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THE FLORIDA STATE UNIVERSITY
COLLEGE OF BUSINESS

ANTECEDENTS OF CIO EFFECTIVENESS: A ROLE-BASED PERSPECTIVE

By

DETLEV H. SMALTZ

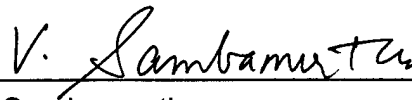
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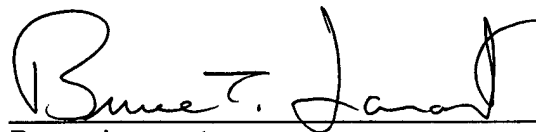
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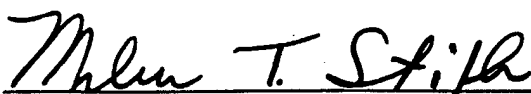


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ABSTRACT

Over the past four decades the role of information technology (IT) has evolved from a primarily supporting role to an increasingly strategic role with the potential to provide competitive advantage. With this new found importance, many organizations have created, primarily over the past two decades, an executive position to manage IT -- the chief information officer (CIO).

However, the literature, and particularly the practitioner literature suggests, that this new executive may be experiencing some problems performing up to expectations. This literature suggests that too many CIOs are not able to focus on business imperatives nor are they able to effectively communicate in business terms, thereby alienating themselves from their CEOs and other top managers. Others argue that CIOs in general tend to focus themselves too narrowly on technical issues as opposed to how IT can add value to the business as a whole. The volume of literature in the practice community reflecting a perception of CIO ineffectiveness provides both the relevance and motivation for this study. What factors contribute to a CIO's effectiveness within his/her organization? Are personal attributes or skills solely responsible for CIO effectiveness or are there other organizational factors that contribute to CIO effectiveness?

This field study of one hundred and six organizations investigated the antecedents of CIO effectiveness in the context of an dynamic, information intensive industry – the healthcare services industry. Prior theory was used to specify two key antecedents of CIO effectiveness: CIO capability and TMT/CIO engagements. The relationship between CIO capability and CIO effectiveness, as well as, the relationship between TMT/CIO engagements and CIO effectiveness was each posited to be moderated by the organization's strategic vision of IT.

Data were collected from dyads of CIO and TMT members. Using a multi-dimensional, role-based measure of CIO effectiveness and the analytical technique of partial least squares estimation, the research model explained 66% of the variance in CIO effectiveness. As predicted, CIO capability (i.e., the CIO's strategic business knowledge, the CIO's strategic IT knowledge, the CIO's political savvy, and the CIO's interpersonal communication skill) had a significant relationship with CIO effectiveness. In addition, TMT/CIO engagements had a significant relationship with CIO capability. While no direct effect of TMT/CIO engagements on CIO effectiveness was found in this study, there is suggestive evidence that TMT/CIO engagements and CIO capability have a synergistic effect on CIO effectiveness. In addition, there is some evidence that suggests that CIO capability may mediate the relationship between TMT/CIO

engagements and CIO effectiveness. Future research should attempt to more robustly test for this mediating relationship.

Finally, no moderating effects of an organization's strategic vision of IT on the main relationships in the research model were found. Future research may want to revisit extant strategic vision conceptualizations to determine their salience in the post-internet environments that organizations find themselves in today.

CHAPTER 1

INTRODUCTION

Over the past four decades the role of information technology (IT) has evolved from a primarily supporting role (Kanter, 1987; Sauers & Yetton, 1997) to an increasingly strategic role with the potential to provide competitive advantage (McFarlan, 1984; Porter & Millar 1985; Drucker, 1988; Applegate & Elam, 1992; Sambamurthy & Zmud, 1992, 1994; Mata, Fuerst, & Barney, 1995; Powell & Dent-Micallef, 1997, McNee, 1997). With this new found importance, many organizations have created, primarily over the past two decades, an executive position to manage IT -- the chief information officer (CIO) (O' Riordan, 1987; Donavan, 1989, Stephens, Ledbetter, Mitra & Ford, 1992; Applegate & Elam, 1992; Grover, Jeong, Kettinger & Lee, 1993).

However, the literature, and particularly the practitioner literature suggests, that this new executive may be experiencing some problems performing up to expectations. A sample of practitioner titles exemplifies the general perception that CIOs are, perhaps, under performing: "CIOs Not Up to Snuff as Active Business Leaders" (Wilder, 1992); "Chasm Closer: the CIO/CEO

Gap Still Dogs Information Systems" (King, 1995); "Hatred: an Update (on) CIO-CEO Relationships" (Klug, 1996). Wang (1994), himself a CEO of a Fortune 500 company, argues that too many CIOs are not able to focus on business imperatives nor are they able to effectively communicate in business terms, thereby alienating themselves from their CEOs and other top managers. Others argue that CIOs in general tend to focus themselves too narrowly on technical issues as opposed to how IT can add value to the business as a whole (Wilder, 1992; Klug 1996; King 1995). While somewhat unscientific, the mere volume of literature in the practice community reflecting a perception of CIO ineffectiveness provides both the relevance and motivation for this study. What factors contribute to a CIO's effectiveness within his/her organization? Are personal attributes or skills solely responsible for CIO effectiveness or are there other organizational factors that contribute to CIO effectiveness?

This study will focus on the factors that affect CIO effectiveness. Specific research questions include:

1. How does a CIO's knowledge and interpersonal skill affect CIO effectiveness?
2. How do engagements between top management team members and the CIO affect CIO effectiveness?

3. What is the nature of the relationship between a CIO's knowledge and interpersonal skill and TMT/CIO engagements?
4. How does an organization's strategic vision of IT moderate the relationships between a CIO's knowledge and interpersonal skill, TMT/CIO engagements, and CIO effectiveness?

Objectives of the Study

The purpose of this study is to examine the effects of 1) business related and strategic IT related knowledge and interpersonal skill of the CIO and 2) interactions between the CIO and top management team members on CIO effectiveness. The combination of business related knowledge, IT strategic related knowledge and interpersonal skill are referred to here as CIO capability. The interactions between the CIO and the TMT are referred to as TMT/CIO engagements. The thesis is that both CIO capability and TMT/CIO engagements are important factors that contribute to CIO effectiveness. In addition, I propose that CIO capability's and TMT/CIO engagements' effect on CIO effectiveness depends on an organization's strategic vision of IT.

The specific benefits of this study are that:

1. It develops a theoretical model to describe the relationships between CIO capability, TMT/CIO engagements, an organization's strategic vision of IT and CIO effectiveness.
2. It extends the literature on CIO effectiveness by going beyond CIO capability, which has been the primary independent variable in the literature, to include organizational contextual factors, such as TMT/CIO engagements and an organization's strategic vision of IT which are herein proposed to have an effect on CIO effectiveness.
3. It defines and develops ways of measuring CIO effectiveness, TMT/CIO engagements, CIO business related knowledge, strategic IT related knowledge, and interpersonal skill.

Organization of the Dissertation

This dissertation is divided into six chapters including the introduction. Chapter two develops a theoretical model of the relationships between CIO capability, TMT/CIO engagements, strategic vision of IT, and CIO effectiveness. This model is developed and supported through an examination of the related research and practitioner literature. Chapter three develops the research model of this study. Research questions are stated, research constructs are defined and hypotheses are posited. Chapter four articulates the methodology that will be used to examine the hypotheses. This includes the operationalization of the

constructs, description of the sample to be examined, and presentation of the data reliability. Chapter five reviews the results of the hypothesis tests. Chapter six discusses the implications of the results for both the academic and practitioner community. In addition, strengths, limitations and directions for future research are presented.

CHAPTER 2

THEORETICAL FRAMEWORK

The theoretical framework for this research is developed by bringing together four areas of the literature: 1) the IT Management and CIO literature, 2) leadership theory, 3) top management team or upper echelon theory, and 4) the literature on management effectiveness.

The IT Management and CIO literature is used to establish the importance of effective IT management in contemporary organizations, particularly in information intensive industries. It is also used to establish the motivation for this research: the literature suggests that CIO effectiveness within the context of their own organization is below the expectations of senior management. In addition to suggesting that CIO effectiveness is subpar, the IT Management and CIO literature is informative in suggesting leadership traits and behaviors are key factors that contribute to CIO effectiveness. While leadership theory is a broad and vast theoretical area, this research will focus in part on the area of leadership traits and behaviors.

The IT Management and CIO literature also suggests that CIOs should be part of the dominant coalition, or top management team, of the organization in order to be effective, at least in information intensive industries. Therefore, a specific focus will be given to leadership traits and behaviors that the literature suggests are necessary for success in the upper echelons of an organization. Therefore, upper echelon theory will be reviewed to inform this research regarding the traits and behaviors necessary to be an effective executive. Upper echelon theory also informs this research regarding organizational contextual factors, such as hierarchical position in the organization, which might have an effect on an executive's potential effectiveness. Finally, the management effectiveness literature will inform this research regarding the general factors that are associated with management effectiveness.

After establishing the theoretical basis for this research by reviewing the literature on CIOs and IT Management, Leadership, Top Management Teams and Upper Echelon Theory, and Management Effectiveness, this chapter will establish the specific focus of this study – CIO effectiveness. It then describes the constructs of CIO effectiveness, CIO capability, CIO/TMT engagements and the TMT's strategic vision of IT. This chapter concludes by proposing a conceptual model (Figure 2) using these aforementioned constructs to guide the research.

IT Management and CIO Literature

As noted in the introduction, over the past four decades the role of information technology (IT) has evolved from a primarily supporting role (Kanter, 1987; Sauers & Yetton, 1997) to an increasingly strategic role with the potential to provide competitive advantage (McFarlan, 1984; Porter & Millar 1985; Drucker, 1988; Applegate & Elam, 1992; Sambamurthy & Zmud, 1992, 1994; Mata, Fuerst, & Barney, 1995; Powell & Dent-Micallef, 1997, McNee, 1997). In fact, Mata, Fuerst & Barney, (1995) suggested that of the all the attributes of organizational IT that have the potential to create sustained competitive advantage for an organization (i.e., customer switching costs, access to capital, proprietary technology, technical IT skills, and managerial IT skills), only managerial IT skills has the potential to do so.

With this growing awareness of the importance of IT management, many organizations have created, primarily over the past two decades, an executive position to manage IT -- the chief information officer (CIO) (O' Riordan, 1987; Donavan, 1989, Stephens, Ledbetter, Mitra & Ford, 1992; Applegate & Elam, 1992; Grover, Jeong, Kettinger & Lee, 1993).

However, the literature, and particularly the practitioner literature , suggests that this new executive may be experiencing some problems performing up to expectations. A sample of practitioner titles exemplifies the general perception

that CIOs are, perhaps, under performing: "CIOs Not Up to Snuff as Active Business Leaders" (Wilder, 1992); "Chasm Closer: the CIO/CEO Gap Still Dogs Information Systems" (King, 1995); "Hatred: an Update (on) CIO-CEO Relationships" (Klug, 1996). Wang (1994), himself a CEO of a Fortune 500 company, argues that too many CIOs are not able to focus on business imperatives nor are they able to effectively communicate in business terms, thereby alienating themselves from their CEOs and other top managers. Empirical findings support this assertion. For instance, in their case study of 14 CIOs, Feeny, Edwards & Simpson (1992) found that the qualities of the ideal CIO included both a business perspective as well as communication skills. Furthermore, they found that of the 14 organizations, only five had "excellent" CEO/CIO relationship while nine had either a "fair" or "poor" relationship. Brier (1994), in interviews with 50 CEOs also found general business knowledge and interpersonal communication skills to be among the top six qualifications for a CIO – the other four were leadership, knowledge of applying information technology to business, innovation, and technology awareness. In a case study of six international organizations, Danielson, DeLisi & Posner (1998) found that other than technical knowledge, CEOs did not believe that their senior IT executive demonstrated enough general management knowledge, a strategic perspective, or adequate interpersonal skills. This coincides with others who argue that CIOs in general tend to focus themselves too narrowly on technical issues as opposed to how IT can add value to the business as a whole (Wilder, 1992; Klug 1996; King 1995; Palmlund, 1997). In fact, Earl & Feeny (1994)

found that the CIO's ability to add value is the biggest single factor in determining whether a firm views IT as an asset or a liability.

These studies taken together present a general sense that CIOs are not performing to expectations. In addition they provide a rich set of traits and behaviors that are posited to yield high CIO effectiveness. Table 1 is a synopsis of the CIO and IT Management literature with respect to various aspects linked to CIO effectiveness.

In addition to indicating that organizations in general are having problems with CIO effectiveness, the literature suggests that when CEOs and other top managers perceive their CIO to be ineffective, leadership is the attribute that is most often found to be missing in the person of the CIO (Feeny & Willcocks, 1998; Watson, 1998; Hersher, 1998; Nilson, 1998; Brier, 1994; Grover et al, 1993; Kanter, 1987). This suggests a review of leadership theory to aid in the development of the conceptual basis for this research.

Leadership Theory

Leadership theory argues that leadership is a process as well as a property (Jago, 1982). "The process of leadership is the use of noncoercive influence to direct or coordinate the activities of the members of an organized group toward

Table 1 – Factors Linked to CIO Effectiveness

Source	Focal Construct(s) Affecting Aspects of CIO Effectiveness
Feeny, Edwards & Simpson (1992)	Affecting CEO/CIO Relationships: • Honesty, integrity, sincerity, openness • Business perspective, motivation, language • Communicator, educator, motivator, leader, politician, relationship builder • Continuously informed on developments in IT, able to interpret their significance to the business • Change-oriented team player, catalyst to business-thinking
Applegate & Elam (1992)	Characteristics of new CIO Hires: • Broad business perspective • Shift from primarily internal hires to equal likelihood of external hires • Shift from primarily IT background to equal likelihood of business background
Brier (1994)	Top Qualifications for a CIO: • Leadership • Knowledge of applying information technology to business • General business knowledge • Innovation • Technology awareness • Interpersonal communication
Nilson (1998)	Qualifications for a CIO: • Technical savvy • Experience commensurate with organizational needs • Business perspective • Leadership
Armstrong (1995)	IT deployment: • Strategic business and IT knowledge • Participation on the top management team • Organizations with 'transform' vision of IT
Karimi, Gupta, & Somers (1996)	IT Leader Effectiveness • Rank, role and status must be congruent with organizational strategy
Stephans, Ledbetter & Mitra (1992)	Bridging gap between an organization's strategy and its successful use of IT • Operates primarily as an executive as opposed to a functional manager • Actively participates in strategy planning • Acts as a bridge between the IT group, the organizations functional areas and external entities • Interaction with other executives and managers outside the IT function • Skilled reading of situations • Strategic business focus • Formal resource allocation authority • Peer acceptance
Palmlund (1997)	CIO success: • External focus as opposed to internal focus • Proactive as opposed to reactive • Communicate well with the rest of the business organization • Deliver on promises

Table 1 continued – Factors Linked to CIO Effectiveness

Source	Focal Construct(s) Affecting Aspects of CIO Effectiveness
Danielson, DeLisi & Posner (1998)	CIO Effectiveness: • General management knowledge • Strategic focus • Interpersonal skill • Understanding of technology at architectural level • Awareness of developing technologies
Earl & Feeny (1994)	Successful CIOs add value by: • Obsessive & continuous focus on business imperatives • Appropriate interpretation of external IT success stories • Establishment & maintenance of executive relationships • Concentration of the IS development effort • Achievement of a shared and challenging vision of the role of IT Profile of CIO that successfully adds value: • Behavior (loyal to the business and displays an openness) • Motivation (goal, idea, and systems thinking orientation) • Competencies (consultant/facilitator, good communicator, IT knowledge) • Experience (background as an IS functional analyst)

the accomplishment of group objectives. As a property, leadership is the set of qualities or characteristics attributed to those who are perceived to successfully employ such influence” (pg. 315). This definition is informative in that it directs research efforts to investigate both the traits of leaders (i.e., the properties of leadership) as well as the behaviors of leaders (i.e., the process of leadership).

The leadership literature is fairly vast and broad. While leadership writings such as Sun Tzu’s The Art of War (circa, 500 B.C.) predate the birth of Christ, the leadership literature within a modern organizational context has its roots in trait based research prior to 1950 and in the behavior based research conducted at Ohio State University and University of Michigan conducted in the 1950s and 1960s (Yukl, 1989). The trait based leadership studies found a myriad of traits

that were positively related to a host of dependent variables such as subordinate satisfaction, motivation, performance, etc. Stogdill (1974) and Jago (1982) provide meta-analytical summations of this trait-based research as well as the behavior-based research after 1950 in Table 2.

In contrast to the trait based studies prior to 1950, the Ohio State University and University of Michigan studies focused on effective leadership behavior. In the OSU studies, effective leadership behavior, as perceived by subordinates, could be factored into the two dimensions of "consideration" and "initiating structure". That is, subordinates saw leaders as either engaged in friendly or supportive behavior or in defining roles and structures for himself and his/her subordinates (Yukl, 1989). The University of Michigan studies found three leadership behaviors that differentiated between effective and ineffective managers: 1) task-oriented behavior (similar to the initiating structure dimension in the OSU studies), 2) relationship-oriented behavior (similar to the consideration dimension in the OSU studies), and 3) participative leadership. The third dimension, participative leadership, describes the extent to which a leader employs subordinates in the decision making process and runs on a continuum from autocratic to consultative to joint decision-making to delegation (Yukl, 1989).

Table 2 - Leadership Traits & Behaviors (adapted from Stogdill (1974) & Jago (1982))

Category	Trait or Behavior
Physical Characteristics	• Activity, energy • Age • Appearance, grooming
Social Background	• Education • Social Status • Mobility
Intelligence & Ability	• Intelligence • Judgement, decisiveness • Knowledge • Technical competence • Fluency of speech, communicative ability
Personality	• Adaptability • Adjustment, normality • Aggressiveness, assertiveness • Alertness • Ascendancy, dominance • Emotional balance, control • Enthusiasm • Extroversion • Independence, nonconformity • Objectivity, tough-mindedness • Originality, creativity • Personal integrity, ethical conduct • Resourcefulness • Self-confidence • Strength of conviction • Tolerance for stress
Task-Related Characteristics	• Achievement drive, desire to excel • Drive for responsibility • Enterprise, initiative • Persistence against obstacles • Responsible in pursuit of objectives • Task orientation
Social Characteristics	• Ability to enlist cooperation • Administrative ability • Attractiveness • Cooperativeness • Nurturance • Popularity, prestige • Sociability, interpersonal skills • Social participation • Tact, diplomacy

Burns (1978) and Bass (1985) later refined this research into the transactional and transformational theories of leadership as well as the charismatic theory of leadership (House, 1977). These researchers proposed that there were two basic styles of leadership. Leadership style was either focused on exchanges for valued outcomes (transactional) or adherence to deeply held personal value systems that compel followers into action (transformational/charismatic) (Kuhnert & Lewis, 1987). Similarly, Dansereau, Graen & Haga (1975) present the vertical dyad linkage model of leadership in which each leader-follower dyad is examined and posited to be uniquely different from all other dyads. In this perspective leader-follower dyads are in a dynamic state whose outcomes depend on the specific context.

Jago (1982) in his meta analysis of leadership studies, presents an informative 2 X 2 framework to view the literature on leadership along the dimensions of leadership traits and behaviors on the one hand and the dimensions of universality and contingency on the other hand. Table 3 is an adaptation of Jago's 2 X 2 framework. The Table was adapted by presenting studies representative of each cell in the framework.

Table 3 – Leadership Theory Review (adapted from Jago, 1982)

		Theoretical Approach	
		Universal	Contingent
Focal Leadership Construct	Leader Traits	Bird, 1940 Gibb, 1947 Jenkins, 1947 Mann, 1959 Stogdill, 1974 Jago, 1982	<u>Contingency Theory</u> Fiedler, 1967 Fiedler, 1971 Fiedler & Chemers, 1974
	Leader Behaviors	<u>OSU Studies</u> Halpin & Winer, 1952 Fleishman, 1951 Fleishman, Harris & Burt, 1955 Halpin, 1957 <u>Michigan Studies</u> Katz, Maccoby & Morse, 1950 Katz, Maccoby, Gurin & Floor, 1951 <u>Transformational and Charismatic Theories</u> House, 1977 Burns, 1978 Bass, 1985 Bass, Avolio & Goodheim, 1987 Cannella & Monroe, 1997 Bass, 1998	<u>Path-Goal Theory</u> House, 1971 House & Dessler, 1974 House & Mitchell, 1974 <u>Vertical-Dyad Linkage Theory</u> Dansereau, Graen, & Haga, 1975 <u>Transactional Theories</u> Conger & Kanungo, 1987 Howell, 1992

The recent literature on CIOs suggests that both the focal leadership constructs (i.e., traits and behaviors) (Feeny & Willcocks, 1998; Watson, 1998; Hersher, 1998; Nilson, 1998; Brier, 1994; Grover et al, 1993; Kanter, 1987), as well as both theoretical approaches to leadership (i.e., universality and contingency) (Karimi et al, 1991; Applegate & Elam, 1992; Stephens et al, 1992; Feeny et al, 1992; Boyle, 1994; Armstrong, 1995; Longest, 1998) are important in

the study of CIO effectiveness. Therefore this study will incorporate both the traits/behaviors dimension of leadership as well as the universality/contingency dimensions.

The full set of traits and behaviors in Table 2 that have historically generated positive effects on a host of dependent variables is unmanageable for a focused dissertation. Fortunately, the CIO and IT management literature suggests a fairly consistent subset of those found in Table 2 that will serve as the basis for this research. These include interpersonal skills and traits (i.e., communicative ability, and political savvy or tact) (Wang, 1994; Palmlund, 1997; Mitchell, 1997; Danielson et al, 1998; Watson, 1998; Furlonger, 1998) as well as joint technical and business competence or knowledge (Raskas, 1992; Brier, 1994; Wang, 1994; Armstrong, 1995; Rockart et al, 1996; Ross et al, 1996; Nilson, 1998; Feeny & Willcocks, 1998). In addition, since leadership is founded on the concept of influence, an aspect of power (Szilagyi & Wallace, 1990), this study will take into account the different contingent sources of power and influence that are operative at the upper echelons of organizations.

French & Raven (1959) first suggested five bases of power exist between a social agent (O) attempting to influence a person, a group or a part of a group (P). These bases of power are:

“(1) reward power based on P’s perception that O has the ability to mediate rewards for him; (2) coercive power, based on P’s perception that O has the ability to mediate punishments for him; (3) legitimate

power, based on the perception by P that O has a legitimate right to prescribe behavior for him; (4) referent power, based on P's identification with O; (5) expert power, based on the perception that O has some special knowledge or expertness...." (pg 378).

Later, Finkelstein (1992) refined these bases of power for top management teams of organizations. He suggested that the bases of power operative at the upper echelons of organizations are structural power (legitimate power), ownership power, which refers to the extent of equity ownership in the organization, expert power and prestige power (referent power). Since this dissertation involves CIOs in healthcare services organizations which are nationally composed of 90% private, not-for-profit organizations, this study will focus on structural or legitimate power (i.e., the hierarchical level of the CIO), expert power (i.e., the extent of knowledge degree of strategic IT and business knowledge of the CIO) and prestige or referent power (i.e., membership in the organization's top management team).

Finally, since a number of researchers posit the importance of credibility and trust to effective leadership in general (Zand, 1997; Mishra, 1996) this research will also investigate the CIOs ability to develop trusting relationships with the other members of the TMT. This is indicated as an important factor in this research effort by the many suggestions in the CIO and IT management literature that suggest a credibility gap exists between the CIO and the other members of the TMT (Wilder, 1992; Wang, 1994; King, 1995; Klug, 1996).

While this literature review on leadership has, to this point, been solely focused on individual leadership, recent literature requires a review of the literature on top management teams or upper echelon theory. With respect to organizations, CEOs and boards of directors have historically been posited to have the greatest potential to impact organizational outcomes, or put another way, to lead the organization. However, recent theory and empirical findings indicate that organizational leadership extends beyond the CEO and board of directors to the other top executives and managers in an organization known as the top management team (Hambrick, 1981; Hambrick & Mason, 1984; Bantel & Jackson, 1989; Chaganti, 1987; Day & Lord, 1988; Hambrick, 1996; Finkelstein & Hambrick, 1996). Since the IT Management literature suggests the CIO should be a member of the top management team (Richmond & Schlier, 1997; Rockart et al, 1996; Mata et al, 1995), a review of upper echelon theory is warranted at this point.

Upper Echelon Theory

Hambrick & Mason's (1984) upper echelon theory introduced the notion that top managers, not just the CEO, could have an organizational impact. In upper echelon theory, the characteristics of the dominant coalition in an organization effect the strategic choices of the organization, which, in turn, effects organizational performance. The relevance of this theory is argued on the basis of the limits on strategic decision-making imposed by the phenomenon of

bounded rationality (March & Simon, 1958; Cyert & March, 1963). By employing a group of heterogeneous top managers that each brings their own perspective to bear on a strategic decision, the effects of bounded rationality on any one individual are overcome, thereby improving strategic decision alternative formation, strategic decision-making and/or firm performance (Bantel & Jackson, 1989; Eisenhardt, 1989; Murray, 1989) and overcome the limitations of finite repertoires of any individual executive (Finkelstein & Hambrick, 1996).

Heterogeneity refers to the demographic characteristics of the members of the top management team such as age, experience, background, educational level, etc. While TMT heterogeneity may overcome the effects of bounded rationality of any one individual, increase the strategic decision alternatives and thus quality of the strategic decision making process it also tends to lead to difficulty in reaching consensus (Dess, 1987; Hambrick, 1995; Hambrick, 1996). In fact Dess (1987) argues that pursuit of an organizational strategy requires a unified focus that can only be provided by a homogenous top management team.

Hambrick (1995) echoes these views arguing that lack of homogeneity can lead to a fragmented approach to strategy formulation and execution that can have negative effects on organizational performance. If both TMT heterogeneity and TMT homogeneity have been linked to positive organizational outcomes this theory base would seem untenable. Fortunately, bringing a contingency perspective to bear on TMT homogeneity vs. TMT heterogeneity issue allows for reconciliation of the two seemingly diametrically opposed views. Finkelstein & Hambrick (1996) and Priem (1990) insightfully present the impact of

environmental dynamism, or turbulence, on the homogeneity/heterogeneity to firm performance relationship. They argue that in stable environments top management team homogeneity will lead to higher firm performance whereas in dynamic environments top management heterogeneity will lead to higher firm performance. Preim's (1990) posited curvilinear relationship is depicted in figure 1 below:

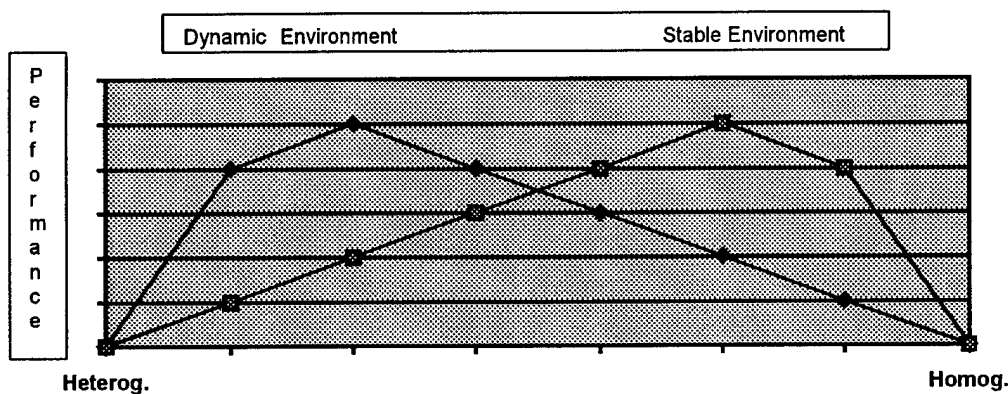


Figure 1: Relationship Between TMT Demographics, Firm Performance & Environmental Dynamism (Adapted from Priem, 1990)

Finkelstein & Hambrick (1996) and Priem's (1990) theory was later tested and supported by Hambrick, Cho, & Chen (1996) who found that TMT heterogeneity is positively related to overall performance improvements in turbulent industries and that TMT heterogeneity is negatively related to action execution speed (i.e. lack of consensus). This suggests that it is important to employ a contingency perspective to investigate TMT demographics and their impact on firm performance. In stable industries, TMT homogeneity is implicated as an important research factor. In turbulent industries, TMT heterogeneity is implicated. Since this thesis will be carried out in the healthcare industry which is

highly dynamic, information intensive and complex (Goes & Meyer, 1991; Kim & Michelman, 1990; Adams, 1996; Longrest, 1998) the theory on TMT heterogeneity implies, among other things, that a breadth of functional backgrounds and experience are required to achieve optimum firm performance.

Top management team and upper echelon theory, therefore, has relevance to this study because of the increased importance cited in the literature of the CIO. That is, in organizations where the CIO is part of the dominant coalition, or top management team, theory would predict increased formation of strategic alternatives, improved strategic decision-making, organizational performance, competitive advantage, CIO effectiveness (Richmond & Schlier, 1997; Rockart et al, 1996; Mata et al, 1995) particularly in information intensive industries like the healthcare industry.

In addition, while CIO membership on the TMT has been suggested in the literature, recent findings in the healthcare industry show that only about half the CIOs are formal members of their organization's TMT (Smaltz, 1998a). In a study of 131 not-for-profit hospital and clinic CIOs, Smaltz (1998a) found that only 73 (56%) were formal members of their respective organizations top management team. As such, this dissertation will incorporate the notion of TMT heterogeneity with respect to functional backgrounds – specifically inclusion of the CIO as a member of the TMT and its effect on CIO effectiveness.

Separate from, though related to, CIO membership on the TMT (and its importance to CIO effectiveness) is the importance of engagements with the other members of the TMT and the development of networks (or trusting relationships) with the other members of the TMT (Armstrong, 1995; Eisenhardt, 1997; Eisenhardt, Kahwajy, & Bourgeois, 1997). Relationships between and among executives in an organization, much less trusting relationships, cannot be formed without the opportunity for engagement or interaction. Eisenhardt and her colleagues (1997) found that interaction was critical to understanding one's own position and those of others. Furthermore it was only through frequent interaction that senior executives got to know one another and trust one another to present conflicting views in the spirit of effective problem solving. In light of the credibility gap between CIOs and the rest of the organization cited earlier in this dissertation, it seems imperative to include the extent of interaction with other TMT members as a potential impacting factor on CIO effectiveness. And not only the extent of interaction (i.e., a quantity of interaction) but also the quality of those interactions in the form of the development of trusting relationships with the other members of the TMT. Lewicki & Bunker (1996) argue that development and sustenance of trusting professional relationships is key to sustaining strong and effective collaboration between the parties in the relationship. Collaboration for optimal organizational outcomes would seem to be the *prima fascia* requirement of all top management teams. Lack of collaboration with any individual executive would suggest perceptions of ineffectiveness. In addition, the credibility gap suggested in the CIO and IT Management literature previously

cited points to the potential need to include trusting relationships in any investigation of CIO effectiveness.

While leadership theory and upper echelon theory provide a sound framework to look at fundamentals of CIO effectiveness, an additional theoretical framework for development of a complete conceptual model is needed – the literature on management effectiveness in general.

Management Effectiveness

Boyatzis (1982) argues that effective job performance of a manager requires a fit between 1) the individual's competencies, 2) the demands of the specific job, 3) effective specific actions or behaviors and 4) the organizational environment. Therefore, an individual's competencies are a necessary but not sufficient condition of management effectiveness. The first three concepts parallel those discussed previously in the leadership and top management/upper echelon sections. That is, with respect to the job of a CIO, the IT management and leadership literature previously outlined inform us that certain individual traits or competencies must exist along with specific actions or behaviors for both leadership and management effectiveness to be perceived. These will not be reiterated in this section, as I believe they have been adequately covered in the previous three sections. However, Boyatzis (1982) insightfully argues that, the organizational context must also be taken into consideration. Organizational

context, with respect to management effectiveness, and specifically CIO effectiveness, can include but is not limited to, the relative hierarchical level of an executive (Ein-Dor & Segev, 1978; Raghunathan & Raghunathan, 1989), an organization's strategic orientation (Scott Morton, 1992; Kumar, Subramanian & Yauger, 1997; Chan, Huff, Barclay, & Copeland, 1997), the composition of its top management team (Bantel & Jackson, 1989; Eisenhardt, 1989; Murray, 1989; Priem, 1990; Hambrick, Cho, & Chen, 1996), and the TMT's strategic vision of IT (Schein, 1992; Armstrong, 1995).

For instance, hierarchical level of the IT executive has been shown to be an important source of power and influence in organizations (Raghunathan & Raghunathan, 1989). In addition, it has been suggested that membership on the top management team is vital to CIO effectiveness (Rockart et al, 1996). With respect to the organizational environment, it has been suggested that an organization's strategic vision of IT (Schein, 1992) has a moderating effect on an organizations ability to deploy IT (Armstrong, 1995), suggestive that it also has an effect on CIO effectiveness. Finally, it has been suggested that an organization's strategic orientation can have a considerable effect on top manager roles (Raskas & Hambrick, 1992) and therefore should be controlled for in any study of top manager effectiveness.

In summary, the management effectiveness literature informs this research of the importance of including four important factors in an investigation of CIO

effectiveness. These are the 1) the individual's competencies, 2) the demands of the specific job, 3) effective specific actions or behaviors and 4) the organizational environment.

Having reviewed the pertinent literature on IT Management/CIOs, Leadership Theory, Top Management Teams/Upper Echelon Theory, and Management Effectiveness, the researcher now turns to the development of a conceptual model, informed by these theoretical perspectives, to guide this research.

Focus of the Study

This research is concerned with examining the factors that affect CIO effectiveness. As such, the focus of the theoretical model, developed in this chapter, is at the executive level of an organization – with the CIO and the members of the TMT.

Stephens, Ledbetter, Mitra & Ford (1992) credit Synott & Gruber (1981) with first using the term 'Chief Information Officer' and defining a CIO as "a senior executive responsible for establishing corporate information policy, standards, and management control over all corporate information resources" (pg. 61. More recently, and to reflect the functional boundary spanning role of the contemporary senior IT executive in an organization, the CIO has been defined as "the highest-

ranking IS executive who typically exhibits managerial roles requiring effective communication with top management, a broad corporate perspective in managing information resources, influence on organizational strategy, and responsibility for the planning of IT to cope with a firm's competitive environment" (Grover, et al, 1993, pg 108). While the term CIO will be used throughout this study to represent the senior IT executive in an organization, it is important to note that this individual's actual title may vary from organization to organization. Typical titles used in organizations include, but are not limited to, Senior Vice-President of Information Systems/Technology/Services, Vice-President of Information Systems/Technology/Services, Information Systems/Technology Manager, and Director of Information Systems/Technology/Services. Regardless of the title employed, this study will focus on the senior IT executive in an organization and use the term CIO to represent this individual.

With the theoretical underpinnings provided at the beginning of this chapter, construction of the conceptual model for this research study follows. The construct of CIO effectiveness is presented first followed by, in turn, CIO capability, CIO/TMT engagements, and TMT's Strategic Vision of IT.

CIO Effectiveness

CIO effectiveness is defined as the CIOs performance within their role as CIO of a particular organization, as assessed by the CEO and other members of

the TMT. The extant literature on overall CIO effectiveness and/or success is almost exclusively based on subjective assessments of CIOs collected using interview or questionnaire methodologies. In addition the literature primarily documents factors that are associated with "successful" CIOs without directly measuring the level of success or effectiveness. (Feeny et al, 1992; Stephens et al, 1992; Applegate & Elam, 1992; Earl & Feeny, 1994). Other studies use more readily measurable constructs such as extent of IT use (Boynton, Zmud & Jacobs, 1994) or extent of IT deployment (Armstrong, 1995; Armstrong & Sambamurthy, 1999), as a barometer of CIO success or IT management effectiveness. However, as the literature has suggested, deploying IT is often not enough for the CEO and other members of the TMT to view the CIO as successful or effective within their organization. At the executive levels of the firm, while delivery and use of functionality remains important to the CIO, equally important are the successful fulfillment of a host of other value-adding roles that could serve as dependent variables. For instance, Rockart, (1982) outlined the emerging CIO's role as one with primarily a staff orientation and responsibility for corporate IT strategy. Feeny, Edwards, & Simpson (1992) argue that CIO efficacy hinges upon establishing a successful two-way relationship with the CEO. Stephens, et al (1992) in their case review of five CIOs argue that the CIO's role is an executive role, as opposed to a manager role and specifically the roles of resource allocator, politician, interdepartmental network builder, and communicator are important. Grover, et al (1993), drawing on six of Mintzberg's (1990) ten managerial roles, reformulates them for the CIO position arguing that

the roles of leader, spokesman, monitor, liaison, entrepreneur, and resource allocator are important. Applegate & Elam (1992) implicitly argue that the CIO's role is to be both a strategic technology and business leader. Earl & Feeny (1994) argue that in order for a CIO to add value to an organization he/she must be skilled at relationship building with the other executives in the organization and skilled at integrating IT investments with business strategy. Karimi, Gupta, & Somers, (1996) in looking at the relationship between a firm's competitive strategy and the CIO's role (and rank), posited that the roles of corporate officer, general business manager (as opposed to IT specialist), politician, strategist, and IT manager are important to varying degrees depending on the organization's competitive strategy. Table 4 below, summarizes some of the CIO roles expressed in the literature along with their meaning.

Jack Livingston, CIO of National Car Rental, argues that at least one problem with the profession of the CIO (and, I would add, the measurement of CIO effectiveness) is a lack of generally accepted CIO role expectations (Wilder, 1992). Indeed, while some commonalties exist from one study to another, Table 4 on CIO roles resonates with Livingston's assertion – while there has been quite a bit written about CIO roles, a clear, consistent, "generally accepted" CIO role is not evident in the literature.

Table 4 - CIO Roles from the Literature (Smaltz, 1998)

Explicit or Implied CIO Roles/Expectations	Meaning	Citation
• Staff Orientation • Responsible for Corporate IT Strategy	• executive, as opposed to operational focus • self explanatory	Rockart, 1982
• Relationship building w/CEO	• self explanatory	Feeny et al, 1992
• Executive role • Resource allocator • Politician • Interdepartmental network builder • Communicator	• executive as opposed to operational focus • has IT resource spending authority • has gained influence via ability to read situations and respond appropriately and tactfully • acts as a bridge between IT group, other functional areas, and external entities • speaks to peers in business language, not technical jargon	Stephens et al, 1992
• Leader • Spokesman • Monitor • Liaison • Entrepreneur • Resource Allocator	• responsible for motivation of subordinates and for staffing and training • interdepartmental information disseminator and advocate • scans the environment for changes in technology &/or competition • interorganizational information disseminator and advocate • initiator and/or designer of controlled change in organization • allocator of human, financial, material and other resources	Grover et al, 1993
• Strategic Technology Leader • Strategic Business Leader	• develops and implements IT strategy • develops and implements business strategy	Applegate & Elam (1992)
• Relationship Builder • Integrator	• self-explanatory • integrates IT investments with business strategy	Earl & Feeny (1994)
• Corporate Officer • General Business Manager • Politician • Strategist • IT Manager	• executive as opposed to operational focus • business as opposed to IT focus • understanding of non-rational as well as rational perspectives in the organization • long-term focus as opposed to short term • IT as opposed to business focus	Karimi et al (1996)

Since organizations are engaged in so many different activities, it seems inconceivable that a single information strategy, or a single CIO role expectation, will fit them each equally well. For instance, some organizations view IT as an asset to be managed internally whereas others view it as a liability or a

commodity to be outsourced (Lacity & Hirschheim, 1993). It seems plausible then, that in light of these views of IT, that role expectations of the CIO might be quite different from organization to organization, even within the same industry. It also suggests that research into CIO effectiveness should take into account all of the CIO roles that are pertinent to that particular organization. Indeed Karimi, et al's (1996) work, looking only within the context of competitive strategy, is a step in the direction of peeling back the layers of the various organizational contexts that might affect CIO role expectations and hence any evaluations of a CIO effectiveness. Karimi and his colleagues found that the role of the IT leader differed significantly ($p = .019$) with respect to the competitive strategy of the firm. They argued that a mismatch between an organization's competitive strategy and IT management strategy would result in situations where IT became a competitive burden (and, I would add, where the CIO might readily be seen by top management as ineffective). Therefore, it seems logical that any investigation of CIO effectiveness can not be fully determinant based only on measures of single roles such as extent of IT deployment or extent of IT use. In addition the contingent nature of organization's competitive writhing within their respective industries, requires a contingent perspective that richly captures the contextual organizational environment within which the CIO finds himself/herself. Indeed, recent research by Welbourne, Johnson, & Erez (1998) argues for a role-based performance scale when attempting to measure employee performance. They proposed the roles of job, organization, career, team and innovator as representative of typical employee roles in an organizational context, but add that

“we are not suggesting that the five roles outlined in the RBPS (role-based performance scale) are the only relevant ones...” (pg. 544). While the roles that Welbourne and her colleagues have proposed may need refinement for different industries and different employee levels within an organization, their call for assessing the full range of roles in employee performance assessments resonates with intuitive fidelity.

Based on this literature that clearly shows the dynamic nature of CIO roles within their respective organizational contexts along with Welbourne et al's (1998) call for role-based performance measurement, this research attempts to measure CEO and TMT perceptions of CIO effectiveness along the entire spectrum of CIO roles that could be pertinent in any given organization.

In an effort to develop a means of measuring CIO effectiveness along these lines (i.e., role informed measures of CIO effectiveness), Smaltz (1999) used the CIO data in this study to find six distinct and specific roles that are operative for healthcare CIOs. – IT educator, IT contract oversight, classic IT support/utility provider, integrator, informaticist/IT strategist and business partner/strategist. Table 5 below presents the results of his findings.

Table 5 - Healthcare CIO Role Expectations (Smaltz, 1999)

Role Factor	Description
IT Educator	This role is concerned with ensuring that the human foundations for innovation are in place. In this role the CIO is 1) a champion for computer literacy throughout the organization and 2) among TMT members, and 3) a conduit of insight into the value of current and emerging technology.
IT Contract Oversight	This role is concerned with ensuring that strategic partnerships with external vendors are optimized. In this role the CIO 1) negotiates new contracts with external vendors/partners, 2) accomplishes executive contract management and oversight and 3) interacts often with non-IT managers throughout the organization to ensure these contracts are meeting business unit needs.
Classic IT Support/Utility Provider	This role is the classic IT support role ensuring that the IT unit is operationally efficient and effective. In this role the CIO ensures that 1) the IT unit is responsive to customer needs, and 2) that the organization has established an effective internal network to facilitate intra-organizational communication and 3) that the organization's users have adequate information tools with which to effectively do their jobs.
Integrator	This role is concerned with developing value-added integration among and between business units as well as with external partners. In this role the CIO 1) directs efforts to build an integrated delivery system, 2) implements the computer-based patient record, 3) migrates the organization from legacy stand-alone applications to cross-departmental integrated applications and 4) seeks to develop a thorough understanding of the healthcare delivery process.
Informaticist/IT Strategist	This role is concerned with developing sound data management and IT plans and processes. In this role the CIO ensures that 1) organizational data is secure and confidential, 2) that organizational data is highly accurate, 3) that senior managers and department managers are provide with metrics that shows the value of the IT, 4) an information systems plan that aligns with the business is in place and 5) the builder and maintainer of a change-ready IT staff.
Business Partner/Strategist	This role is concerned with issues relating to the greater organization outside of the IT unit. In this role the CIO 1) helps to shape the organizations overall mission and vision, 2) is heavily involved in overall business strategic planning and decisions, 3) provides expertise on multi-disciplinary BPI teams, and 4) directs IT-enabled BPR.

In addition to finding six distinct CIO organizational roles within the healthcare industry, Smaltz (1998) also found that a host of organizational contextual factors have an impact on the relative importance of the different CIO

roles. For instance, he found that extent of the CIO's internal networking activities, CIO membership on the TMT, an organization's tax status (i.e., for-profit, not-for-profit), and system affiliation (i.e., independent organizations as opposed to multi-entity organizations) all had a significant impact on the relative importance of the six CIO role expectations. This provides additional support to the notion that an investigation of CIO effectiveness must take into account all the CIO roles that might be pertinent in his/her respective organization.

By assessing CIO effectiveness along the full spectrum of roles the CIO is asked to play (as opposed to a single dependent variable role such as IT deployment), a better understanding of the independent variables and their relationships is expected to emerge. It is hoped that by assessing CIO effectiveness in the context of their many organizational roles, that previous research attesting to the importance of CIO capabilities will be supported and new findings reflecting the importance of TMT/CIO engagements to CIO effectiveness will emerge. In addition, it is expected that measuring effectiveness within organizational role contexts will show the moderating effect of strategic IT vision on the relationships between CIO capability, TMT/CIO engagements, and CIO effectiveness.

CIO Capability

Arguably the most studied area of CIO effectiveness is the area of CIO capability. Some of this body of literature, summarized in Table 1, has focused on personal attributes such as vision, leadership ability, political savvy, and ability to communicate in business terms (Stephens et al, 1992, Feeny et al, 1992, Earl & Feeny, 1994, Wang, 1994) while other areas of the literature focus on background characteristics such as prior experience, age, and education level (Armstrong, 1995). In this study, CIO capability is defined as the knowledge and interpersonal skill of the CIO to include: 1) the degree of strategic business knowledge 2) the degree of strategic IT knowledge, 3) the degree of political savvy, and 4) the ability to communicate with the other members of the TMT in business terms. These constructs were selected based on the factors linked to CIO effectiveness in Table 1 as well as Stogdill's (1974) and Jago's (1982) summary of leadership traits and behaviors summarized in Table 2. While inclusion of each factor in Table 1 and each leadership trait and behavior in Table 2 would make this dissertation untenable, the author has selected those factors, traits and behaviors that are predominantly indicated in the CIO and IT Management literature (i.e., business knowledge, IT knowledge, political savvy and communicative ability).

Degree of Strategic Business Knowledge

Debatably the biggest shortcoming of CIOs referenced in the literature appears to be the lack of knowledge regarding the business of the organization. "CIOs Not Up to Snuff as Active Business Leaders" (Wilder, 1992) typifies some of the practitioner press that berates the CIOs lack of business acumen. Wang (1994) suggests that this lack of business acumen on the part of CIOs is at least in part to blame for the general 'disconnect', to use his term, between CIOs and CEOs and other top managers. In fact, Applegate & Elam's (1992) findings indicate that CIOs simply must possess a broad business perspective in order to be effective. In a case study of 6 CEOs from diverse industries, Danielson, DeLisi & Posner (1998) found that CEOs expect, along with IT technical knowledge, that their CIOs possess the same business knowledge and perspective as they themselves do – in effect to develop the business knowledge of a CEO-understudy. In addition, Armstrong (1995) and Armstrong & Sambamurthy (1999) found that firms with the highest extent of IT deployment were those where the CIO possessed a high level of both strategic business and IT knowledge. Finally, Chan, Huff, Barclay & Copeland (1997) found that business strategic orientation leads to IS-business strategic alignment which leads to IS effectiveness and improved business performance. Clearly, a strong knowledge of the business, at a strategic level, is important for CIO effectiveness.

Degree of Strategic IT Knowledge

As the highest-ranking executive within the IT organization, a fundamental requisite of any CIO is a high degree of strategic IT knowledge (Wang, 1994; Armstrong, 1995). However, recent hiring trends show that a number of organizations are selecting executives for the CIO position from functional areas other than the IT organization (Applegate & Elam, 1992; Brier, 1994; Abrahamson, 1998). This could lead to a reduction in strategic IT knowledge at the highest level of the IT organization – the CIO. Yet Feeny et al (1992), in their case study of 14 organizations, found that successful CIOs had spent almost their entire careers within the IT functional area, suggesting the importance of in-depth knowledge of the IT domain. In addition, Chan et al (1997) also found the importance of a strong strategic IT orientation to IT-business strategic alignment and IS effectiveness. Finally, Garets & Redman (1998) and Wang (1994) argue that significant knowledge of the IT domain is absolutely essential for CIO success. Therefore, it is anticipated that CIOs with a high degree of strategic IT knowledge will be perceived by their top management teams as being more capable, and ultimately more effective, than CIOs with little strategic IT knowledge.

Degree of Political Savvy

The top management team and upper echelon literature clearly shows that at the executive level within organizations, political activity is operative. In their case study of 5 CIOs, Stephens et al (1992) found that a skilled reading of situations was an important factor affecting a CIO's ability to successfully bridge the gap between the IT organization and the strategic business objectives of their respective firms. In an exploratory study Feeny et al (1992) interviewed 14 CEOs from large organizations in the U.K. They proposed from their interviews that political prowess was an essential quality of the ideal CIO. One comment from a CEO in their study exemplifies this need: "I need a CIO who can conciliate and defuse and explain instead of confront..." (pg. 445).

The strategic change literature presents another lens that is informative in developing the theoretical framework in this study. The implementation of new enterprise-wide IT almost always presents the occasion for organizational change (Barley, 1986). Since implementing new enterprise-wide IT is generally a typical function of the IT organization and, hence the ultimate responsibility of the CIO, it follows that the literature on change process should be informative with respect to CIO effectiveness. In fact, Hutt, Walker and Frankwick's (1995) study of the implementation of an IT project at a Fortune 500 firm showed that the project was, along with a strategic change process, a political process. They argue that "tensions across units spawned by differing views of the technology-

market fit can be constructive and speed learning. In contrast, conflicts over turf stifle learning, hamper communication, and create distrust" (pg.29). Clearly the CIO engaged in the process of strategic change via IT must not only be aware of the political ramifications of IT, but also be able to effectively and positively deal with the political processes in their respective organizations. This suggests that CIOs with a high degree of political savvy will be perceived by their top management teams as more capable, and ultimately more effective.

Interpersonal Communicative Ability

Another personal attribute that has been often cited in the literature to be important to CIO effectiveness is the ability of the CIO to communicate in business terms. In their study of 14 UK organizations, Feeny et al (1992) proposed that the ideal CIO communicates in terms that the CEO can understand as opposed to employing technical language. The following comment by one of the CEOs in their study exemplifies the importance of communicating in business terms: "(Our) CIO discusses (in English!) how we might achieve what I want, not (in technobable) why we can't achieve what I want; he (or she) doesn't patronize me by saying 'it's all very complicated and would take a long time to explain to someone like you.'" (pg. 444). Brier (1994) in a study of 50 CEOs found that, among other things, interpersonal communication was an important skill of the ideal CIO. Palmlund (1997) echoes these findings noting that CIOs who fail did not communicate well with the rest of

the business while those that succeeded were those that communicated well both internally and externally. Finally, CIO Magazine (1997), lists the ability to communicate with and understand the needs of non-technical internal clients as one of the skills needed by contemporary CIOs. This suggests that CIOs that communicate in non-technical terms, but rather in business terms, will be perceived by their top management team as more capable, and ultimately more effective, than CIOs that communicate in technical terms.

In summary, CIO capability is indicated in the literature as an important antecedent to CIO effectiveness. Furthermore, the literature suggests that the degree of strategic business knowledge, the degree of strategic IT knowledge, the degree of political savvy and the ability to communicate in non-technical, business terms are important dimensions of CIO capability.

TMT/CIO Engagements

A number of researchers and practitioners suggest that communication and collaboration with the top managers is at least one of the keys to CIO effectiveness. Earl & Feeny, 1996 argue that "it is only through dialogue with the CEO and other executives that the CIO can tease out the motivations, meanings, and priorities; know the mind of the business; sense the impending changes; and maintain relevance and timeliness of the IS effort" (pg. 14). However, communication cannot occur without opportunities for interaction or engagement.

The literature suggests that a number of factors are indicative of TMT/CIO engagements to include 1) the hierarchical level of the CIO within the organization, 2) formal membership on the organization's top management team, 3) the extent of networking, and 4) the extent of trusting relationships with other members of the TMT. I take each in turn.

Hierarchical Level of the CIO

Prior research has found that the reporting level of an individual in an organization can influence perceived authority and power to influence the actions of TMTs (Hambrick, 1981). More specifically, Raghunathan & Raghunathan (1989) found significant effects in their study of CIO's rank and its influence on CIO's role in the organization. This finding leads them to suggest that the reporting level of the CIO may be a key variable to increasing organizational effectiveness of IT. In a study of 64 newly appointed CIOs, Applegate & Elam (1992) suggest how the reporting relationship phenomenon, with respect to CIOs may work. They found 27% report directly to the CEO and argue from this increased position of rank they can directly affect the strategic direction of their organization through increased participation with senior managers.

The practitioner literature also suggests the importance of the hierarchical level of the CIO. Monahan (1998), notes that "some of the most successful

healthcare organizations in America are the ones whose CEOs and CIOs are joined at the hip" (pg 10). Lando (1998) suggests that effective IT leadership can only be accomplished by bringing the CIO into the senior leadership ranks. Nilson (1998) suggests that "where your top information technology executive ranks in the organization will determine how much influence he or she will have on the organization's success" (pp. 9-10). Schrage (1996) reports that CIOs feel that their relevance and importance is significantly affected upon the rank of their direct reporting official. He notes that CIOs with direct reporting relationships with the CEO report that they have a greater chance to impact enterprise-wide decisions and policies than those that report to the CFO or COO where they can be marginalized. This literature suggests that CIOs more proximal to the CEO in the organization's hierarchy will enjoy greater opportunities for engagement with the other members of the top management team and that this increased interaction will ultimately lead to greater CIO effectiveness.

TMT Membership

Research has shown that even more important to CIO effectiveness than the reporting level of the CIO, is whether or not he/she is a member of the organization's TMT (Karake, 1995, Earl & Feeny, 1994; Grover, et al, 1993, Stephens, et al, 1992; Feeny, Edwards & Simpson, 1992). Rockart, Earl & Ross (1996) argue that in order to achieve two-way strategic alignment of the IT unit and the business unit, the CIO must be either a formal or at least an informal

member of the top management team. Richmond & Schlier (1997) from the Gartner Group ascribe a 0.9 probability that a CIO's longevity as well as his/her perceived effectiveness in healthcare organizations is dependent upon acceptance as an integral part of the organization's executive management team. Furthermore, lack of full acceptance by executive management minimizes the CIO's influence and adversely positions the IT department to address key issues. Membership on the top management team provides the CIO with regular opportunities for engagement with other top managers. It stands to reason, that through this membership the CIO has improved chances to be effective since he/she is, by virtue of membership on the TMT, assured of executive level engagements.

Extent of Networking

Extent of networking is defined as the frequency of formal and informal interactions with the CEO and the other members of the TMT. While enjoying a higher position in the organization's hierarchy and membership on the top management team provide the potential for increased TMT/CIO engagements and ultimately CIO effectiveness, the development of networks with the other top managers in the organizations that transcend these organizational structuring arrangements is also indicated in the literature. In a study of nine newly appointed CIOs from large U.S. companies, Applegate & Elam (1992) found that all nine stressed the importance of networking with corporate senior executives

to effectively accomplishing their goals. In looking at means of developing long-term competitiveness through IT assets, Ross, Beath, & Goodhue (1996) found that developing, what they termed 'the relationship asset' was one of three key IT assets that lead to long-term competitiveness. At an U.S. insurance company they found that limited communication between IT and business managers resulted in "less creative application of IT than the company was able to produce" (pg. 35). Over time by ensuring regular interaction with the business side of the house, a relationship of trust and mutual respect developed which significantly improved the insurance company's ability to implement valuable IT applications. In short, developing an extensive organizational network through interaction with the CEO and other members of the TMT is theoretically linked to CIO effectiveness.

Extent of Trusting Relationships with Other Members of the TMT

Viewed from a stakeholders perspective, the TMT of an organization should strive to collaborate for organizationally (as opposed to functionally) optimal decisions. However, collaboration requires trust (Mishra, 1996). Mishra, summarizes the extant literature on collaboration and trust noting that "trust encourages interdependent individuals and groups to eliminate their fear of exploitation and recognize their existing conflicts (Gibb & Gibb, 1969; Walton & McKersie, 1965), be more cooperative in their behavior (Deutsch, 1962; Ouchi, 1981), and generate suggestions for change focused on the problem itself

(Hackman & Oldman, 1980)" pg 276. In addition, Zand (1997) argues that credibility and trust are essential to effective leadership in general, a characteristic sought in CIOs. As such, developing a trusting relationship with the other members of the TMT seems an important qualitative dimension of a CIO engagements with the TMT.

In summary, TMT/CIO engagements are indicated in the literature as an important antecedent to CIO effectiveness. Furthermore, the literature suggests that the hierarchical level of the CIO, membership on the top management team, the extent of networking with the other members of the top management team, and the extent of trusting relationships with the other members of the top management team are important dimensions of TMT/CIO engagements.

Strategic Vision of IT

The attitude of senior executives toward technology has often been cited as an important criteria for CIO success. Boyle (1994) in a survey of Fortune 1000 senior executives found that the CEO's attitude to technology was a key factor in affecting the CIO's success. It can be argued that an executive's attitude or perspective with respect to a functional domain in an organization, is a critical factor in shaping the executives vision of that function's role in the organization. In fact, Earl & Feeny's studies (1994) on CEO/CIO relationships find that CEO's tend to be polarized in their attitude toward IT – they either see IT

as a strategic resource or as a cost and that this view seems to have an effect on whether the CIO is viewed as a success or as a failure.

Recently Schein (1992) introduced a vision scheme that has been useful in a number of IT research efforts (Feeny, et al, 1992; Armstrong, 1995; Armstrong & Sambamurthy, 1999) that used the organization's strategic vision of IT to help explain the effects of various relationships. Schein proposed that organizations possess one of four strategic visions of IT: 1) automate, 2) informate up, 3) informate down, and 4) transform (see Table 6 for a more complete review of Schein's strategic vision of IT framework).

Table 6 – Schein's (1992) Strategic Visions of IT

Strategic Vision of IT	Description
To automate	The potential of IT is cost saving or quality improvement through automation. The role of IT is to replace expensive, unreliable human labor.
To informate up	The potential of IT is increased managerial control of the organization. The role of IT is to provide data and transactions that allow management more clear and organized views of the state and dynamics of the organization.
To informate down	The potential of IT is to empower employee driven performance improvements. The role of IT is to provide data and transactions that yield a comprehensive picture at the "operator" level, with members of the staff gaining greater insights into their own processes.
To transform	The potential of IT is to transform the organization. The role of IT is to fundamentally change the organization and/or industry through new healthcare products and services often including redefinition of relationships with the organization's customers and/or suppliers

Feeny et al, (1992) used Schein's categorization of the vision of IT and found it to be a powerful predictor of excellent CEO/CIO relationships. That is

when the CEO and CIO share the same strategic vision of IT in the organization, excellent relationships occur. Furthermore, Armstrong (1995) and Armstrong & Sambamurthy (1999) found that the level of TMT/CIO engagements was positively related to the extent of a firms' IT deployments and that the impact of the level of TMT/CIO engagements on the extent of IT deployment was stronger for firms that espoused a transform vision than for firms that espouse an automate vision. Since it can be argued that extent of IT deployment is at least a dimension of CIO effectiveness, it seems reasonable to propose that the strategic vision of IT may moderate the more comprehensive construct of CIO effectiveness.

In summary, this chapter has reviewed the extant literature on CIO and IT management, leadership theory, top management or upper echelon theory, and the literature on management effectiveness. From this review the construct of CIO effectiveness was developed to incorporate the importance of their specific roles within the context of their own organizations and their impact on CIO effectiveness, as suggested by Boyatzis (1982). In addition two main constructs were developed as antecedents of CIO effectiveness – CIO capability and TMT/CIO engagements. Finally, based primarily on Armstrong's (1995) and Armstrong & Sambamurthy's (1999) work, the construct of the TMT's strategic vision of IT is proposed as a moderator to both antecedent-dependent variable relationships. The full conceptual model that will guide this research is depicted in Figure 2 below:

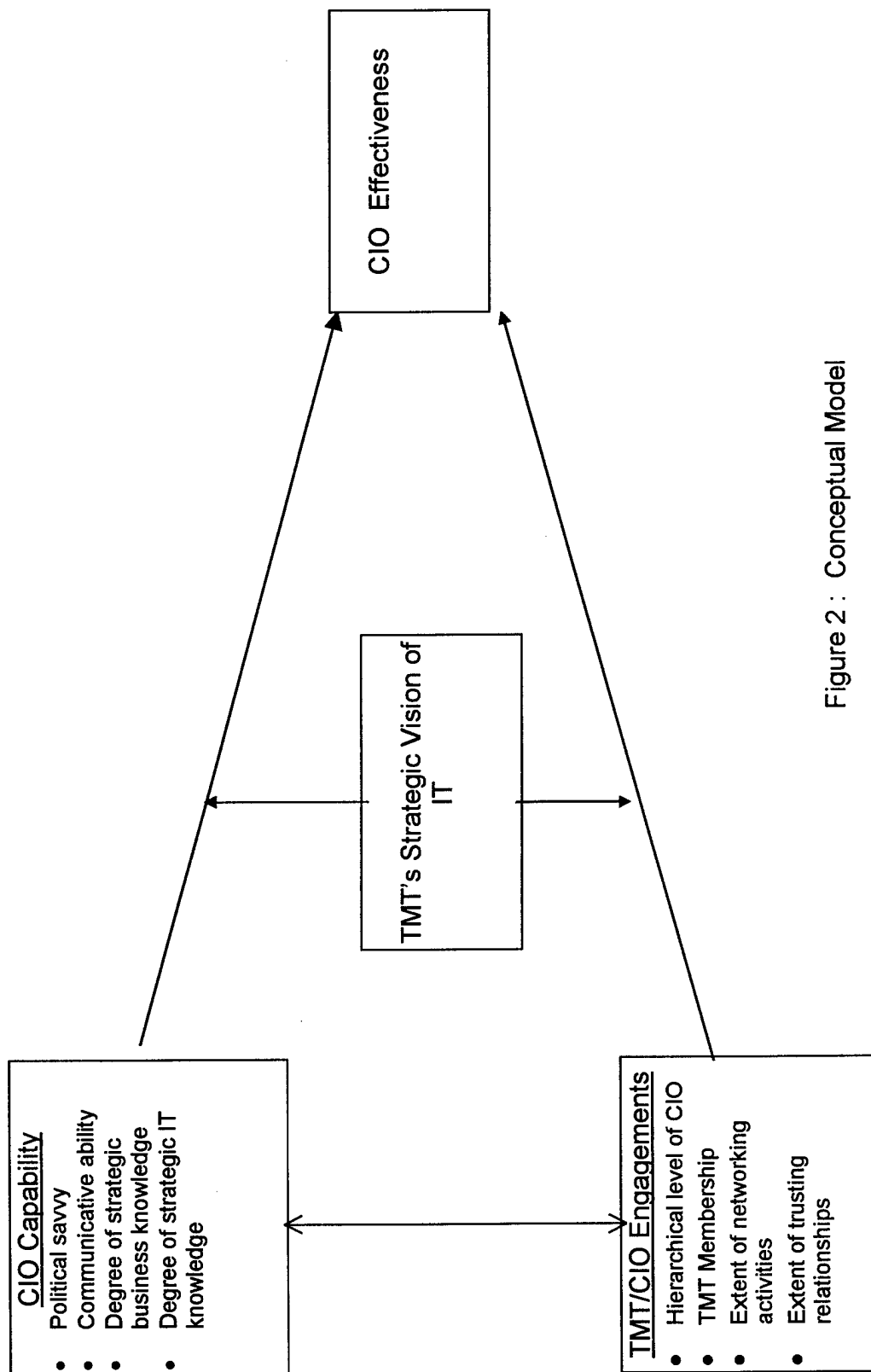


Figure 2 : Conceptual Model

CHAPTER 3

RESEARCH MODEL

This chapter describes the research model that will be used in this study. The chapter begins with a review of the specific research questions that will be examined followed by a presentation of the research model and its constructs. Hypotheses are presented based on theory and empirical findings presented in Chapter 2. The chapter concludes by presenting the control variables that will be used in this study.

Research Questions

This research is concerned with examining the factors that affect CIO effectiveness. Based on this focus and the conceptual model presented in Chapter 2, the following research questions will be examined.

1. How does a CIO's capability affect CIO effectiveness?
 - a) How does a CIO's knowledge (i.e., strategic business knowledge and strategic IT knowledge) effect CIO effectiveness?

- b) How does a CIO's interpersonal skill (i.e., communicative ability and political savvy) effect CIO effectiveness?
2. How do engagements between top management team members and the CIO effect CIO effectiveness?
3. What is the nature of the relationship between a CIO's capability and TMT/CIO engagements?
4. How does an organization's strategic vision of IT moderate the relationships between CIO capability, TMT/CIO engagements, and CIO effectiveness?

Based on the conceptual model developed from theory in Chapter 2 and these four research questions, the research model in Figure 3 was developed and can be found at the end of this chapter. The research model presents the specific items for each construct as well as the relationships to each other as developed in Chapter 2. However, in the research model the control variables, tax status, type of organization, strategic orientation and TMT group cohesion were added. These will be discussed in detail at the end of this chapter.

Hypotheses

To provide some clarity to the presentation of the hypotheses under investigation, the hypotheses are organized and presented by construct. Hypotheses dealing with CIO capability's effect on CIO effectiveness are presented first followed by hypotheses dealing with TMT/CIO engagements'

effect on CIO effectiveness. Subsequently, an examination of the relationship between CIO capability and TMT/CIO engagements is presented. This section concludes with a presentation of hypotheses dealing with the effect of a TMT's strategic vision of IT on 1) the relationship between CIO capability and CIO effectiveness and 2) the relationship between TMT/CIO engagements and CIO effectiveness.

Hypotheses Dealing with the Relationship between CIO Capability and CIO Effectiveness.

The top management team and upper echelon literature clearly shows that at the executive level within organizations, political activity is operative. In their case study of 5 CIOs, Stephens et al (1992) found that a skilled reading of situations was an important factor affecting a CIO's ability to successfully bridge the gap between the IT organization and the strategic business objectives of their respective firms. In an exploratory study Feeny et al (1992) interviewed 14 CEOs from large organizations in the U.K. They proposed from their interviews that political prowess was an essential quality of the ideal CIO. One comment from a CEO in their study exemplifies this need: "I need a CIO who can conciliate and defuse and explain instead of confront..." (pg. 445).

The strategic change literature presents another lens that is informative in developing the theoretical framework in this study. The implementation of new enterprise-wide IT almost always presents the occasion for organizational

change (Barley, 1986) and change initiatives almost always have political ramifications (Hinings & Greenwood, 1988). Since implementing new enterprise-wide IT is generally a typical function of the IT organization and, hence the ultimate responsibility of the CIO, it follows that the literature on change process should be informative with respect to CIO effectiveness. In fact, Hutt, Walker and Frankwick's (1995) study of the implementation of an IT project at a Fortune 500 firm showed that the project was, along with a strategic change process, a political process. They argue that "tensions across units spawned by differing views of the technology-market fit can be constructive and speed learning. In contrast, conflicts over turf stifle learning, hamper communication, and create distrust" (pg.29). Clearly the CIO engaged in the process of strategic change via IT must not only be aware of the political ramifications of IT, but also be able to effectively and positively deal with the political processes in their respective organizations. This suggests the following hypothesis:

Hypothesis 1a: The degree to which a CIO has a high degree of political savvy is positively related to CIO effectiveness, as perceived by the members of the TMT.

Another personal attribute that has been often cited in the literature to be important to CIO effectiveness is the ability of the CIO to communicate in business terms. CIO Magazine (1997), suggests that the ability to communicate with and understand the needs of non-technical internal clients as one of the key skills needed by contemporary CIOs. In their study of 14 UK organizations,

Feeny et al (1992) proposed that the ideal CIO communicates in terms that the CEO can understand as opposed to employing technical language. The following comment by one of the CEOs in their study exemplifies the importance of communicating in business terms: "(Our) CIO discusses (in English!) how we might achieve what I want, not (in technobable) why we can't achieve what I want; he (or she) doesn't patronize me by saying 'it's all very complicated and would take a long time to explain to someone like you.'" (pg. 444). Finally, Brier (1994) in a study of 50 CEOs found that, among other things, interpersonal communication was an important skill of the ideal CIO. Palmlund (1997) echoes these findings noting that CIOs who fail did not communicate well with the rest of the business while those that succeeded were those that communicated well both internally and externally. This suggests the following hypothesis:

Hypothesis 1b: The degree to which a CIO communicates in terms that the other members of the TMT can understand is positively related to CIO effectiveness, as perceived by the members of the TMT.

The researcher will now switch from interpersonal related attributes of CIO capability to knowledge related aspects of CIO capability. A recurrent shortcoming of CIOs referenced in the literature appears to be the lack of knowledge regarding the business of the organization. "CIOs Not Up to Snuff as Active Business Leaders" (Wilder, 1992) typifies some of the practitioner press that berates the CIOs lack of business acumen. Wang (1994) suggests that this

lack of business acumen on the part of CIOs is at least in part to blame for the general 'disconnect', to use his term, between CIOs and CEOs and other top managers. Chan, Huff, Barclay & Copeland (1997) found that business strategic orientation leads to IS-business strategic alignment which leads to IS effectiveness and improved business performance. In other words, where CIOs are connected to the business aspects of the larger organization, strategic IT alignment is achieved along with organizational effectiveness, and I would argue, CIO effectiveness as well. In fact, Applegate & Elam's (1992) study of 81 CIOs found that CIOs simply must possess a broad business perspective in order to be effective. In a case study of 6 CEOs from diverse industries, Danielson, DeLisi & Posner (1998) found that CEOs expect, along with IT technical knowledge, that their CIOs possess the same business knowledge and perspective as they themselves do – in effect to develop the business knowledge of a CEO-understudy. In addition, Armstrong (1995) found that firms with the highest extent of IT deployment were those whose TMTs possessed a high level of both strategic business and IT knowledge, a construct he called 'joint knowledge'. While Armstrong's findings are informative in terms of establishing the need for both strategic IT and business knowledge at the TMT level, the previously cited literature seems to indicate that such joint knowledge (of both the business and technology) are needed in the person of the CIO specifically. This literature clearly suggests that a strong knowledge of the business, at a strategic level, seems to be important to CIO effectiveness. This suggests the following hypothesis:

Hypothesis 1c: The degree of business knowledge held by the CIO is positively related to CIO effectiveness, as perceived by the members of the TMT.

As the highest ranking executive within the IT organization, a fundamental requisite of any CIO is a high degree of strategic IT knowledge (Wang, 1994; Armstrong, 1995). However, recent hiring trends show that a number of organizations are selecting executives for the CIO position from functional areas other than the IT organization (Applegate & Elam, 1992; Brier, 1994; Abramson, 1998; Schriener, 1998). This could lead to a reduction in strategic IT knowledge at the highest level of the IT organization – the CIO. Yet Feeny et al (1992), in their case study of 14 organizations, found that successful CIOs had spent almost their entire careers within the IT functional area, suggesting the importance of in-depth knowledge of the IT domain. In addition, Chan et al (1997) also found the importance of a strong strategic IT orientation to IT-business strategic alignment and IS effectiveness. Finally, Garets & Redman (1998) and Wang (1994) argue that significant knowledge of the IT domain is absolutely essential for CIO success. This suggests the following hypothesis:

Hypothesis 1d: The degree of IT knowledge held by the CIO is positively related to CIO effectiveness, as perceived by the members of the TMT.

In sum, these four hypotheses lead to the following overarching hypothesis:

Hypothesis 1: CIO capability is positively related to CIO effectiveness, as perceived by the members of the TMT.

Hypotheses Dealing with the Relationship between TMT/CIO Engagements and CIO Effectiveness.

Prior research has found that the reporting level of an individual in an organization can influence perceived authority and power to influence the actions of TMTs (Hambrick, 1981). More specifically, Raghunathan & Raghunathan (1989) found significant effects in their study of CIO's rank and its influence on CIO's role in the organization. This finding leads them to suggest that the reporting level of the CIO may be a key variable to increasing organizational effectiveness of IT. In a study of 64 newly appointed CIOs, Applegate & Elam (1992) suggest how the reporting relationship phenomenon, with respect to CIOs may work. They found 27% report directly to the CEO and argue from this increased position of rank they can directly affect the strategic direction of their organization through increased participation with senior managers.

The practitioner literature also suggests the importance of the hierarchical level of the CIO. Monahan (1998), notes that "some of the most successful healthcare organizations in America are the ones whose CEOs and CIOs are joined at the hip" (pg. 10). Lando (1998) suggests that effective IT leadership can only be accomplished by bringing the CIO into the senior leadership ranks. Nilson (1998) suggests that "where your top information technology executive

ranks in the organization will determine how much influence he or she will have on the organization's success" (pp. 9-10). Schrage (1996) reports that CIOs feel that their relevance and importance is significantly affected upon the rank of their direct reporting official. He notes that CIOs with direct reporting relationships with the CEO report that they have a greater chance to impact enterprise-wide decisions and policies than those that report to the CFO or COO where they can be marginalized. This suggests the following hypothesis:

Hypothesis 2a: The hierarchical level of the CIO is positively related to CIO effectiveness, as perceived by the members of the TMT.

Research has shown that even more important to CIO effectiveness than the reporting level of the CIO, is whether or not he/she is a member of the organization's TMT (Karake, 1995, Earl & Feeny, 1994; Grover, et al, 1993, Stephens, et al, 1992; Feeny, Edwards & Simpson, 1992). Rockart, Earl & Ross (1996) argue that in order to achieve two-way strategic alignment of the IT unit and the business unit, the CIO must be either a formal or at least an informal member of the top management team. Richmond & Schlier (1997) from the Gartner Group ascribe a 0.9 probability that a CIO's longevity as well as his/her perceived effectiveness in healthcare organizations is dependent upon acceptance as an integral part of the organization's executive management team. Furthermore, lack of full acceptance by executive management minimizes the CIO's influence and adversely positions the IT department to address key

issues. Membership on the top management team provides the CIO with regular opportunities for engagement with other top managers. It stands to reason, that through this membership the CIO has improved chances to be effective since he/she is, by virtue of membership on the TMT, assured of executive level engagements. This suggests the following hypothesis:

Hypothesis 2b: TMT membership is positively related to CIO effectiveness, as perceived by the members of the TMT.

Extent of networking is defined as the frequency of formal and informal interactions with the CEO and the other members of the TMT. In a study of nine newly appointed CIOs from large U.S. companies, Applegate & Elam (1992) found that all nine stressed the importance of networking with corporate senior executives to effectively accomplishing their goals. In looking at means of developing long-term competitiveness through IT assets, Ross, Beath, & Goodhue (1996) found that developing, what they termed 'the relationship asset' was one of three key IT assets that lead to long-term competitiveness. At an U.S. insurance company they found that limited communication between IT and business managers resulted in "less creative application of IT than the company was able to produce" (pg. 35). Over time by ensuring regular interaction with the business side of the house, a relationship of trust and mutual respect developed which significantly improved the insurance company's ability to implement valuable IT applications. In short, developing an extensive organizational

network through interaction with the CEO and other members of the TMT is theoretically linked to CIO effectiveness. This suggests the following hypothesis:

Hypothesis 2c: Extent of networking with the other members of the TMT is positively related to CIO effectiveness, as perceived by the members of the TMT.

While extent of networking provides a quantitative measure of CIO interaction with the other members of the TMT, such a view would be incomplete if it did not also consider the qualitative aspects of the networking relationships. Eisenhardt and her colleagues (1997) found that interaction was critical to understanding one's own position and those of others. Furthermore it was only through frequent interaction that senior executives got to know one another and trust one another to present conflicting views in the spirit of effective problem solving.

Viewed from a stakeholders perspective, the TMT of an organization should strive to collaborate for organizationally (as opposed to functionally) optimal decisions. However, collaboration requires trust (Mishra, 1996). Mishra, summarizes the extant literature on collaboration and trust noting that "trust encourages interdependent individuals and groups to eliminate their fear of exploitation and recognize their existing conflicts (Gibb & Gibb, 1969; Walton & McKersie, 1965), be more cooperative in their behavior (Deutsch, 1962; Ouchi, 1981), and generate suggestions for change focused on the problem itself

(Hackman & Oldman, 1980)" pg. 276. Lewicki & Bunker (1996) argue that development and sustenance of trusting professional relationships is key to sustaining strong and effective collaboration between the parties in the relationship. Collaboration for optimal organizational outcomes would seem to be the prima fascia requirement of all top management teams. Lack of collaboration with any individual executive would suggest perceptions of ineffectiveness. In addition, the credibility gap suggested in the CIO and IT management literature previously cited suggests that developing trusting relationships with the other members of the TMT is an important qualitative dimension of CIO engagements with the TMT. This suggests the following hypothesis:

Hypothesis 2d: Extent of trusting relationships developed with the other members of the TMT is positively related to CIO effectiveness, as perceived by the members of the TMT.

In sum, these four hypotheses lead to the following overarching hypothesis:

Hypothesis 2: TMT/CIO engagements are positively related to CIO effectiveness, as perceived by the members of the TMT.

Hypothesis Dealing with the Relationship between CIO Capability and TMT/CIO Engagements.

As noted earlier, Wang (1994) argues that too many CIOs are not able to focus on business imperatives nor are they able to effectively communicate in business terms, thereby alienating themselves from their CEOs and other top

managers. This suggests that CIO capability has an impact on TMT/CIO engagements. In fact, empirical findings support this suggestion. For instance, in their case study of 14 CIOs, Feeny, Edwards & Simpson (1992) found that the qualities of the ideal CIO included both a business perspective as well as communication skills. Furthermore, they found that of the 14 organizations, only five had "excellent" CEO/CIO relationship while nine had either a "fair" or "poor" relationship, suggesting that elements of CIO capability (i.e., business knowledge and communicative ability) are potentially having an impact on TMT/CIO engagements (i.e., extent of networking, extent of trusting relationships) or vice versa. Cohen & Bradford (1990) argue that influence is predicated upon understanding the expectations that others have of you as well as possessing qualifications necessary to meet those expectations. Furthermore, they argue that a disconnect between what one party can offer another can lead to reduced willingness to engage at all. It follows then that if certain CIO capabilities are missing in the person of the CIO, that members of the TMT may reduce their willingness to engage with the CIO. While this may suggest a unidirectional relationship where CIO capability leads to TMT/CIO engagements, the literature also suggests an opposite causal relationship.

Since the position of the CIO is a relatively new executive position (O'Riordan, 1987; Donovan, 1989; Stephens et al, 1992; Applegate & Elam, 1992) it is of no surprise that the practitioner press suggests that CIOs have not yet fully mastered the ascendancy into the executive ranks (Wilder, 1992; Klug,

1996; King, 1995). Furthermore, a number of executive development authors suggest that one way to help CIOs gain executive skills and capabilities is to nurture their development through greater interaction and engagement (Willis & Dubin, 1990; King, 1995; Hall, 1995; Kram & Hall, 1995). Since both arguments seem valid, a bi-directional relationship between CIO capability and TMT/CIO engagements is posited. This suggests the following hypothesis:

Hypothesis 3: CIO capability is positively associated with TMT/CIO engagements.

Hypotheses Dealing with the Moderating Effects of TMT Strategic Vision of IT on the Relationship between CIO Capability and CIO Effectiveness.

The attitude of senior executives toward technology has often been cited as an important criteria for CIO success. Boyle (1994) in a survey of Fortune 1000 senior executives found that the CEO's attitude to technology was a key factor in affecting the CIO's success. It can be argued that an executive's attitude or perspective with respect to a functional domain in an organization, is a critical factor in shaping the executives vision of that function's role in the organization.

Recently Schein (1992) introduced a vision scheme that has been useful in a number of IT research efforts (Feeny, et al, 1992, Armstrong, 1995) that used the organization's strategic vision of IT to help explain the effects of various relationships. Schein proposed that organizations possess one of four strategic

visions of IT: 1) automate, 2) informate up, 3) informate down, and 4) transform which were highlighted in Table 6 of Chapter 2.

Arguably, an organization that articulates an 'automate' vision may also perceive their respective CIO as being highly effective even though he/she may not possess the 'idealized' set of CIO capabilities incorporated in the construct of CIO capability (i.e., political savvy, communicative ability, IT strategic knowledge and strategic business knowledge). However, it is doubtful based on the CIO and IT management literature reviewed in Chapter 2, that an organization with a 'transform' vision of IT would perceive their respective CIO as being highly effective without a high degree of CIO capability. This suggests that a TMT's strategic vision of IT may moderate the relationship between CIO capability and CIO effectiveness. This suggests the following hypothesis:

Hypothesis 4: The impact of CIO capability on CIO effectiveness will be stronger for organizations that articulate a 'transform' vision than for organizations that articulate an 'automate' vision.

Hypotheses Dealing with the Moderating Effects of TMT Strategic Vision of IT on the Relationship between TMT/CIO Engagements and CIO Effectiveness.

Earl & Feeny's studies (1994) on CEO/CIO relationships found that CEO's tend to be polarized in their attitude toward IT – they either see IT as a strategic resource or as a cost and that this view seems to have an effect on whether the

CIO is viewed as a success or as a failure. Feeny et al, (1992) used Schein's categorization of the vision of IT and found it to be a powerful predictor of excellent CEO/CIO relationships. That is when the CEO and CIO share the same strategic vision of IT in the organization, excellent relationships occur. Furthermore, Armstrong (1995) found that the level of TMT/CIO engagements was positively related to the extent of a firms' IT deployments and that the impact of the level of TMT/CIO engagements on the extent of IT deployment was stronger for firms that espoused a transform vision than for firms that espouse an automate vision. Since it can be argued that extent of IT deployment is at least a dimension of CIO effectiveness, it seems reasonable to propose that the strategic vision of IT may moderate the more comprehensive construct of CIO effectiveness. This suggests the following hypothesis:

Hypothesis 5: The impact of the level of TMT/CIO engagements on CIO effectiveness will be stronger for organizations that articulate a 'transform' vision of IT than for organizations that articulate an 'automate' vision of IT.

Control Variables

Four additional variables are expected to have an affect on CIO effectiveness, primarily through their effect on the role component of the CIO effectiveness construct – tax status, strategic orientation, type of organization, and TMT group cohesion. Recall that the various CIO roles found in Smaltz

(1999) will be used to assess CIO effectiveness. Smaltz (1998) found that a healthcare organizations tax status yielded significant differences in the importance of at least one of the six CIO roles that he found in his study of 90 healthcare CIOs. In addition, profit orientation is regularly used as a control variable in healthcare organizational studies of performance (Kumar, Subramanian & Yauger, 1997). While tax status indirectly controls for differences in organizational strategy, to fully control for the effects of differences in organizational strategy on CIO roles and hence CIO effectiveness is to measure it directly. Therefore, organizational strategy is used as a second control variable.

Since the focal industry is the healthcare industry, it is important to control for the type of healthcare organization as well. For instance, the CIO's role in a teaching hospital may be very different than that of a corporate healthcare system. Again, since the CIO effectiveness construct in this research employs a role-based perspective, type of organization will be controlled for primarily due to its effect on the role dimensions of CIO effectiveness.

Finally, it can be argued that a CIO's effectiveness is a function of the individual, the groups in which he/she performs his/her role and the organizational context of the groups. Since group cohesion has been shown to effect the performance of TMTs, TMT group cohesion will also be controlled for in this study.

Tax Status

Tax status refers to the official designation of an organization for tax purposes. These categories are generally dichotomous – either an organization is 'for-profit' or it is 'not-for-profit'. However, since this research expects to include a number of government healthcare organizations, the 'not-for-profit' tax status categorization is further broken out into 'not-for-profit' and 'not-for-profit (government/military)'.

Since a 'for-profit' tax status squarely represents an organization's desire to make a profit, this profit motive is expected to have an impact on organizational strategies, and hence, organizational information strategies and CIO roles. I now turn to the organizational strategy control variable.

Organizational Strategic Orientation

As with tax-status, an organization's strategy is expected to have an effect on the role component of the construct of CIO effectiveness. Primarily Miles & Snow (1978) and Porter (1980) represent the research on organizational strategy, with respect to categorization of strategies. Miles and Snow (1978) proposed that organizations can be categorized as either 'defenders', 'prospectors', 'analyzers', or 'reactors'. Alternatively, Porter (1980) proposed that

organizations can be categorized into three strategic categories – ‘overall cost leadership’, ‘differentiation’ and ‘focus’. Both the Miles & Snow (1978) typology and the Porter (1980) categorization have had empirical support for differentiating between an organization’s strategic orientation (Hambrick, 1983; Dess & Davis, 1984). Within the healthcare industry in particular Porter’s (1980) categorization is used frequently as a means of categorizing healthcare organizations (Lamont, Marlin & Hoffman, 1993; Kumar et al, 1997) and, thus, will be the typology used as a control variable in this research.

To see how strategic orientation can impact the role component of CIO effectiveness, Kumar et al’s (1993) table on the application of Porter’s generic strategies to healthcare organizations is presented in Table 7.

From Kumar et al’s (1997) table impacts on CIO roles and hence CIO effectiveness can be inferred. For instance an organization with an overall cost leadership strategy (staff reduction, tight cost controls, efficiency focused) may dictate a very different role for its CIO than an organization with a differentiation strategy (‘high tech’ image, use of latest technology). The former strategy may focus the CIO role into a utility provider role (efficient support) or external relationship facilitator (reduction of staff, elimination of marginally or unprofitable services) as the IT function may be increasingly outsourced. The latter may focus the CIO role into an integrator or business strategist role (affiliation with a medical school, offer wide range of services). Since the CIO effectiveness

construct takes into account the different and varying roles that a CIO might be expected to fill, it is imperative that strategic orientation of the organization is controlled for in this investigation.

Table 7: Kumar et al's (1997) Application of Porter's Generic Strategies to Hospitals

Strategic Target	Strategic Advantage	
	Uniqueness Perceived by Patients Differentiation	Low-Cost Position Overall Cost Leadership
Market-Wide (Broad)	Purpose: To create price inelasticity on the part of patients by developing institutional loyalty.	Purpose: Controlling costs and creating internal efficiencies to protect from competitive forces and regulatory pressures.
	Examples of bases of differentiation used by hospitals: • Quality of care • "High-tech" image • Affiliation with a medical school • Performance of the most sophisticated procedure (e.g., organ transplants) • Use of the latest (and most expensive) technology (e.g., MRI) • Offer of wide range of services • Offer of services not commonly offered (e.g., burn care, alcoholism services, etc.)	Examples of cost control activities used by hospitals: • Upgrading of existing facilities or building of new and efficient facilities • Institution of tight cost controls • Increase in advertising to improve occupancy • Elimination of marginally profitable and unprofitable services • Reduction of wastes • Improvement of interfunctional coordination • Staff reduction
Particular Segment Only (Narrow)	Focus	
	Purpose: To serve the particular needs of one or more specific market segments. Examples of market segment: • Tuberculosis and other respiratory diseases • Obstetrics and gynecology • Ear, nose and throat • Radiation Therapy	

Organization Type

Just as with tax-status and strategic orientation, organizational type (e.g., teaching hospital, non-teaching hospital, clinic, etc.) is expected to have an effect on the role component of the construct of CIO effectiveness. For instance an organization that is part of an integrated delivery system, with its increased complexity of inter-organizational relationships may have quite a different set of CIO role expectations than a single entity outpatient clinic. Therefore organization type will be controlled for in this investigation.

TMT Group Cohesion

As noted in the introduction to this section, it can be argued that a CIO's effectiveness is a function of the individual, the groups in which he/she performs his/her role and the organizational context of the groups. Since group cohesion has been shown to effect the performance of TMTs (Hambrick 1995 & 1997; Priem, 1990), TMT group cohesion will also be controlled for in this study.

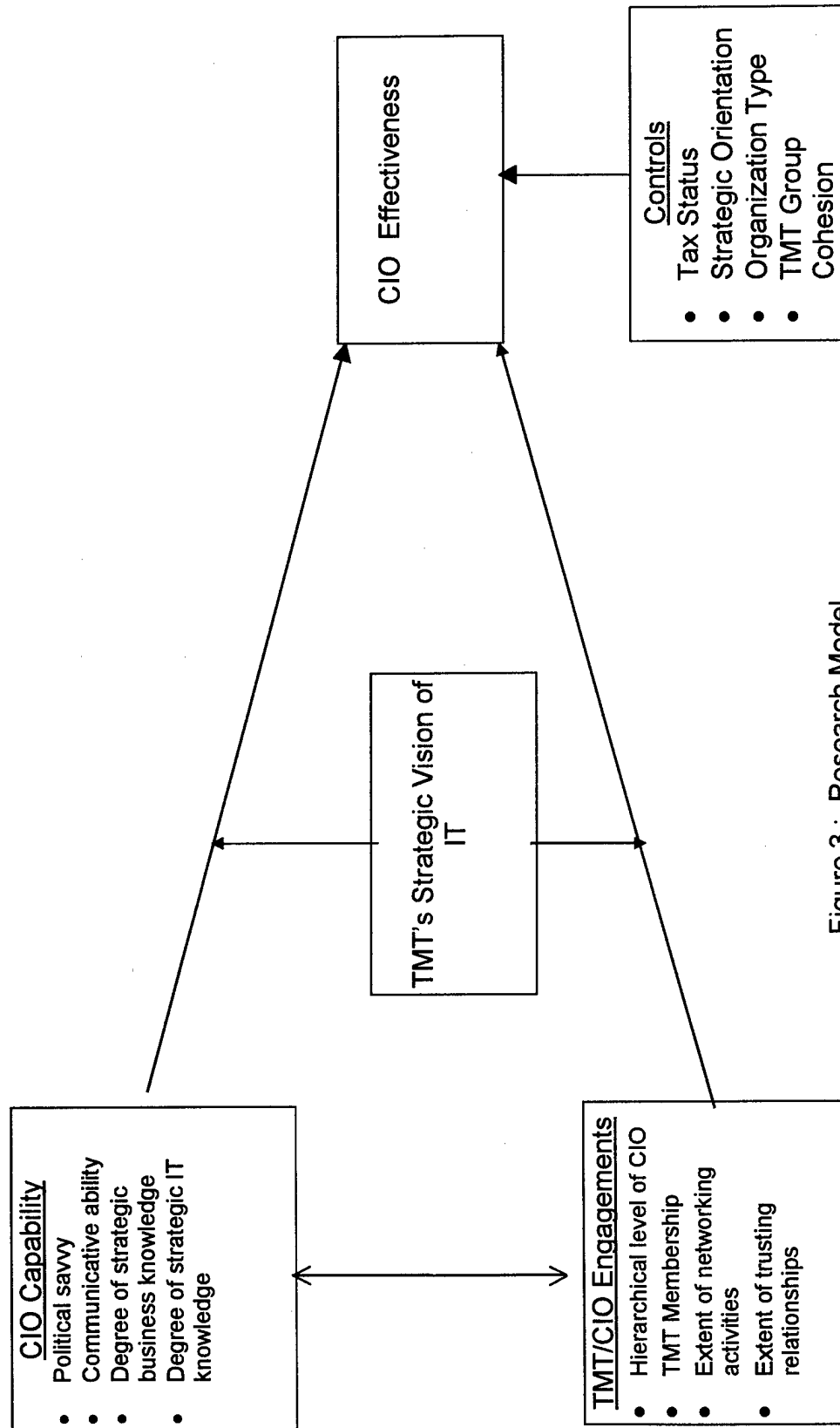


Figure 3 : Research Model

CHAPTER 4

RESEARCH METHODOLOGY

The research methodology described in this chapter follows the framework suggested by Creswell (1994). First the overall study design is presented – a field survey – along with justification for its use in answering the research questions proposed in Chapter 3. Then, the population as well as the sample to be used for this study is presented followed by the instrumentation used to collect data. Finally the operationalization of the variables in the research model (Figure 3, in Chapter 3) is presented along with a plan to analyze the data in this study.

Field Survey

Since the thesis of this research involves making generalizations about CIO effectiveness a sufficient sample of the population of CIOs is needed to achieve the requisite power to make generalizations. Survey methodologies are a suggested means of gaining sample data in order to attempt generalizations about the larger population from which they are sampled (Babbie, 1998). In addition, within the MIS domain roughly 25% of the empirical research employs a survey methodology (Newsted, Munro & Huff, 1991). While some have identified problems that the MIS research community has experienced in using a

survey methodology (e.g. inappropriate research questions for survey methodology, atheoretical application, untested instruments), these researchers agree that employing rigorous survey techniques linked to established theory can be a sound method of collecting data for a number of research questions within the MIS domain (Kraemer & Dutton, 1991; Zmud & Boynton, 1991 Newsted et al, 1991).

Yin (1994) in his comparison of the appropriate use of different research methodologies notes that survey methodologies are particularly useful when attempting to answer “what”, “how much” or “how many” type research questions. Since the research questions posed in Chapter 3 all deal with these types of questions (e.g., what level of CIO knowledge leads the TMT to view the CIO as effective, what level of CIO interpersonal skill leads the TMT to view the CIO as effective, what is the nature of the relationship between a CIO’s capability and TMT/CIO engagements), employing a survey methodology is appropriate. In addition, when seeking data from a geographically dispersed population, mailed questionnaires, and particularly internet-based questionnaires, have the advantages of allowing greater accessibility to the population, being less intrusive, offering the respondent greater convenience, providing rapid turn-around in data collection, reducing researcher bias, and can also be administered at a lower cost (Creswell, 1994; Armstrong, 1995).

Other forms of data collection were considered for this study but ruled out for various reasons. For instance, the quantity and nature of survey questions that were asked of CIOs and TMT members make telephone interviews difficult. The geographic dispersion and number of organizations taking part in the study would make on-site interviews too costly. Finally, since the investigation of CIO effectiveness is partially motivated by literature that suggests that there is currently a problem in general with CIO effectiveness, a cross-sectional survey appropriately captures phenomenon at a point in time. Therefore, a cross-sectional field survey design provided the best method, given the trade-offs cited above, to investigate the research questions and model in Chapter 3.

Population and Sample

In order to control for industry effects, this research sought to limit the investigation of CIO effectiveness to a single industry. In addition, the researcher sought an industry that is presently characterized as highly dynamic, information intensive and complex. It was assumed that in such an industry, information management, and hence the CIO, should be important to the organization's competitive survival and advancement and thus provide relevance to the investigation (i.e., an industry in which CIO effectiveness matters).

The population of interest selected for this study is the healthcare industry. An investigation of CIO effectiveness would necessarily require seeking a

population of organizations in which the CIO's role should be important. Since the healthcare delivery industry is highly dynamic, information intensive and complex (Goes & Meyer, 1991; Kim & Michelman, 1990; Adams, 1996; Longrest, 1998) it provides an excellent population in which IT management should be important to organizational survival and advancement – and one in which CIO effectiveness should be important as well. The researcher defines the healthcare industry in this study as organizations whose primary mission is the medical treatment and care of patients. Types of organizations that make up the bulk of the healthcare industry include hospitals, clinics, group practices, nursing homes, and home health care agencies to include any regional or corporate headquarters of any of the same. Since type of organization might introduce variation primarily through the CIO role importance component of the construct of CIO effectiveness, the researcher will control for type of healthcare organization in this investigation.

Due to the constantly changing organizational landscape via mergers, acquisitions and divestitures, it was not possible to determine the actual size of the population of healthcare organizations. Since the study involved CIOs in the healthcare industry, a logical “next-best” approach to securing a total population list of healthcare organizations was to obtain the most comprehensive list of healthcare CIOs available. The Healthcare Information & Management Systems Society is the largest professional credentialing organization in North America for healthcare IT managers and management engineers (HIMSS, www.himss.org).

Each year HIMSS produces a complete directory of its 10,000+ members. While the directory lists both information managers as well as management engineers, the sampling frame for this research was drawn by selecting every name in the HIMSS 97/98 directory (HIMSS, 1997) with one of the following job titles: CIO, (Senior) Vice-President of Information Systems or Services or Resources or Technology, Director of Information Systems or Services or Resources or Technology. In addition, slight variations of the above titles, such as Director of Management Information Systems, were also selected for solicitation. The resulting group of organizations represents the sampling frame for this study.

In addition to employing the HIMSS 97/98 membership directory, CIOs attending the 1998 Healthcare Information & Management Systems Society's Annual Conference will also be solicited for inclusion in the study. This conference was, held in late February 1998, and attended by over 12,000 healthcare IT and management engineering professionals, and as such, presented an outstanding opportunity for data collection. Individuals with the CIO titles listed previously were solicited and are included in the sampling frame.

Dual-stage Sampling Strategy

The field survey design followed a dual-stage sampling strategy. Once CIO responses were obtained from the sampling frame, their corresponding TMT members were surveyed, since any investigation of CIO effectiveness would be

remiss in leaving out the definitive key informants and stakeholders of such an inquiry – the members of the TMT. Using the organizational name and address that the CIOs provided in their questionnaire, the researcher used the American College of Healthcare Executives 1998/99 Member Directory (ACHE, 1998) to find the CIOs corresponding CEO, COO and CFO to administer the second stage of the study. The ACHE is the largest professional credentialing organization for healthcare executives in all functional disciplines. It boasts a membership of over 20,000 members. Once the TMTs for each CIO responding organization were identified, they were surveyed via mailed questionnaires or the internet version of the questionnaire depending on the TMT member's preference. Since these are high ranking executives, the researcher felt that offering these executives multiple avenues to respond provided extra flexibility and convenience to the healthcare executives and should increase the potential response rate. A description of the methodology used in each stage follows.

Stage one. During the first stage of sampling, CIOs were solicited via three methods: in-person, through postal mail services, and through electronic mail. CIOs attending the 1998 HIMSS Conference in Orlando Florida from 25-29 February 1998 were solicited in person by the researcher. Individuals were approached on the basis of their name badges that represented them as the CIO of their respective organization. Second, between March-April 98 individuals that were identified as CIOs from the HIMSS 97/98 member directory were mailed questionnaires. Finally, the ability to provide the questionnaire via

internet became available in late April 98 and the remainder of the potential CIO respondents were solicited via e-mail letters that provided them with the internet address of the questionnaire. Table 8 below, highlights the sampling methods employed for the potential CIO respondents as well as the response rates:

Table 8 – CIO Survey Response Rates

Method of Solicitation	# of Surveys Delivered	# of Surveys Returned	Response Rate
In-Person	68	54	79.4%
Via Mail	93	27	29.0%
Via E-Mail	481	107	22.2%
Total	642	188	29.3%

Of the 188 CIO surveys returned, 3 could not be used because their own job title or the supervisor's title of the respondent suggested that they themselves were not the actual CIO. For instance, one respondent whose survey could not be used listed their own title as "Assistant Vice President of IS" while their supervisor's title was listed as "Vice President, CIO". After removing these three surveys, 185 useable surveys remained. The organizational demographics of responding organizations can be found in Tables 9-11 below:

Table 9 – Type of Organization

Type of Organization	Number Responding	% of Total Responding
Non-Teaching Hospital	53	28.6%
Teaching Hospital	50	27.0%
Corporate/Regional Headquarters	41	22.2%
Out-Patient Clinics/Group Practices	18	9.7%
Other	16	8.6%
Missing	7	3.8%
Total	185	100%

Table 10 – Tax Status of Responding Organizations

Tax Status of Organization	Number Responding	% of Total Responding
For-Profit	16	8.6%
Not-for Profit	99	53.5%
Not-for-Profit (Government)	64	34.6
Missing	6	3.2%
Total	185	100%

Table 11 – Title of Responding Senior IT Executives

Title of Responding Senior IT Executive	Number Respondents with this Title	Percentage of Total
CIO	52	28.1%
Vice-President	43	23.2%
Director, MIS/IM/IT/IS/IRM	38	20.5%
Chief, MIS/IM/IT/IS/IRM	36	19.4%
Senior Vice-President	6	3.2%
Other	10	5.4%
Total	185	100%

Stage two. For those organizations where the CIO responded to the questionnaire (i.e., 185 organizations) names and contact information for the CEO, COO and CFO for each responding organization were obtained from the American College of Healthcare Executives 1998/99 member directory (ACHE, 1998). To increase the likelihood that the executives would respond to the questionnaire, attempts were made to contact these individuals, in advance, via telephone or e-mail (if available) and they were asked to complete the TMT survey instrument found at Appendix B. They were given the option of having a survey mailed to them or taking the on-line survey. Since these are high-ranking

executives, the researcher felt that offering the executives multiple avenues with which to respond provides the potential respondents with greater flexibility and convenience and will hopefully have positive effects on the response rate of these executives. Data on these executives was collected within 12 months of collecting from their respective CIOs in order to lessen the chance of CIO turnover. Of the 185 organizations in the study, 106 organizations returned at least one TMT member survey, representing an organizational response rate of 57.3%. Table 12 highlights the frequency of multiple responses and Table 13 highlights the titles of responding TMT members.

Table 12 - Frequency of Multiple Responses

Number of Surveys Returned	Number of Organizations (Percentage)
1	79 (74%)
2	24 (23%)
3	3 (3%)
Total Number of Responding Organizations	106

Table 13 - Frequency of Titles of Responding TMT Members

Title	Number Respondents with this Title	Percentage of Total
President/Chief Executive Officer (CEO)	34	25%
Chief Operating Officer (COO)	46	34%
Chief Financial Officer (CFO)	32	24%
Vice President	10	7%
Executive Director	4	3%
Executive VP	2	1%
Hospital Administrator	5	4%
Senior Vice President	1	1%
Chief Medical Officer (CMO)	2	0.01%
Total	136	100%

In organizations where multiple TMT members responded, all responses will be averaged with the exception of Strategic Vision of IT where the senior-most responding TMT member's response will be used. For clarity, similar titles were aggregated into the groupings shown in Table 13. For instance, all of the following titles were aggregated into the Chief Executive Officer group: President and CEO, CEO, President, Hospital Commander. Additionally, for cases where TMT members held multiple titles, such as CEO & COO the highest title held was used for reporting purposes in Table 13. In addition, titles such as Executive Vice-President & COO, that included one of the target TMT titles of CEO, COO or CFO were reported with the simple targeted title, in this case, COO.

Organizations whose targeted TMT members indicated that they did not have the time to take part in this research study, were asked to provide contact information of other TMT members to take part in this study – specifically TMT members that were either peers or superiors to the organizations CIO. This resulted in ten Vice-President level TMT members and two Chief Medical Officers responses.

The most common title is Chief Operating Officer followed by Chief Executive Officer and Chief Financial Officer. These three titles represent over 82% of the sample indicating that the respondents were the organization's top executives.

While every effort was made to obtain responses from multiple TMT members from each organization, slightly more than a quarter of the responding organizations provided multiple responses. In order to ensure that organizational data points with single TMT respondents reflected team and organizational phenomena, correlations between multiple responses were analyzed for some of the study's key constructs. Table 14 reflects this correlation analysis. The fact that all of the variables in the model are significantly correlated among multiple respondents from the same organization provides justification for using organizations in which only one TMT member responded.

Table 14 - Correlations between TMT Member Responses for Multiple Responses

Variable ³	Correlation	N
TMT Group Cohesion ¹	.461**	27
TMT Size ²	.642***	27
CIO's Political Savvy ¹	.512**	24
CIO's Communication Skill ¹	.543***	25
CIO's Business Knowledge	.377*	27
CIO's IT Knowledge	.345*	26
Extent of Trusting Relationships (CIO-TMT) ¹	.406**	24
CIO Effectiveness ¹	.507***	25

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

¹ Correlations based on factor scores using Pearson Product Moment

² Correlations based on raw TMT Size variable using Pearson Product Moment

³ Operationalizations of variables will be discussed later in this Chapter

Non-response bias. While the response rate achieved in Stage One of this research (29%) is typical of questionnaires sent via correspondence

(Kraemer & Dutton, 1991; Armstrong, 1995), whenever response rates are low, it is important to test for non-response bias (Fowler, 1988).

In reviewing the organizational demographics, it appears that the sample fairly represents the healthcare organizations with respect to tax status. Green (1997) reports that nationally 90% of hospitals are not-for-profit while 10% are for-profit. In this study 91.1% of the healthcare organizations responding to the CIO questionnaire are not-for-profit (putting the 'not-for-profit' and 'not-for-profit (government)' categories together) and 8.9% are for-profit. With respect to type of organization, no definitive references were available that represented the make-up of the entire healthcare services industry. However, hospitals and clinics/group practices clearly make up the majority of organizations that deliver healthcare services to patients (Green, 1997) which is also the case in this study – over 90% of responding organizations are either hospitals, clinics, group practices or the corporate/regional headquarters of the same. Less than 10% consist of other entities such as home health care agencies and nursing homes. While a fully representative sample of all types of healthcare organizations is not claimed here, the sample drawn is reflective of healthcare organizations where CIOs are used and their effectiveness should matter.

The varied nature of responding organizations and the lack of a database to make comparisons across the entire spectrum of responding organizations makes it difficult to analyze non-response bias along dimensions other than tax-

status. However, the large number of hospitals reporting (over 60% of responding organizations are hospitals) and the availability of secondary data sources (American Hospital Directory, 1998) to compare responding hospitals with non-responding hospitals, allows analysis of non-response bias along a number of financially based measures. Therefore, in addition to the non-response bias test already performed on the basis of tax status mentioned above, non-response bias of hospitals was accomplished using the American Hospital Directory database using total inpatient days, total discharges, total patient revenue and net income as indicators. An ANOVA revealed no significant differences existed in mean CIO effectiveness scores for any of the indicators between responding hospitals and non-responding hospitals. This suggests that the hospitals in this sample are representative of American hospitals in general along these dimensions.

Instrumentation

Two survey instruments were used to collect data in this study – a CIO questionnaire (Appendix A) and a TMT questionnaire (Appendix B). As noted earlier, items that were used in previous research were employed to the greatest extent possible. Where items did not exist in previously used instruments, such as the role-based CIO effectiveness measure, they were developed through interviews with six established and experienced healthcare CIOs and CEOs. The three healthcare CIOs that were interviewed for item development were 1) a

regional level CIO at a for-profit multi-entity healthcare system 2) the CIO of an independent not-for profit hospital, and 3) a regional level CIO of a government healthcare system. The three healthcare CEOs that were interviewed for item development were 1) the CEO of one of the top not-for-profit healthcare systems in the country, 2) the CEO of a government hospital, and 3) the CEO of the public health department of a major U.S. city.

Operationalization of Variables

This section outlines how each of the constructs in the research model (Figure 3, in Chapter 3) was operationalized. These will be presented in the following order: 1) CIO effectiveness, 2) CIO capability, 3) TMT/CIO engagements and 4) strategic vision of IT.

CIO Effectiveness

As noted earlier, CIO effectiveness is defined as the CIOs performance, as assessed by the CEO and other members of the TMT, within their role as CIO of a particular organization. As described in Chapter 2, the importance of including a role component in measurements of employee performance has been suggested by Welbourne et al (1998). While Welbourne and her colleagues presented a role based performance scale for employees, its role dimensions did

not adequately encompass the specific roles that CIOs play in healthcare organizations. They proposed the roles of job, organization, career, team and innovator as representative of typical employee roles in an organizational context, but add that “we are not suggesting that the five roles outlined in the RBPS (role-based performance scale) are the only relevant ones....” (pg. 544). Specific to the healthcare industry, Smaltz (1999), using the CIO data in this study, found six distinct and specific roles that are operative for healthcare CIOs which somewhat overlap Welbourne et al’s generic roles. The healthcare CIO roles that Smaltz found through factor analysis in his study of 168 healthcare CIOs were: business partner/strategist, IT contract oversight, integrator, informaticist/IT strategist, IT educator, and classic IT support/utility provider. By using Welbourne et al’s (1998) method of incorporating a role component in the measurement of employee performance and incorporating Smaltz’ (1999) specific healthcare CIO roles, it was thought that CIO effectiveness could very saliently and pertinently be assessed by healthcare TMT members. Table 15 reflects the validity and reliability of Smaltz’ (1999) healthcare CIO roles.

To develop these CIO roles, Smaltz (1998) interviewed three healthcare CIOs and three healthcare TMT members at different organizations to develop a list of 25 role items that subsequently factored into the role dimensions listed in Table 15. This dissertation will use Smaltz’ 25 role items and ask TMT members

Table 15 – Results of Factor Analysis on CIO Roles

Factor	Business Partner/Strategist	IT Contract Oversight	Integrator	Informaticist/IT Strategist	IT Educator	Classic IT Support/Utility Provider
Item & Loading	■ Provide expertise on multidisciplinary BPI teams (.788) ■ Intimately involved in shaping mission, vision (.756) ■ Intimately involved in business strategic planning & decisions (.747) ■ Direct IT-enabled BPR (.549)	■ Negotiate new IT contracts w/ external vendors (.814) ■ Ensure contracts remain w/in scope & budget (.782) ■ Executive oversight for all external vendor IT contracts (.718) ■ Interact often w/ non-IT managers throughout organization (.512)	■ Direct efforts to build IDS (.807) ■ Develop/ acquire CBPR throughout enterprise (.753) ■ Integrate enterprise applications (.579) ■ Develop an understanding of the healthcare delivery process (.520)	■ Oversight for enterprise data quality (.745) ■ Ensure confidentiality & security of enterprise data (.664) ■ Develop metrics that reflect the value of IT to enterprise (.528) ■ Build skilled IT staff (.448) ■ Develop & implement strategic IT plan (.431)	■ Champion computer literacy (.775) ■ Assist TMT in improving its computer literacy (.771) ■ Educate TMT on new emerging technologies (.560)	■ Establish responsive IT department (.770) ■ Establish electronic linkages throughout enterprise (.710) ■ Provide users with adequate IT tools to do their job (.564)
Mean	2.3046	2.0476	2.1098	1.8789	2.4711	1.5781
Std. Dev.	0.1442	0.2523	0.2328	0.4952	0.1590	0.2821
Eigenvalue	7.589	1.730	1.541	1.383	1.148	1.076
% Variance Expl. (cumulative)	32.995	40.517	47.218	53.230	58.222	62.899
Cronbach's α	.8227	.7600	.7332	.7585	.7434	.7005

to rate the effectiveness of their respective CIO in meeting these individual role expectations on a 5-point Likert scale ranging from 'outstanding' to 'not meeting expectation'. The actual wording of the 25-item role scale can be found in Appendix B – TMT Questionnaire.

As opposed to using a single overall measure of CIO effectiveness, a multi-dimensional effectiveness measure was used by computing the average performance rating of the items that make up each of the six healthcare CIO

roles in Table 15. The resulting 6 effectiveness ratings were then used as reflective indicators of CIO effectiveness in a structural equation model.

Law, Wong & Mobley (1998) suggest modeling indicators as reflective (i.e., as latent construct) when the multidimensional construct is a higher-order construct that underlies its dimensions. To clarify, they provide general mental ability (GMA) as an example of such a reflective construct in that GMA is a general latent construct underlying different ability dimensions, such as verbal ability, quantitative ability, reasoning ability and associative ability. Similarly, the 6 CIO role effectiveness dimensions in this study have been shown to represent the overall construct of CIO effectiveness in the healthcare industry (Smaltz, 1999) – that is CIO effectiveness is the general latent construct underlying different effectiveness dimensions, such as business partner role effectiveness, integrator role effectiveness, IT educator role effectiveness, informaticist/IT strategist role effectiveness, and classic IT support/utility provider role effectiveness. Reflective indicators are expected to move together (Chin, 1998a and 1998b) therefore the researcher expects to find a high degree of correlation among the six role-based dimensions of CIO effectiveness.

While this method of measuring CIO effectiveness is theoretically supported (Welbourne et al, 1998), to this researcher's knowledge an actual empirical application has not been attempted in the CIO literature to date.

CIO Capability

As noted earlier in Chapter 2, CIO capability is defined as the knowledge and interpersonal skill of the CIO to include: 1) the degree of strategic business knowledge, 2) the degree of strategic IT knowledge, 3) the degree of political savvy, and 4) the ability to communicate with other members of the TMT in business (non-technical) terms.

Degree of strategic business knowledge. In an effort to employ previously established instrumentation to the greatest extent possible, Armstrong's (1995) scales for CIO's business knowledge were adapted to measure the CIO's degree of strategic business knowledge. Armstrong operationalized the CIO's business knowledge by asking the TMT members to assess the CIO's personal knowledge of the organization's present and future products (services), markets and business processes, and on the organization's basis of competition. In this dissertation, these items will be used in a 5-point Likert scale ranging from 'very well informed' to 'not informed'. The reliability of this multiple-item scale was reported by Armstrong (1995) as .90 (Cronbach's alpha) and therefore were thought to serve as an effective means of assessing the CIO's degree of strategic business knowledge. Since CIOs in the healthcare industry not only need to understand standard business practices but also industry clinical practices such as clinical pathways, diagnosis related groups (DRGs), etc., an item was added asking TMT members to assess the CIO's

knowledge of healthcare industry clinical practices. In this study, the validity and reliability of the multi-item strategic business knowledge scale was 6.33 (eigenvalue) and .82 (Cronbach's alpha). The actual wording of the items in the scale can be found in Appendix B – TMT Questionnaire.

Degree of strategic IT knowledge. Armstrong's (1995) scale of CIO's strategic IT knowledge (Cronbach's alpha = .87) were adapted for degree of strategic IT knowledge. TMT members were asked to rate the CIO's knowledge regarding 1) how other organizations like their own are applying IT, 2) how to utilize existing organizational IT assets to address current needs, 3) how to identify relevant emerging technologies to support the organization, and 4) how to guide the organizations IT acquisition decisions. A 5-point Likert scale was used to assess the CIO's level of strategic IT knowledge ranging from 'very well informed' to 'not informed'. The validity and reliability of this multi-item scale is 1.79 (eigenvalue) and .86 (Cronbach's alpha). The actual wording of the items in the scale can be found in Appendix B – TMT Questionnaire.

Degree of political savvy. Ferris, Berkson, Kaplan, Gilmore, Buckley, Hochwarter & Witt (1999) political skill instrument was adapted to assess political savvy of CIOs in this study. This was operationalized by asking the TMT members to assess the CIO's ability to effectively handle each of the following 1) the ability to accurately read potentially contentious situations, 2) the ability to act with tact when confronted with potentially contentious situations, and 3) the ability

to develop good rapport with most people. A 5-point Likert scale was used to assess the CIO's degree of political savvy ranging from 'extremely effective' to 'not effective at all'. The validity and reliability of the multi-item scale used in this dissertation is 1.08 (eigenvalue) and .88 (Cronbach's alpha). The actual wording of the items can be found in Appendix B – TMT Questionnaire.

Interpersonal communicative ability. This was operationalized by asking the TMT members to assess the CIO's ability to 1) effectively use non-technical terms when making presentations to the TMT, 2) effectively use business terms familiar to the other members on the TMT, 3) effectively use clinical terms when making presentations to clinical business units. The assessment is on a 5-point Likert scale ranging from 'extremely effective' to 'not effective at all'. While theoretically communication skill and political skill are separate constructs, in practice the two go hand-in-hand when speaking of interpersonal skill. While the communication skill items initially loaded with the political skill construct, the literature cited in Chapter 2 clearly makes a theoretical distinction between political savvy and communication skill. Therefore, communication skill was used as a separate construct (eigenvalue = .778). The reliability of the 3 item communication scale was .83 (Cronbach's alpha). Once again, the actual wording of the items can be found in Appendix B – TMT Questionnaire.

TMT/CIO Engagements

Data on TMT/CIO engagements were obtained by using both the CIO Questionnaire at Appendix A as well as the TMT Questionnaire at Appendix B. The items that made up the construct of TMT/CIO engagements are 1) the hierarchical level of the CIO, 2) formal membership on the TMT, 3) the extent of formal and informal networking activities, and 4) the extent of trusting relationships established with the other members of the TMT.

Hierarchical level of the CIO. Asking the CIO how many reporting levels are between him/her and the CEO operationalized this construct. The CIO was asked to indicate if he/she had a direct reporting relationship with the CEO, was one level removed from the CEO, or was two or more levels removed from the CEO. The actual wording of the item can be found in Appendix A – CIO Questionnaire.

Formal membership in the TMT. This was operationalized via a dichotomous global measure asking the TMT member whether or not the CIO was a formal member of the TMT, using a simple 'yes' or 'no' response. Since a dichotomous variable does not provide the means to assess the level of involvement of the CIO with the TMT, an additional measure of TMT/CIO engagement was needed. To more deeply get at the level of interaction between

the CIO and the other members of the TMT, the extent of networking activities was used.

The extent of networking activities. This was operationalized along two dimensions: formal interaction with the CEO and other members of the TMT and informal interaction with CEO and other members of the TMT. Data for this item was obtained by asking the CIO the level, on average, of formal interaction he/she has with the CEO and the other members of the TMT. The 5-point scale employed ranges from 'daily' to 'once a year or less'. The actual wording of the item can be found in Appendix A – CIO Questionnaire. While the items for this factor yielded an high eigenvalue (1.208) its reliability was too low (Cronbach's $\alpha = .53$) to use in factor form. Therefore, extent of formal interaction is modeled as two single item factors in the subsequent analysis (i.e., formal interaction with the CEO and formal interaction with the TMT).

In addition, the extent of informal interaction was obtained by asking CIOs the level, on average, of informal interaction that he/she has with the CEO and the other members of the TMT. The 5-point scale employed ranges from 'daily' to 'once a year or less'. The reliability of this two-item scale was .88 (Cronbach's α). The actual wording of the item can be found in Appendix A – CIO Questionnaire.

Extent of trusting relationships. McKnight's (1997) measures of trusting relationships was adapted for use in this dissertation. TMT members were asked to assess the level of trust they had with the CIO on the following dimensions: 1) to act in the TMT members best interest, 2) the level of positive affect towards the CIO, and 3) the dependability of the CIO in critical situations. A 5-point Likert scale was used ranging from 'strongly agree' to 'strongly disagree'. The actual wording of the items can be found in Appendix B – TMT Questionnaire. The multi-item scale's reliability is .86 (Cronbach's alpha).

Strategic Vision of IT

Following Armstrong's (1995) procedure, strategic vision of IT was operationalized in the same manner as by Feeny et al (1992) which was based on Schein's (1992) strategic IT vision scheme of automate, informate up, informate down and transform. The TMT member will be asked to articulate which best describes his/her TMT's present vision of the role of IT (previously highlighted in Table 6 found in Chapter 2 and reprinted here as Table X) in his/her organization. For organizations providing multiple responses (i.e., more than one TMT member responds), as with Armstrong (1995) and Armstrong & Sambamurthy (1999) the TMT member with the highest organizational title will be used. Specifically, CEO responses will be the first priority in establishing the organization's strategic vision of IT, followed by the COO and then by the CFO.

Table 16 – Shein's (1992) Strategic Visions of IT

Strategic Vision of IT	Description
To automate	The potential of IT is cost saving or quality improvement through automation. The role of IT is to replace expensive, unreliable human labor.
To informate up	The potential of IT is increased managerial control of the organization. The role of IT is to provide data and transactions that allow management more clear and organized views of the state and dynamics of the organization.
To informate down	The potential of IT is to empower employee driven performance improvements. The role of IT is to provide data and transactions that yield a comprehensive picture at the "operator" level, with members of the staff gaining greater insights into their own processes.
To transform	The potential of IT is to transform the organization. The role of IT is to fundamentally change the organization and/or industry through new healthcare products and services often including redefinition of relationships with the organization's customers and/or suppliers

Control Variables

Tax status. Information on tax status of responding organizations was collected at three levels: 1) for-profit, 2) not-for-profit, and 3) not-for-profit – government affiliated.

Strategic orientation. Strategic orientation was collected by asking the TMT members what the dominant strategy of their organization was using Porter's strategic typology (1980) of 1) low cost provider of services, 2) differentiation, or 3) niche.

Organization type. Organizational type was operationalized along the following dimensions: 1) teaching hospital, 2) clinic, 3) group practice, 4) non-teaching hospital, 5) nursing home, 6) home healthcare agency, 7) corporate/regional headquarters.

Group cohesion. Group cohesion was operationalized by adapting Moorehead & Montanari's (1986) and Keller's (1986) measures of group cohesion, which are based on Seashore's (1954) pioneering work on group cohesion in industrial settings. The three item scale asked TMT members to assess the TMT and its members regarding 1) how well they get along together, 2) how well they help each other out, and 3) how well they resolve their differences. The reliability of the scale used in this study is .88 (Cronbach's alpha).

Data Analysis Plan

Data analysis will begin by presenting information about the number of responses and non-responses of each survey (the CIO Questionnaire as well as TMT Questionnaire). As noted earlier in this chapter, non-response bias will be tested and reported along the tax-status and organizational type dimension for all healthcare organizations and along other demographic and financial dimensions for hospitals using the American Hospital Directory database (AHD, 1998). With

respect to the independent and dependent variables, descriptive statistics will be reported along with means and standard deviations.

While some scales used in the instruments of this study have been previously tested for validity and reliability, those multiple-item scales that have not been previously established or those that have been adapted from previous scales will be tested for validity (factor loadings) and reliability (Cronbach's alpha).

Hypotheses will be tested using structural equation modeling (SEM) techniques. SEM allows simultaneous testing of all relationships in the research model (Chin, 1998b). Since the constructs in the research model employ both formative and reflective indicators, for which more well-known SEM tools such as LISREL are not well suited (Hulland, 1999; Chin, 1998a), PLS Graph will be employed, which was designed to handle both reflective and formative indicator-based models. In addition, partial least squares methods are more robust to small sample sizes (Chin, 1998a; Chin 1998b; Hulland, 1999) and are particularly well suited to research whose objective is predictive accuracy and explanation of complex relationships (Sambamurthy & Chin, 1994). Significance of relationships will be determined via the betas obtained in the SEM procedure. Subsequent to the data analysis, findings will be presented and discussed. Both the academic and practitioner contributions of this study will be summarized.

Finally, the limitations of this study and directions for future research will be discussed.

CHAPTER 5

ANALYSIS AND RESULTS

This chapter assesses the hypotheses developed in Chapter 3.

Descriptive statistics of the data and correlations of the variables are first provided followed by tests of the hypotheses. Prior to the analysis all scale and interval variables, including the dependent variables, were tested to ensure that they met the assumptions of normality. P-P plots and the Kolmogorov-Smirnov tests for normality revealed that all of the variables in the study met the assumptions for normality with the exception of two variables – CIO's extent of formal interaction with the TMT and CIO's extent of informal interaction with the TMT. A number of transformations were attempted on these two variables including a natural logarithm, a base ten logarithm, a square root (after adding 10 to each variable in order to make all values positive as required by log and square root transformations), reciprocal, reciprocal of the square root, and sine (since the data displayed a slight sinusoidal pattern around the slope of the normal distribution). These all proved unsuccessful. Therefore, despite the fact that all other variables meet the assumptions of normality, assumptions of non-normality will be used in all tests involving these two variables. Fortunately, the partial least squares approach to structural equation modeling "does not presume any distributional form for measured variables" (Chin, 1998, pg. 295) and

therefore serves as a suitable tool for testing the research model put forth in Chapter 3.

Descriptive Statistics

Table 17 provides summary statistics for the variables in the research model developed in Chapter 3. Table 18 provides the frequency table of the nominal variables in the research model. Table 19 presents the correlations among the research variables. All correlations in Table 19 reflect Pearson Product-Moment correlations with the exception of correlations between two nominal variables which reflect Spearman's Rho coefficients.

Table 17 suggests that the mean CIO effectiveness rating along all 6 CIO role dimensions of business partner, IT contract oversight, integrator, IT strategist/informaticist, IT educator, and utility provider/classic IT support fall between 'excellent' and 'satisfactory' (i.e., slightly above the mid-point in the scale).

CIO capability is formulated in this study as the knowledge and interpersonal skill of the CIO. Table 17 suggests that the average CIO's strategic business knowledge and strategic IT knowledge both falls between 'well informed' and 'informed' (i.e., slightly above the mid-point in the scale). The

average CIO's political savvy and interpersonal communication skill fell between 'very effective' and 'effective' (i.e., slightly above the mid-point in the scale).

Table 17 - Summary Statistics

Variable	N	Mean	Std. Dev.	Min.	Max.
<u>CIO Effectiveness</u>					
Business Partner Role ¹	105	3.379	0.705	1.83	5.00
Contract Oversight Role ¹	105	3.814	0.714	1.75	5.00
Integrator Role ¹	105	3.490	0.712	1.50	5.00
IT Strategist/Informaticist Role ¹	105	3.643	0.667	2.00	5.00
IT Educator ¹	105	3.386	0.721	1.33	5.00
Utility Provider/Classic IT Support ¹	105	3.918	0.676	1.67	5.00
<u>CIO Capability</u>					
Political Savvy ²	106	3.851	0.900	1.00	5.00
Communication Skill ²	106	3.599	0.831	1.00	5.00
IT Knowledge ³	106	3.851	0.743	1.25	5.00
Business Knowledge ³	106	3.762	0.765	2.33	5.00
<u>TMT/CIO Engagements</u>					
Hierarchical Level of the CIO	98	0.87 ⁴	0.45	0	2
Extent of Formal Interaction w/CEO ⁵	99	3.63	0.80	2	5
Extent of Formal Interaction w/TMT ⁵	99	4.64	0.60	3	5
Extent of Informal Interaction ⁵	99	2.702	0.939	1	5
Extent of Trusting Relationships ⁶	105	4.281	0.734	2	5
<u>Control</u>					
TMT Group Cohesiveness ⁶	105	4.287	0.626	2.00	5.00

¹ 5 point scale from 'outstanding' to 'not meeting expectation'

² 5 point scale from 'extremely effective' to 'not effective at all'

³ 5 point scale from 'very well informed' to 'not informed'

⁴ Represents median reporting level

⁵ 5 point scale from 'daily' to 'once a year or less'

⁶ 5 point scale from 'strongly agree' to 'strongly disagree'

Table 18 - Frequency of Nominal Variables

Construct	N (Valid %)	Missing
<u>TMT's Strategic Vision of IT (Valid N = 106)</u>		0
Automate	17 (16%)	
Informate Up	24 (22.6%)	
Informate Down	35 (33%)	
Transform	30 (28.4%)	
<u>Levels of Management Between CIO and CEO (Valid N= 98)</u>		8
0 (Direct Report)	17 (17.3%)	
1	77 (78.6%)	
2 or more	4 (4.1%)	
<u>Dominant Organizational Strategy (Valid N = 104)</u>		2
Low Cost Provider	42 (40.4%)	
Differentiation	41 (39.4%)	
Niche	21 (20.2%)	
<u>Tax Status of Organization (N = 100)</u>		6
For Profit	6 (6%)	
Not-for-Profit	49 (49%)	
Not-for-Profit (Government)	45 (45%)	
<u>Type of Organization (N = 100)</u>		6
Teaching Hospital	33 (33%)	
Non-teaching Hospital	28 (28%)	
Corporate/Regional Headquarters	26 (26%)	
Clinic/Group Practice	10 (10%)	
Other	3 (3%)	

TABLE 19 - Correlation Table

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1) Dominant Strategy																			
2) TMT's Strategic Vision of IT	.04																		
3) Tax Status	-.08	-.01																	
4) Type of Organization	-.10	-.00	-.07																
5) TMT Group Cohesiveness	.02	.13	.14	.10															
6) Hierarchical Level of CIO	-.05	-.16	.29**	-.04	-.11														
7) CIO Effectiveness in Business Partner Role	.01	.15	.05	.14	.11	-.02													
8) CIO Effectiveness in IT Contract Oversight Role	-.14	.18	-.08	.15	.36**	-.08	.60**												
9) CIO Effectiveness in Integrator Role	-.07	.18	.10	-.01	.35**	.03	.65**	.68**											
10) CIO Effectiveness in IT Strategist/Informaticist Role	-.04	.19*	.02	.01	.25*	-.07	.76**	.70**	.73**										
11) CIO Effectiveness in IT Educator Role	-.02	.08	.14	.08	.12	.05	.65**	.56**	.59**	.63**									
12) CIO Effectiveness in Utility Provider/Classic IT Support Role	-.16	.07	.25*	.09	.24*	.06	.55**	.57**	.57**	.62**	.55**								
13) CIO Membership in TMT	.10	.23*	-.3**	.18	.11	-.3**	.33**	.37**	.32**	.34**	.14	.03							
14) Extent of Formal Interaction w/ TMT	-.17	.14	.12	.17*	.23*	.37**	.28**	.34**	.26**	.32**	.25*	.34**	.25*						
15) Extent of Informal Interaction w/ TMT	-.04	.24*	.02	.15*	-.03	-.03	-.02	.09	-.07	-.01	.04	.01	.14	.16*					
16) Extent of Trusting Relationships w/TMT members	.06	.13	-.03	.02	.16	-.06	.59**	.56**	.46**	.59**	.44**	.58**	.20*	.23*	.03				
17) CIO's Communicative Skill	-.06	.11	-.07	-.04	.12	-.08	.60**	.56**	.63**	.65**	.43**	.40**	.30**	.14	-.05	.54**			
18) CIO's Political Savvy	.01	.10	.04	.01	.19	-.07	.57**	.54**	.50**	.59**	.40**	.49**	.18	.32**	-.15	.72**	.65**		
19) CIO's Business Knowledge	-.08	.09	-.07	.10	.29**	-.03	.59**	.53**	.63**	.58**	.48**	.43**	.31**	.30**	.08	.45**	.62**	.45**	
20) CIO's IT Knowledge	-.04	.06	-.16	.10	.19	-.14	.56**	.58**	.64**	.60**	.48**	.43**	.40**	.28**	.08	.51**	.51**	.40**	.60**

* p < .05 ** p < .01

The median number of levels of management between the CIO and the CEO was one with 17.3% reporting directly to the CEO. Surprisingly, only 4.1% of CIOs in this sample are two or more levels removed from the CEO and fully 95.9% are within 1 level or less from the CEO.

Hospitals and the corporate/regional headquarters of healthcare delivery systems represented 87% of the organizations in the sample with another 10% represented by clinics and/or group practices that deliver healthcare services on an outpatient basis. As noted earlier, the healthcare industry is highly dynamic, complex and information intensive. While organizational characteristics may vary among healthcare organizations, hospitals generally reflect the characteristics that provide relevance to this study – that is organizations that are highly information intensive, complex and dynamic where the impact of a CIO should matter.

The dominant strategy of organizations in this sample were varied with 40.4% of organizations indicating a low-cost provider strategy, 39.4% indicating a differentiation strategy, and 20.2% indicating a niche strategy. In addition, the strategic vision of IT was fairly evenly distributed with 16% indicating an 'automate' vision, 22.6% indicating an 'informate up' vision, 33% indicating an 'informate down' vision, and 28.4% indicating a 'transform' vision. Recall that Schein's (1992) strategic IT vision scheme can be thought of hierarchically from the simple 'automate' vision to increasingly more enlightened visions culminating

in the 'transform' vision. Using Spearman's Rho coefficients in Table 19, no correlations between an organization's dominant strategy and its strategic vision of IT were detected. In fact very few of the organizational variables were correlated at all.

CIO Effectiveness

With respect to the CIO effectiveness construct, Table 20 presents the loadings of the 6 role-based dimensions of CIO effectiveness.

Table 20 - CIO Effectiveness Dimension Loadings and Significance

CIO Role-Based Effectiveness Dimensions	Loading
Business Partner Role Effectiveness	.85*****
IT Contract Oversight Role Effectiveness	.83*****
Integrator Role Effectiveness	.86*****
IT Strategist/Informaticist Role Effectiveness	.90*****
IT Educator Role Effectiveness	.78*****
Utility Provider/Classic IT Support Role Effectiveness	.76*****

* p < .10 ** p < .05 *** p < .01 **** p < .005 ***** p < .001

Note: Loadings were obtained using structural equation modeling techniques which employ a partial least squares approach and the t statistic

Sambamurthy & Chin (1994) suggest that loadings are more appropriate for interpreting the effects for reflective constructs while weights are more appropriate for examining formative constructs. Table 20 clearly shows that the 6 role-based dimensions of CIO effectiveness all load significantly ($p < .001$) on the latent CIO effectiveness construct. Recall that Table 19 showed that the 6

role-based dimensions of CIO effectiveness were all highly correlated, as well, ranging from $r = .55$ to $r = .76$ ($p < .01$). The high correlations and the high loadings suggest that the multi-dimensional CIO effectiveness construct used in this study is well suited to reflective modeling for PLS analysis.

CIO Capability

Table 21 presents the CIO capability item loadings and scale reliabilities.

Table 21 – CIO Capability Factor Loadings

Factor	Strategic Business Knowledge	Strategic IT Knowledge	Political Savvy	Communication Skill
Item & Loading	- Healthcare industry clinical practices (.787) - Healthcare industry business practices (.765) - Org's products, services, markets, & business strategies (.756)	- Competitors use of IT (.822) - Relevant emerging IT (.808) - Timing & investment strategies in IT (.737) - Optimize existing IT (.736)	- Developing good rapport w/people (.899) - Act w/ tact (.869) - Accurate reading of potentially contentious situations (.732)	- Use of non-technical terms in presentations to TMT (.790) - Use business terms in presentations to TMT (.763) - Use clinical terms in presentations to clinical audience (.561)
Mean	3.7662	3.8154	3.6783	3.5857
Std. Dev.	0.2976	0.1315	0.2345	0.2993
Eigenvalue	6.328	1.797	1.084	0.778
% Variance Expl. (cumulative)	48.676	62.498	70.833	76.818
Cronbach's α	.8218	.8585	.8789	.8313

A factor analysis of the 13 questionnaire items that were used to measure CIO capability revealed four component factors – 1) strategic business knowledge, 2) strategic IT knowledge, 3) political savvy, and 4) communication skill. While theoretically communication skill and political skill are separate constructs, in practice the two go hand-in-hand when speaking of interpersonal skill. In fact in this study the communication skill items initially loaded with the

political skill construct, however, the literature cited in Chapter 2 clearly makes a theoretical distinction between political savvy and communication skill.

Therefore, communication skill was used as a separate construct (eigenvalue = .778). The reliability of the 4 scales were all between .82 and .88 (Cronbach's alpha) .

TMT/CIO Engagements

Table 18 presents the hierarchical level of CIOs in the sample of 106 organizations from which both a CIO responded and at least one response from a TMT member was received. As noted earlier, the median number of levels of management between the CIO and the CEO was one with 17.3% reporting directly to the CEO. Interestingly, only 4.1% of CIOs in this sample are two or more levels removed from the CEO and fully 95.9% are within 1 level or less from the CEO.

Table 18 also presents the frequency of CIOs with respect to formal membership on the TMT. The sample of organizations in this study is fairly evenly split with regard to CIO membership in the TMT. 52.8% of the organizations indicated that their CIO was a formal member of the TMT whereas 47.2% indicated that the CIO was not a formal member of the TMT.

Table 22 presents the TMT/CIO engagement item loadings and scale reliabilities.

Table 22 – TMT/CIO Engagement Factor Loadings

Factor	Extent of Trusting Relationships	Informal Interaction w/CEO & TMT
Item & Loading	- Dependable in critical situations (.903) - Act in TMT's best interest (.894) - CIO is person TMT likes (.831)	- Informal interaction w/TMT (.941) - Informal interaction w/CEO (.936)
Mean	4.2814	2.7020
Std. Dev.	0.7335	0.9393
Eigenvalue	2.554	1.760
% Variance Expl. (cumulative)	36.49	61.63
Cronbach's α	.86	.85

A factor analysis was performed on the 7 questionnaire items designed to tap into the extent of networking activities and extent of trusting relationships developed by the CIO with the other members of the TMT. This initially revealed three factors: 1) extent of trusting relationships, 2) extent of informal interaction w/CEO and TMT and 3) extent of formal interaction w/CEO and TMT. While all three factors had eigenvalues greater than one, the latter, extent of formal interaction's scale reliability was only .52. It was therefore not used as a component factor but rather as two single item scores representing the extent of formal interaction with the CEO and the extent of formal interaction with the other members of the TMT. The reliability of the scales for extent of informal interaction and extent of trusting relationships were .85 and .86 respectively (Cronbach's alpha).

Hypothesis Testing

The research model found at the end of Chapter 3 was tested using a partial least squares approach through PLS Graph. While other structural equation modeling tools exist in the research community (e.g., LISREL), PLS Graph provides the opportunity to model variables both formatively and reflectively and is robust to small sample sizes, unlike LISREL (Hulland, 1999; Chin, 1998a; Sambamurthy & Chin, 1994). Since the research model in this study involves independent variable constructs made up of formative indicators and a multi-dimensional dependent variable made up of reflective indicators, PLS Graph was a logical choice for testing the model. Formative indicators "are not assumed to be correlated nor do they measure the same underlying phenomenon. Instead, formative indicators are viewed as cause variables that provide the condition under which the latent variables they are connected to is formed" (Chin, 1998b, pg. 306). In short, while formative indicators together may 'cause' a construct, they do not necessarily move together. That is, when the level of one formative indicator changes, the other formative indicators do not necessarily change with it. Reflective indicators on the other hand, are correlated and are presumed to measure the same underlying phenomenon. If the actual level of the phenomenon changes, then all of the reflective indicators should also change in the same direction (Chin, 1998b). To test the research model, all of the CIO capability items (indicators) and all of the TMT/CIO Engagements items (indicators) were modeled as formative indicators in PLS

Graph. The six role-based CIO effectiveness measures were modeled as reflective of the overall construct CIO effectiveness.

Figure 4 presents the full-model with results of the PLS Graph estimation with path weights displayed for the indicators of CIO Capability and TMT/CIO Engagements and path loadings displayed for the indicators of CIO effectiveness. Sambamurthy & Chin (1994) suggest that weights are more appropriate for interpreting the effects for formative constructs while loadings are more appropriate for examining reflective constructs. For increased rigor, the research model was tested with all of the research variables included, with the exception of categorical control variables and the moderator variable, strategic vision of IT, whose analysis will be discussed later in this chapter. While PLS techniques allow the simultaneous testing of the effects of the research variables in the model, to provide some structure to this analysis, assessment of the hypotheses will be accomplished by first analyzing the impact of the control variables and then discussing the relationships between each construct pair in turn.

Control Variables

Analysis of the control variables in the research model (i.e., tax status, strategic orientation, organization type and TMT group cohesion) will be accomplished in two ways. The continuous scale variable, TMT group cohesion, was included in the PLS analysis. The categorical variable's impact on CIO

effectiveness will be accomplished via ANOVA using an aggregated total of the 6 CIO effectiveness dimensions.

Table 23 provides the results of the ANOVA using the categorical control variables 'tax status', 'type of organization' and 'strategic orientation'. None of these control variables had a significant effect on the dependent variable CIO effectiveness. A review of Figure 4 reveals that TMT Group Cohesion has an insignificant path coefficient of .10 suggesting that it has little effect on CIO effectiveness in this study.

Table 23 – Analysis of the Effects of Control Variables on CIO Effectiveness

Control Variable	F statistic
Tax Status	0.682 (ns)
Type of Organization	1.235 (ns)
Strategic Orientation	0.357 (ns)

ns = not significant

Hypotheses Dealing with the Relationship Between CIO Capability and CIO Effectiveness

The hypothesized relationships between the CIO capability items and CIO effectiveness developed in Chapter 3, follow:

Hypothesis 1: CIO capability is positively related to CIO effectiveness, as perceived by the members of the TMT.

Hypothesis 1a: The degree to which a CIO has a high degree of political savvy is positively related to CIO organizational effectiveness, as perceived by the members of the TMT.

Hypothesis 1b: The degree to which a CIO communicates in terms that the other members of the TMT can understand is positively related to CIO organizational effectiveness, as perceived by the members of the TMT.

Hypothesis 1c: The degree of business knowledge held by the CIO is positively related to CIO organizational effectiveness, as perceived by the members of the TMT.

Hypothesis 1d: The degree of IT knowledge held by the CIO is positively related to CIO organizational effectiveness, as perceived by the members of the TMT.

In reviewing Figure 4, the CIO capability – CIO effectiveness path has a path coefficient of .68 and is highly significant ($p < .001$) providing support for H1. Additionally, each of the formative indicator weights of CIO capability (i.e., CIO's political savvy, CIO's interpersonal communication skill, CIO's strategic IT knowledge and CIO's strategic business knowledge) are all significant, as well, with weights ranging from .36 to .65 ($p < .001$), providing support for H1a-H1d. This finding confirms theory and prior research indicating the importance of CIO capability on CIO effectiveness.

Hypotheses Dealing With The Relationship Between TMT/CIO Engagements And CIO Effectiveness

The hypothesized relationships between the TMT/CIO engagement items and CIO effectiveness developed in Chapter 3, follow:

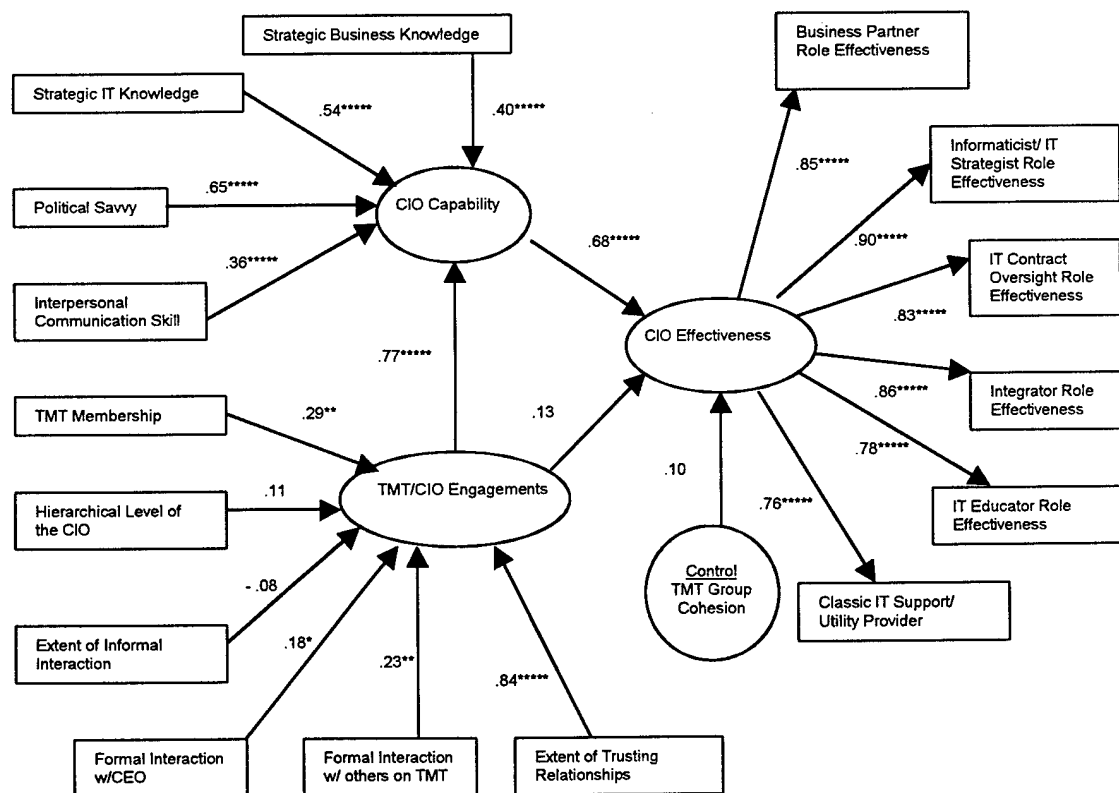
Hypothesis 2: TMT/CIO engagements is positively related to CIO effectiveness, as perceived by the members of the TMT.

Hypothesis 2a: The hierarchical level of the CIO is positively related to CIO organizational effectiveness, as perceived by the members of the TMT.

Hypothesis 2b: TMT membership is positively related to CIO organizational effectiveness, as perceived by the members of the TMT.

Hypothesis 2c: Extent of networking with the other members of the TMT is positively related to CIO organizational effectiveness, as perceived by the members of the TMT.

Hypothesis 2d: Extent of trusting relationships developed with the other members of the TMT is positively related to CIO organizational effectiveness, as perceived by the members of the TMT.



* p < .10 ** p < .05 *** p < .01 **** p < .005 ***** p < .001

R² = .66

Figure 4 – Results from PLS Analysis

In reviewing Figure 4 the path coefficient for TMT/CIO Engagements to CIO Effectiveness is not significant though Formal Interaction with the CEO, Formal Interaction with the other members of the TMT, TMT Membership, and Extent of Trusting relationships each have significant formative indicator weights ($p < .10$, $p < .05$, $p < .05$, and $p < .001$ respectively). Neither the hierarchical level of the CIO or the extent of informal interaction with the TMT had a significant weight on TMT/CIO Engagements. From a rigorous confirmatory analytical standpoint, no support can be claimed for H2 or any of its subordinates H2a-H2d despite the fact that four of its formative indicators were found to have significant weights. While this may seem counterintuitive, based on prior research cited in Chapter 2, it provides keen insight into the dominance of CIO capability with respect to CIO effectiveness. It also indicates the value of using statistical techniques that can simultaneously and more comprehensively test the relationships between the research variables. In summary, in the present study TMT/CIO engagements is not directly related to CIO effectiveness.

Hypothesis Dealing with the Relationship between CIO Capability and TMT/CIO Engagements

Hypothesis 3 developed in Chapter 3 follows:

Hypothesis 3: CIO capability is positively related to TMT/CIO engagements.

In reviewing Figure 4, the TMT/CIO Engagements – CIO Capability path the path coefficient is highly significant ($p < .001$) with a path coefficient of .77. While no causal claim is made here, the two constructs are clearly significantly associated providing support for H3.

While no causal path was hypothesized between CIO capability and TMT/CIO engagements (only an association was posited), a post-hoc analysis may provide some insight into the holistic effects of the CIO capability – TMT/CIO engagements relationship on CIO effectiveness. In reviewing Figure 3, the research model at the end of Chapter 3, the path diagrams imply that two potential mediating relationships exist in this study, though no formal hypotheses were posited. The model implies that either CIO capability may act as a mediator between TMT/CIO engagements and CIO effectiveness, or that TMT/CIO engagements may act as a mediator between CIO capability and CIO effectiveness. To test these two alternatives, Barron & Kenny's (1986) procedure was employed. They suggest that:

“a variable functions as a mediator when it meets the following conditions: (a) variations in levels of the independent variable significantly account for variations in the presumed mediator..., (b) variations in the mediator significantly account for variations in the dependent variable..., and (c) when (the mediator paths) are controlled, a previously significant relation between the independent and dependent variables is no longer significant....” (pg. 1176).

In reviewing Figure 4, the TMT/CIO engagements → CIO Capability path yielded a highly significant path coefficient (.77, $p < .001$) as did the CIO

Capability → CIO Effectiveness path (.68, $p < .001$). However, in the opposite direction, while the CIO Capability path → TMT/CIO engagements remains highly significant (.77, $p < .001$) the TMT/CIO engagements → CIO Effectiveness path has a low and insignificant path coefficient (.13, $p > .10$). Therefore, from a holistic perspective, the only full path to CIO effectiveness that is fully significant (and the only one that meets Baron & Kenny's (1986) first two requirements ('a' & 'b' above) for mediation) is the TMT/CIO engagements → CIO Capability → CIO Effectiveness path. Therefore to test the final of Baron & Kenny's requirements for mediation (requirement 'c' above), the researcher removed the path from TMT/CIO engagements → CIO Capability and also the path from CIO Capability → CIO effectiveness and indeed the TMT/CIO engagements → CIO effectiveness path yielded a highly significant path coefficient (.647, $t_{adj} = 6.35$, $p < .001$). However, in the presence of the mediator, CIO capability (i.e., when the model is tested with the TMT/CIO engagements → CIO Capability and also the CIO Capability → CIO effectiveness path), the TMT/CIO engagements → CIO effectiveness path approaches zero (path coefficient = .13, not significant, as shown in Figure 4). This suggests that CIO capability may be a mediator between TMT/CIO engagements and CIO effectiveness.

Hypotheses Dealing with the Moderating Effects of TMT Strategic Vision of IT on the Relationship between CIO Capability and CIO Effectiveness

To test both hypothesis 4 and hypothesis 5, which each deal with the proposed moderating effects of the TMT's strategic vision of IT on the primary relationship paths in the research model, the sample was split into three groups. It was hoped that enough subgroups of the total sample would be received in order to test for moderating effects across all four of Shein's (1990) strategic visions of IT. (i.e., automate, informate up, informate down, or transform). The minimum requirements to maintain sufficient power in PLS requires that the one of two sample size conditions must be met. (Chin, 1998) suggests that in order to determine the minimum sample size required one must first determine which independent variable construct in the model has the largest number of formative indicators. In this case TMT/CIO engagements has 6 formative indicators. Then one must determine the largest number of independent variable constructs that impact the dependent variable. In this study there are only two IV → DV paths. The minimum sample size required for PLS analysis then is 10 times the greater of these two alternatives (Chin, 1998). Therefore, in analyzing the moderating impact of the TMT's strategic vision of IT on the IV → DV paths, the subsample analyses require at least 60 cases, under assumptions of non-normality, in order to maintain requisite power. Others (Bentler & Chou, 1988) suggest a more liberal heuristic of 5 times the greater of these two alternatives when the parameters are normal or elliptical, which in this case would require 30 cases in

order to maintain power. Recall that all of the variables displayed normal distributions with the exception of formal and informal interaction w/the TMT.

In reviewing Table 18, however, it is apparent that the 106 organizations in this study are rather evenly distributed with respect to TMT's strategic vision of IT with the lowest number of cases being 'automate' with 17 cases and the highest number of cases being 35 for the informate up subgroup. Therefore the following model trimming actions were taken to test hypotheses 4 and 5.

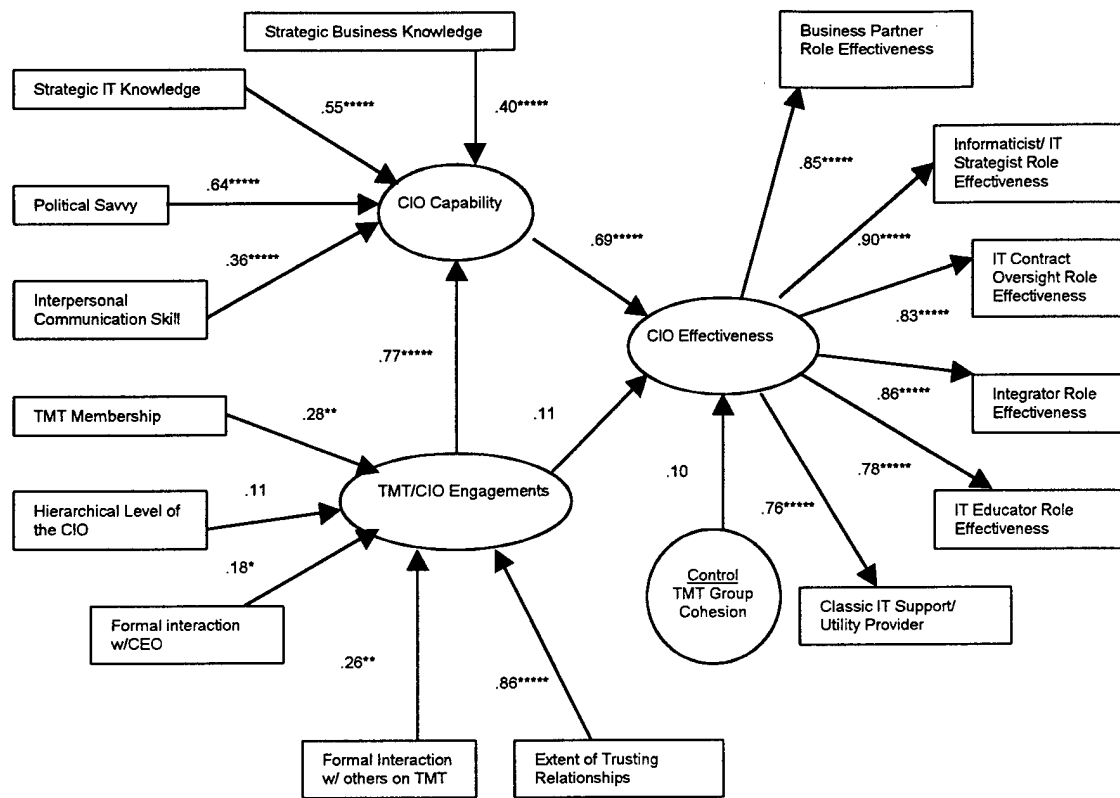
First informal interaction was trimmed from the model since it has an insignificant and negative path coefficient. This has the effect of reducing the sample size requirement for a sub-sample analysis. This action yields a model with 5 formative constructs as the key constraint in determining the required sample size of subgroups. In addition since all of the remaining variables in the model were normally distributed, Bentler & Chou's (1988) heuristic of 5 cases per formative indicator was used to determine that roughly 25 cases are needed to maintain adequate power to test hypotheses 4 and 5.

In order to ensure that the removal of the insignificant indicator of TMT/CIO engagements, extent of informal interaction, did not significantly change the parameters of the research model a PLS analysis was accomplished with extent of informal interaction removed. Figure 5 presents the research model with extent of informal interaction removed.

In reviewing Figure 5 and Table 26, it is clear to see that the removal of the insignificant TMT/CIO engagement variable – extent of informal interaction – had a negligible impact on the research models parameters. This allows analysis of subgroups based on TMT's strategic vision of IT with a smaller subgroup sample size requirement. Therefore, hypotheses 4 and 5 will be tested with the revised model in Figure 5.

While the revised model with its fewer formative indicators provides some relief from subgroup sample size requirements for PLS testing, in reviewing Table 18 it is apparent that the 'automate' vision is only represented by 17 of the 106. Therefore, similar to Armstrong (1995) who also had difficulty obtaining adequate subgroup samples for the 'automate' vision, this analysis will omit the 'automate' vision since it has fewer than 20 cases. Figures 6, 7 and 8 provide the results of the PLS analysis using the subgroups of organizations that espouse an informate up, informate down and transform vision, respectively. Table 27 compares the results obtained in each sub-sample. Hypothesis 4 which was developed in chapter 3 follows:

Hypothesis 4: The impact of CIO capability on CIO organizational effectiveness will be stronger for organizations that articulate a 'transform' vision than for organizations that articulate an 'automate' vision.



* p < .10 ** p < .05 *** p < .01 **** p < .005 ***** p < .001

R² = .66

Figure 5 – Results from PLS Analysis on Trimmed Model

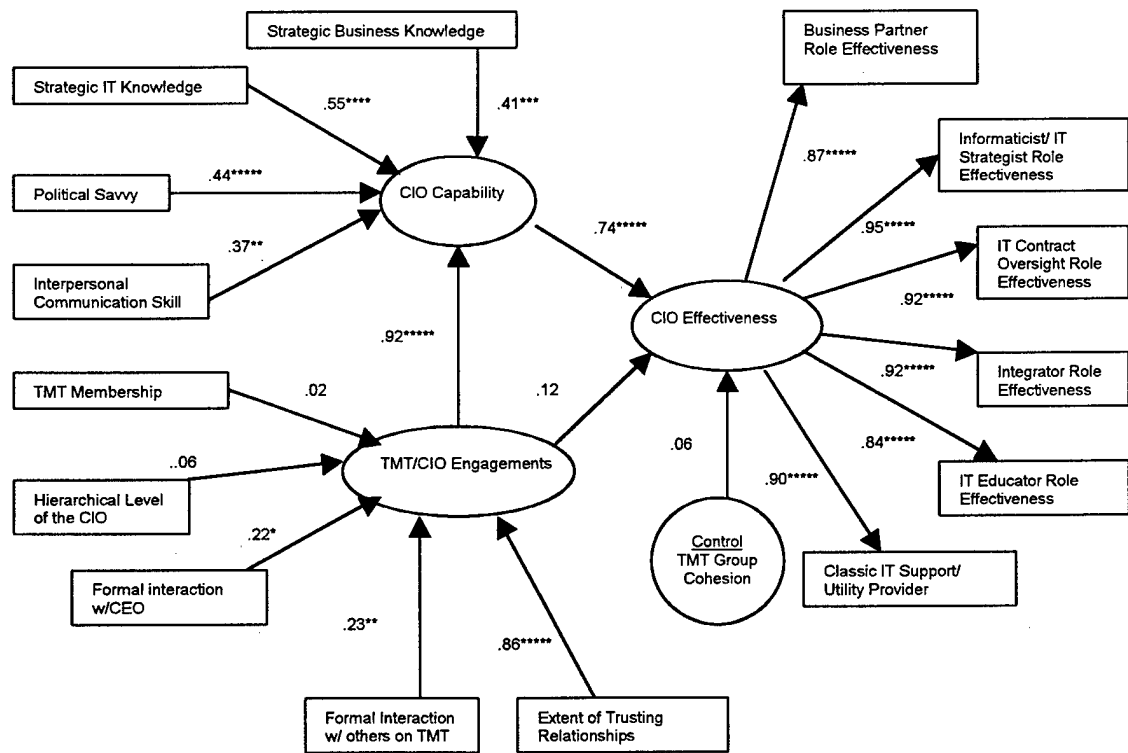
Table 24 - Indicators and Path Coefficients for Trimmed Model

Variable	Loading (revised model)	Change in Weight (from full model)
CIO Effectiveness		
Business partner role effectiveness	.85*****	.00
Integrator role effectiveness	.86*****	.00
IT contract oversight role effectiveness	.83*****	.00
Informaticist/IT strategist role effectiveness	.90*****	.00
IT educator role effectiveness	.78*****	.00
Classic IT support/utility provider role effectiveness	.76*****	.00

Table 24 continued

Variable	Weight (revised model)	Change in Weight (from full model)
CIO Capability Variable		
CIO's political savvy	.64*****	.00
CIO's interpersonal communication skill	.36*****	.00
CIO's business knowledge	.40*****	.00
CIO's IT knowledge	.55*****	.01
TMT/CIO Engagements Variable		
TMT membership of the CIO	.28**	.01
Hierarchical Level of the CIO	.11	.00
Extent of formal interaction w/CEO	.18*	.00
Extent of formal interaction w/TMT	.23**	.00
Extent of trusting relationships w/TMT	.85*****	.01

* p < .10 ** p < .05 *** p < .01 **** p < .005 ***** p < .001



* p < .10 ** p < .05 *** p < .01 **** p < .005 ***** p < .001

R² = .78

Figure 6 – Results from PLS Analysis – Informate Up Vision (N=24)

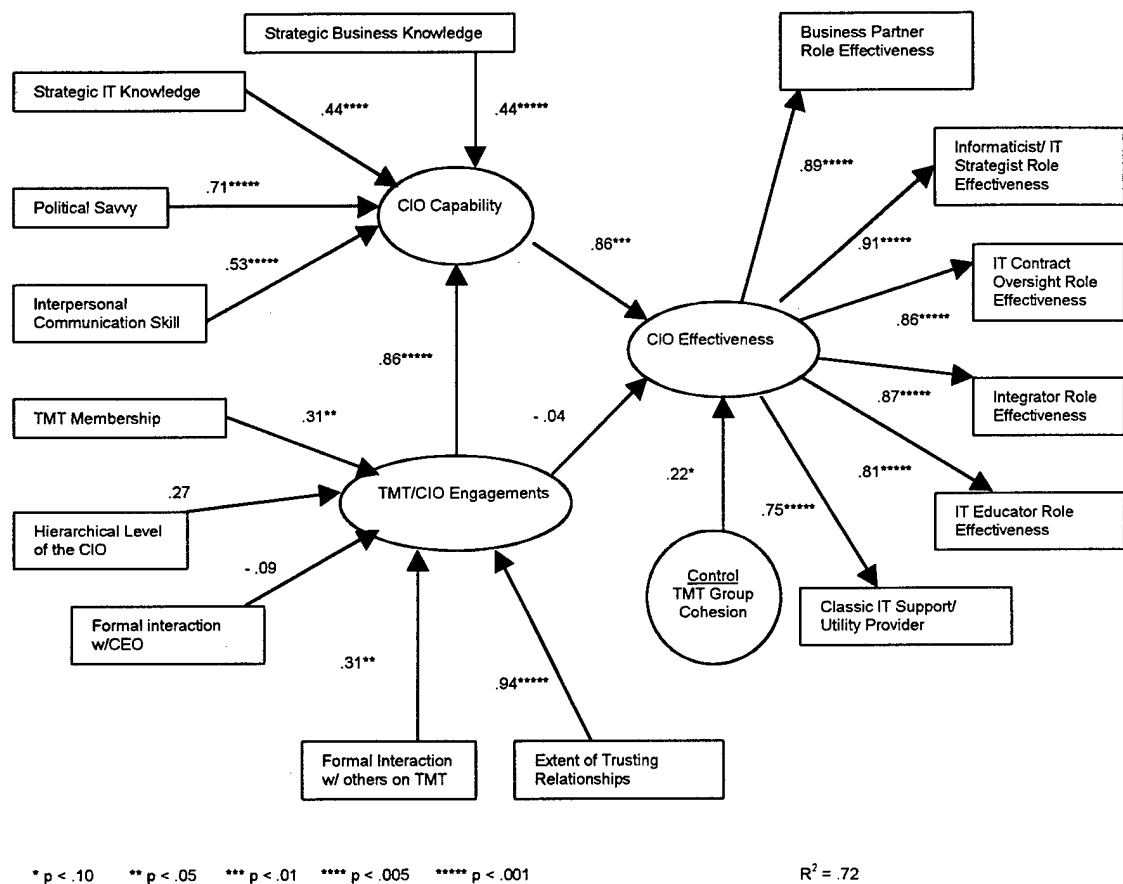


Figure 7 – Results from PLS Analysis – Informate Down Vision (N=35)

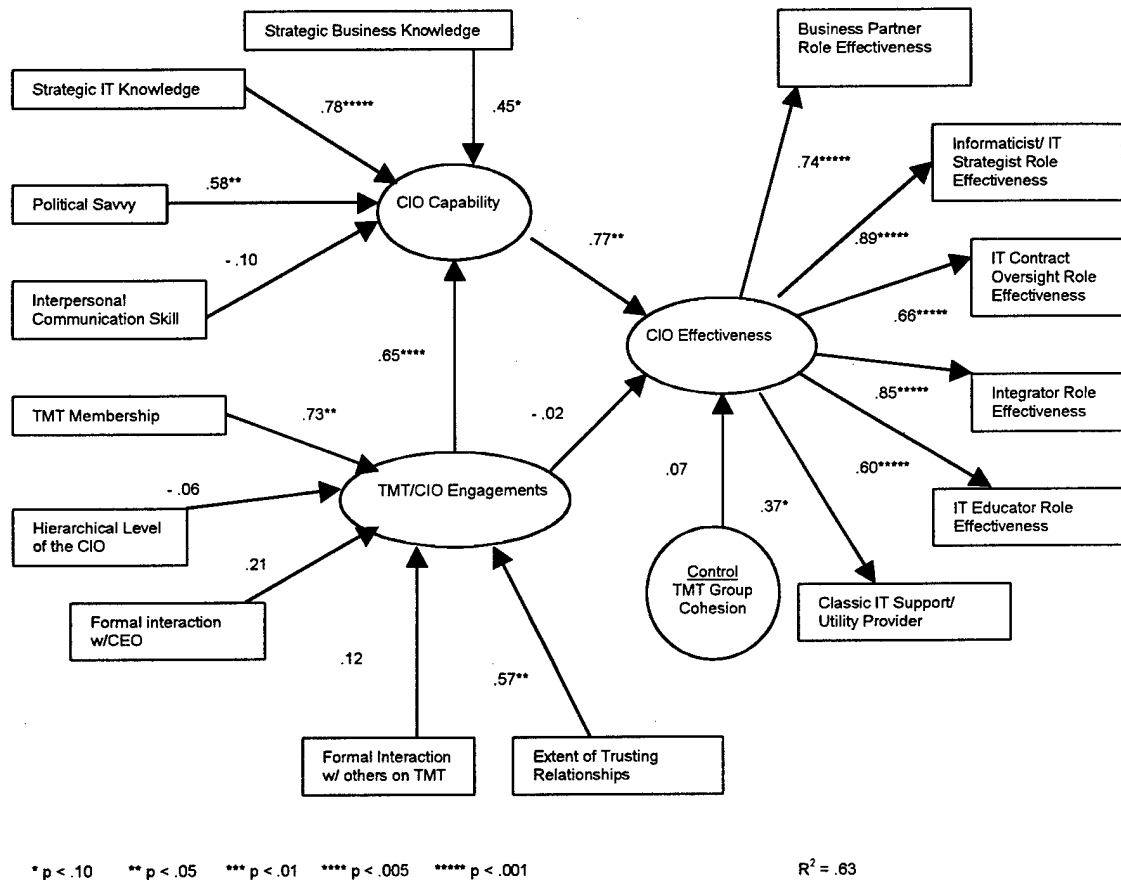


Figure 8 – Results from PLS Analysis – Transform Vision (N=30)

Table 25 - Comparative Analysis – Strategic Vision of IT

Construct/ Variable	Loadings/Weights			
	Automate (N = 17)	Informate Up (N = 24)	Informate Down (N = 35)	Transform (N = 30)
CIO Effectiveness				
Business Partner Role Effectiveness ¹		.87*****	.89*****	.74*****
Integrator Role Effectiveness ¹		.92*****	.87*****	.85*****
IT Contract Oversight Role Effectiveness ¹		.92*****	.86*****	.66*****
Informaticist/IT Strategist Role Effectiveness ¹		.94*****	.91*****	.89*****
IT Educator Role Effectiveness ¹		.84*****	.81*****	.60*****
Classic IT Support/Utility Provider Role Effectiveness ¹		.90*****	.75*****	.37*
CIO Capability				
Strategic Business Knowledge ²		.41***	.44*****	.45*
Strategic IT Knowledge ²		.55*****	.44***	.78*****
Political Savvy ²		.44*****	.71*****	.58**
Interpersonal Communication Skill ²		.37**	.53*****	-.10
TMT/CIO Engagements				
Hierarchical Level of the CIO ²		.06	.27	-.06
TMT Membership ²		.00	.31**	.73**
Extent of Formal Interaction w/CEO ²		.22*	-.09	.21
Extent of Formal Interaction w/other TMT members ²		.23**	.31**	.12
Extent of Trusting Relationships Established ²		.86*****	.94*****	.57**
Control				
TMT Group Cohesion ³		.06	.22*	.08
Path Relationships				
CIO Capability → CIO Effectiveness ^{3, (4)}		.74* (1.49)	.86*** (2.54)	.77** (2.25)
TMT/CIO Engagements → CIO Effectiveness ^{3, (4)}		.12 (0.18)	-.04 (-0.37)	-.02 (0.04)
TMT/CIO Engagements → CIO Capability ^{3, (4)}		.92***** (12.2)	.86***** (9.70)	.65***** (2.97)
Variance Explained (R ²)		.78	.72	.63

* p < .10 ** p < .05 *** p < .01 **** p < .005 ***** p < .001

Notes:

¹ Represents a loading

² Represents a weight

³ Represents a path coefficient

⁴ Adjusted t statistic obtained from jackknife procedure

In reviewing Figures 6, 7, and 8 and Tables 25 the adjusted t statistic for the CIO Capability → CIO Effectiveness path increases from $t_{adj} = 1.49$ for the informate up vision to $t_{adj} = 2.54$ for the informate down vision and $t_{adj} = 2.25$ for the transform vision providing no support for H4. It is important to note, however, that a PLS analysis on the 17 case

'automate' subsample yielded an very low t_{adj} of 0.21 for the relationship between CIO capability and CIO effectiveness. However, due to an inadequate subsample size of organizations with an 'automate' vision no support can be claimed. In summary, no support for the moderating effect of strategic vision of IT on the relationship between CIO capability and CIO effectiveness was found.

Hypothesis 5: The impact of the level of TMT/CIO engagements on CIO organizational effectiveness will be stronger for organizations that articulate a 'transform' vision of IT than for organizations that articulate an 'automate' vision of IT.

No support was found for this hypothesis. The path coefficient for the TMT/CIO engagements → CIO Effectiveness relationship changed very little from one strategic vision of IT to the next with none of the subgroups yielding a significant path. Therefore hypothesis 5 is not supported.

A summary of the hypotheses and the results is provided in Table 26. Chapter 6 will discuss these results along with their implications for theory and practice. In addition, Chapter 6 will discuss the limitations of this research as well as directions for future research.

Table 26 - Summary of Results

Hypothesis	Result
Hypothesis 1: CIO capability is positively related to CIO effectiveness, as perceived by the members of the TMT.	Supported
Hypothesis 1a: The degree to which a CIO has a high degree of political savvy is positively related to CIO organizational effectiveness, as perceived by the members of the TMT	Supported
Hypothesis 1b: The degree to which a CIO communicates in terms that the other members of the TMT can understand is positively related to CIO organizational effectiveness, as perceived by the members of the TMT.	Supported
Hypothesis 1c: The degree of business knowledge held by the CIO is positively related to CIO organizational effectiveness, as perceived by the members of the TMT.	Supported
Hypothesis 1d: The degree of IT knowledge held by the CIO is positively related to CIO organizational effectiveness, as perceived by the members of the TMT.	Supported
Hypothesis 2: TMT/CIO engagements is positively related to CIO effectiveness, as perceived by the members of the TMT.	Not Supported
Hypothesis 2a: The hierarchical level of the CIO is positively related to CIO organizational effectiveness, as perceived by the members of the TMT.	Not Supported
Hypothesis 2b: TMT membership is positively related to CIO organizational effectiveness, as perceived by the members of the TMT.	Not Supported
Hypothesis 2c: Extent of networking with the other members of the TMT is positively related to CIO organizational effectiveness, as perceived by the members of the TMT.	Not Supported
Hypothesis 2d: Extent of trusting relationships developed with the other members of the TMT is positively related to CIO organizational effectiveness, as perceived by the members of the TMT.	Not Supported
Hypothesis 3: CIO capability is positively related to TMT/CIO engagements.	Supported
Hypothesis 4: The impact of CIO capability on CIO organizational effectiveness will be stronger for organizations that articulate a 'transform' vision than for organizations that articulate an 'automate' vision.	Not Supported
Hypothesis 5: The impact of the level of TMT/CIO engagements on CIO organizational effectiveness will be stronger for organizations that articulate a 'transform' vision of IT than for organizations that articulate an 'automate' vision of IT.	Not Supported

CHAPTER 6

DISCUSSION OF RESULTS

This chapter discusses the implications of the results presented in Chapter 5. First a summary of the results is provided followed by a discussion section in which interpretation of the results are provided along with implications for theory and practice. The chapter concludes with a review of strengths and limitations of the study and with suggestions for future research.

Summary of the Results

This study examined the relationships between CIO capability, TMT/CIO engagements and CIO effectiveness. The cross-sectional field study employed a survey methodology. Questionnaires were both mailed and e-mailed to CIOs and TMT members resulting in 106 organizations in which both the CIO and at least one of the organization's TMT members responded.

Analysis of the data found that all six of the role-based CIO effectiveness dimensions yielded highly significant loadings ($p < .001$) onto the CIO effectiveness construct providing the study with a valid dependent variable that captures CIO effectiveness along six different role-based dimensions. Overall,

the model explained 66% of the variance in CIO effectiveness. In addition, the researcher found that a CIO's political savvy, a CIO's interpersonal communication skill, a CIO's extent of strategic IT knowledge, and a CIO's extent of strategic business knowledge are all significant reflective indicators of a CIO's overall capability ($p < .001$). Moreover, a significant relationship between CIO capability and CIO effectiveness was found ($p < .001$). No support was found for the hypothesis that the strategic vision of IT moderates the relationship between CIO capability and CIO effectiveness. However, this non-finding may have resulted from inadequate subsample groups (e.g., there were only 17 organizations that espoused the 'automate' vision) and therefore is inconclusive.

Analysis of the data also revealed that a CIO's extent of trusting relationships formed with TMT members, his/her formal membership on the TMT, and his/her extent of formal interaction with the TMT members were significant indicators of TMT/CIO engagements. On the other hand, the hierarchical level of the CIO and the extent of informal interaction with the TMT members were not a significant indicator of TMT/CIO engagements. Additionally, no significant relationship between TMT/CIO engagements and CIO effectiveness was found.

Finally, the most highly significant relationship found in the research model was that of TMT/CIO engagements with CIO capability.

Discussion of the Results

The discussion of the results are presented using the four research questions articulated in Chapter 1.

Research Question One: How does a CIO's capability (i.e., his/her knowledge and interpersonal skill) affect CIO effectiveness?

The findings presented in Chapter 5 suggest that CIO's that possess high levels of both strategic IT and strategic business knowledge and are skilled communicators and politicians were perceived by their respective TMT's as more effective than their counterparts. This finding confirms prior research that suggests that such knowledge and skill are essential ingredients in effective CIOs (Stephens et al, 1992, Feeny et al, 1992, Earl & Feeny, 1994; Applegate & Elam, 1992; Chan et al, 1997; Danielson, et al, 1998).

The fact that all four of the CIO capability items were highly significant suggests that they must all be manifest in the person of the CIO in order for him/her to be perceived by the CEO and other members of the TMT as effective. In addition, the finding that all of the role-based dimensions of CIO effectiveness had highly significant loadings (.76 to .90; $p < .001$) suggests that this knowledge and interpersonal skill are important ingredients not only for the more strategic CIO roles, such as business partner and integrator, but also for the more operational CIO roles, such as classic IT support/utility provider. From the

researcher's own experience as a healthcare CIO for over 10 years, the interactions with the CEO and other TMT members on operational level issues (e.g., IT department responsiveness, upgrading the cable plant in a particular department, etc.) require just as much knowledge and interpersonal skill as do interactions on more strategic level issues (e.g., the implications of acquiring a new hospital, revising the organization's strategic plan, etc.).

Research Question Two: How do engagements between the top management team members and the CIO affect CIO effectiveness?

In this study, no direct relationship between TMT/CIO engagements and CIO effectiveness was found. This is in contrast to previous literature which suggests that engagements with the TMT are an important determinant of top executive effectiveness (French & Raven, 1959; Hambrick, 1981; Applegate & Elam 1992; Earl & Feeny, 1996; Finkelstein & Hambrick, 1996; Schrage 1996). The researcher provides two potential interpretations of this finding.

Recall that the research model was tested using SEM techniques which simultaneously test all of the relationships in the model. Under these more rigorous and conservative conditions, it appears that CIO capability simply dominates the paths to CIO effectiveness. This might lead one to an interpretation that TMT/CIO engagements do not matter and what matters most is the CIO's capability. However, prior research consistently cites the importance

of TMT/CIO engagements and therefore stands to refute this interpretation. This suggests an alternative interpretation.

As noted in Chapter 5, the TMT/CIO engagements → CIO Capability path yielded a highly significant path coefficient (.77, $p < .001$) as did the CIO Capability → CIO Effectiveness path (.68, $p < .001$). The post-hoc analysis revealed that CIO Capability may act as a mediator between TMT/CIO engagements and CIO effectiveness. Put another way, high levels of TMT/CIO engagements only have an impact on CIO effectiveness if the CIO has the capability to take advantage of the increased engagements with the CEO and other members of the TMT. CIOs without the requisite knowledge and interpersonal skill that are thrust into an increased level of engagements with TMT members may actually suffer perceptions of ineffectiveness as a result. This interpretation seems to be in line with others that suggest that CIOs must be brought into the inner executive circle and demonstrate effective communication skills, political skills, business knowledge and, of course, IT knowledge (Wang, 1994; Feeny, et al 1992; Brier 1994; Stephens et al, 1992; Earl & Feeny, 1994; Danielson et al, 1998; Applegate & Elam, 1992; Armstrong & Sambamurthy, 1999). While theoretically, TMT/CIO engagements are an important ingredient for CIO effectiveness, this study suggests that only through the mediation of CIO capability do these engagements become important. Armstrong & Sambamurthy (1999) found a similar synergistic relationship between CIO capability and TMT/CIO engagements in their study of IT assimilation, though

they did not test for mediating effects. Future research should attempt to more robustly test for this mediating relationship which would more fully determine that TMT/CIO engagements are a necessary condition but not sufficient condition to determine CIO effectiveness.

Research Question Three: What is the nature of the relationship between a CIO's knowledge and interpersonal skill (i.e., CIO capability) and TMT/CIO engagements?

As noted in the discussion of research question two, the relationship between TMT/CIO engagements and CIO capability yielded a highly significant path coefficient (.77, $p < .001$). Because of the cross-sectional nature of this study, we cannot draw causal inferences based on a review of the path relationships between the primary constructs in the model. However, as argued earlier in the section on research question two, the TMT/CIO engagements → CIO Capability path yielded a highly significant path coefficient (.77, $p < .001$) as did the CIO Capability → CIO Effectiveness path (.68, $p < .001$). In the opposite direction, while the CIO Capability path → TMT/CIO engagements remains highly significant (.77, $p < .001$) the TMT/CIO engagements → CIO Effectiveness path has a low and insignificant path coefficient (.13, $p > .10$). Therefore, from a holistic perspective, the only full path to CIO effectiveness that is fully significant is the TMT/CIO engagements → CIO Capability → CIO Effectiveness path. This suggests an interesting interpretation: CIO's that are brought into the inner executive circle and made trusted members of the TMT will, by virtue of

increased TMT/CIO engagements, gain greater levels of strategic business knowledge, strategic IT knowledge (that is how IT impacts the business), insight into the business jargon and vocabulary and insight into the informal political power structure and 'the way things are done'. If true, this suggests that organizations that lament the general ineptitude of CIOs and seek more capable CIOs (Wilder, 1992; King, 1995; Klug, 1996) can actually take matters into their own hands by increasing the level of TMT/CIO engagements. Furthermore, as Armstrong & Sambamurthy (1999) suggest, by increasing TMT/CIO engagements the TMT and, by extension, the organization has the potential to enhance its overall systems of knowing which, they found, has a direct impact on IT assimilation and innovation. Thus TMT/CIO engagements, along with CIO capability, not only provide a synergistic influence on CIO effectiveness, it may as a by-product enhance an organizations systems of knowing, innovativeness, and ultimately performance. Future research should attempt to include organizational performance measures to assess the impact of CIO effectiveness and its antecedents on organizational performance – i.e., a direct test of Mata et al (1995).

Research Question Four: How does an organization's strategic vision of IT moderate the relationships between a CIO's knowledge and interpersonal skill (i.e., CIO capability), TMT/CIO engagements, and CIO effectiveness?

This study found no support for the hypothesis that the strategic vision of IT moderates the relationship between CIO capability and CIO effectiveness. In

addition, no support was found for the hypothesis that the strategic vision of IT moderates the relationship between TMT/CIO engagements and CIO effectiveness. It is important to caution, that only three of Shein's (1992) four visions of IT could be tested using PLS techniques due to a low subgroup sample size for the 'automate' vision ($n=17$). While not conclusive, a post-hoc test of the full research model for organizations that espouse an 'automate' vision yielded an insignificant adjusted t statistic of 0.21 for the CIO capability $\rightarrow$ CIO effectiveness path while the other strategic visions of IT all had significant paths (informate up: $t_{adj} = 1.49$, $p < .10$; informate down: $t_{adj} = 2.54$, $p < .01$; transform: $t_{adj} = 2.25$, $p < .025$). As was the case in Armstrong (1995), this sample suffers from not having enough organizations that espouse an 'automate' vision in order to present conclusive results. Therefore, no interpretations of the strategic vision of IT's impact on the relationship between CIO capability and CIO effectiveness are presented. Future research should attempt to obtain adequate sub-sample groups in order to more fully test the posited moderating relationship between CIO capability and CIO effectiveness. Furthermore, future research may want to reconceptualize organizational strategic IT vision schemes for post-internet environments that may have selected out organizations that subscribe to less enlightened visions.

Contributions to Theory

One contribution of this study is the identification of a means of using a multi-dimensional role-based CIO effectiveness measure. While the specific

role-based measures used in this study may require some minor adaptation for specific differences from one industry to the next, the role dimensions seem appropriate across industry boundaries. In addition, the high loadings of the role-based performance measures (.76 to .90, $p < .001$) suggests that the scales employed and the role dimensions that emerged are relatively useful in studies of CIO effectiveness, to include formulations with other antecedents. Furthermore, a relatively high r^2 achieved (.66) suggests that the theory informed antecedents used in this study account for two-thirds of the variance in CIO.

An additional contribution to theory is the finding that TMT/CIO engagements does not directly lead to perceptions of CIO effectiveness. Rather, the results suggest that CIO capability may actually mediate the relationship between TMT/CIO engagements and CIO effectiveness. In other words, while TMT/CIO engagements might be a necessary condition for CIO effectiveness they are not a sufficient condition. Only through CIO capability may TMT/CIO engagements have an impact on CIO effectiveness. This finding was made possible by employing PLS techniques, a second generation multivariate technique, which unlike first generation techniques such as multiple regression, tests all paths simultaneously and has smaller sample size requirements while making no distributional assumptions. With 106 cases, a full test of the model using multiple regression techniques would not have been possible. Since it is often difficult to obtain executive level data from organizations, future researchers

are advised to consider PLS techniques in investigating complex organizational phenomena where predictive accuracy is the goal.

Although not a specific goal of this research, the inconclusive findings regarding the posited moderating effect of the strategic vision of IT on the main relationships in the model, calls into question the salience of extant conceptualizations of strategic vision. Recently Armstrong (1995), and Armstrong & Sambamurthy (1999) along with the present study, all had difficulty obtaining adequate subsample sizes for the least enlightened vision of IT, the 'automate' vision. Perhaps, in the post-internet age of hyperturbulence, those organizations that maintain 'automate' visions are being selected out of their respective environments. Future research may want to investigate the salience of present strategic IT vision conceptualizations.

Contributions to Practice

For organizations that lament the general ineptitude of CIOs and seek more capable CIOs (Wilder, 1992; King, 1995; Klug, 1996) this study suggests that they can actually take matters into their own hands to develop capable CIOs by increasing the level of TMT/CIO engagements. This study found a strong relationship between TMT/CIO engagements and CIO capability that suggests that an organization that makes the CIO a formal member of the TMT, that works to increase the formal interactions that the CIO has with the CEO and other

members of the TMT, and works to build trusting relationships with the CIO will increase the CIO's overall capability and effectiveness. This has a great deal of intuitive appeal. Through increased exposure to the executive workings of the organization, the CIO has the potential to increase their awareness of the political power structures, can learn to "talk-the-talk" of the business, and can increase his/her knowledge of, not only the key business processes of the organization but also, how IT can have a positive impact on those business processes.

Surprisingly, informal interaction with the CEO and other members of the TMT was not an important indicator of TMT/CIO engagements. Since extent of trusting relationships was a very important indicator of TMT/CIO engagements, the implication for practitioners is that engaging in informal social interactions is far less important than formal interactions that build trust.

Additionally, taken together with Armstrong & Sambamurthy's (1999) findings, the synergistic effect of CIO capability and TMT/CIO engagements may not only increase CIO effectiveness, but also may enhance an organization's overall systems of knowing, IT assimilation, innovativeness and ultimately organizational performance.

Limitations and Directions for Future Research

As with most studies into organizational phenomenon, this study is not without its limitations. While it is possible to establish relationships in a cross-

sectional research design such as the present study, causality cannot be established. In order to establish causality, Cook & Campbell (1979) suggest three requirements: (a) the cause must temporally precede the effect, (b) the variables posited to have a causal relationship must be significantly correlated, and (c) other variables are not responsible for the influencing the posited causal relationship. Clearly this study has only met requirement (b) above. As with many organizational phenomena, and particularly phenomena that involve senior executives in dynamic, turbulent organizational environments, meeting all of Cook & Campbell's requirements and maintaining a high degree of fidelity is a difficult undertaking. However, longitudinal designs, which would meet Cook & Campbell's (1979) temporal precedence requirements ((a) above) are clearly warranted in future inquiries into the antecedents of CIO effectiveness. On the other hand, experimental designs, which would meet Cook & Campbell's requirement (c) above, would be very difficult to design and still maintain a level of relevance that would resonate with CIOs and TMT members. For this reason, future designs may want to incorporate longitudinal, qualitative elements that attempt to clearly establish temporal order among the variables in this study and also rule out other variables that may influence the relationships in this study. Such a design, in the researcher's opinion, offers a suitable balance between academic rigor and relevance.

An additional limitation of cross-sectional designs that employ a single method of data collection is common method variance. "Subject response

tendencies when they are responding to (a) questionnaire may account for false relationships that are found or for inflated correlations among variables. The component of the correlation due to bias common to the method of data collection is the common method variance" Karahanna (1993, pg, 235). Since this study employed a single method of data collection, i.e. questionnaires, common method variance cannot be ruled out.

The development of the multi-dimensional role-based CIO effectiveness measure has both strengths and weaknesses. Using experts within the focal industry of the study to develop the important aspects of the CIO role, ensured that the items that were used to make up the role-based dimensions of CIO effectiveness were fairly relevant as evidenced by both the high loadings of the individual role-based dimensions of CIO effectiveness and the high r^2 of .66 of the overall research model. While some minor adaptation of the role items may be necessary for investigations across industries, the role-dimensions seem fairly relevant irrespective of industry. Future research should attempt to replicate this study across multiple industries to determine the robustness of the CIO role items and dimensions. Such a multi-industry study may provide a means of generalizing CIO effectiveness and its antecedents.

An additional limitation of this study, is the low sub-group samples obtained to fully test the posited moderating effect of the strategic vision of IT on the relationships in the model. Future research may want to revisit extant

strategic vision conceptualizations to determine their salience in the post-internet environments that organizations find themselves in today.

APPENDIX A
CIO QUESTIONNAIRE

Healthcare Leadership Survey:

An Investigation of the Chief Information Officer Role Expectations & Effectiveness in

Healthcare Organizations

by Detlev H. Smaltz, CHE

Florida State University

This questionnaire is intended for the **most senior information systems executive** within your organization (at your location). If you are not that individual, please forward this packet to him or her. The survey should take less than 15 minutes to complete. By filling out this survey you consent to being a participant in this research effort. You have the right to decline participation and can withdraw from participation at any time.

All surveys are held in strict confidence and all findings will be cited anonymously. No specific reference will ever be made to you, your organization, or any member of your organization.

Name & address of the
organization where you are
currently serving as the CIO:

Organization: _____

Address: _____

If you would like an electronic copy of the findings of this study, please provide your e-mail address below. Thank you for providing these valued inputs to our research effort.

Your name: _____

Your e-mail
address: _____

Please return the questionnaire in the accompanying postage-paid envelope, or mail to:

D. H. Smaltz; College of Business/Grad. Office; Florida State University; Tallahassee, FL 32306-1110

Chief Information Officer Questionnaire

INFORMATION ABOUT YOUR ORGANIZATION (please darken only one circle per item, unless otherwise requested):

Tax Status: ☐ For Profit ☐ Not for Profit ☐ Not for Profit (Military/Govt.)	Affiliation: ☐ Corporate System Affiliated ☐ Government Affiliated ☐ Independent (Free-Standing)
Type of Organization where you work: ☐ Teaching Hospital ☐ Clinic ☐ Home Health Care ☐ Non-teaching Hospital ☐ Group Practice ☐ Nursing Home ☐ Corporate/Regional Headquarters ☐ Other: _____	
Size: Number of Beds: Licensed: _____ Operational: _____ (if different) ☐ N/A; not classified by number of beds	Size: Total Number of Employees (including contractors): In the <u>entire</u> organization: _____ At this location: _____ (if different)

INFORMATION ABOUT YOURSELF:

My primary work experience is: ☐ in healthcare ☐ not in healthcare	Furthermore, my primary work experience prior to my current position is: ☐ in IT/IS ☐ in a functional area other than IT/IS (please specify below): _____
My highest educational level completed is: ☐ High School ☐ BS/BA ☐ Master's Degree ☐ M.D. or Doctorate ☐ Other: _____	I have been in my current position for: ☐ less than 1 year ☐ 1-3 years ☐ 3-5 years ☐ 5-10 years ☐ more than 10 years
On average, I spend about _____ hours per week reading <u>IT/IS related</u> books, articles or journals: ☐ Less than 1 hour ☐ 1-2 hours ☐ 2-4 hours ☐ more than 4 hours	On average, I spend about _____ hours per week reading <u>healthcare or general business related</u> books, articles or journals: ☐ Less than 1 hour ☐ 1-2 hours ☐ 2-4 hours ☐ more than 4 hours
I am a member/affiliate of the following professional organizations (check <u>all</u> that apply): ☐ None ☐ AAMA ☐ HFMA ☐ HIMSS ☐ ACHE ☐ CHIME ☐ Other(s): _____	On average I attend demonstrations of new technologies: ☐ Daily ☐ Weekly ☐ Monthly ☐ A few times a year ☐ Once a year or less

Chief Information Officer Questionnaire _____

1. What is your official title: _____

2. What is the title of the person you report to: _____

3. If the above person is not the CEO, how many reporting levels are between you and the CEO?

☐ 0 (I report directly to the CEO) ☐ 1 ☐ 2 or more

4. Are you (CIO) a formal member of your organization's top management team/executive staff (TMT)?

☐ Yes ☐ No

5. Please respond to the following by darkening in the bubble that you feel most closely corresponds to you:

1 = Daily
2 = Weekly
3 = Monthly
4 = A few times a year
5 = Once a year or less

5(A) On average, I interact with the CEO on a formal basis (e.g., official meetings, work-related phone calls, etc.) :

5(B) On average, I interact with (other) members of the top management team/executive staff (TMT) on a formal basis (e.g., official meetings, work-related phone calls, etc.) :

5(C) On average, I interact with the CEO on an informal basis (e.g., social gatherings, golf, tennis, etc.)

5(D) On average, I interact with (other) members of the top management team/executive staff (TMT) on an informal basis (e.g., social gatherings, golf, tennis, etc.)

1	2	3	4	5
☐	☐	☐	☐	☐
☐	☐	☐	☐	☐
☐	☐	☐	☐	☐
☐	☐	☐	☐	☐

Chief Information Officer Questionnaire _____

6. How knowledgeable is the top management team/executive staff (TMT) about the potential as well as the limitations of your current IT?

- ☐ Extremely well informed ☐ Well informed ☐ Informed ☐ Somewhat informed ☐ Hardly even aware

7. How knowledgeable is the top management team/executive staff (TMT) about the potential as well as the limitations of "next generation" IT?

- ☐ Extremely well informed ☐ Well informed ☐ Informed ☐ Somewhat informed ☐ Hardly even aware

8. How knowledgeable is your TMT about how your competitors or other organizations like your own are applying IT?

- ☐ Extremely well informed ☐ Well informed ☐ Informed ☐ Somewhat informed ☐ Hardly even aware

9. Which of the following best describes your organizations IT outsourcing activities?

- ☐ We have totally (except for a few individuals) outsourced our IT function.
- ☐ We have selectively outsourced some of our IT functions while retaining others.
- ☐ We have exclusively (except for an occasional, short-duration contract) retained the IT function "in-house".

10. Which best describes your top management team's/executive staff's present vision of the role of IT in your organization?

- ☐ The potential of IT is **cost saving or quality improvement through automation**. The role of IT is to replace expensive, unreliable human labor, or at least transform its productivity.
- ☐ The potential of IT is to **empower employee driven performance improvements**. The role of IT is to provide data and transactions that yield a far fuller picture at "operator" level, with members of the staff gaining greater insights into their own activities.
- ☐ The potential of IT is to **transform the organization**. The role of IT is to fundamentally change the organization and/or industry through new healthcare products or services often including redefinition of relationships with our customers and/or suppliers.
- ☐ The potential of IT is **increased managerial control of the organization**. The role of IT is to provide data and transactions that allow management more clear and organized views of the state and dynamics of the organization.

Chief Information Officer Questionnaire _____

11. On the scale provided, how would you classify your organization in terms of:

	Virtually all				Virtually none
A. Offices throughout your organization with a LAN drop	☐	☐	☐	☐	☐
B. Application systems (i.e., pharmacy, admissions, dispositions & transfer, billing, etc.) that use a LAN for connectivity	☐	☐	☐	☐	☐
C. Physicians with access to your clinical systems from their own offices	☐	☐	☐	☐	☐
D. Physicians with access to the internet from their own offices	☐	☐	☐	☐	☐
E. Information stored in medical records that is also available to physicians on-line	☐	☐	☐	☐	☐
F. Business transactions (i.e., ordering and paying for medical supplies, etc.) conducted with suppliers/customers using electronic commerce	☐	☐	☐	☐	☐
G. Employees with an organizational e-mail account	☐	☐	☐	☐	☐
H. PCs that are 486 based <u>or less</u>	☐	☐	☐	☐	☐

12. On the scale provided, for each of these general healthcare domains, how would you classify the role that your top management team/executive staff want you (the CIO) to fill:

	Provide support when called upon				Take the lead
A. Internal clinical processes	☐	☐	☐	☐	☐
B. External clinical processes	☐	☐	☐	☐	☐
C. Internal business processes	☐	☐	☐	☐	☐
D. External business processes	☐	☐	☐	☐	☐

NOTE:

- Internal processes are those that operate within the organization
- External processes are those that operate between your organization and other organizations

Chief Information Officer Questionnaire _____

13. The following are general expectations that apply to healthcare CIOs to varying degrees from organization to organization. In the first column, please indicate how important each expectation is in **your organization**. In the second column, indicate the level **you feel** you are meeting these expectations (circle n/a if you rated the importance of the expectation "5 - not important at all")

Answer by circling	Importance					Rate yourself				
	1= critically important	2= fairly important	3= important	4= least important	5= not important at all	1 = outstanding	2 = excellent	3 = satisfactory	4 = could be better	5 = not meeting expectation
A. Keep key systems operational	1	2	3	4	5	1	2	3	4	5 n/a
B. Establish and maintain an IT department that is responsive to user requests/problems	1	2	3	4	5	1	2	3	4	5 n/a
C. Establish electronic linkages throughout the organization	1	2	3	4	5	1	2	3	4	5 n/a
D. Ensure the organization's users have adequate workstations (PCs) to accomplish their jobs	1	2	3	4	5	1	2	3	4	5 n/a
E. Establish electronic linkages to external entities (insurance payers, private physician offices, suppliers)	1	2	3	4	5	1	2	3	4	5 n/a
F. Direct efforts to build an integrated delivery system	1	2	3	4	5	1	2	3	4	5 n/a
G. Build and maintain an IT staff with skill sets that match your current and planned technology base	1	2	3	4	5	1	2	3	4	5 n/a
H. Champion computer literacy throughout the organization	1	2	3	4	5	1	2	3	4	5 n/a
I. Provide insight to the top management team/executive staff (TMT) on new emerging technologies	1	2	3	4	5	1	2	3	4	5 n/a
J. Assist TMT in improving its computer literacy	1	2	3	4	5	1	2	3	4	5 n/a
K. Migrate organization from legacy, departmental applications to cross-departmental, integrated applications	1	2	3	4	5	1	2	3	4	5 n/a
L. Develop/acquire computer-based patient record capability throughout the enterprise	1	2	3	4	5	1	2	3	4	5 n/a
M. Develop an understanding of the healthcare delivery process	1	2	3	4	5	1	2	3	4	5 n/a
N. Provide executive oversight for all IT contracts with external vendors	1	2	3	4	5	1	2	3	4	5 n/a
O. Negotiate with vendor IT organizations on new external contract proposals	1	2	3	4	5	1	2	3	4	5 n/a
P. Ensure IT contracts with external vendors remain within scope and budget	1	2	3	4	5	1	2	3	4	5 n/a
Q. Develop and implement a strategic IT plan that aligns with the organization's strategic business plan	1	2	3	4	5	1	2	3	4	5 n/a
R. Develop/maintain metrics that reflect the value of IT to the organization	1	2	3	4	5	1	2	3	4	5 n/a
S. Direct IT-enabled business process restructuring/ reengineering	1	2	3	4	5	1	2	3	4	5 n/a
T. Provide expertise on multidisciplinary business process improvement teams	1	2	3	4	5	1	2	3	4	5 n/a
U. Interact often with non-IT managers throughout the organization	1	2	3	4	5	1	2	3	4	5 n/a
V. Be intimately involved in shaping the mission/vision of the organization	1	2	3	4	5	1	2	3	4	5 n/a
W. Be intimately involved in business strategic planning and decisions	1	2	3	4	5	1	2	3	4	5 n/a
X. Provide oversight for quality assurance of organizational data	1	2	3	4	5	1	2	3	4	5 n/a
Y. Ensure confidentiality & security of organizational data	1	2	3	4	5	1	2	3	4	5 n/a

14. Using the corresponding letters (A-Y) from the list above, please list the 4 most important general expectations of your organization: (1) _____ (2) _____ (3) _____ (4) _____

Chief Information Officer Questionnaire _____

APPENDIX B
TMT QUESTIONNAIRE

Healthcare Leadership Survey An Investigation of the Chief Information Officer Role Expectations & Effectiveness in Healthcare Organizations by Detlev H. Smaltz, CHE Florida State University College of Business; Graduate Office; Florida State University; Tallahassee, FL 32306-1110

This questionnaire is intended for formal members of your organization's (at your location) top management team/executive staff (i.e., CEO, COO, CFO). If you are not a formal member of the top management team/executive staff at your location, please forward this packet/URL to a member of the top management team/executive staff. The survey should take between 12-15 minutes to complete. By filling out this survey you consent to being a participant in this research effort.

PURPOSE OF THE STUDY: As the healthcare industry becomes more dynamic and complex, the role of the senior information systems/technology executive, commonly referred to as the chief information officer (CIO) has become more and more important to healthcare organizations. Yet many senior information systems executives (CIO) are having difficulty assimilating to the executive environment. This short questionnaire hopes to determine key roles and expectations that top management teams/executive staffs (TMT) in healthcare have with respect to their senior information systems executive (CIO) as well as the CIOs effectiveness in meeting these role expectations. We sincerely appreciate your cooperation in responding to the questions.

All surveys are held in <u>strict confidence</u> and all findings will be cited anonymously. No specific reference will ever be made to you, your organization, or any member of your organization.

Name & address of the organization where you are currently serving:	Name of org.: _____ Address: _____
---	---------------------------------------

If you would like an electronic copy of the findings of this study, please provide your name & e-mail address below. Thank you for providing these valued inputs to our research effort.

Your name: _____

Your e-mail address: _____

Name of your senior information technology executive (CIO):	Name of your CIO: _____ (Note: this is essential to cross-validate surveys)
---	--

Top Management Team Questionnaire - _____

1 (A). What is your official title: _____

1 (B). How long have you been serving in your current position (in years & months):

2. With the baseline assumption that all healthcare organizations strive to provide quality healthcare services, to what degree do each of the following strategies describe your own organization's overall strategy relative to other organizations like your own:

5 = Strongly Agree
4 = Agree
3 = Neither Agree or Disagree
2 = Disagree
1 = Strongly disagree

2 (A) Our healthcare organization's strategic focus is on **minimizing cost** (e.g., low-cost provider)

2 (B) Our healthcare organization's strategic focus is on **differentiating our services** from those of our competitors (e.g., "hospital hotel" concept).

2 (C) Our healthcare organization's strategic focus is on providing **niche or focused** healthcare services to selected segments of the market (e.g., home health care only; acute care only; etc.).

5	4	3	2	1
☐	☐	☐	☐	☐
☐	☐	☐	☐	☐
☐	☐	☐	☐	☐

2 (D) Of the three strategic foci listed in 2A, 2B & 2C above (i.e., minimizing cost, differentiation & niche/focused), our organization's dominant strategic focus is (choose only one):

☐ Minimizing cost

☐ Differentiation

☐ Niche/Focused

3. Please respond to the following by darkening in the bubble that you feel most closely corresponds to you:

5 = Daily
4 = Weekly
3 = Monthly
2 = A few times a year
1 = Once a year or less

3(A) On average, I interact with the senior information technology executive (CIO) on a **formal** basis (e.g., official meetings, work-related phone calls, etc.):

3(B) On average, I interact with the senior information technology executive (CIO) on an **informal** basis (e.g., social gatherings, golf, tennis, etc.)

5	4	3	2	1
☐	☐	☐	☐	☐
☐	☐	☐	☐	☐

4. Approximately how long has your senior information technology executive (CIO) been serving in his/her current position as the senior IT executive of your organization (in years and months): _____

Top Management Team Questionnaire - _____

5. The following are general expectations that apply to healthcare CIOs to varying degrees from organization to organization. In the first column, please indicate how important each expectation is in your organization. In the second column, indicate the level you feel the CIO of your organization is meeting these expectations (circle n/a if the importance of the expectation is "5 - not important at all")

Answer each expectation by circling a number in each of the columns at right →	Importance					Rate your CIO				
	5 = critically important	4 = fairly important	3 = important	2 = least important	1 = not important at all	5 = outstanding	4 = excellent	3 = satisfactory	2 = could be better	1 = not meeting expectation
A. Keep key systems operational	5	4	3	2	1	5	4	3	2	1 n/a
B. Establish and maintain an IT department that is responsive to user requests/problems	5	4	3	2	1	5	4	3	2	1 n/a
C. Establish electronic linkages throughout the organization	5	4	3	2	1	5	4	3	2	1 n/a
D. Ensure the organization's users have adequate workstations (PCs) to accomplish their jobs	5	4	3	2	1	5	4	3	2	1 n/a
E. Establish electronic linkages to external entities (insurance payers, private physician offices, suppliers)	5	4	3	2	1	5	4	3	2	1 n/a
F. Direct efforts to build an integrated delivery system	5	4	3	2	1	5	4	3	2	1 n/a
G. Build and maintain an IT staff with skill sets that match your current and planned technology base	5	4	3	2	1	5	4	3	2	1 n/a
H. Champion computer literacy throughout the organization	5	4	3	2	1	5	4	3	2	1 n/a
I. Provide insight to the top management team/executive staff (TMT) on new emerging technologies	5	4	3	2	1	5	4	3	2	1 n/a
J. Assist TMT in improving its computer literacy	5	4	3	2	1	5	4	3	2	1 n/a
K. Migrate organization from legacy, departmental applications to cross-departmental, integrated applications	5	4	3	2	1	5	4	3	2	1 n/a
L. Develop/acquire computer-based patient record capability throughout the enterprise	5	4	3	2	1	5	4	3	2	1 n/a
M. Develop an understanding of the healthcare delivery process	5	4	3	2	1	5	4	3	2	1 n/a
N. Provide executive oversight for all IT contracts with external vendors	5	4	3	2	1	5	4	3	2	1 n/a
O. Negotiate with vendor IT organizations on new external contract proposals	5	4	3	2	1	5	4	3	2	1 n/a
P. Ensure IT contracts with external vendors remain within scope and budget	5	4	3	2	1	5	4	3	2	1 n/a
Q. Develop and implement a strategic IT plan that aligns with the organization's strategic business plan	5	4	3	2	1	5	4	3	2	1 n/a
R. Develop/maintain metrics that reflect the value of IT to the organization	5	4	3	2	1	5	4	3	2	1 n/a
S. Direct IT-enabled business process restructuring/ reengineering	5	4	3	2	1	5	4	3	2	1 n/a
T. Provide expertise on multidisciplinary business process improvement teams	5	4	3	2	1	5	4	3	2	1 n/a
U. Interact often with non-IT managers throughout the organization	5	4	3	2	1	5	4	3	2	1 n/a
V. Be intimately involved in shaping the mission/vision of the organization	5	4	3	2	1	5	4	3	2	1 n/a
W. Be intimately involved in business strategic planning and decisions	5	4	3	2	1	5	4	3	2	1 n/a
X. Provide oversight for quality assurance of organizational data	5	4	3	2	1	5	4	3	2	1 n/a
Y. Ensure confidentiality & security of organizational data	5	4	3	2	1	5	4	3	2	1 n/a

6. Using the corresponding letters (A-Y) from the list above, please list the 4 most important general expectations of your organization: (1) _____ (2) _____ (3) _____ (4) _____

Top Management Team Questionnaire - _____

7. Is your senior information technology executive (CIO) a formal member of your organization's top management team/executive staff (TMT)?

☐ Yes

☐ No

8. Approximately how many members, including yourself, compose your organization's top management team or executive staff (TMT)? _____

9. In general, how would you assess your organization's top management team/executive staff (TMT) along the following dimensions?

5 = Strongly Agree
4 = Agree
3 = Neither Agree or Disagree
2 = Disagree
1 = Strongly disagree

9(A) The members of the top management team/executive staff (TMT) get along together

9(B) The members of the TMT help each other out

9(C) The members of the TMT resolve their differences amicably

9 (D) Overall the TMT is a cohesive group

5	4	3	2	1
☐	☐	☐	☐	☐
☐	☐	☐	☐	☐
☐	☐	☐	☐	☐
☐	☐	☐	☐	☐

10. Which best describes your present vision of the role of information technology (IT) in your organization?

☐ The potential of IT is **cost saving or quality improvement through automation**. The role of IT is to replace expensive, unreliable human labor, or at least transform its productivity.

☐ The potential of IT is to **empower employee driven performance improvements**. The role of IT is to provide data and transactions that yield a far fuller picture at "operator" level, with members of the staff gaining greater insights into their own activities.

☐ The potential of IT is to **transform the organization**. The role of IT is to fundamentally change the organization and/or industry through new healthcare products or services often including redefinition of relationships with our customers and/or suppliers.

☐ The potential of IT is **increased managerial control of the organization**. The role of IT is to provide data and transactions that allow management more clear and organized views of the state and dynamics of the organization.

Top Management Team Questionnaire - _____

11. For each of the following areas, please circle the number that in your opinion corresponds to the level of knowledge of the organization's senior information systems executive/CIO:

5 = Very well informed
 4 = Well informed
 3 = Informed
 2 = Somewhat Informed
 1 = Not informed

- 11 (A) Your organization's products, services, markets, and business strategies
- 11 (B) Healthcare industry **business** practices (i.e., managed care principles, reimbursement processes, billing processes, etc., as applicable to your organization)
- 11 (C) Healthcare industry **clinical** practices (i.e., clinical pathways, DRGs, integrated delivery system key processes, patient scheduling, patient records, etc., as applicable to your organization)
- 11 (D) Your organization's **internal environment** such as its informal political power structure
- 11 (E) Your organization's **external environment** such as how other organizations like your own are applying information technology in their organizations
- 11 (F) How to **utilize** your **existing** information technology resources to address your organization's current needs
- 11 (G) How to **identify** relevant **emerging** information technology for supporting your organization's products, services, markets, business strategies, clinical processes and operational processes
- 11 (H) How to **guide** your organization's **decisions** related to the timing and level of investment in **emerging** information technologies
- 11 (I) How healthcare **legislation and/or regulatory issues** affect the healthcare delivery process

5	4	3	2	1
☐	☐	☐	☐	☐
☐	☐	☐	☐	☐
☐	☐	☐	☐	☐
☐	☐	☐	☐	☐
☐	☐	☐	☐	☐
☐	☐	☐	☐	☐
☐	☐	☐	☐	☐
☐	☐	☐	☐	☐

Top Management Team Questionnaire - _____

12. How effective is your senior information systems executive/CIO at the following:

5 = Extremely effective
4 = Very effective
3 = Effective
2 = Somewhat effective
1 = Not effective at all

12 (A) The ability to accurately read potentially contentious situations

5	4	3	2	1
☐	☐	☐	☐	☐
☐	☐	☐	☐	☐
☐	☐	☐	☐	☐
☐	☐	☐	☐	☐
☐	☐	☐	☐	☐
☐	☐	☐	☐	☐

12 (B) The ability to use non-technical terms when making presentations to the top management team/executive staff

12 (C) The ability to use business terms and/or examples when making presentations to the top management team or executive staff (TMT)

12 (D) The ability to use clinical terms and/or examples when making presentations to a clinical audience

12 (E) The ability to act with tact when confronted with a potentially contentious situation

12 (F) The ability to develop good rapport with most people

13. Please respond to the following by darkening in the bubble that you feel most closely corresponds to you:

5 = Strongly Agree
4 = Agree
3 = Neither Agree or Disagree
2 = Disagree
1 = Strongly disagree

13 (A) I believe that the CIO cares enough to act in my personal best interest

5	4	3	2	1
☐	☐	☐	☐	☐
☐	☐	☐	☐	☐
☐	☐	☐	☐	☐
☐	☐	☐	☐	☐
☐	☐	☐	☐	☐
☐	☐	☐	☐	☐

13 (B) If I had to rehire a CIO, I would, without a doubt, hire our CIO again

13 (C) Overall I believe the CIO has satisfied my expectations of him/her

13 (D) The CIO is a person that I really like

13 (E) When an issue that is critical to me arises, I feel I can depend on the CIO

13 (F) I would characterize the CIO's performance as skillful and effective

Top Management Team Questionnaire - _____

THANK YOU!

APPENDIX C
HUMAN SUBJECTS COMMITTEE APPROVAL



Office of the Vice President
for Research
Tallahassee, Florida 32306-2811
(850) 644-5260 • FAX (850) 644-4392

APPROVAL MEMORANDUM

from the Human Subjects Committee

Date: March 4, 1998

From: Jack Brigham, Chair. JBH/14

To: Detley H. Smaltz

Dept: IMS

Re: Use of Human subjects in Research

Project entitled: Chief Information Officer Role Expectations and Effectiveness

The forms that you submitted to this office in regard to the use of human subjects in the proposal referenced above have been reviewed by the Secretary, the Chair, and two members of the Human Subjects Committee. Your project is determined to be exempt per 45 CFR § 46.101(b)2 and has been approved by an accelerated review process.

The Human Subjects Committee has not evaluated your proposal for scientific merit, except to weigh the risk to the human participants and the aspects of the proposal related to potential risk and benefit. This approval does not replace any departmental or other approvals which may be required.

If the project has not been completed by March 4, 1999 you must request renewed approval for continuation of the project.

You are advised that any change in protocol in this project must be approved by resubmission of the project to the Committee for approval. Also, the principal investigator must promptly report, in writing, any unexpected problems causing risks to research subjects or others.

By copy of this memorandum, the chairman of your department and/or your major professor is reminded that he/she is responsible for being informed concerning research projects involving human subjects in the department, and should review protocols of such investigations as often as needed to insure that the project is being conducted in compliance with our institution and with DHHS regulations.

This institution has an Assurance on file with the Office for Protection from Research Risks. The Assurance Number is M1339.

cc: V. Sambamurthy
APPLICATION NO. 98.023



Office of the Vice President
for Research
Tallahassee, Florida 32306-2811
(850) 644-5260 • FAX (850) 644-4392

REAPPROVAL MEMORANDUM

from the Human Subjects Committee

Date: February 18, 1999

From: David Quadagno, Chairperson *DQ/ph*

To: Detlev H. Smaltz

Dept: College of Business

Re: Reapproval of Use of Human subjects in Research

Project entitled: Chief Info Officer Role Expectations and Effectiveness in Healthcare Organizations

Your request to continue the research project listed above involving human subjects has been approved by the Human Subjects Committee. If your project has not been completed by February 18, 2000, please request renewed approval.

You are reminded that a change in protocol in this project must be approved by resubmission of the project to the Committee for approval. Also, the principal investigator must report to the Chair promptly, and in writing, any unanticipated problems involving risks to subjects or others.

By copy of this memorandum, the Chairman of your department and/or your major professor are reminded of their responsibility for being informed concerning research projects involving human subjects in their department. They are advised to review the protocols of such investigations as often as necessary to insure that the project is being conducted in compliance with our institution and with DHHS regulations.

:hh

cc: V. Samburthy

human/renewal.hs

APPLICATION NO. 99.065R

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BIOGRAPHICAL SKETCH

Detlev H. Smaltz has extensive experience as a chief information officer in various U.S. Air Force healthcare organizations including a 20-bed hospital, a 300-bed tertiary referral medical center and teaching hospital and a regional headquarters in Europe. Upon completion of this doctoral program, he has been selected to be the chief information officer for TRICARE Gulfsouth, a regional headquarters of the Department of Defense's managed care organization. He received his undergraduate degree from the University of Tampa in 1985 in Management Information Systems and earned a Master of Business Administration degree from Ohio State University in 1992. Dr. Smaltz's publishing activity includes an article in the Air Force Medical Digest and one in the Medical Service Corps newsletter. In addition, Dr. Smaltz has made five presentations at the international Air Force Medical Systems Symposium, one at the international Air Force Resource Management Symposium, and one at the Healthcare Information & Management Systems Society's annual conference. His primary research interests include factors that affect the successful management of information technology in general and complexity theory and resource-based theory applications to information technology management, in particular.

ABSTRACT

Over the past four decades the role of information technology (IT) has evolved from a primarily supporting role to an increasingly strategic role with the potential to provide competitive advantage. With this new found importance, many organizations have created, primarily over the past two decades, an executive position to manage IT -- the chief information officer (CIO).

However, the literature, and particularly the practitioner literature suggests, that this new executive may be experiencing some problems performing up to expectations. This literature suggests that too many CIOs are not able to focus on business imperatives nor are they able to effectively communicate in business terms, thereby alienating themselves from their CEOs and other top managers. Others argue that CIOs in general tend to focus themselves too narrowly on technical issues as opposed to how IT can add value to the business as a whole. The volume of literature in the practice community reflecting a perception of CIO ineffectiveness provides both the relevance and motivation for this study. What factors contribute to a CIO's effectiveness within his/her organization? Are personal attributes or skills solely responsible for CIO effectiveness or are there other organizational factors that contribute to CIO effectiveness?

This field study of one hundred and six organizations investigated the antecedents of CIO effectiveness in the context of an dynamic, information intensive industry – the healthcare services industry. Prior theory was used to specify two key antecedents of CIO effectiveness: CIO capability and TMT/CIO engagements. The relationship between CIO capability and CIO effectiveness, as well as, the relationship between TMT/CIO engagements and CIO effectiveness was each posited to be moderated by the organization's strategic vision of IT.

Data were collected from dyads of CIO and TMT members. Using a multi-dimensional, role-based measure of CIO effectiveness and the analytical technique of partial least squares estimation, the research model explained 66% of the variance in CIO effectiveness. As predicted, CIO capability (i.e., the CIO's strategic business knowledge, the CIO's strategic IT knowledge, the CIO's political savvy, and the CIO's interpersonal communication skill) had a significant relationship with CIO effectiveness. In addition, TMT/CIO engagements had a significant relationship with CIO capability. While no direct effect of TMT/CIO engagements on CIO effectiveness was found in this study, there is suggestive evidence that TMT/CIO engagements and CIO capability have a synergistic effect on CIO effectiveness. In addition, there is some evidence that suggests that CIO capability may mediate the relationship between TMT/CIO

engagements and CIO effectiveness. Future research should attempt to more robustly test for this mediating relationship.

Finally, no moderating effects of an organization's strategic vision of IT on the main relationships in the research model were found. Future research may want to revisit extant strategic vision conceptualizations to determine their salience in the post-internet environments that organizations find themselves in today.