to improve IT efficiency for the sake of business performance) it comes as no surprise that this element influences the strategic impact of IS use and not the operational impact of IS use.

My finding, as it pertains to the relationship between ITA maturity and IS success, supports what others have implied in prior studies -- the maturity of an ITA influences systems success (Doll 1985; Goodhue et al. 1992a; Goodhue et al. 1988; Henderson and Sifonis 1988; Kim and Everest 1994a; Lederer and Sethi 1996; Raghunathan and Raghunathan 1994; Sabherwal 1999). For instance, Doll (1985) reported that organizations with successful information systems were three times more likely to have and use formal plans for systems development. Sabherwal (1999) reported on a study of 36 companies, where 16 of 18 successful users of IS had formal IT plans. Raghunathan and Raghunathan (1994) found that IT planning success predicted improvement in systems' capabilities.

The findings and implications of the abovementioned studies help explain why the relationship between business case for IT and strategic impact of IS use is also significant when only formal organizations are considered. Conventional wisdom suggests that the relationship between business case for IT and operational impact of IS use would be significant in formal organizations because they tend to be more focused on cost containment and operational efficiency. In this case, however, the findings tend to defy conventional wisdom. This could have to do with the amount of vertical communication required to implement and maintain a mature ITA. Although vertical communication is typically extremely low in formal organizations, the process of deploying an ITA leads to an increase in communication between users, developers, and top management (Goodhue

et al. 1992a; Sauer and Willocks 2002). The increase in communication in turn leads to increased top management support, facilitates better definition of scope and requirements of systems development projects, and more efficient management and allocation of human and technical resources (Goodhue et al. 1992a; Goodhue et al. 1988; Hagel and Brown 2001; Kim and Everest 1994b). With regard to the reason operational impact of IS use is not influenced by elements of ITA maturity in formal organizations, the argument previously presented when corporate culture is not considered appears to be applicable here as well. A supplement to that argument could be that even when the business case/objective for IT investments is operational in nature, formal organizations view operational impact of IS use as an intermediate impact that leads to a strategic impact. Therefore, in affect, the overarching objective of formal organizations is to improve the strategic impact of IS use whether directly or indirectly. It could also be that number of formal organizations in the present study is so small that anticipated significant relationships are going undetected.

One major surprise was that the relationship between business case for IT and strategic impact of IS use was not significant in entrepreneurial firms, as posited in one of the hypotheses. Although entrepreneurial organizations would typically embody the things necessary to have a mature ITA, such as vertical communication and top management support, their justifications for IT investments or the way they justify IT investments tend to have no significant influence on either strategic or operational impacts of IS use. An explanation is that entrepreneurial organizations may not employ common methods to justify IT investments. Rather, their IT investment decisions could be driven by intuition, expert opinions, their current business environment, or their desire to create or enter new

markets (Liu 1998; Tidd, Bessant, and Pavitt 2005). The time it takes to develop and implement an ITA could also be a factor. Since entrepreneurial organizations tend to move quickly, they may not have the time to develop and implement an ITA before they must make decisions.

Another surprise was the direction of the significant relationship between risk mitigation and operational impact of IS use in formal organizations. As previously mentioned, prior studies suggest that elements of ITA maturity would have a significant influence on the operational impact of IS in formal organizations. The results of prior studies also suggest that as organizations better address and account for potential elements of risk (i.e., take steps to mitigate risk) they would experience greater success with their systems. The finding, relative to this, in the present study suggests that the opposite happens when formal organizations attempt to mitigate risk. In other words, as formal organizations better mitigate risk, the operational impact of IS use decreases. One reason for this finding could be that IS use decreases uncertainty, which could minimize the effect of risk mitigation. Another possible explanation for this finding is that formal organizational cultures may send confusing or contradictory messages to members about risk tolerance (Grabowski and Roberts 1999). The impact of contradictory messages in formal organizations can be extreme (Grabowski and Roberts 1999). This is partly due to their low tolerance for risk. When an organization has a low tolerance for risk, and yet the message about risk mitigation is confusing or contradictory, their will in most cases be a negative outcome. This is not to say that an error or catastrophe will occur, rather it is to

suggest that degradation in performance (i.e., efficiency in this case) is likely to manifest (Grabowski and Roberts 1998).

ITA Maturity and IT Infrastructure Flexibility

The results of the present study indicate that, regardless of the corporate culture exhibited by organizations, ITA maturity directly influences IT infrastructure flexibility. This statement implies that several things are happening that enable organizations' ITA to influence the flexibility of their IT infrastructure. Moreover, the statement assumes that their intended IT capabilities are taking on an enterprise focus, that they are moving towards implementing modular business processes, and that they are adequately addressing and employing key IT governance initiatives. If organizations are actively working towards the accomplishment of the aforementioned tasks, they will experience an increase in the flexibility of their IT infrastructure. Specifically, the IT capability intent and key IT governance initiatives elements of ITA maturity influence IT infrastructure flexibility. The only variation in this result is which element of ITA maturity influences IT infrastructure flexibility when organizations exhibit a particular corporate culture.

For instance, whereas the key IT governance initiative element of ITA maturity influences IT infrastructure flexibility in entrepreneurial organizations, the IT capability intent element of ITA maturity influences IT infrastructure flexibility in formal organizations. These findings are not surprising and can be possibly be explained in at least two ways, both having to do with organizations' need and ability to adapt quickly and appropriately to change in their internal and external environments. One is because firms that do not employ a mature ITA may find it difficult to adapt quickly and appropriately to

changes that can occur because of shifts in the marketplace or strategic restructurings, organizations that are more susceptible to such changes, namely entrepreneurial organizations, would employ a sophisticated planning process. As such, the key IT governance initiatives element of ITA maturity accounts for aspects of a formal planning methodology (e.g., post implementation assessments, methodology to align project priorities, formal compliance process). This explanation is in line with the findings of Bradley, et al. (Forthcoming) and Veliyath and Shortell (1993). Both studies found that entrepreneurial organizations employed a more rigorous and complex planning process than formal organizations. The second explanation has to do with the significant relationship between IT capability intent and IT infrastructure flexibility in formal organizations. Formal organizations experience an increase in the flexibility of their IT infrastructure as they plan for more mature IT capabilities. The objective of these IT capabilities is to embed core business functionality (i.e., core business activities and core business processes) in organizations' IT infrastructure (Butler 2001; Gibson 1994; Ross 2003). This means creating and utilizing new technologies or modifying existing technologies for the purpose of automating core business processes. The accomplishment of this task leads to efficiency, with respect to cost and speed, and flexibility, with respect to business functionality, synergy, and standardization -- all of which are trademarks of formal organizations.

ITA Maturity and Strategic Alignment

The results of the present study indicate that, regardless of the corporate culture exhibited by an organization, ITA maturity directly influences strategic alignment.

Specifically, the risk mitigation, business case for IT, and key IT governance initiative elements of ITA maturity directly influence strategic alignment when corporate culture is not considered. In other words, as organizations take steps to effectively mitigate social and technical risks, better address and justify their IT investments in terms of business cases/objectives, and adequately address and employ key IT governance initiatives, the level of strategic alignment increases. The only variation in this result is which element of ITA maturity influences strategic alignment when organizations exhibit a particular corporate culture. For instance, the risk mitigation and key IT governance initiative elements of ITA maturity influence strategic alignment in entrepreneurial organizations. The same two elements of ITA maturity, in addition to the IT capability intent element of ITA maturity, influence strategic alignment in formal organizations. It is important to note that when corporate culture is considered, the business case for IT element becomes nonsignificant in both entrepreneurial and formal organizations and the IT capability intent element becomes significant in formal organizations. This could possibly indicate that when justifications for IT investments or the way IT investments are justified conflict with the corporate culture, culture prevails. This argument is supported by the notion that culture almost always prevails when there is a conflict between a firm's strategic intent and its corporate culture (Kolb and Henchey 2000; Miles and Snow 1994; Tidd et al. 2001).

IT Infrastructure Flexibility and IS Success

The results of the present study suggest that IT infrastructure flexibility directly influences IS success. Specifically, IT infrastructure flexibility directly influences the operational impact of IS use element of IS success. This result holds regardless of the

corporate culture exhibited by an organization. This suggests that there is no strategic impact of IS use associated with IT infrastructure flexibility. This could very well be the case for at least two reasons. One is that IT infrastructure flexibility, relative to IS use, does not enable firms to adjust to changing market conditions and does not enable strategic agility. Another reason, which is based on the premise that the operational impact of IS use is an intermediate impact that influences the strategic impact of IS use, could be that IT infrastructure flexibility only directly influences intermediate impacts as it relates to IS use. Although IT infrastructure flexibility enables the creation of responsive systems, it could very well be that the responsiveness of such systems is limited to internal environmental factors.

IT Infrastructure Flexibility and Firm Performance

The results of the present study suggest that corporate culture plays a vital role in the relationship between IT infrastructure flexibility and firm performance. My findings indicate that IT infrastructure flexibility has no direct or indirect influence on firm performance when corporate culture is not considered. The findings differ significantly when corporate culture is considered.

When considering only entrepreneurial organizations, IT infrastructure flexibility has only an indirect influence on firm performance. Specifically, IT infrastructure flexibility, through its relationship with operational impact of IS use, influences average length of patient stay. In other words, as the level of IT infrastructure flexibility increases in entrepreneurial organizations, thereby increasing the operational impact of IS use, the average length of patient stay decreases. This finding comes as no surprise because prior

studies suggest that IT infrastructure flexibility enables and promotes efficiency at the operational level (Keen 1991). The improved efficiency at the operational level should in turn positively affect clinical elements such as average length of patient stay. My finding also supports Brynjolfsson and Hitt's (1996) claim that the IT platform contributes to productivity.

When considering only formal organizations, IT infrastructure flexibility has a direct and an indirect influence on firm performance. Specifically, IT infrastructure flexibility directly influences both the number of outpatient visits and the average length of patient stay in formal organizations. In other words, as the level of IT infrastructure flexibility increases in formal organizations the average length of patient stay decreases. I interpret this result as an increase in firm performance. IT infrastructure flexibility also influences average length of patient stay through its relationship with operational impact of IS use. However, the indirect influence changes the nature of the relationship between IT infrastructure flexibility and firm performance. As the level of IT infrastructure flexibility increases in formal organizations, thereby increasing the operational impact of IS use, the average length of patient stay increases. This result is indicative of a decrease in firm performance. The reason for this finding has less to do with IT infrastructure flexibility and more to do with the relationship between operational impact of IS use and firm performance. Therefore, this relationship will be discussed in the section pertaining to IS success and firm performance.

The question in need of an answer is why is the direct relationship between IT infrastructure flexibility and firm performance significant in formal organizations and

nonsignificant in entrepreneurial organizations? A viable reason for this result lies in the nature of the two elements of firm performance that IT infrastructure flexibility significantly influences. The number of outpatient visits element of firm performance is a workload or patient capacity measure. The average length of patient stay is a clinical measure. Both types of measures are operational in nature and related to productivity and efficiency. These are ideal areas of focus for formal organizations. They are also areas in which they are more likely to excel and outperform entrepreneurial organizations.

Another point of interest is that IT infrastructure flexibility and the outpatient visits are negatively associated. In other words, as the level of IT infrastructure flexibility increases the number of outpatient visits decreases. This suggests that although an organization is better able to adapt to expected changes in its internal and external environments, this flexibility does not translate into being able to accommodate more outpatient visits. This result might be attributed to a trade-off between the decision to invest in the technology and personnel necessary to increase flexibility of the IT platform and the decision to invest in the equipment and professionals necessary to offer services that would increase the number of outpatient visits. An alternative explanation might be the increase in complexity of the systems put in place to increase the flexibility of the IT platform. The increase in the complexity of the systems could greatly hamper the efficiency of end-users and, thus, their ability to accommodate more outpatients.

It should also be noted that regardless of the corporate culture exhibited by the organizations in this study, IT infrastructure flexibility had no significant effect on the profitability (i.e., operating margin) and revenue (i.e., net patient revenue) elements of firm

performance used in this study. These results support the claims of others who have studied IT infrastructure flexibility and financial performance (Shafer and Byrd 2000; Weill and Olson 1999). These studies suggest that the discovery of a significant relationship between IT infrastructure flexibility and financial performance is not very likely.

Strategic Alignment and IS Success

The results of this study suggest that corporate culture plays an integral role in the relationship between strategic alignment and IS success. The findings of the present study indicate that only in formal organizations does strategic alignment influence IS success. More specifically, strategic alignment directly influences the operational impact of IS use when considering only formal organizations. In other words, as the level of strategic alignment in formal organization increases, so does the operational impact of IS use. These results are consistent with findings in prior studies. Studies conducted by Miles and Snow (1978; 1994) suggest that formal firms are more centrally planned and managed than entrepreneurial firms. As such, formal organizations tend to be centrally managed and are more likely to embrace and exhibit characteristics of shared domain knowledge. The findings of the present study are supported by other studies that suggest that the effect of strategic alignment on IS success is greater in a firm that embraces a culture of shared domain knowledge (Avital and Vandenbosch 2002; Chan et al. 1997b; Reich and Benbasat 1996).

Strategic Alignment and Firm Performance

The results of the present study suggest that corporate culture plays a vital role in the relationship between strategic alignment and firm performance. The findings of the present study indicate that strategic alignment has a direct influence on three elements of

firm performance when corporate culture is not considered. Specifically, the level of strategic alignment directly influences the number of adjusted patient days, average length of patient stay, and net patient revenue. The same is true when only entrepreneurial organizations are considered. As the level of strategic alignment increases in entrepreneurial organizations, they experience increases in adjusted patient days, average length of patient stay, and net patient revenue. The anomaly of these findings is that average length of stay was expected to decrease as the level of strategic alignment increased. With the exception of this anomaly, the results can be interpreted as an increase in strategic alignment leads to an increase in firm performance along two dimensions. This finding can be attributed to entrepreneurial organizations' ability to effectively implement and align strategic plans. Because these organizations employ a more formal methodology, relative to their strategic planning processes, than formal organization, they are more adept at ensuring synergy between their business and IT strategies (Chan 2002; Luftman 2000; Luftman et al. 1993; Luftman et al. 1999). In fact, Chan (2002) found that organizations with better structural alignment have a greater predisposition for strategic alignment than organizations with poor structural alignment.

Regarding the previously mentioned anomaly (i.e., the positive association between strategic alignment and average length of patient stay), there could be a number of reasons for this result. One is that the small amount of variance accounted for by the variables in the model when culture is not considered ($R^2=.07$) suggests that other factors also contribute to average length of patient stay. Furthermore, because strategic alignment implies that business and IT priorities and objectives are in accord, the effect of strategic

alignment on clinical elements such average length of stay may not manifest as clearly as its effect on elements directly related to business initiatives.

When considering only formal organizations, strategic alignment has no significant effect on any element of firm performance. A reason for this could have to do with the fact that formal organizations do not implement strategic plans as well as entrepreneurial organizations. Centralized management in formal firms can make decisions about their stable set of technologies without the benefits of a plan because of similar decisions they may have made in the past (Bradley et al. Forthcoming). Unfortunately, this philosophy no longer applies to formal organizations in the healthcare industry. This is because the healthcare industry has lagged behind other industries in adopting formal strategic planning techniques. The instability and uncertainty that currently exists in the healthcare industry further exacerbates the issue.

IS Success and Firm Performance

The results of the present study suggest that corporate culture plays a vital role in the relationship between IS success alignment and firm performance. The findings indicate that IS success has no direct effect on any element of firm performance when corporate culture is not considered. The results differ significantly when considering corporate culture. When considering only entrepreneurial organizations operational impact of IS use directly influences average length of patient stay. More specifically, as the operational impact of IS use increases, average length of patient stay decreases. The interpretation of this result suggests an increase in firm performance.

When only formal organizations are considered operational impact of IS use directly influences average length of patient stay. More specifically, as the operational impact of IS use increases, average length of patient stay increases. The interpretation of this result suggests a decrease in firm performance. There are at least two reasons for this result. One is that operational efficiency more than likely affects elements that pertain to business initiatives and productivity, not clinical elements such average length of stay. As such, the effect of successful IS on clinical elements (even if significant) may not manifest as clearly as its effect on elements directly related to business initiatives in formal organizations. Another way to explain this result is that the efficiency and productivity of an organization and its systems, no matter the level, cannot fully explain the effect on variables that are dependent upon the state of the patient and type of illness. This was exactly the case at Massachusetts General Hospital. Although the hospital cited important, tangible improvements in many areas, it acknowledged that it still faced still important challenges when it came to the hospital's average length of stay (Massachusetts General Hospital 1998).

It should also be noted that the strength of the relationship between operational impact of IS use and average length of patient stay is significantly greater in formal organizations than in entrepreneurial organizations. However, the direction of the relationship is more favorable in entrepreneurial organizations than in formal organizations. Given that operational impact of IS use accounts for about 50% of the total variance explained ($R^2=.30$) for the average length of patient stay variable, it is reasonable to expect the relationship to be stronger in formal organizations. The former result (i.e., the

relationship being more favorable in entrepreneurial organizations) suggests that entrepreneurial organizations are better than formal organizations at leveraging intermediate impacts (even if they are at the operation level) to achieve their business objectives.

Implications

Research Implications

Researchers investigating the strategic value of IT should contemplate including the elements of ITA maturity as variables because of the substantial effects found in this study. The results of the present study indicate that several dimensions of ITA maturity may also help to explain some of the variance in studies investigating issues related to IT infrastructure flexibility, strategic alignment, IS success, and firm performance. The results of the present study also suggest that the type of cultural environment affects some of the relationships between factors in my research model. This shows that corporate culture should be included in studies examining the value of IT and IT artifacts. Even when relationships between two factors in the model were found to be significant in both cultural types, there were still substantial differences in the strengths of the relationships for both entrepreneurial firms and formal organizations. This suggests that researchers should review the research on strategic information systems planning, IT strategic management, and information resource management a little more critically and evaluate whether corporate culture has been an important missing variable in that literature. The findings of the present study seem to suggest that this could very well be the case.

A general implication of the results of this study is that corporate culture and the elements of ITA maturity are important in studying the effects of IT resources on firm performance. Very few studies at the organizational level of analysis have considered either of these contingencies individually in their models and they have certainly not considered them together. Corporate culture has been shown to be an important contingency and the elements of ITA maturity have been shown to be an important antecedent in evaluating the strategic value of IT. These results support those of other researchers, including Sabherwal (Sabherwal 1999). Combined with findings on the value of IT plans in other studies (Bradley et al. Forthcoming; Raghunathan and Raghunathan 1994), these results firmly establish that ITA maturity is an antecedent that should be accounted for when considering the realization of IT resources, specifically the realization of IT infrastructure flexibility and strategic alignment and their ensuing influence on firm performance.

The findings of the present study indicate that some elements of ITA maturity have a greater influence on the realization of IT resources than other elements of ITA maturity. This suggests that researchers may want to investigate these elements separately. It could quite possibly be that combining the elements masks a great deal of information. Separating the elements provides researchers the opportunity to gain more insight by investigating the ITA maturity construct at a greater level of granularity.

Lastly, although the effects of the elements of ITA maturity were greater in entrepreneurial organizations, ITA maturity was still important in formal organizations. The results of the model for entrepreneurial organizations closely resemble the results of the combined model. This assessment suggests several of things. One thing that it suggests

is that the effects of the variables in the research model are so much greater in entrepreneurial organizations that they outweigh the effects of those variables in formal organizations. The second assertion is that the nature of the variables is more conducive to entrepreneurial organizations than they are to formal organizations. The third assertion is that the number of formal organizations in the present study may be too few to detect all of the significant paths in the research model.

Managerial Implications

Organizations should not neglect the ITA but rather should devote just as much time and energy to its quality and detail as they devote to other corporate endeavors. This support includes the allocation of sufficient human and financial resources. Providing adequate resources is of great importance because the development of a mature ITA can be quite time consuming and dynamic in nature, requiring frequent changes (Goodhue et al. 1992a; Henderson and Venkatraman 1995).

Along certain dimensions, the level of ITA maturity had a significant bearing on IT infrastructure flexibility, strategic alignment, IS success, and various elements of firm performance in both entrepreneurial and formal organizations. As regulations and competition in the healthcare industry necessitate rapid changes, more hospitals will take on the characteristics of an entrepreneurial firm. Additionally, such companies besieged by competition and looking to invest more in their IS may need to look first at the operational level since this is where the biggest impact is likely to be felt, according to findings of the present study. Perhaps even entrepreneurial organizations may want to take lessons from formal organizations when it comes to justifying IT investments. Especially since business

case for IT is the only element of ITA maturity to have a significant effect on the strategic impact of IS use. This could help prevent entrepreneurial organizations from spending indiscriminately without proper and appropriate business justification. Organizations may need to pursue ways to increase the strategic value of IT in order to justify their IT expenditures. In the present study, several significant relationships were found that indicate ITA has some strategic value. The relationship between business case for IT and strategic impact of IS use has already been mentioned, but the most telling of the relationships are the indirect influences of the elements of ITA maturity on the elements of firm performance. It is important for organizations to understand when and under what circumstances ITA maturity will have a significant effect on firm performance. In both entrepreneurial and formal organization, for example, certain elements of ITA maturity indirectly influence elements of firm performance through their relationship with IT infrastructure flexibility, strategic alignment, and IS success. It is imperative that organizations not sacrifice one IT resource for the other, but devote sufficient financial, human and technical resources for all three. As articulated in prior studies (Chan 2002; Chan et al. 1997b; Ross 2003), it is this type of total commitment and devotion from top management that affects overall firm performance, and through which strategic value ultimately flows.

Limitations of Study

The current study has several limitations that should be considered when interpreting the results. The most significant limitation of the study is its relatively small

sample size. Although the methodology chosen is able to accommodate smaller samples, larger samples are ideal as they can help mitigate issues related to power. PLS requires a minimum sample size that equals 5-10 times or greater the number of items comprising the formative factor with the highest number of items or the number of independent factors influencing a single dependent factor. Sample size is not an issue when analyzing the combined groups; however, sample size does become an issue when one wishes to test the model separately for each group of data. For instance, the cluster analysis yielded two groups with sample sizes of 47 and 24. Although the guideline for the sample size was met in my model, a larger sample size is always desirable in an analysis of this type. I should note, however, that the need for multiple respondents serves as an impediment to obtaining a larger sample.

Another limitation of the current study is that the entire sample came from a single industry. The firms chosen for this study were restricted to the healthcare industry. Unfortunately, this restriction, limits the generalizability of the study making it less appropriate and challenging to simply the results of the study in a manner that would make the findings and implications applicable to firms in other industries.

Lastly, it should be pointed out that the present study violated one of the assumptions normally associated with multigroup analysis -- data set independence. This violation occurred because the data sets used to compare the two models both came from a larger data set. However, it should be noted that the same violation was evident in other published studies that made use of multigroup analysis (Bradley et al. Forthcoming; Grace and Pugesek 1998; Smith, Brown, and Valone 1997).

Suggestions for Future Research

Future research on the strategic value of ITA should continue to examine factors such as corporate culture and types of IS use, in addition to environmental uncertainty. Future studies should also consider different definitions of corporate culture and the strength of the culture exhibited. I have shown that one conceptualization of culture does affect the relationships among constructs in this study's research model. Future research is needed, with other conceptualizations to support or refute the results of the present study, to get a clearer picture of the effect of this important concept.

Other studies that analyze the strategic value of ITA might also look at the impact of different types of IS use. The impact of IS use has mainly been viewed as one overall impact instead of as different effects at different levels in the organization. Future studies need to break down the impact of IS use into different types, such as the ones in this study. It seems from the results of the present study that the operational impact of IS use is an intermediate impact that could affect the strategic impact of IS use. This possibility certainly needs to be explored further.

Different industries might also be analyzed in future studies. The present study focused on the healthcare industry. Other researchers should study other types of firms in other sectors including manufacturing, financial, and technology. The results of such studies could also be compared to the results of the present study to determine if, and where, similarities and differences exist. General theories could then be developed where appropriate and more specific or limited theories could be developed when differences are discovered.

Conclusion

One of the purposes of this study was to demonstrate the strategic value of ITA by assessing its influence on IS success and firm performance. Another aim of this study was to investigate the influence of an ITA on the realization of IT resources. It has been shown in the present study that contingencies and antecedent variables can make a difference in the results of studies and analyses exploring the strategic value of ITA. Specifically, elements of ITA maturity as antecedent variables and corporate culture as a contingency variable significantly affected the nature of the relationships in the research model. Perhaps multiple in-depth case studies with several hospitals of similar size and different corporate cultures would provide a clearer picture of these differences. Such examinations could prove to have valuable implications for both researchers and practitioners.

In summary, the present study addressed the following research questions:

- To what degree does variation in ITA maturity affect the realization of IT resources?
- What effect does a firm's corporate culture have on the ability of its ITA to influence the realization of IT resources?
- How do variations in ITA maturity affect its influence on IS success and firm performance?
- What effect does a firm's corporate culture have on the ability of its ITA to influence IS success and firm performance?

The findings of the present study suggest that along certain dimensions the level of ITA maturity is paramount when determining the level of IT infrastructure flexibility and

strategic alignment. As ITA maturity increases along certain dimensions so does the level of these IT resources. In addition, the findings indicate that the corporate culture exhibited by an organization moderates the nature of the influence of the elements of ITA maturity on both IT infrastructure flexibility and strategic alignment.

As it relates to IS success and firm performance, the findings of the present study suggest that the level of ITA maturity along certain dimensions is critical when determining the level of IS success and firm performance. More specifically, the business case for IT element of ITA maturity directly influences the strategic impact of IS use element of IS success and the IT capability intent element of ITA maturity indirectly influences the operational impact of IS use element of IS success. Thus, IS success increases as ITA maturity increases along certain dimensions. The findings also indicate that the corporate culture exhibited by an organization moderates the nature of the influence of ITA maturity on IS success.

Elements of ITA maturity also indirectly influence elements of firm performance. As ITA maturity increases along certain dimensions so does the level of certain aspects of firm performance. The corporate culture exhibited by an organization moderates the nature of the influence of ITA maturity on firm performance. Corporate culture moderates the relationship in such a way that the indirect influences of elements of ITA maturity on operational efficiency indicators of firm performance are significant in both entrepreneurial and formal organizations, whereas the indirect influences of elements of ITA maturity on financial indicators of firm performance are significant in only formal organizations. The results of this study and the assertions put forth should appeal to the curiosity of IS

researchers and lead them to further exploration of the constructs of interest in the present study.

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APPENDIX A

INFORMATION TECHNOLOGY ARCHITECTURE SURVEY FOR CIO



Strategic Valuation of Enterprise IT Architecture in Healthcare Organizations Research Survey

The goal of the survey is to assess the strategic value of enterprise IT architecture. We define enterprise IT architecture, henceforth referred to as IT architecture (ITA), as:

The plan (or set of plans) that serves as the organizing logic for decisions that pertain to data, applications, IT infrastructure (technical and human), and management responsibilities and strategies (IT and business), captured in a set of policies, procedures, and technical choices that guide and direct the arrangement, development, and accessibility of those elements with the intent to achieve desired business and technical standardization and integration to enable the accomplishment of a firm's business objectives.

The survey refers specifically to the **firm-wide enterprise architecture**, and should be completed by the CIO, CTO, or other executive responsible for aligning business strategy and enterprise architecture. If your hospital is part of a healthcare system (single- or multi-hospital) or an integrated delivery system, but acts as an autonomous enterprise, take the perspective of that hospital throughout the survey. Please be sure that your responses consistently represent a single perspective – do not shift between the hospital and overall healthcare system perspectives.

All individual firm data will be kept completely confidential. All respondents will receive a summary of the results. Additionally, if you have any questions or advice regarding this questionnaire, please contact either of the persons mentioned below:

Randy V Bradley
Telephone: 334-354-5966
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Terry A Byrd
Telephone: 334-844-6543
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Thank you for participating.

The items below are intended to gather background information on you and your firm.

1. Please enter your survey code: _____
2. Indicate your position. CIO CTO IT Director Other (Position _____)
3. To whom do you report? CEO CFO COO Other (Position _____)
4. Email address (necessary if you want a copy of the results) _____
5. Please indicate the name of your firm. _____
6. Is your firm part of a multi-hospital system? No Yes (Name _____)
7. Is your firm part of an integrated delivery system? No Yes (Name _____)
8. How many full-time IT professionals work in your firm (including contractors hired for at least 1 year)? _____
9. According to the IRS your firm is designated as: not-for-profit for-profit.
10. Does your firm have an enterprise architecture unit or team (including consultants)? No Yes
11. To whom does the head of the enterprise architecture unit report:
 N/A (we do not have an enterprise architecture unit/team CIO Other (Name _____)
12. Approximately what percentage of your firm's 2005 budget is/was for IT? Include hardware, software, outsourcing, contracting, communications, phone, and people dedicated to providing IT services. _____%
13. Approximately what percentage of your firm's 2006 budget is for IT? Include hardware, software, outsourcing, contracting, communications, phone, and people dedicated to providing IT services. _____%

Estimate the percentage outsourced (in terms of budget allocation) for each of the following activities in 2005:

14. Infrastructure and data center operations (computer assets, staffing and related expenses for all shared services). _____%
15. New application/functionality development. _____%
16. Application maintenance/support. _____%
17. Business processes. _____%

Please estimate the following for 2005:	Est. %
18. What percentage of IT projects were delivered on time, on budget?	_____%
19. What percentage of IT projects achieved their intended technical objectives?	_____%
20. What percentage of IT projects achieved their intended business objectives?	_____%

The statements below address the IT capability intent of your firm.

Please rate your level of agreement with each of the following:	Strongly Disagree			Strongly Agree			
	1	2	3	4	5	6	7
21. An intended IT capability of my firm is to develop applications that address enterprise-wide business needs.							
22. An intended IT capability of my firm is to have IT platforms that are based on a set of established standards.							
23. An intended IT capability of my firm is for IT platforms to support infrastructure sharing.							
24. An intended IT capability of my firm is to have business processes that are modular components that plug and play.							

The statements below are meant to assess the extent to which your firm has addressed elements of social and technical risk.

Please rate the extent to which your firm has addressed the risk posed by each of the following:	Not at All							Very Great Extent
	1	2	3	4	5	6	7	
25. The use of new/emerging information technology (e.g., open source, web services).	1	2	3	4	5	6	7	
26. The high level of technical complexity of IT projects.	1	2	3	4	5	6	7	
27. The use of leading edge information technologies.	1	2	3	4	5	6	7	
28. The use of information technology that has not been used in prior projects.	1	2	3	4	5	6	7	
29. The negative effects of corporate politics on IT projects.	1	2	3	4	5	6	7	
30. An unstable organizational environment (e.g., excessive turnover, organization undergoing restructuring during project, change in organizational management during project).	1	2	3	4	5	6	7	
31. The negative attitudes of senior business stakeholders towards IT projects.	1	2	3	4	5	6	7	
32. Lack of cooperation from business stakeholders in adopting new technologies (e.g., not committed to project, resistant to change).	1	2	3	4	5	6	7	

The statements below address the business case for your firm's IT investments.								
Please rate your level of agreement with each of the following:	Strongly Disagree			Agree			Strongly Agree	
	1	2	3	4	5	6	7	
33. My firm justifies IT investments in terms of return on investment (ROI) of enterprise-wide business initiatives.	1	2	3	4	5	6	7	
34. My firm justifies IT investments in terms of reduced cost of IT operations.	1	2	3	4	5	6	7	
35. My firm justifies IT investments in terms of quality of business operations.	1	2	3	4	5	6	7	
36. My firm justifies IT investments in terms of reduced cost of business operations.	1	2	3	4	5	6	7	
37. My firm justifies IT investments in terms of speed to market/strategic agility.	1	2	3	4	5	6	7	

The statements below are meant to address major IT governance initiatives.								
Please rate your level of agreement with each of the following:	Strongly Disagree			Agree			Strongly Agree	
	1	2	3	4	5	6	7	
38. My firm employs a methodology to increase the effectiveness of IT investments.	1	2	3	4	5	6	7	
39. My firm employs a methodology to manage enterprise-wide technical standards.	1	2	3	4	5	6	7	
40. My firm employs a methodology to align IT project priorities with business priorities.	1	2	3	4	5	6	7	
41. My firm employs a methodology to encourage business process module reuse.	1	2	3	4	5	6	7	
42. My firm employs a formal architecture exception process.	1	2	3	4	5	6	7	
43. My firm employs a formal compliance process for IT projects.	1	2	3	4	5	6	7	
44. My firm employs metrics (e.g., six sigma) to assess IT projects.	1	2	3	4	5	6	7	
45. My firm employs a formal technology adoption process.	1	2	3	4	5	6	7	
46. My firm conducts post-implementation assessment of business impacts of IT (including IT projects).	1	2	3	4	5	6	7	
47. In my firm, funding of enterprise applications is centralized.	1	2	3	4	5	6	7	

The statements below are meant to assess the extent to which IT has improved your firm's performance. Please note that stakeholder refers to any combination of patients, physicians, insurance carriers, regulatory agencies, suppliers, and vendors, etc.								
Based on the past five (5) years, please rate the extent to which IT (i.e., information systems, applications) has improved each of the following:	Not at							Very All Great
	1	2	3	4	5	6	7	

The statements below are meant to address major IT governance initiatives.							
Please rate your level of agreement with each of the following:	Strongly Disagree		Agree			Strongly	
	Extent						
48. My firm's speed of response to stakeholders' needs.	1	2	3	4	5	6	7
49. My firm's ability to tailor products/services to individual stakeholder needs.	1	2	3	4	5	6	7
50. The speed at which my firm can enter new markets.	1	2	3	4	5	6	7
51. My firm's ability to quickly respond to changes in regulations.	1	2	3	4	5	6	7
52. The rate at which my firm can introduce new products/services.	1	2	3	4	5	6	7
53. My firm's ability to reduce clinical errors.	1	2	3	4	5	6	7
54. My firm's ability to lower costs of business operations.	1	2	3	4	5	6	7
55. My firm's ability to detect/catch clinical errors.	1	2	3	4	5	6	7
56. My firm's ability to work with external suppliers to leverage shared IT capabilities to create high-value IT resources.	1	2	3	4	5	6	7
57. My firm's ability to manage relationships with outsourcing partners.	1	2	3	4	5	6	7
58. My firm's ability to manage relationships with contracted caregivers who are not employed by this firm.	1	2	3	4	5	6	7

The statements below are meant to assess the corporate culture exhibited by your firm.							
Please rate your level of agreement with each of the following:	Strongly Disagree		Agree			Strongly	
	Extent						
59. My firm is very dynamic and entrepreneurial.	1	2	3	4	5	6	7
60. My firm is very bureaucratic and structured.	1	2	3	4	5	6	7
61. My firm's CEO is an innovator or risk taker.	1	2	3	4	5	6	7
62. My firm's CEO is a coordinator or organizer who avoids taking risks.	1	2	3	4	5	6	7
63. The glue that holds my firm together is commitment to innovation and development.	1	2	3	4	5	6	7
64. The glue that holds my firm together is formal rules and policies.	1	2	3	4	5	6	7
65. My firm emphasizes growth and the acquisition of new resources.	1	2	3	4	5	6	7
66. My firm emphasizes permanence and stability.	1	2	3	4	5	6	7
67. Managers in my firm commonly speak of the company's style or way of doing things.	1	2	3	4	5	6	7
68. Managers in my firm tend to have long tenures at the firm.	1	2	3	4	5	6	7
69. My firm has made its values known through a creed or credo and has made a serious attempt to get managers to follow them.	1	2	3	4	5	6	7
70. My firm has been managed according to long-standing policies and practices other than just those of the current CEO.	1	2	3	4	5	6	7

The statements below are meant to assess the alignment between your firm's IT and business priorities and objectives.							
Please rate your level of agreement with each of the following:	Strongly Disagree		Agree			Strongly	
	Extent						
71. My firm has a business plan to use existing technology to enter new market segments.	1	2	3	4	5	6	7
72. My firm has a business plan to develop new technologies for new kinds of products/services.	1	2	3	4	5	6	7
73. CEO and CIO have a strong working relationship.	1	2	3	4	5	6	7
74. Business and IT strategies are consistent.	1	2	3	4	5	6	7
75. Business personnel participate in IT planning.	1	2	3	4	5	6	7
76. IT personnel participate in new product/service development.	1	2	3	4	5	6	7
77. IT projects have business sponsors.	1	2	3	4	5	6	7

The statements below are meant to identify the individual(s) responsible for defining IT applications, IT personnel requirements, and hardware/software requirements. Please note that *senior IT management* refers to any combination of IT director, CTO, and CIO. *Senior management* refers to any combination of CEO, COO,

and CFO.

78. Please choose the option that best indicates who defines applications for your firm:

- a. Senior IT management only.
- b. Business unit leaders only.
- c. Senior management only.
- d. Business unit leaders in conjunction with senior IT management.
- e. Business unit leaders and senior IT management, all in conjunction with senior management.
- f. Business unit leaders, senior IT management, and senior management, all in conjunction with industry leaders.

79. Please choose the option that best indicates who defines IT personnel requirements for your firm:

- a. Senior IT management only.
- b. Business unit leaders only.
- c. Senior management only.
- d. Business unit leaders in conjunction with senior IT management.
- e. Business unit leaders and senior IT management, all in conjunction with senior management.
- f. Business unit leaders, senior IT management, and senior management, all in conjunction with industry leaders.

80. Please choose the option that best indicates who defines hardware/software requirements for your firm:

- a. Senior IT management only.
- b. Business unit leaders only.
- c. Senior management only.
- d. Business unit leaders in conjunction with senior IT management.
- e. Business unit leaders and senior IT management, all in conjunction with senior management.
- f. Business unit leaders, senior IT management, and senior management, all in conjunction with industry leaders.

Enterprise architecture of the entity: In prior research, we have observed that firms go through stages in the development of their IT capabilities (enterprise architecture).

81. Please choose the description that best matches your entity's IT capabilities (enterprise architecture):

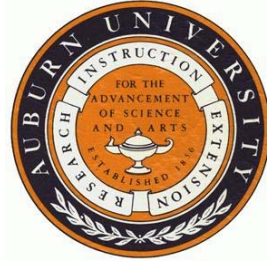
- a. IT capabilities focus on the individual needs of *local business units*.
- b. IT capabilities reflect the efficiencies of *standardized technical platforms and shared infrastructure services*.
- c. IT capabilities support *standardization of processes and provide standardized data where needed*.
- d. IT capabilities create a *library of standardized, reusable business application and process modules*

82. Relative to your enterprise IT architecture/capabilities, what are some of the things that seem to be causing problems/going wrong, and why? Please feel free to elaborate.

83. Relative to your enterprise IT architecture/capabilities, what are some of the things that seem to be going well, and why? Please feel free to elaborate.

APPENDIX B

IT INFRASTRUCTURE FLEXIBILITY SURVEY FOR IT MANAGER



Strategic Valuation of Enterprise Information Technology Architecture in Healthcare Organizations Research Survey

The goal of the survey is to assess the flexibility of firm's information technology (IT) infrastructure. We divide IT infrastructure into two components – technical and human. The survey will assess various aspects of technical infrastructure flexibility including modularity and integration of applications and IT platforms. The survey will also assess various aspects of human infrastructure flexibility including technology knowledge/skills and business knowledge.

The survey refers specifically to the firm's **existing IT infrastructure**, and should be completed by the most senior (with regard to authority) IT manager **below the executive level**. If your hospital is part of a healthcare system (single- or multi-hospital) or an integrated delivery system, but acts as an autonomous enterprise, take the perspective of that hospital throughout the survey. Please be sure that your responses consistently represent a single perspective – do not shift between the hospital and overall healthcare systems perspectives.

All individual firm data will be kept completely confidential. All respondents will receive a summary of the results. Additionally, if you have any questions or advice regarding this questionnaire, please contact either of the persons mentioned below:

Randy V Bradley
Telephone: 334-354-5966
bradlr@auburn.edu

Terry A Byrd
Telephone: 334-844-6543
tbyrd@business.auburn.edu

Thank you for participating.

The items below are intended to gather background information on you and your firm.

1. Your position. ___ CTO ___ IT Director ___ IT Manager ___ Other (Position _____)
2. To whom do you report? ___ CIO ___ CTO ___ CFO ___ Other (Position _____)
3. Email address (necessary if you want a copy of the results) _____
4. Please indicate the name of your firm. _____
5. How many full-time IT professionals work in the IT unit (including contractors hired for at least 1 year)? _____
6. How many devices (e.g., PCs, printers, servers, network devices, PDAs) does the IT unit support? ____
7. How many interfaces (e.g., software applications, platforms) does the IT unit support? _____

The statements below are aimed at assessing the extent of the flexibility of your firm's existing IT infrastructure.

Please rate the extent of each of the following:	Not at							Very Great Extent
	All							
8. Our firm has a high degree of systems inter-connectivity.	1	2	3	4	5	6	7	
9. Our systems are sufficiently flexible to incorporate electronic links to external parties.	1	2	3	4	5	6	7	
10. Remote users can seamlessly access centralized data.	1	2	3	4	5	6	7	
11. Data is captured and made available in the firm in real-time.	1	2	3	4	5	6	7	
12. Software applications can be easily transported and used across multiple platforms.	1	2	3	4	5	6	7	
13. Our firm offers multiple interfaces or entry points for external end users.	1	2	3	4	5	6	7	
14. Our user interfaces provide transparent access to multiple applications regardless of platform.	1	2	3	4	5	6	7	
15. Our firm makes use of middleware to integrate key enterprise applications.	1	2	3	4	5	6	7	
16. Our firm makes use of web services to provide interoperability between software applications running on different platforms.	1	2	3	4	5	6	7	
17. Reusable software modules are widely used throughout our systems development group.	1	2	3	4	5	6	7	
18. Legacy systems within our firm hamper the development of new IT applications.	1	2	3	4	5	6	7	
19. Functionality can be quickly added to critical applications based on end-user requests.	1	2	3	4	5	6	7	
20. Our firm can easily handle variations in data formats.	1	2	3	4	5	6	7	

The statements below are aimed at assessing the extent of the flexibility and domain knowledge (technical knowledge and skills) of your firm's existing IT personnel.

Please rate the extent of each of the following:	Not at							Very Great Extent
	All							
21. Our IT personnel are proficient in/with multiple operating systems.	1	2	3	4	5	6	7	
22. Our IT personnel are proficient in/with distributed processing/computing.	1	2	3	4	5	6	7	
23. Our IT personnel are proficient in network management.	1	2	3	4	5	6	7	
24. Our IT personnel are proficient in/with developing Web-based applications.	1	2	3	4	5	6	7	

The statements below are aimed at assessing the extent of the business knowledge of your firm's existing IT personnel.

Please rate the extent of each of the following:	Not at							Very All Great Extent
	All							
25. Our IT personnel understand the firm's policies and plans.	1	2	3	4	5	6	7	
26. Our IT personnel understand the business environment they support.	1	2	3	4	5	6	7	
27. Our IT personnel are knowledgeable about the firm's business functions.	1	2	3	4	5	6	7	

28. Our IT personnel are knowledgeable about environmental constraints within which the firm operates (e.g., government regulations, competition).	1	2	3	4	5	6	7
29. Our IT personnel are knowledgeable about the firm's critical success factors.	1	2	3	4	5	6	7
30. Our IT personnel are knowledgeable about the firm's products/services.	1	2	3	4	5	6	7
31. Our IT personnel work well in cross-functional teams addressing business problems.	1	2	3	4	5	6	7

The statements below are meant to assess the corporate culture exhibited by your firm's IT unit.

Please rate your level of agreement with each of the following:	Strongly Disagree			Agree			Strongly
	1	2	3	4	5	6	7
32. Our IT unit is very dynamic and entrepreneurial.	1	2	3	4	5	6	7
33. Our IT unit is very bureaucratic and structured.	1	2	3	4	5	6	7
34. Our CIO is an innovator or risk taker.	1	2	3	4	5	6	7
35. Our CIO is a coordinator or an organizer who avoids taking risks.	1	2	3	4	5	6	7
36. The glue that holds our IT unit together is commitment to innovation and development.	1	2	3	4	5	6	7
37. The glue that holds our IT unit together is formal rules and policies.	1	2	3	4	5	6	7
38. Our IT unit emphasizes growth and the acquisition of new resources.	1	2	3	4	5	6	7
39. Our IT unit emphasizes permanence and stability.	1	2	3	4	5	6	7
40. Managers in our IT unit commonly speak of the company's style or way of doing things.	1	2	3	4	5	6	7
41. Managers in our IT unit tend to have long tenures at the firm.	1	2	3	4	5	6	7
42. Our IT unit has made its values known through a creed or credo and has made a serious attempt to get managers to follow them.	1	2	3	4	5	6	7
43. Our IT unit has been managed according to long-standing policies and practices other than just those of the current CIO.	1	2	3	4	5	6	7

APPENDIX C
INFORMATION EMAIL

**INFORMATION EMAIL
for Research Study Entitled
Strategic Valuation of Enterprise Information Technology Architecture in Healthcare
Organizations**

You are invited to participate in a dissertation research study to investigate the strategic value of IT planning in healthcare of organization, specifically within hospitals. This study is being conducted by Randy Bradley, a Ph.D. Candidate in Management Information Systems, under the direction of Dr. Terry Byrd (tbyrd@business.auburn.edu), Professor of Management at Auburn University. The goal of the study is to assess the strategic value of IT initiatives and strategic planning in hospitals by examining the maturity of a hospital's enterprise IT architecture (ITA)/strategic IT plans.

If you decide to participate, I will provide a link to two electronic survey instruments at the end of this email. You may simply click on the respective link to begin the survey. You will be asked to complete a series of questions regarding the current state of IT strategic planning and IT infrastructure flexibility within hospitals. The surveys will take approximately 30 and 15 minutes to complete, respectively. When you have completed the survey, simply press submit to send your electronic response.

You will be asked to provide the name of your hospital on the survey instrument, but you will not be asked to provide your name. This information will serve two purposes. First, it will allow me to match the survey responses for your hospital with additional financial and quality information available in the HIMSS Analytics Database and American Hospital Directory. Second, I will provide a summarized report of the survey results to all hospitals that choose to participate in this study. No hospital names will be included in the report; only aggregate data will be reported and analyzed.

The results of this study may provide insight to you and your hospital regarding the benefits of investment in IT resources and the achievement of alignment between the organizational and IT goals and resources of the hospital. You will receive a report describing the relationship between IT architecture maturity, strategic alignment, IT infrastructure flexibility, and IT success to quality measures and financial measures. These performance measures will include, but may not be limited to, average length of hospital stay, mortality and morbidity, outpatient versus inpatient frequency, operational cost, clinical cost, and return on assets. I cannot promise you that you will receive any or all of the benefits described.

Any information obtained in connection with this study will remain anonymous. Information collected through your participation may be used to fulfill a dissertation requirement for the degree of PhD of Management at Auburn University, published in a professional journal, and/or presented at a professional meeting. You may withdraw from participation at any time, without penalty. However, after you have provided anonymous information, you will be unable to withdraw your data after participation since there will be no way to identify individual information.

HUMAN SUBJECTS
OFFICE OF RESEARCH
PROJECT #06-053 EP 0604
APPROVED 04/14/06 TO 03/13/07

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Your decision whether or not to participate will not jeopardize your future relations with Auburn University or the Management Department of Auburn University.

If you have any questions I invite you to ask them now by emailing me at bradlr@auburn.edu. If you have questions later, I can be reached at (334) 354-5966 (bradlr@auburn.edu) or you may contact my faculty advisor, Dr. Terry Byrd at (334) 844-6543. We will be happy to answer any questions you might have regarding this study or the information to be provided in the survey instrument.

For more information regarding your rights as a research participant you may contact the Auburn University Office of Human Subjects Research or the Institutional Review Board by phone (334)-844-5966 or e-mail at hsubjcc@auburn.edu or IRBChair@auburn.edu.

HAVING READ THE INFORMATION PROVIDED, YOU MUST DECIDE WHETHER TO PARTICIPATE IN THIS RESEARCH PROJECT. IF YOU DECIDE TO PARTICIPATE, THE DATA YOU PROVIDE WILL SERVE AS YOUR AGREEMENT TO DO SO. THIS EMAIL IS YOURS TO KEEP.

IF YOU WISH TO PARTICIPATE, PLEASE CLICK ON THE FOLLOWING LINK TO ACCESS THE ELECTRONIC SURVEY INSTRUMENT:
(Survey hyperlink will be place here, once the survey is ready.)

Sincerely,
Randy Bradley
Department of Management
Auburn University, AL 36849
(334) 354-5966
bradlr@auburn.edu

HUMAN SUBJECTS
OFFICE OF RESEARCH
PROJECT #06-053 EP 0604
APPROVED 04/14/06 TO 04/13/07

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APPENDIX D
SPONSOR LETTER



HIMSS Analytics, a wholly-owned, not-for-profit subsidiary of HIMSS, supports improved decision-making for healthcare organizations, healthcare IT companies, and consulting firms by delivering high quality data and analytical expertise. On behalf of HIMSS Analytics, I am pleased to sponsor the graduate research of Mr. Randy Bradley (bradlrv@auburn.edu), a doctoral candidate in Management Information Systems at Auburn University, Auburn, Alabama. Mr. Bradley is working under the direction of Dr. Terry Byrd (tbyrd@business.auburn.edu), Professor of Management at Auburn.

The goal of his study is to assess the level of sophistication of strategic planning in hospitals relative to IT initiatives by assessing the maturity of a hospital's enterprise IT architecture (ITA). An ITA is a plan (or set of plans) that guides the identification and utilization of the technical and human IT resources at the disposal of an organization, enabling the organization to successfully accomplish its business objectives. Furthermore, the study quantifies the influence of a hospital's ITA on (a) the flexibility of existing IT infrastructure (human and technical); (b) the alignment of business and IT priorities and objectives; (c) the success of information systems in improving the hospital's strategic agility and the management of relationships with external stakeholders; and (d) the financial performance of the hospital. Moreover, this study will examine how these relationships differ both in both nature and strength with variations in ITA maturity and across different organizational cultures. In other words, can a hospital gain more value from IT by implementing and utilizing an ITA with a higher level of maturity?

Results of previous studies indicate that the implementation and utilization of an ITA has become an urgent priority for many organizations. Studies also report that an ITA can help prevent organizations from drifting to the point of developing and acquiring IT resources that are characterized by a hodge-podge collection of incompatible technological resources. In other words, the ITA serves as a guiding force when making decisions about the acquisition of IT resources that could potentially affect interconnectivity and interoperability with other systems within and beyond organizational boundaries. For CEOs and CIOs, this research lends tremendous support to the efforts to quantify the value of IT for the healthcare organization.

HIMSS Analytics recognizes the contribution and benefit of this research for the further advancement of IT in the healthcare industry. We encourage you to assist this effort through the completion of web-based surveys developed for this study. The survey for the CIO will take approximately 30-35 minutes to complete, and the survey for the IT Manager will take approximately 15-20 minutes to complete. If your organization would prefer even more detailed information about the value of IT, an optional survey for the CEO (approximately 30-35 minutes to complete) is also available. Mr. Bradley will provide links to the surveys.

Although summarized results of the study will be provided to HIMSS Analytics and all research participants, individual corporate data will remain strictly confidential. We believe this study will provide valuable insight for CEOs and CIOs as you continue to address the IT needs and issues of healthcare organizations. Thank you for your support of this research project.

A handwritten signature in blue ink that reads "David E. Garets".

David E. Garets
President and CEO, HIMSS Analytics

APPENDIX E
FIRST FOLLOW-UP EMAIL

This email is a follow-up to a survey that was sent approximately two weeks ago. You were asked to complete a survey about the level of strategic IT planning in your hospital, and have your one of your IT managers complete a survey about the flexibility of your hospital's IT infrastructure. Your responses are of great, critical value in identifying the challenges of CEOs and CIOs as they continue to address the IT needs and issues of healthcare organizations.

If you and your organization's IT Manager have already completed the surveys, I would like to thank you for your contribution to this study. If you have been unable to complete the surveys, I would encourage you to add your input to those of your colleagues. If for any reason you are having trouble accessing the links in the previous announcement, they are included at the bottom of this message.

The results of this study will contribute to better understanding of the strategic value of IT initiatives and strategic planning in hospitals by examining the maturity of a hospital's enterprise IT architecture (ITA)/capabilities. More information about the study is provided in the letter from Dave Garets, CEO of HIMSS Analytics. The letter can be accessed at http://business.auburn.edu/~bradlr/research_sponsorship_letter.pdf.

Time is critical so please complete the survey within seven days if your schedule permits. Please remember to also have your IT Manager complete the IT Manager Survey. Your time and cooperation are truly appreciated, therefore, a summary of the results of the study will be provided to all research participants and HIMSS Analytics. The summary report will only make use of aggregate data from all participants, therefore, your responses, organization name, and individual corporate data will remain strictly confidential. Your participation in this study will help provide valuable insight for CEOs and CIOs as they continue to address the IT needs and issues of healthcare organizations.

Your organization code and the links to the two surveys are as follows:

Organization Code:

CIO Survey (20-25 minutes) –
<http://www.surveymonkey.com/s.asp?u=626531745332>

IT Manager Survey (10-15 minutes) –
<http://www.surveymonkey.com/s.asp?u=385001745200>

Thank you for your support of this research project. If you have any questions feel free to contact me at 334-354-5966 or via email at bradlr@auburn.edu.

Randy V Bradley
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Auburn University
Department of Management
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Auburn University, AL 36849
Mobile: (334) 354-5966
Office: (334) 844-6459
Fax: (334) 844-5159

APPENDIX F

SECOND FOLLOW-UP EMAIL

Approximately 1 month ago I sent you an email requesting your participation in my dissertation study on the strategic value of enterprise IT capabilities in hospitals (the original email is at the end of this message). Unfortunately, I have yet to receive the completed surveys for your organization/hospital. I ask that you please complete the CIO/IT Director Survey and have one of your IT Managers complete the IT Manager Survey. If you, regardless of your title/position, are the person responsible for the day-to-day operations of the IT unit and IT personnel, then you should complete both the CIO/IT Director Survey and the IT Manager Survey. Otherwise, please forward the link to the IT Manager Survey to the appropriate person.

It is important that both surveys be fully completed, because I must match the responses from the CIO/IT Director Survey with those from the IT Manager Survey to get a broader perspective of the level of strategic planning within your organization. For your convenience, I am including your organization code and the links to the CIO/IT Director and IT Manager Surveys. I ask that you please ensure that both surveys are completed within 7 days.

Thank you for your support of this research project. If you have any questions feel free to contact me at 334-354-5966 or via email at bradlr@auburn.edu.

Organization Code:

CIO/IT Director Survey (10 - 15 minutes) -
<http://www.surveymonkey.com/s.asp?u=626531745332>

IT Manager Survey (5 - 7 minutes) -
<http://www.surveymonkey.com/s.asp?u=385001745200>

Sincerely,
Randy Bradley

Randy V Bradley
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Lowder Business Building, Suite 401
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