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An Investigation of the Factors Contributing to the Development of Poorly Defined IS Strategies for Firms in the United States

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by

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A dissertation report submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy
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We hereby certify that this dissertation, submitted by Karen B. Lacaden, conforms to acceptable standards and is fully adequate in scope and quality to fulfill the dissertation requirements for the degree of Doctor of Philosophy.

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An Abstract of a Dissertation Report Submitted to Nova Southeastern University in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy

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Although empirical research has shown that a clearly defined information system (IS) strategy has a positive impact to a firm's performance and a poorly defined IS strategy has a negative impact to a firms' performance, firms still develop poorly defined IS strategies. Further compounding the problem, research has revealed that 87% of the business executives believe information systems are a critical enabler to their firms' strategic realization, yet only 33% of business executives involve the Chief Information Officer (CIO) in their firm's business strategy development. The main goal of this research study is to empirically identify factors which impact development of an IS strategy. This research analyzed the relationship of factors which included organizational mindfulness, CIO and senior management team relationship, and CIO capability to the firm's level of IS strategy definition.

A total of 80 senior leaders completed a web-based survey instrument containing previously validated and refined questions. The questions were answered using a five-point Likert scale. The survey results were analyzed using statistical methods including Pearson's Correlation, Cronbach's *alpha* and linear regression. The statistical results revealed that the factors accounted for 50% of the variance in the level of information system strategy definition. Further, this research study identified five variables which include CIO knowledge of the business, communication ability, informal interaction, trust, and top management support that potentially predict the levels of IS strategy definition. Six variables which include openness, extraversion, political savvy, Top Management Team (TMT) knowledge of IS, formal interaction and reluctance to simplify interpretations were not identified as potential predictors of levels of IS strategy definition. This research study discusses the methodology; data collection and analysis; results of the three research questions and overarching question; and the conclusions, implications, and recommendations. Several future studies are required to provide additional qualitative and quantities findings to better understand the results of this study.

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Chapter 1

Introduction

> *Supporting business growth requires people who specialize in managing the relationship with business leaders…as well as people with expertise in strategy, data and business analysis", Mr. Marc Cecere, Forrester Analyst (Wailgum, 2010).*

Background

Based on Leidner, Lo, and Preston's (2011) empirical research, a clearly defined information systems (IS) strategy has a positive impact to a firm's performance whereas a poorly defined IS strategy has a negative impact on a firms' performance (Leidner, Lo, & Preston, 2011). A poorly defined IS strategy characteristic is focused on short term projects which automate or refine operational processes instead of a long term IS strategy enabling the business strategy (Leidner et al., 2011; Chen, Mocker, Preston, & Tuebner, 2010). The Diamond Management & Technology Consultants Incorporated of Chicago study found that 87% of the business executives believe information systems are a critical enabler to their firms' strategic realization, yet only 33% of business executives involve the Chief Information Officer (CIO) in their firm's strategy development (Worthen, 2007). The CIO plays a vital role in the ability of a firm to garner business value from information technology (Preston, Leidner, & Chen, 2008). Furthermore, based on the CIO Magazine's "State of the CIO 2014: The Great Schism" only 25% of the CIO's are involved with developing business strategy and are part of the CEO team, whereas

48% are focused on internal IT operations supporting cost centers or service providers (Nash, 2014). In other words, at least 48% of the CIOs are not involved with strategic thinking and development. With business executives and CIOs recognizing the importance of IS strategy and Leidner's empirical research reflecting the direct relationship of an IS strategy to the firm's performance, it has been recommended that additional research be administered to identify factors which lead firms to develop a poorly defined IS strategy.

This research study will compare the CIO and senior management team relationship (Smaltz, Sambamurth, & Agarwal, 2006), the CIO capabilities (Smaltz et al., 2006), and the level of organizational mindfulness (Swanson & Ramiller, 2004) against the quality of the IS strategy. From this point forward, the senior management team will be referred to as TMT which comprises of the firm's "chief executive officer (CEO) and other senior level executives who are formal members of the TMT" (Preston & Karahanna, 2009b, p. 1). The TMT, depending on the firm's hierarchy structure, may include the CIO (Preston & Karahanna, 2005). The CIO capabilities to be analyzed includes the personal traits (Li, Tan, Teo & Tan, 2006), skills, knowledge, and ability (Smaltz et al., 2006) of the CIO. Lastly, the level of organizational mindfulness will analyze how a firm identifies IS innovation investments. In other words, do firms apply new innovations without detailed analysis and ignore their existing IS strategy or do they assure the innovation aligns with their IS strategy (Swanson & Ramiller, 2004)?

Information systems provide the basis to form the firms perspective of how to strategize, resource and apply IS (Pyburn, 1983; Armstrong and Sambamurth 1999; Preston and Karahanna 2009a). According to Chen et al. (2010), success in developing a sound IS strategy requires the TMT to understand the significant role IS has in supporting the firm's business strategy and vision (Chen, Mocker, Preston, & Tuebner., 2010). Further, for the IS strategy to support the

firm's business strategy, it's imperative for the TMT to understand and support the IS strategy (Tai and Phelps, 2000). Conflicts can lead to lack of direction and, in turn, potentially adopting a poorly defined IS strategy (Tai and Phelps, 2000).

A firm that applies a poorly defined IS strategy basically does not have a clearly defined long term IS strategy (Leidner et al., 2011) and may not understand the significant role information systems had within the firm (Chen et al., 2010). Further, a poorly defined IS strategy may be vague, unorganized, and not agreed upon by the firm's TMT (Leidner et al., 2011; Chen et al., 2010). Before solutions can be recommended to avoid development of poorly defined IS strategy, factors contributing toward the development of poorly defined IS strategy must first be identified and validated through this research project. The goal of this research topic it to empirically identify which factors contribute toward the development of a poorly defined IS strategy. The factors being investigated are grouped into three overarching factors: 1) Level of organizational mindfulness Factor (OM); 2) CIO/TMT Relationship Factor (REL); and 3); CIO Capability Factor (CAP).

Since alignment of IS and business strategies is a complex challenge (Chan & Reich, 2007; Johnson & Lederer, 2010) and since the quality of business strategies vary by firm, the business strategy was identified as a control variable. Factors which complicate strategy alignment involves information system executives not having access to the firm's business strategy (Chan & Reich, 2007); the firm's business strategy is available but it may be too ambiguous for the CIO to understand (Chan & Reich, 2007; Campbell, 2005; & Montgomery, 2012); firm leaders not knowledgeable about information system capabilities (Chan & Reich, 2007; & Chen et al., 2010); a newly hired CEO develops a new business strategy which, in turn, invalidates the current IS strategy (Higgins, 2005); and the CIO is not involved with

development of the business strategy. Based on Nash (2014) only 25% of the CIOs participate in business strategy development & 48% are involved with IT Operations planning, which is not at the IS strategy level. This research study will attempt to provide a model displaying factors which predict the level of IS strategy definition. The conceptual model is displayed in Figure 1.

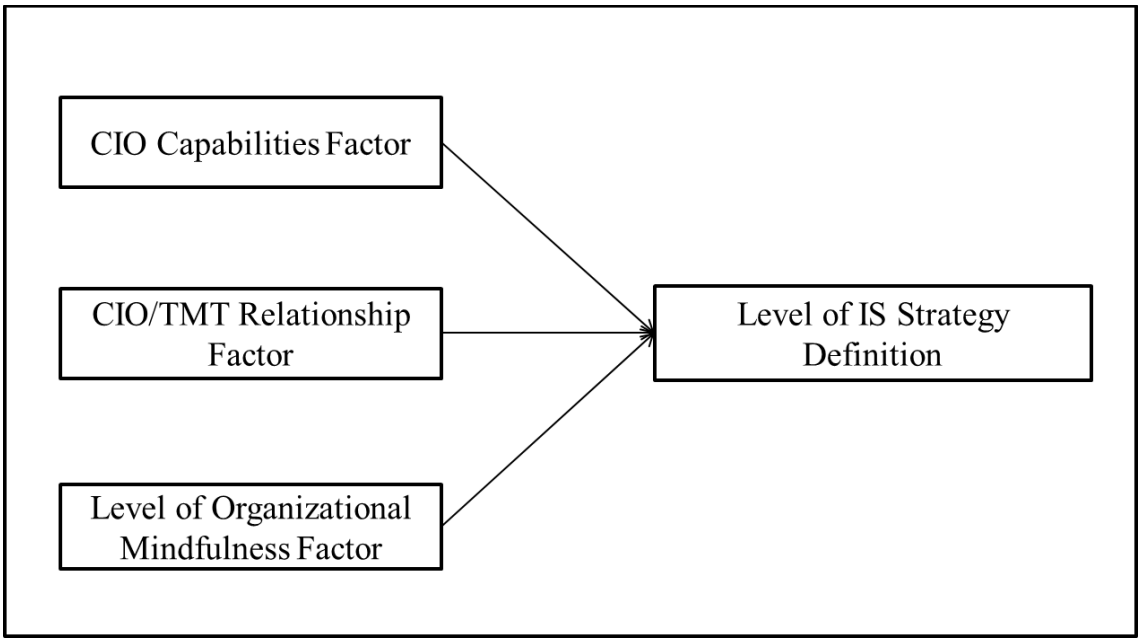

Figure 1. Conceptual model – Factors contributing to the level of IS strategy definition

Problem Statement

Based on the research conducted by Leidner et al. (2011), solid evidence has been found which states that firms with established IS strategies outperform companies with poorly defined IS strategies, yet 10% develop poorly defined IS strategies. Further compounding this problem is the findings discussed by Nash (2014) which states 48% of the CIOs only work on internal IT Operation solutions. Based on Chen et al. (2010), IT Operations focuses on the planning of IT and associated resources (i.e., people, equipment and infrastructure), not development of an IS strategy and business strategy. In addition, Nash (2014) doesn't address the status of another 27% of the CIO's. This means, approximately 48% - 75% of the CIO's are not involved with business strategy and IS strategy development. Further, some firms may choose to ignore their IS strategy and choose to implement a new innovation presented by a consultant before analyzing the solution to ensure it fits into the firms architecture.

Chen, Mocker, Preston, & Tuebner's (2010) review of 48 articles resulted in the development in a clear definition for IS strategy. IS strategy is "the shared view of the IS role within the organization" (Chen et al., 2010, p. 239). Under this definition, three strategy types were identified: IS innovative strategy; IS conservative strategy; and a poorly defined IS strategy (Chen et al., 2010). Mindful firms use the first two strategy types whereas mindless firms use the third – a poorly defined strategy. A poorly defined IS strategy "does not have clear long-term IS goals nor does it have a consistent pattern of behavior regarding it's IS strategy" (Chen et al., 2010, p. 244). In this paper, "poorly defined IS strategy" and "undefined IS strategy" are interchangeable. A mindful firm links IS innovation to the firm's strategy and performance (Ramiller & Swanson, 2009). In addition, a mindful firm conducts detailed analysis

to discriminate "choices that best fit the firm's unique circumstances, rather than familiar and known behaviors based on what others are doing" (Fiol & O'Connor, 2003, p. 59).

A mindless firm places little attention toward the firms strategy and does not necessarily identify information technology (IT) as a critical competency for the firm (Swanson & Ramiller, 2004; & Chen et al., 2010). Furthermore, a mindless firm may implement a new innovation presented by a consultant (i.e. an enterprise resource planning system) without first conducting detailed analysis to determine if the solution supports the business strategy or meets the firms unique circumstances (Ramiller & Swanson, 2009). Since 48-75% of the firms do not realize the relevance of an IS strategy, additional research to identify contributors that lead firms to develop a poorly defined IS strategy is warranted.

Dissertation Goal

The main goal of this research study was to develop and empirically validate factors which may influence a firm to develop a poorly defined IS strategy. Based on Banker, Hu, Pavlou & Luftman's (2011) empirical findings, "alignment between a firm's strategic positioning and its CIO reporting structure positively affects firm performance" (p. 501). CIOs that report directly to the CEO and are part of the TMT have "greater opportunities to communicate with the executive management and build an understanding of the organization's business practices" (Preston & Karahanna, 2005, p. 1). Further, a mutual understanding between the firm's CIO and CEO on the role of information systems enable the development of a shared IS strategy (Preston & Karahanna, 2005; Johnson & Lederer, 2010).

Research Questions

This research study will investigate several factors to determine if there is a relationship to the level of IS strategy definition. The factors involve the relationship between the CIO and TMT, levels of organizational mindfulness, and CIO capabilities. The results of these findings will contribute toward answering the main research question of this study which is "What are the contributing factors that lead firms to develop a poorly defined IS strategy?"

Relationship between CIO and CEO

The Preston & Karahanna (2009b) study identified several attributes which established "excellent" relationships between the CIO and CEO. First, if the "CIO reports to the CEO and is a member of the TMT, the CIO and TMT reach a congruent IT vision" (Preston & Karahanna, 2009b, p. 3). Further, the CIO's position within the firm's hierarchy facilitates formal discussion between the CIO and TMT, in turn increasing each team member's understanding about the business priorities and IS's role in enabling these goals (Preston & Karahanna, 2009b). The results from the Preston & Karahanna (2009b) study found that if the CIO has formal access to the TMT, then the CIO has an understanding of the TMT's mindset and an understanding of the business strategy. Conversely, if the CIO only has informal, in other words, social access to the TMT, then little is gained toward development of a shared vision (Preston & Karahanna, 2009b). The social connection between the CIO and TMT does build trust which is a "critical to the CIO-TMT relationship" (Preston & Karahanna, 2009b, p. 4). The research of this study sought to answer question 1 which states "Are the levels of CIO-TMT relationship correlated to the adoption of an IS strategy?"

Levels of Organizational Mindfulness

The level of organizational mindfulness has a significant impact on how a firm applies IS innovation (Ramiller & Swanson, 2009). A mindful firm links IS innovation strategies to the firm's strategy and performance (Swanson & Ramiller, 2004; and Weick & Sutcliffe 2001). In addition, a mindful firm conducts detailed analysis to determine options which "best fit the firm's unique circumstances, rather than familiar and known behaviors based on what others are doing" (Fiol & O'Connor, 2003, p. 59).

A mindless firm does not identify or explore new IS innovations, instead a mindless firm relies on routine behavior and doesn't consider that things can be done differently (Levinthal & Rerup, 2006). In addition, a mindless firm will apply a new IS innovation or allow a powerful person within the firm to determine the new innovation without conducting the research required to link the IS strategy to their business strategy (Ramiller & Swanson, 2009). Further, firms "that have been burned by CIO predecessors are reluctant in providing credibility to the new CIO" (Leidner & Mackay, 2007, p. 17), in turn, leading to mindlessness behavior by the firm. Mindless means that a firm could arbitrarily apply an innovation that results in potentially ignoring their existing IS strategy. The research of this study sought to answer question 2 which states "Are levels of organizational mindfulness correlated to the adoption of an IS strategy?"

CIO capabilities

Research has empirically found that the CIO's capabilities directly impact the effectiveness of the CIO. The CIO capability factor includes the personal traits (Li, Tan, Teo & Tan, 2006), skills, knowledge, and ability (Smaltz, Sambamurth, & Agarwal, 2006) of the CIO. Based on Li et al. (2006) research, the CIO's personality traits have a direct impact on the IS

innovation applied by the firm. In addition, this finding further validates "the upper echelon theory that espouses the critical role top-level decision maker's play in shaping an organization" (Li et al., 2006, p. 185). Two personality trait variables which enable development of an IS innovation include openness and extraversion (Li et al., 2006). Openness describes an individual who is broad-minded, imaginative, original, creative, curious, sensitive, adventurous, unconventional, and flexible (Costa & McCrae, 1992). Extraversion describes an individual who is assertive, active, sociable, gregarious, ambitious, and excitement-seeking (Costa & McCrae, 1992).

Further, Smaltz, Sambamurthy, and Agarwal's (2006) research found that the CIO's political savvy, communication ability, knowledge of the business strategy and knowledge of the IS Strategy are other important CIO capabilities required for success. Political savvy is an individual's ability to "negotiate, influence, and persuade" (Smaltz et al., 2006, p. 211). The CIO needs to have the ability to clearly communicate in business terms to the TMT (Smaltz et al., 2006). In addition, the CIO needs to understand the business strategies, vision, and competition to be able to incorporate meaningful IS strategies which enable the business strategy (Smaltz et al., 2006). Lastly, the CIO needs to be conversed on current and emerging technologies so that the best IS strategy is developed to facilitate the business strategy (Smaltz et al., 2006). The research of this study sought to answer question 3 which states "Are levels of CIO capabilities correlated to the adoption of an IS Strategy?"

Relevance and Significance

Based on Nash (2014) article, 48% of the CIO's focus solely on IT Operations, in other words, they are not involved in developing IS strategy which supports the firms business strategy. Even though it may seem inconceivable for a firm to have a poorly defined IS Strategy, the results of Leidner et al. (2011) research identified 10% of the firms have poorly defined or no IS Strategies (Leidner et al., 2011). A poorly defined IS strategy "does not have clear long-term IS goals nor does it have a consistent pattern of behavior regarding its IS strategy" (Chen et al., 2010, p. 244). In addition, a poorly defined IS strategy is vague, unorganized, and not agreed upon by the firm's TMT (Leidner et al., 2011). Further, mindless firms ignore their defined IS strategy (Swanson and Ramiller, 2004), don't apply explorative or exploitative goals to meet the firm's long term vision (Leidner et al., 2011), and instead apply a new innovation presented by a consultant without first conducting detailed explorative or exploitative analysis (Ramiller, 2001; Strang & Macy, 2001). An explorative goal involves experimentation with new options that may provide a benefit in the future whereas an exploitative goal is an extension of existing technologies and capabilities (He & Wong, 2004; March, 1991; Piccoli & Ives, 2005). Further research is necessary to empirically identify factors which lead toward a poorly defined IS strategy for a firm.

Leidner et al. (2011) research empirically found that a poorly defined IS strategy has a negative impact on the firm's performance. Further, the literary research conducted by Chen et al. (2010) also recognizes the potentially negative impact a poorly defined IS strategy may have on the firm's performance. Leidner et al. (2011) research identifies numerous potential factors which might result in an organization adopting a poorly defined IS strategy. Lastly, Leidner et al. (2011) research determined that "quantitative and qualitative studies are needed to uncover

the reasons why firms choose a particular IS strategy" (p. 433). This dissertation seeks to identify factors which predict the level of IS strategy definition.

Since the 1980s, IS strategic planning has been ranked in the top 10 concerns by information system leaders. In 2010, information system ranked 6th place and in 2011 ranked 5th place. Even in Europe, Asia, and Latin America, information system leaders rank IS strategy in the top 10 (Luftman, Zadeh, Derksen, Santana, Rigoni, & Huang, 2012). This research is significant because identification of factors which lead firms to develop a poorly defined IS strategy will provide the academic community with a body of knowledge to begin solving the poorly defined IS strategy dilemma. The factors which may lead to poorly defined IS strategy dilemma include mindless firms that ignore their defined IS strategy for quick solutions to complex problems; the CIO/TMT relationship, and the CIO capabilities. The consequence of not solving the poorly defined IS strategy problem will perpetuate the negative impact a poorly defined IS strategy has to a firm's performance. Results from Leidner et al. (2011) research revealed that a firm without strategy is at a disadvantage which leads to the finding that a negative relationship exists between a poorly defined IS strategy and firm performance (Leidner et al., 2011). By empirically identifying factors which influence development of a poorly defined IS strategy, the academic research community will be a key step closer toward resolving the issue of firms developing poorly defined IS strategies or ignoring their existing IS strategies.

Limitations

A limitation of this research study was related to the limited reference material available about factors which lead firms to develop poorly defined IS strategies. Existing literary research and empirical results are focused on definitive IS strategy. Chen et al. (2010) and Leidner et al. (2011), have identified the existence of poorly defined IS strategies within firms and recommend this topic as a future research topic. Chen et al. (2010) states "future research should seek to understand why certain organizations have an articulated IS strategy while the IS strategy of other organizations is undefined" (p. 252). In fact in the Chen et al. (2010) article it states that they recognized this issue existed but following through to identify potential problems would be unglamorous.

Further, since a poorly defined IS strategy may be a byproduct of potential issues within the firm, executives may not be willing to share IS strategy failures. Based on Chen et al. (2010), a mindless firm has "an undefined and/or inconsistent IS strategy" (p. 247). In addition, based on Leidner et al. (2011), a negative relationship exists between a firm's poorly defined IS strategy and firm performance. A firm that applies a poorly defined IS strategy basically is a company which does not have a clearly defined long term IS Strategy (Leidner et al., 2011).

Definitions of Terms

Chief Information Officer (CIO) – Is the "highest ranking IT Executive within the organization" (Preston et al., 2008, p. 68).

CIO Capability Factor - includes the personal traits (Li, Tan, Teo & Tan, 2006) , skills, knowledge, and ability (Smaltz et al., 2006) of the CIO.

IS Strategy – is the shared view of the information system role within the organization (Chen et al., 2010).

Top Management Team (TMT) - comprises of the CEO, other business executives, and depending on the firm's hierarchy structure, may include the CIO (Preston & Karahanna, 2005).

Undefined IS strategy - does not provide a clearly defined long term IS strategy; instead it is nonexistent or focuses on short term projects which automate or refine operational processes (Leidner et al., 2011; Chen et al., 2010).

Summary

Chapter 1 discussed the background to the research topic, addressed the problem and described a measurable goal. The research problem of this study compared the CIO and TMT relationship, the CIO capabilities, and organizational mindfulness against the level of IS strategy definition. The main goal was to develop and empirically analyze factors which may influence development of a poorly defined IS strategy within a firm. In order to explain the relationship between the dependent variables and the independent variable, a framework of the aforementioned factors and their effect on the level of IS strategy was discussed. The main research question of this study is "What are the contributing factors that lead firms to develop a

poorly defined IS strategy?" In addition, three research questions were presented in this chapter. The relevance and significance of this study were addressed as well as barriers and issues which impact this research. Lastly, the specific terms to be used in this study are defined.

Chapter 2

Review of the Literature

This chapter will explore literature specific to IS strategy, CIO relationships, CIO capabilities, and organizational mindfulness. First, factors impacting the relationship between the CIO and the TMT will be discussed. This section will be followed by the CIO capability, organizational mindfulness, and then IS strategy. Within each section, metrics are listed by study for each factor. Lastly, a summary of the research conducted within this decade will be highlighted.

The model of this study suggests that an investigation of the CIO/TMT Relationship, CIO capabilities, and organizational mindfulness to determine the level of IS strategy within a firm is required. Based on the literary research, studies have been conducted on combinations of these factors, but not all in the same study to determine the level of IS strategy.

According to Preston & Karahanna's (2009b) research, the benefits IS provides to a firm's performance is so significant that the firm needs to develop an IS strategy which enables the firm's objectives and aligns with the business strategy (Reich & Benbasat, 1996; Potts, 2007; & Galliers, 2007). IS strategy provides solutions such as e-commerce which supports the firm's internal operations, enables collaboration between firms, and meet the needs of the external customer (Pant & Ravichandran, 2001). Information systems' contribution to the firm's performance is not an isolated effort devoid from the other functional areas within the company

(Galliers, 2004 & Galliers 2006), instead by applying organizational mindfulness the organization's information systems will enable their business strategy (Mu & Butler, 2009). Even though results of extensive research provide empirical evidence that a defined IS strategy has a direct impact on a firm's performance, based on Leidner et al. (2011) research, 10% of the firms have poorly defined IS strategies.

The quality of a defined IS strategy ranges from excellent to poor. A poorly defined IS strategy lacks completeness, does not have long term goals, and is viewed by the firm as an afterthought; or may be nonexistent (Leidner et al, 2011; Chen et al., 2010). Further compounding the problem in identifying research focused on "poor" IS strategy is that the IS strategy theory excludes the lack or absence of IS Strategy (Inkpen & Choudhury, 1995). Absence of strategy "relies on the existing stock of strategy knowledge and, therefore, observations will be colored by the researcher's ideology" (Inkpen & Choudhury, 1995, p. 316). "Strategy ideology is largely grounded in theories and concepts that exclude absence" (Inkpen & Choudhury, 1995, p. 316). When strategy absence is addressed, it is usually equated with firm failure (Mintzberg, Ahlstrand, & Lampel, 2012; Inkpen & Choudhury, 1995). Since research focuses on firms that are non-failures, this means "there are few references to strategy absence in the strategy literature" (Inkpen & Choudhury, 1995, p. 316).

Lack of strategy could be due to the firm being in a transitional phase (Hamel and Prahalad, 1993). For example, a newly established firm may not have a business or IS strategy (Inkpen & Choudhury, 1995). Another example would be an existing firm "that has ambitions far greater than its limited resource base may be ill equipped to act 'strategically' given the gap between its aspirations and its resources, as knowledge grows and top management execute their vision, a clear strategy may emerge" (Inkpen & Choudhury, 1995, p. 317). Since transitional

strategy absence is a temporary phase or an accident, researchers may have little interest in analyzing this concept (Inkpen & Choudhury, 1995).

CIO/TMT Relationship Factor

Even though results from empirical studies have found that the CIO and TMT relationship directly impacts the development of a defined IS strategy, firms still do not necessarily place the CIO at the TMT level within the firms hierarchy. Preston and Karahanna's (2009b) research found that when the CIO reports to the CEO and is a member of the TMT, a moderate to high shared vision exists between the CIO and TMT. In addition, this reporting structure facilitates formal interaction between the CIO and TMT which, in turn, enables each individual to better comprehend the other's priorities and supporting information system requirements (Preston & Karahanna, 2009b).

A structural network between the CIO and TMT facilitates a shared vision for the firm and provides the CIO with an understanding of the business and TMT's mindset. If the CIO is at the same level as the TMT, then the CIO's success in collaborating with the TMT to develop the IS strategy (Potts, 2007) is greater. A turbulent relationship between the CIO and TMT contributes to misaligned business and IS strategies (Preston & Karahanna, 2009b; Chan 2002; Luftman and Brier 1999; Rockart, Earl, & Ross, 1996).

The Schobel and Denford (2013) research, which consisted of three case studies in the public sector, used open ended questions to ascertain the relationship between the CIO and CFO and their impact toward development of an effective and aligned strategy. The key result of this study found that if the relationship between the CIO and CFO is positive, then their individual roles are effective and has a positive impact on development of aligned IS and business

strategies. The relationship between the CIO and CFO is important because "within the TMT, no other executive, other than the CEO, can impact a CIO's plan as much as the CFO, primarily due to the degree of discretionary spending IT operations and projects consume" (Schobel and Denford, 2013, p. 262).

For the last twenty years, IS and business strategy alignment has been a top concern for CIOs and TMT (Chan & Reich, 2007). The alignment of the business and IS strategies supports the future needs of the firm (Chen et al., 2010). The greater the alignment, the greater the likelihood is for the firm to achieve higher levels of performance (Chen et al., 2010). Success in aligning business and IS strategies requires CIO participation in business strategy development and likewise TMT participation with IS strategy development (Chen et al., 2010). Findings from the Li and Ye (1999) empirical research came to the conclusion that if the CEO and CIO work closely together then the firms' performance is positive.

The Smaltz et al. (2006) study found that formal membership to the TMT enables the CIO to understand the strategic needs of the business and the direction of the TMT. In addition, this study found that the "CIO's formal membership in the TMT" and the "TMT's trust of the CIO to support their vested interest" were the only significant indicators which contribute toward the CIO being an effective business strategist and integrator. Integrator refers to the CIO's leadership capability in developing a strategy for transforming the information system solution to meet the business strategy (Smaltz et al., 2006). The Smaltz et al. (2006) study kept the "Formal Interaction with the TMT" and "Formal Interaction with CEO" as separate metrics because of the low validity results; "Cronbach's *alpha* = .53" (p. 215).

A study of an insurance company in the United States found that minimal communication between the CIO and TMT resulted in limited creativity in applying information systems (Ross,

Beath, & Goodhue, 1996). As the business and IT managers began interacting regularly, a trusting relationship was established which enhanced the insurance company's ability to creatively apply applications (Ross et al., 1996). As summarized in the Smaltz et al. (2006) study, "CIOs can enhance their role effectiveness through extensive organizational networking" (p. 212).

Developing a trusting relationship with the TMT is an essential characteristic desired in a CIO (Zand, 1997). To establish collaboration of meaningful information which enables decision making, a level of trust needs to exist between the TMT members (Smaltz et al., 2006). "Trust encourages interdependent individuals and groups to eliminate their fear of exploitation and recognize their existing conflicts, be more cooperative in their behavior, and generate suggestions for change focused on the problem itself" (Mishra, 1996, p. 276). Because development of poorly defined IS strategies could be the result of CIOs and TMT not having a good relationship, additional research is warranted.

Informal interaction between the TMT and CIO is another characteristic which can enable the CIO to understand the strategic needs of the business and the direction of the TMT (Rockart, Earl, & Ross, 1996). The Preston, Karahanna, & Rowe (2006) study conducted in France and the United States (U.S.) found that in France, but not the U.S., the informal interaction with the TMT had a significant relationship to developing a shared understanding of information systems within the firm. The Smaltz et al. (2006) study which was conducted in North America supported Preston et al. (2006) study which found that the CIO reporting level and informal interaction did not provide a significant indicator toward the effectiveness of the CIO. One significant finding from the Preston et al. (2006) study is that because of national

culture, results from one study cannot be assumed applicable for another country. The summary of the studies which focused on CIO/TMT relationship variables is in Table 1.

Table 1

Summary of Studies focused on CIO/TMT Relationship since 2004

Variables \ Study	Bassellier and Benbasat (2004)	Preston and Karahanna (2009a)	Preston, Karahanna, and Rowe (2006)	Schobel and Denford (2013)	Smaltz, Sambamurthy, and Agarwal (2006)
Reporting level of CIO		✓	✓	✓	✓
Formal TMT Membership		✓	✓	✓	✓
Formal Networking	✓	✓	✓	✓	✓
TMT trusting the CIO		✓	✓	✓	✓
Informal Networking		✓	✓	✓	

There are two scenarios to informal networking. One is informal interaction within the firm and the other is social interaction outside the work environment. The Preston et al. (2006) research found that in France social interaction had a direct relationship to shared understanding, whereas in the United States this relationship didn't exist. This finding shows that social interaction ties to the national culture. The Preston & Karahanna (2009b) research found that social interaction "between the CIO and TMT does not directly contribute to the development of a shared vision" (p. 3).

An interesting finding was identified in the Schobel and Denford (2013) study which was conducted in Canada. Their research found that the physical proximity of the CIO and CFO increase informal communication, in turn providing "opportunities to create trust and shared understanding" (Schobel & Denford, 2013, p. 276). In previous studies, proximity has been linked to increased communication (Te'eni, 2001), the Schobel and Denford (2013) research proposes that proximity may also have a direct relationship between the CIO and TMT.

Studies of the CIO/TMT Relationship have found that the CIO/TMT relationship is not the only key contributor to determine the CIO effectiveness. The Smaltz et al. (2006) study found that the CIO/TMT Relationship factor (known as TMT/CIO Engagement in the Smaltz study) through the CIO Capability factor has an impact on the effectiveness of the CIO role. The CIO role includes the following four out of 25 expectations listed in the Smalz et al. study. These four expectations directly relate to this study:

- "Develop and implement a strategic IT plan that aligns with the organization's strategic business plan" (Smaltz et al., 2006)
- "Interact often with non-IT managers throughout the organization" (Smaltz et al., 2006)
- "Be intimately involved in shaping the mission/vision of the organization" (Smaltz et al., 2006)
- "Be intimately involved in business strategic planning and decision making" (Smaltz et al., 2006)

The measure of CIO/TMT Relationship for each study is summarized in Table 2. All characteristics, except for "trust" were applied in all the mentioned studies.

Table 2

CIO/TMT Relationship Metrics

Study	CIO/TMT Relationship Metrics
Preston and Karahanna (2009a)	1. CIO reports to CEO 2. CIO is formal member of TMT 3. Formal interaction with TMT (including the CEO) 4. Informal interaction with TMT 5. CIO trusted to support TMT members best interest
Preston, Karahanna, and Rowe (2006)	1. CIO reports to CEO 2. CIO is formal member of TMT (includes formal interaction with TMT) 3. Informal interaction with TMT (socialize)
Schobel and Denford (2013)	1. CIO reports to CEO 2. CIO is formal member of TMT 3. Formal interaction with CFO 4. CIO trusted to support TMT members best interest (Smaltz et al. 2006) 5. Describe the informal structure in the organization
Smaltz, Sambamburthy, and Agarwarl (2006)	1. CIO reports to CEO 2. CIO is formal member of TMT 3. Formal interaction with TMT 4. Formal interaction with CEO 5. Informal interaction with TMT 6. CIO trusted to support TMT members best interest

Based on the Preston et al. (2009a) study, a shared vision between the CIO and TMT is critical in establishing and maintaining an aligned IS strategy in the firm. The shared vision is based on the CIO/TMT Relationship and the CIO Capability. A low shared vision level was identified by the study when the CIO/TMT Relationship and CIO Capability categories had low results in all characteristics. Any combination of low, average and high results provided a moderate to high shared vision level. This analysis was based on the Scheffe's Multiple Comparison Test in a one-way ANOVA (analysis of variance).

CIO Capability Factor

The CIO capabilities addressed in this section are important skills that enable organizational change and information system strategy development. Even though empirical results find that the capabilities of a CIO directly impact the development of a defined IS strategy, there still are instances where poorly defined IS strategies are developed.

The knowledge of IS strategy requires the CIO to be attuned and understanding of current and emerging technologies and the relation of these technologies to the business strategy. "Organizations need guidance in making sense of emerging technologies, understanding their potential functionalities, and timing their investments in appropriate technologies" (Smaltz et al., 2006, p. 211). Further, the results from the Smaltz et al. (2006) research found that "knowledge of IS strategy" has a significantly positive relationship with the CIO's role as an integrator and business strategist.

The Li et al. (2006) research found that personality traits influence a firm's use of IS. Two personality traits analyzed in this research study were "openness" and "extraversion". Openness describes an individual who is broad-minded, imaginative, original, creative, curious, sensitive, adventurous, unconventional, and flexible (Costa & McCrae, 1992). The results of the Li et al. (2006) study found that openness appears to provide a "significant role in influencing the level of organizational innovative usage of IT" (p. 185). Since this research was conducted in Singapore, the results may be impacted by the national culture and therefore may not be applied in another country without further testing in that desired country; in this case – the United States.

CIOs who have high extraversion characteristics may display more willingness to pursue uncertain innovations (Li et al., 2006). Extraversion characteristics include the CIOs charisma (Li et al., 2006, p. 180), assertiveness, and ambition (Costa & McCrae, 1992) applied toward

obtaining the TMTs buy-in for the proposed IS strategy. In addition, since applying innovative solutions is fraught with a resistance to change, a CIO needs to be proactive and persuasive so that the organization can successfully transform. Based on Li et al. (2006) research, the degree of extraversion displayed by a CIO appears to "play a significant role in influencing the level of organizational innovative usage of IT" (p. 185). The results of the Li et al. (2006) study found that extraversion appears to provide a "significant role in influencing the level of organizational innovative usage of IT" (p. 185).

Some TMT members don't understand how IS is a key strategy enabler for the firms to meet its business strategy. In addition, TMT members frequently misunderstand the capabilities of information systems because they have very limited knowledge on the topic and because they have not worked in the information system career field (Weill and Broadbend, 1998). Further, if their experience did involve IS, it was from a cost center perspective and not as an enabler to achieve business goals (Venkatraman, 1997; Avison, Cuthbertson, & Powell, 1999; Papp, 2001). Conversely, TMTs overestimate the capabilities available for a given information system solution which results in misunderstandings and, in turn, an unproductive relationship between the CIO and TMT (Preston & Karahanna, 2009b).

A CIO who has political savvy can increase the TMTs knowledge of IS resulting in aligned business and IS strategies. Preston and Karahanna's (2009b) research found that CIO's who educate the executives, manage their expectations, and clearly define the information system capabilities in relation to the firm's business are successful in developing an information system vision which aligns with the business strategy. Excellent venues for educating the TMT about information systems is through CIO sponsored seminars, workshops, and vendor demonstrations.

Political savvy consists of the ability to negotiate, influence and persuade others (Hambrick and Mason, 1984), in this case peers. The CIO must be able to educate the TMT members about significant information system opportunities and negotiate for resources which support information system initiatives supporting the IS strategy (Smaltz et al., 2006). Another term which comprises of similar characteristics is "extraversion" which was analyzed in the Li et al. 2006 study. Extraversion encompasses the skills of being ambitious, gregarious, and sociable (Costa & McCrae, 1992). Individuals "high in extraversion also tend to take actions to influence environmental change by scanning for opportunities, showing initiatives, taking actions, and persuading people" (Smaltz et al., 2006, p. 180; Bateman & Grant, 1993). Since change resistance is encountered during information system innovation, success for the CIO requires proactive and persuasive skills to enable change management (Smaltz et al, 2006). The intent of this paragraph is to show the linkage between the Political savvy and "extraversion".

The results of the Smaltz et al. (2006) study found that political savvy was the paramount CIO capability contributing toward CIO role effectiveness; one of which is being a strategist. The Lane & Koronios (2007) study did not analyze political savvy, but CIO's recommended considering political savvy as a critical CIO competency.

Based on Feeny, Edwards, and Simpson's (1992) research, CEO's expect CIO's to be conversant on the business, in turn understanding key priorities and opportunities. In addition, understanding of the business leads to alignment of IS and business strategies, information system effectiveness and an increase in firm performance (Chan, Huff, Barclay, & Copeland, 1997). Further, the results from the Smaltz et al. (2006) research found that "knowledge of business strategy" has a significantly positive relationship with the CIO's role as an integrator and business strategist.

In the Preston & Karahanna (2009a) study, communication ability was focused on a shared business language. The "communication ability" addresses the capability required to "communicate clearly, persuasively, and in business terms (Smaltz et al., 2006) to TMT members. Their results found that CIOs who "articulated issues in business terms, framed discussions and IT value propositions from a business perspective, and avoided technical jargon were more likely to build a common strategic view of IT" (p. 3). In all five visioning configurations developed in the Preston & Karahanna (2009b) study, a shared language either was rated higher or in the same range as CIO Business Knowledge and CIO information system Knowledge. Conversely, the results of the Smaltz et al.(2006) study found that the "Interpersonal Communication Skill" provided the lowest contribution toward CIO Role effectiveness which includes strategist. Due to the wide range of results, which are addressed in the two aforementioned studies, communication ability, business knowledge, and information system knowledge require further analysis. The Lane & Koronios (2007) study did not analyze "communication ability", but CIO's who completed their survey highly recommended considering the "ability to communicate" as a critical CIO competency.

Understanding and applying a shared business language influences the development of a shared vision. Shared vision is difficult to obtain when the CIO discusses information system in technical terminology which is not readily understandable to non-IT savvy staff (Smaltz et al., 2006). To further compound the problem, the CIO is unable to discuss information systems in relation to the firm's business terminology, operating environment, and business strategy (Smaltz et al., 2006). Basically the CIO and firm executives are speaking past each other; a very frustrating unproductive situation. The CIO's inability to present IS relationships and relevance

to the business strategy hinders their ability to work with the firms executives (Preston & Karahanna, 2009b), in turn contributing toward development of a poorly defined IS strategy.

A summary of studies focused on CIO capabilities over the last decade is provided in Table 3.

Table 3

Summary of Studies focused on CIO Capabilities since 2004

Variables \ Study	Bassellier and Benbasat (2004)	Khan, Lederer, and Mirehandani (2013)	Lane and Koronios (2007)	Li and Tan (2013)	Li, Tan, Teo, and Tan (2006)	Preston and Karahanna (2009)	Smaltz, Sambamurthy, and Agarwal (2006)
Political Savvy			✓*				✓
Communication Ability	✓		✓*			✓	✓
Strategic Business Knowledge	✓	✓	✓			✓	✓
Strategic IT Knowledge		✓	✓			✓	✓
Personality Trait - Openness				✓	✓		
Personality Trait - Extraversion				✓	✓		
Conscientiousness				✓	✓		

* Survey did not include these dimensions. Instead CIO's provided these recommendations in the comments section of the survey.

The results of the Smaltz et al. (2006) study found that it was the CIO capabilities, not the CIO/TMT relationships, which influence the CIO's strategic roles. Having TMT membership though provides the CIO with the venue for applying their political savvy and communication ability to address IT and business strategy issues.

The Smaltz et al. (2006) study found that CIOs who had strategic business knowledge, strategic IT knowledge, political savvy, and interpersonal communication skills had a significantly positive relationship with the CIO role effectiveness which included strategist. Strategic business knowledge pertains to an individual's "understanding and appreciation of their firm's competitive forces and business strategies" (Smaltz et al., 2006, p. 211) and strategic IT knowledge pertains to an individual's understanding about current and emerging information technologies, their relevance for the firm" (Smaltz et al., 2006, p. 211). Further, the results of the Lane and Koronios (2007) study found that the modern CIO role is "increasingly strategic and business focused" (p. 1108). Their findings identified "leadership in CIO Role" and "Strategic Planning of ICT" as the top two critical competencies for the CIO which for each includes as a subset of interpersonal skills, business knowledge, and technical IT knowledge. The measure of CIO capabilities for each study is summarized on Table 4.

Table 4

CIO Capability Metrics

Study	CIO/TMT Capability Metrics
Li and Tan (2013); and Li, Tan, Teo and Tan (2006)	1. Personality Trait - Openness - "I love to read challenging material" - "I am quick to understand things" - "I love to think up new ways of doing things" - "I like to challenge the norms" 2. Personality Trait - Extraversion - "I feel comfortable around people" - "I know how to captivate people" - "I am skilled in handling social situations" - "I talk to a lot of different people at parties"
Preston and Karahanna (2009a)	1. Communication Ability through a Shared Business Language - "CIO and TMT members share a common language in our conversations" - "CIO primarily uses business terminology when interacting with TMT members" - "CIO avoids using IS jargon when interacting with TMT members" 2. Strategic Business Knowledge - "For each area, please evaluate the CIO's level of knowledge:" - "Your firm's present and future products, markets, business strategies, and business" - "Your industry's practices" - "Your firm's competitors" 3. Strategic IS Knowledge - "How knowledgeable is the TMT about the potential and limitations of current IS?" - "How knowledgeable is the TMT about the potential and the limitations of "next-generation" IS?" - "How knowledgeable is the TMT about how your competitors are applying IS?"

Table 4 (continued)

CIO Capability Metrics

Study	CIO/TMT Capability Metrics
Smaltz, Sambamburthy, and Agarwarl (2006)	1. Political Savvy - "What is the CIO's ability to accurately read potentially contentious situations?" (Smaltz et al., 2006, p. 215; Field, 1998) - "What is the CIO's ability to act with tact when confronted with potentially contentious situations?" (Smaltz et al., 2006, p. 215; Field, 1998) - "What is the CIO's ability to develop good rapport with most people?" (Smaltz et al., 2006, p. 215; Field, 1998) 2. Communication Ability - What is the CIO's ability to "effectively use nontechnical terms when making presentations to the TMT?" (Smaltz et al, 2006, p. 215) - "What is the CIO's ability to effectively use business terms familiar to the other members on the TMT?" (Smaltz et al., 2006, p. 215) - "What is the CIO's ability to effectively use clinical terms when making presentations to clinical business units?" (Smaltz et al., 2006, p. 215) 3. Strategic Business Knowledge (Armstrong & Sambamurthy, 1999, p. 323) - "What is the CIO's knowledge about:" - "Your firm's present and future products, markets, business strategies, and business processes" - "Your industry's practices" - "Your firm's competitors" - "How your competitors are applying IS in the business" - "How to utilize your IT infrastructure to address your firm's business needs" - "How to identify relevant emerging IT for supporting your firm's products, markets business strategies, and business processes:" - "How to guide your firm's decisions related to the timing and level of investment in emerging technologies" 4. Strategic IT Knowledge (Armstrong & Sambamurthy, 1999, p. 322) - "How knowledgeable is the top management team about potential and limitations of current IT?" - How knowledgeable is the TMT about potential and limitations of "next generation" IT?" - "How knowledgeable is the TMT about how your competitors are applying IT?"

Level of Organizational Mindfulness Factor

Little empirical research has been conducted to determine the relationship of mindlessness against information system innovation and strategy. The mindlessness theory was applied toward high reliability organizations (HRO) such as a nuclear power-generation plant, air traffic control system, or a space shuttle. In these types of systems, the "effective HROs organize socially around failure rather than success in ways that induce an ongoing state of mindfulness" (Weick, Sutcliffe, and Obstfeld, 1999, p. 61). With these HRO systems, a combination of orderly processes and routing activities aid in identifying unpredictable failure (Weick, Sutcliffe, and Obstfeld, 1999).

More recent studies are looking at applying the mindlessness theory to information system innovation within a firm. The Mu and Butler (2009) study established an assessment model for identifying the level of organizational mindfulness within a firm which is a key factor for firms to enable assimilation of IT innovations. This is important because firms are successful in fielding IT solutions, but fully integrating the new solution into the firm is problematic (Fichman and Kemerer, 1997; Pyun, 2002). Successfully integrating the IT innovation into the firm is a delicate balance of not only incorporating the new solution into the firm's existing architecture, but also incorporating the solution into its operations which includes the culture, strategy, and goals (Mu & Butler, 2009; Ross & Weill, 2006).

The mindfulness theory "focuses on an organization's ability to perceive cues, interpret them and respond appropriately (Butler & Gray, 2006, 216). The Khan, Lederer, & Mirchandani (2013) research found that the more the TMT understood the critical role information system plays in the support of the business strategy, the higher their appreciation of information system and the associated challenges. TMT's appreciation of IS, in turn, leads to greater mindfulness. The five mindfulness variables are summarized on Table 5.

Table 5

Summary of Studies focused on Mindfulness since 2004

Variables \ Study	Khan, Lederer, and Mirehandani (2013)	Mu and Butler (2009)
Preoccupation with Failure (PF)	✓	✓
Reluctance to Simplify Interpretations (RSI)	✓	✓
Sensitivity to Operations (SO)	✓	✓
Commitment to resilience (CR)	✓	✓
Deference to Expertise (DE)	✓	✓

Weick and Sutcliffe (2001) research identifies five processes associated with organizational mindfulness: preoccupation with failure, reluctance to simplify interpretations, sensitivity to operations, commitment to resilience, and deference to expertise. A description of each process follows:

- Preoccupation with failure "assumes that errors, problems, and unusual events, no matter how small, are potentially important indicators of potential problems with the health of the organization and potentially unexpected aspects of the situation" (Mu & Butler, 2009, p. 30). In a mindful organization, people are encouraged to report all errors and identify improvement opportunities. In turn, these errors are treated as systemic, not individual, issues (Mu & Butler, 2009)
- Reluctance to simplify interpretations. Since information system innovation is frequently presented in a hype-saturated environment, it is critical for firms to conduct a detailed analysis of the proposed technology to understand how it fits into their current operation and enables their business strategy. By not simplifying interpretation of the detailed analysis results, it will assist in avoiding a quick solution. In turn, this will gear the firm

toward an understanding of how the IT innovation will fit with the firm's unique characteristics, requirements and business strategy (Fiol and O'Connor, 2003). In addition, this detailed analysis will assist the firm in identifying latent opportunities "because they are less likely to assume that the current processes and structures are necessarily the most appropriate" (Mu & Butler, 2009, p. 31).

- Operations. Collective mindfulness requires an organization to deal with small disruptions and errors swiftly, in turn potentially avoiding escalation into larger problems. By empowering experts to resolve operational issues, it will then lead toward identification of information system transformation supporting current operations and enabling business strategies (Mu & Butler, 2009).
- Commitment to Resilience. Mindful organizations understand that there is no zero-defect organization and that a disaster can happen at any time. In turn, survivability of the firm is dependent on its ability to "respond appropriately to the unexpected situation" (Mu & Butler, 2009, p. 32).
- Deference to expertise. In mindful organizations, leadership will relax formal structure to allow the subject matter experts in other functional areas to fix the crisis. Innovation requires "on-going learning that organizational members can help to foster in one another (Swanson & Ramiller, 2004, p. 561).

Mu and Butler (2009) established a model and framework and tested it's applicability within a firm. Further, Khan et al. (2013) applied this model to determine the relationship of the five organizational mindfulness variables against the firm's performance. Based on their findings, only "Sensitivity to IS operations" influenced IS performance. "Commitment to IS

resilience" had a low result. These findings lead toward the conclusion that information system management is not like other firm endeavors; meaning that information system solutions need to be planned.

Successful IT innovation is the result of achieving a fit between a firm's Information System framework and its current operations, strategy, and goals (Ross and Weill, 2006). Information system transformation involves identifying technologies and systems that when fielded will be compatible with current operations and align with the business strategy (Armstrong and Sambamurthy, 1999). Further, information system transformation not only includes the identification and fielding of technologies, but also "adapting processes, changing organizational structures, and developing strategies that fully leverage the capabilities of their IT investments" (Mu & Butler, 2009, p. 28)

Frequently, IT innovations are presented in ways that exaggerate benefits and capabilities, downplay challenges, and "seek to create urgency by claiming that widespread industry-level adoption is inevitable and that organizational adoption is absolutely critical for the continued success and survival of the firm" (Mu & Butler, 2009, p. 28). In turn, this type of environment encourages mindless behavior which can significantly distort rational leadership decision making within a firm (Wu, Zsidisin, & Ross, 2007).

A summary of the level of organizational mindfulness metrics is provided in Table 6. The metrics for the other organizational mindfulness processes are not provided in the table 6 because they are not part of this research study.

Table 6

Level of Organizational Mindfulness Metrics

Study	Mindfulness Metrics
Khan, Lederer, and Mirehandani (2013)	Reluctance to Simplify Interpretations (RSI) - "Top management believes complex responses are needed in complex environments" - "Top management believes general interpretations of events or phenomena may not always apply to our organizational situations" - "Top management is open to new ideas even when they come from outside our organization" - "Top management is reluctant to simplify interpretations"
Mu and Butler (2009)	Reluctance to Simplify Interpretations (RSI) - "People are encouraged to question the way things are usually done here" - "Personnel here are willing to challenge the status quo" - "We appreciate skepticism here" - "People feel free to prolong their analysis to better grasp nature of problems"

Level of IS strategy definition

Through extensive analysis of 48 articles, the Chen et al. (2010) study developed a definition of Information System strategy as "the organizational perspective on the investment in, deployment, use, and management of information systems" (p. 237). IS strategy is part of the overarching corporate strategy, but should not be identified as a subset of business strategy (Chen et al., 2010). In addition, IS strategy should be at the organizational level, vice functional level, which supports and questions the business strategy (Chen et al., 2010; Earl, 1989). Lastly, IS strategy should portray the organizational view shared by the TMT (Chen et al., 2010; Mintzberg, 1987).

Chen et als. (2010) research defines two IS strategies: IS innovators and IS conservatives. An IS innovator wants to be the first in exploring, developing and capitalizing on innovative IS initiatives, whereas the IS conservatives seeks to exploit new information system technology for strategic purposes after it's a proven solution (Chen et al., 2010). Leidner et als. (2011) research empirically links these two strategies to firm performance. In addition to the IS innovators and IS conservatives strategies, Chen et als. (2010) and Leidner et al. (2011) also identify the existence of poorly defined IS strategies. Poorly defined IS strategies are minimally defined strategies, basically strategies developed as an afterthought.

In the Li and Tan (2013) study which focused on the relationship of CIO personality traits (i.e. Openness, Extraversion, and Consciousness) and business strategy (prospector and defender) to the organization's business performance. The prospector business strategy is focused on maintaining the reputation as being an innovator, whereas the defender business strategy is focused primarily on process improvement, not product innovation (Li & Tan, 2013). The IS strategy associated with prospector is the "flexibility and innovation" IS strategy whereas the IS strategy associated with the defender is the "cost containment and stability" IS strategy (Li & Tan, 2013). The two strategies addressed in the Li and Tan (2013) research are very similar to the innovative and conservative strategies identified by Leidner et al. (2011) and Chen et al. (2010) studies. The measure of CIO/TMT Relationship for each study is summarized on Table 7.

Table 7

Level of Strategy Definition Metrics

Study	Level of Strategy Definition Metrics
Chen, Mocker, Preston, and Teubner (2010)	Innovative IS Strategy Conservative IS Strategy Undefined IS Strategy
Leidner, Lo, and Preston (2011)	Innovative IS Strategy Conservative IS Strategy Undefined IS Strategy
Li and Tan (2013)	Flexibility and Innovative IS Strategy Cost Containment and Stability IS Strategy

Business Strategy – Control Variable

IS strategy is not developed in a stovepipe, instead firms cannot be competitive if their business and IS strategies are not aligned (Avison, Jones, Powell, & Wilson, 2004). Aligning IS and business strategies are a complex endeavor. Success in developing a shared vision requires collaboration amongst the TMT to develop visions, identify risks, tradeoffs; and address the "dynamic interplay between IT and business strategies" (Preston & Karahanna, 2009b, p.1). Based on Agarwal and Sambamurth (2002), Earl (1989), Galliers (2004), and Preston and Karahanna (2009b), IS strategy should support and, where possible, question and expand the existing business strategy. In addition, Galliers (1991, 1993, & 2004) states that IS Strategy "should be considered as an integral strategy that implies the potential impact of IS on organizational performance" (Chen et al., 2010, p. 240). Furthermore, success in aligning Business-IS strategies requires the CIO involvement in business strategy development and likewise, TMT involvement with IS strategy development (Chen et al., 2010).

IS strategy development is a partnership between information system experts, IT experts, and functional managers of the firm. Success of the strategy development requires communication, negotiation, and collaboration between this team (Piccoli, 2008; McNurlin, Sprague, & Bui, 2009). Many factors may contribute toward the development of a poorly defined IS strategy which includes mergers and acquisition, poorly written business strategy, constant environmental changes (Khan et al., 2013), firm staff structure and a new CIO.

A poorly defined IS strategy may be the result of a recent merger and acquisition (Robbins and Stylianou, 1999; & Merali and McKiernan, 1993) which requires the IT department to resolve operational chaos while focusing on consolidating staff, IT resources, and processes (Preston, Leidner, & Chen, 2008). The intent of merging two firms is to "produce synergistic opportunities, but the benefits do not flow automatically and the process can be extremely" (Robbins & Stylianou, 1999, p. 205) difficult especially when attempting to integrate information systems. Immediate gains anticipated from mergers are derived due to unrealistic gains expected from IS integration (Robbins & Stylianou, 1999). A successful merger which involves integration of IS requires end-user participation in IS strategic decision-making. In other words, integration of information systems cannot be an afterthought.

Results of detailed case studies conducted in Europe and the United States revealed that information system leadership was basically absent from the merger decision-making process. Over 50% of the cases did not have information about the target company's IS strategy. In most cases, no "attempt was made to consider the merged business entity and its requirements for IS strategy" (Merali & McKiernan, 1993, p. 119). Lastly, only 25% of the time, information system leadership was at the table during the merger decision-making process and 50% of the time information system issues were not addressed at the pre-acquisition stage. Basically, IS strategy

was excluded from critical discussion since it was determined to be of lesser importance to business strategy (Merali & McKiernan, 1993). "Based on the results of detailed case studies and a preliminary survey, it is found that managers involved in pre- and post-acquisition decision-making often fail to adequately consider the strategic importance of IS in contributing to the acquisition outcome" (Merali & McKiernan, 1993, p. 105).

The alignment of the business and IS strategies supports the future needs of the firm (Chen et al., 2010). Chen et al. (2010) research found that the greater the alignment, the greater the likelihood for the firm to achieve higher levels of performance. Even though alignment of strategies has been well documented, firms still have misaligned strategies. Misalignment could be due to an incomplete or vague business strategy. For example, the business strategy may have poorly written goals and objectives; and poorly defined performance drivers to measure success in meeting the strategic goals (Montgomery, 2012). If the business strategy is vague, then it's difficult to ascertain any potential IS opportunities and, in turn, develop a sound IS strategy which aligns with the business strategy (Montgomery, 2012).

Van Der Zee and De Jong (1999) identified a significant issue associated with the misalignment of business and IS strategies. With the constant change in the business environment and information technology, the time it takes to develop business and IS strategies results in products which at times are obsolete (Higgins, 2005). Basically, once the IS strategy is established, "there is a high probability that the plan and the technology are already obsolete" (Chan & Reich, 2007, p. 299) due to the change in the business environment or information technology. It's very difficult to stay current.

Difficulty in developing IS strategy could be due to the staffing structure of a firm. The Dincer, Tatogly, and Glaister (2006) study surveyed the Istanbul chamber of Industry's 500

largest Turkish manufacturing firms and firms listed on the Istanbul Stock Exchange. The results of 135 surveys revealed that only 25% of the firms have an office designated with the responsibility of developing business, corporate and/or strategic planning (Dincer et al., 2006).

Further, the Grover, Henry, and Thatcher (2007) survey results of 89 information system executives from U.S. firms with "over 50 IT employees or over 1,000 PCs or listed on the Fortune 1000 or Forbes 500 lists" (p. 86) revealed that decisions on IS strategic vision was controlled by the Chief Information Officer approximately 50% of the time; TMT approximately 25% of the time; and to the business unit, IT unit or vendors approximately 25% of the time. In other words, in 25% of the firm, the TMT and CIO are not key decision makers on the firm's IS strategy.

Misaligned business and IS strategies can also be the result of a newly assigned CEO within the firm. The CEO is incorporating new ideas into the existing business strategy, in turn, causing misalignment to the IS strategy which still needs to be updated (Higgins, 2005). As long as the existing IS strategy is not updated to align with the newly established business strategy, then the IS strategy aligning with the business strategy of a previous CEO could be categorized as a poorly defined IS strategy (Higgins, 2005).

This research is relevant, as it seeks to identify factors which lead to development of poorly defined IS strategies or a firm ignoring it's defined IS strategy. Even though it may seem inconceivable for a firm to have a poorly defined IS strategy, the results of Leidner et al. (2011) research identified 10% of the firms have poorly defined or no IS strategies (Leidner et al., 2011). Further, mindless firms ignore their defined IS strategy (Swanson and Ramiller, 2004), don't apply explorative or exploitative goals to meet the firm's long term vision (Leidner et al., 2011), and instead apply a new innovation presented by a consultant without first conducting

detailed explorative or exploitative analysis (Ramiller, 2001; Strang and Macy, 2001). Leidner et al. (2011) research determined that "quantitative and qualitative studies are needed to uncover the reasons why firms choose a particular IS strategy" (p. 433).

Summary and Discussion of Literary Research

A summary and discussion of literary research conducted over the last decade is provided in Appendix A. There has been a selection of research conducted over the years which analyze one or two of the factors, but not all three to ascertain the level of IS strategy within a firm. The factors researched in these studies include CIO roles/capabilities, CIO/TMT relations, and organizational mindfulness. But there hasn't been a study combining these factors to determine the level of IS strategy within a firm. By determining the level of IS strategy, it will provide a foundation for researchers to begin analyzing factors contributing toward poorly defined IS strategies.

Nine out of eleven research topics used the survey method to gather their data, one used the survey and interview methods, and one used case studies. Five out of eleven used a paired approach by sending surveys to the CIO and TMT within the same firm. The other six surveys either contacted just the CIO or the CEO; of which one of the six contacted IT professional at all levels within the firm. Since not all firms have CIOs, the definition of CIO within the survey was broadened to include the senior IT professional within the firm. Eight out of twelve applied the Five-point Likert scale, two used the seven-point Likert scale, one used a combination of the five-point and seven point Likert scales, one used multi-item questions, and another used open ended questions.

These research studies were conducted all over the world. Four out of twelve were focused on U.S. firms, two in North America, two in Asia, one in Canada, one in France and the

U.S., and one in Australia. None of the studies focused on the same areas and industries. Further, none of the studies covered all factors being addressed in this research study. This research topic will be the first to analyze how data in the CIO/TMT relationship, CIO capabilities and organizational mindfulness interact to determine the level of IS strategy within a firm.

Summary

This chapter reviewed and analyzed literature specific to factors addressed in this study. The factors include CIO/TMT relationships, CIO capabilities, organizational mindfulness, and IS strategy. For each of these factors, results were compared and metrics identified. Lastly, a summary of all key research studies over the last decade were reviewed and provides the foundation for the survey instrument to be developed for this research topic.

Chapter 3

Methodology

Research Design

The research study utilized a quantitative methodology to address the research questions presented in this study. This methodology was used to identify factors which contributed toward the level of IS strategy definition. The four factors being investigated include CIO capability, CIO-TMT relationship, organizational mindfulness, and level of IS strategy definition. This chapter describes validation of the survey instrument, population surveyed, analysis of the data, results from the pilot, resources used, and a chapter summary.

Survey Instrument and Measures

This research study utilized one survey instrument to measure several factors including CIO/TMT relationship (REL), CIO capabilities (CAP), organizational mindfulness (OM), and level of IS strategy definition (ISSD). In addition, this survey instrument collected demographic information. The survey instrument was a compilation of validated survey questions from previous studies listed in Table 8. Even though the study comprised of validated questions, a semi-structured interview and a pilot were administered to validate the survey instrument.

Table 8

Measure, Factors, and Source

Measure	Factors	Source
Demographics	Respondents job title to verify position required for study	
	Age, gender, tenure in current position, and tenure in the organization	Li and Tan, 2013 Preston et al., 2006
	Organization's industry	
	TMT Membership, and	Smaltz et al., 2006
	Reporting level of CIO	Preston & Karahanna, 2009a
CIO capabilities	Knowledge of Business Strategy, Knowledge of IS Strategy, Political Savvy, and Communication ability	Smaltz et al., 2006
	Openness and Extraversion	Li and Tan, 2006
	Knowledge of Business Strategy, Knowledge of IS Strategy, and Communication ability	Preston & Karahanna, 2009a
CIO/TMT Relationship	Trusting Relationship, Informal interaction, and Formal interaction	Smaltz et al., 2006 Preston & Karahanna, 2009a
Level of Organizational Mindfulness	Reluctance to simplify interpretations and Top Management Support	Khan, Lederer, & Mirchandani, 2013
level of IS strategy definition	Undefined IS Strategy	Leidner et al., 2011 Chen et al., 2010

The "Official Information System Survey" survey instrument, located in Appendix B, was sent to TMT members including CIOs to complete. Due to the limited number of senior leaders available, the TMT group in this survey pool included President/CEO, Vice President, CIO, Other C-Level officers, General Manager, and Directors. Surveys collected from individuals in other levels (i.e., Manager, Intermediate, and Entry Level) were excluded from the analysis.

Official Information System Survey

This 50-question instrument included validated questions developed by Li and Tan (2013); Preston & Karahanna (2009b); Smaltz et al. (2009); Armstrong & Sambamurthy (1999); Khan et al. (2013); Leidner, et al. (2011); and Chen et al. (2010). In addition, key demographic questions used in Li and Tan (2013) research and Preston et al. (2006) have been incorporated into this research study.

Based on Dillman, Smyth, and Melani (2009), all demographic questions are to be placed at the end of the survey instrument. In line with this guidance, this research study placed all demographic questions, except one, at the end of the survey instrument. The first demographic question which identified the position title of the individual was placed at the beginning of the survey. This question was used as the discriminator question; anyone in a position less than the director was excluded from this research study. These remaining demographic questions focused on the age, gender, organizational tenure and position tenure of the individual (Smaltz et al., 2006); and identification of the firm's industry (Li and Tan, 2013).

Originally, question 49 "Have you taken an Information System strategy course within the last 60 days was to be used as the disqualifier question. In other words, anyone that had completed strategy training within the last 60 days was to be excluded from any further analysis. After conducting the pilot, it was found that the individuals that had completed strategic training within the last 60 days were also the individuals holding TMT positions. So by deleting surveys completed by these individuals would have resulted in conducting analysis primarily on surveys completed by Entry Level – Managers. By using question 49 as the disqualifier question would have resulted in disqualifying the wrong group and, in turn, qualifying the wrong group. This resulted in changing the disqualifier question to question 1 "My current position title is" where

anyone identifying themselves as Manager, Intermediate, Entry Level or Other were disqualified. In turn, only senior leader surveys were kept for further analysis.

CIO Capabilities Measure

In the CIO capabilities (CAP) factor, this research study measured six variables that were validated in previous research studies. The Smaltz et al. (2006) survey instrument included questions pertaining to knowledge of business strategy, knowledge of IS strategy, communication ability, and political savvy. Their research surveyed CIOs and TMT members from the same firms obtained from the Healthcare Information and Management Systems Society (HIMSS) member directory. The HIMSS is a world-wide nonprofit organization focused on enabling better health through IT (http://www.himss.org/AboutHIMSS/index.aspx).

The Preston and Karahanna (2009b) research applied a three-step process to validate their survey instrument which included questions pertaining to knowledge of business strategy, knowledge of IS strategy, and communication ability. The first step involved semi-structured interviews with six CIO's to evaluate content validity. The second step was an item-sorting exercise to qualitatively evaluate the validity of each factor. The third step involved a statistical assessment of the Likert scales. The Preston and Karahanna (2009b) research surveyed CIOs and TMT members from firms obtained from the Dun & Bradstreet Million Dollar Database and from several professional industry associations. The Dun & Bradstreet Million Dollar Database comprises of business in the United States and Canada (http://www.mergentmddi.com/).

In the Li et al. (2006) research, questions pertaining to openness and extraversion were validated by having the head of the IT Management Association and two CIOs review and provide comments to the survey instruments. This survey was conducted in Singapore.

Shared language (communication ability) and TMT strategic IS knowledge were used in the Preston & Karahanna's (2009b) research to empirically investigate the relationship between a shared understanding and the alignment of a firms business and IS strategies; whereas the Smaltz et al. (2006) research used the political savvy, communication ability and CIO strategic business knowledge to identify the relationship between the CIO roles to the CIO's effectiveness. The Smaltz et al. (2006) study used a five-point Likert scale to empirically assess the CIO roles to the CIO's effectiveness.

In the Li and Tan's (2013) research, the personality trait variables were used in their survey instrument to identify the relationship between specific CIO characteristics to different business strategies. In this research study, these same variables were used to determine the relationship between CAP and the level of ISSD within a given firm. These questions applied a five-point Likert scale which ranges from (1) "strongly disagree" to (5) "strongly agree".

In this research study, these questions are being used to identify the relationship between CAP and the level of ISSD. These questions applied a five-point Likert scale which ranges from (1) "strongly disagree" to (5) "strongly agree".

CIO/TMT Relationship Measure

In the CIO/TMT Relationship (REL) factor, this research study measured four variables that were validated in previous research studies. Questions from the Preston, and Karahanna, (2009a) and Smaltz et al. (2006) research studies validated the questions pertaining to TMT membership; reporting level of CIO; formal and informal interaction; and trusting relationship. Preston and Karahanna (2009a) and Smaltz et al. (2006) validation process for the survey instruments is the same as what was discussed in the aforementioned CIO Capability Measure section.

In the Preston & Karahanna's (2009a) research, the questions were used to empirically investigate the relationship between the TMT and CIO shared understanding and business and IS strategy alignment. The Smaltz et al. (2006) study used a five-point Likert scale to empirically assess the CIO roles to the CIO's effectiveness.

This research study, focused on three variables which included informal relationship, formal relationship, and TMT trust of the CIO. These variables were used to identify the relationship of the REL to the level of ISSD. The six questions supporting these variables a five-point Likert scale which ranges from (1) "strongly disagree" to (5) "strongly agree.

Lastly, since two of the CIO/TMT Relationship questions used in the survey instrument were factual in nature, they were placed in the demographics section. One question focused on the CIO hierarchy relation to the CEO. The answers to this question are direct report, one level separation, or two or more levels separation. The other question asked if the CIO is a formal member of the TMT; response options were "yes" or "no".

Organizational Mindfulness Measure

In the organizational mindfulness (OM) factor, this research study measured the mindfulness questions validated in the Khan et al. (2013) research. The only questions incorporated into this study were associated with TMT's perception of information systems and TMTs process to resolve complex situations. The responses from the survey instruments identified organizations that are more likely to apply new solutions and/or technology without adequate analysis because they are seeking simplified solutions to complex issues. Based on organizational mindfulness, firms should conduct in-depth analysis to determine sound solutions which can be incorporated into the firm's architecture design and business processes; and will aid in transforming the firm into an architecture which meets their long term goals (Khan et al., 2013).

The OM variables which focus on reluctance to simplify interpretations and top management support were used in Khan et al. (2013) research to determine the impact of top managements influence on information system performance. In this research study, these variables were used to determine the relationship between OM and level of ISSD. The questions apply the five-point Likert scale which ranges from (1) "strongly disagree" to (5) "strongly agree".

IS Strategy Definition Measure

In the IS Strategy Definition (ISSD) factor, this research study will measure the strategy variables validated by Leidner et al. (2011) research. Leidner et al. (2011) surveyed CEOs from United States based credit unions to test the model and hypotheses. Just like Leidner et al. (2011) research, a five-point Likert scale which ranges from (1) "strongly disagree" to (5)

"strongly agree" will be applied in this research study. Lastly, the ISSD variables will be used to determine the relationship between REL, CAP, and OM to the level of ISSD.

Factors

A summary of the four factors and associated variables are provided in Table 9. To easily group the questions for data analysis, codes have been developed for each variable. A breakout by individual question is provided in Appendix C.

Table 9

Variable Codes

Factors/Variables	**Code for Variable**
CIO capabilities (CAP)	
Communication Ability	CA
Openness	OP
Extraversion	EXT
Political Savvy	PS
Knowledge of Business Strategy	CIOSBK
Knowledge of IS Strategy	TMTITK
CIO/TMT Relationship (REL)	
Trusting Relationship	TR
Informal Interaction	I
Formal Interaction	F
Level of Organizational Mindfulness (OM)	
Reluctance to Simplify Interpretations	RSI
Top Management Support	TMS
level of IS strategy definition (ISSD)	

Reliability and Validity

Reliability

Reliability is a means of measuring the consistency and stability of the instrument (Salkind, 2009). Cronbach's *alpha* is one of the most frequently used statistical tools to determine the internal consistency of the questionnaire (Salkind, 2009). "Internal consistency examines how unified the items are in a test" (Salkind, 2009, p. 112). The Cronbach's reliability *coeff*icients should be as close to 1.0, as possible (Sekaran & Bougie, 2013). Coefficients below .60 equate to poor, .70 equates to acceptable, .80 equates to good, and 1.0 would be excellent (Sekaran & Bougie, 2013).

The Smaltz et al. (2006) study and the Li et al. (2006) study applied the Cronbach's *alpha* to determine reliability and validity of questions within a given variable. The Cronbach's *alpha* results ranged from .82 to .94; details are provided in Table 10. These validated questions were used in this research study.

Table 10

Cronbach's alpha to Validated Questions from Previous Studies

Variables	Cronbach's *alpha*	Study
CIO/TMT Relationship		
Informal Networking	0.88	Smaltz et al., 2006
TMT trusting the CIO	0.86	Smaltz et al., 2006
CIO capabilities		
Political Savvy	0.88	Smaltz et al., 2006
Communication Ability	0.83	Smaltz et al., 2006
Strategic Business Knowledge	0.82	Smaltz et al., 2006
Strategic IT Knowledge	0.86	Smaltz et al., 2006
Personality Trait - Openness	0.92	Li et al., 2006
Personality Trait - Extraversion	0.94	Li et al., 2006
Conscientiousness	0.90	Li et al., 2006

In this research study, the Cronbach's *alpha* reliability analysis was applied against each factor and each variable. Survey questions below .70 were reviewed for potential rewrite or deletion.

Validity

Instrument validation determines if the instrument measures what it is supposed to measure (Fink, 2013). Based on Fink (2013), valid survey information is derived from reliable and valid survey instruments. In addition, a valid survey must consider the context of when and where the survey is given and how respondents are selected. Lastly the survey must minimize threats to internal and external validity (Fink, 2013).

Internal Validity can be threatened by a wide range of events. Attrition which includes the loss of respondents because they are too busy can impact the results of a survey (Fink, 2013). Since this survey is sent out via the web, it's not known if the reason an individual chose not to answer the survey is because they are too busy. Instrumentation can impact the results because instructions and questions vary because different individuals are administering the survey (Fink, 2013). Instrumentation is not applicable to this research study because there is only one administrator and the survey is sent out via emails with the same information to each individual. Giving the survey to an individual within a short timeframe (i.e three weeks) may result in the individual thinking over the questions and answering the questions differently in the second survey (Fink, 2013). In this research study, individuals only answer the survey one time. Maturation which applies to children does not apply because this survey is only given to adults (Fink, 2013).

An external validity threat could involve respondents behaving "uncharacteristically because they are aware that their circumstances are different" (Fink, 2013, p. 110). An external validity threat may be an individual knowing that they are part of a special experiment which may involve the participant being observed with a camera. The Hawthorne effect involves the participant behaving uncharacteristically because they know that they are involved in a special experiment. Conducting a survey fits into the category of special experiment. This survey is being conducted through a web-based application which helped minimize the uncharacteristic environment and could assist in minimizing the Hawthorne effect. Uncharacteristic environment would involve being observed by a camera while participating in a special experiment. In this case, the individual completed the web-based survey in their office, home or subway, in turn minimizing the Hawthorne effect. This doesn't mean the Hawthorne effect is stopped, because knowing that they are selected for this survey, still could impact how they answer the questions.

To be able to confirm each hypothesis, surveys were provided to TMT members including CIOs. Official surveys were sent out via a web-based application to 352 individuals from either the AFCEA directory for small businesses or Cint, a privately owned software company. The surveys were sent out during the November – December 2014 timeframe. For individuals from AFCEA who did not respond to the surveys, reminder emails were sent out two weeks after the initial mailing. Since 90% of the individuals contacted through Cint responded, no follow-on reminder emails were transmitted.

Pre-Analysis Data Screening

Pre-analysis data screening is a process of identifying and resolving irregularities with collected data (Levy, 2006). This process is conducted to validate the accuracy and consistency of data collected from the surveys (Mertler & Vanatta, 2010). Four primary reasons exist for pre-analysis data screening: 1) validate accuracy of data collected; 2) identify and resolve issues with response-set; 3) deal with incomplete or missing data; and 4) identify outliers (Mertler & Vanatta, 2010).

In this research study, a web-based survey application was used to collect data. Based on Cooper and Schindler (2006), surveys administered through a web-based application significantly increases data quality and reduce data inaccuracy concerns. To limit erroneous input to the web-based survey instrument, the survey format included drop down menus or buttons to select options, where appropriate, and limited type of response by assuring date, number or letter format. In addition, all questions needed to be completed which resolved the potential issue of missing data.

Response set is the potential of a respondent to "agree with questionnaire statements regardless of content, is a source of bias in attitude measurement" (Winkler, Kanouse, & Ware, 1982, p. 555). This behavior potentially threatens validity of the data being collected. To decrease the chance of confusing words and phrases which can lead to response set answers, the survey instrument associated with this research study which used questions validated through previous studies was reviewed by CIO and business subject matter experts prior to conducting the pilot and official survey.

Since outlier responses can distort survey analysis, responses must be reviewed before conducting final analysis of survey results (Hair, Anderson, Tatham, & Black, 1984). The mean

+/- two standard deviations was applied to determine if outliers should be retained or excluded from the final analysis.

Pilot Test

Before the pilot test was administered, three CIO and business subject matter experts (SME) from within the Department of Defense completed the web-based survey and participated in a semi-structured interview which contributed toward further evaluation of the content validity and understandability of the survey instrument. This follows the same process conducted by the Preston and Karahanna (2009b) research which conducted semi-structured interviews with six CIO's to evaluate content validity.

A pilot test was administered to ensure the validity of the survey instrument (Fink, 2013). The pilot test comprised of sixteen information system and business experts. The intent of the pilot test is to ensure that the survey instrument was usable and provided the desired information (Fink, 2013). Pilot tests help determine if the respondent can easily navigate through the survey, understand the questions, and complete the survey in a reasonable amount of time (Fink, 2013). The pilot test should be conducted in the same medium and environment as the actual survey (Fink, 2013). In this case, the respondents used a web-based application to complete the survey instrument.

Population and Sample

This study comprised of businesses associated with AFCEA and Cint. AFCEA was selected because of the availability of their active email addresses and Cint was selected because it was a partner with Survey Monkey. Survey Monkey was the service used for developing,

distributing and gathering all survey results. The survey was sent out via Survey Monkey to specific email addresses available in AFCEA and sent out to individuals in the Cint database.

Based on Dillman et al. (2009), to obtain results with a 95% Confidence Level +/- 10 percent margin of error, 78 completed surveys for a 50/50 split or 53 completed surveys for a 80/20 split is required for a population of 400 (pg 57). In this research study, 80 usable completed surveys were received out of a 352 population which meets the criteria for a 95% Confidence Level +/- 10 percent margin of error.

AFCEA is a non-profit organization which provides a forum for the ethical exchange of information pertaining to information technology, communications and electronics supporting defense, homeland security and intelligence communities (AFCEA International, 2014). Cint is a software company which obtains opinions from over 10 million individuals in 60 countries (http://www.cint.com/about/)

Based on Tai and Phelps (2000) research, CEO's have an approximate 10% response rate and CIO's have an approximate 10% response rate. This means out of 600 firms, approximately 60 - 120 TMT's may respond to the survey. To ensure 83 responses are received, the plan is to send the survey instrument to all emails associated with all firms on the AFCEA list. Since all businesses listed in AFCEA will receive a survey instrument to complete, the simple random sampling process was not conducted.

Data Analysis

This research study investigated the relationship between CAP, REL, OM and ISSD. To obtain the answer for all the research questions, linear and multiple regression analysis was used in this study. In addition, descriptive statistics were used to describe and summarize demographic data collected from participants.

Linear Regression

Linear regression analysis was applied against all three research questions. Linear regression analysis depicts the relationship between an independent variable and one dependent variable. According to Sekaran and Bougie (2013), linear regression is applied to assess when one independent variable is hypothesized to affect one dependent variable. For this research study, the tests used included:

- An *F* test which will calculate if the independent variables predicted the dependent variable (Tabachnick & Fidell, 2013).
- R-squared (R^2) will calculate the variance provided by the independent variable (Hair, Black, Babin, & Anderson, 2010).
- A *t* test to analyze the statistical significance between the independent variables and the dependent variable (Hair et al., 2010).

In addition, scatter plots were created to evaluate the homoscedasticity, normality, and linearity of the results. Homoscedasticity validates that the scores spread normally around the regression line, normality shows if the scores are or are not normally distributed, and linearity determines whether the relationship between the two variables is a straight line (Tabachnick & Fidell, 2013)

Multiple Linear Regression

A multiple regression analysis was conducted for all three research questions and a main question. This analysis determined the relationship between the CAP, REL, OM and ISSD. In this analysis, REL, CAP, and OM will be identified as the independent variables and ISSD as the dependent variable. Multiple regression analysis assists in understanding the degree of which a set of predictors impacts the dependent variable (Sekaran & Bougie, 2013). Since the position of the CIO in relation to the CEO (RELH) may impact CAP, REL, and OM, RELH was incorporated in all multiple linear regression analysis to determine if it was a significant predictor.

Lastly, in Preston & Karahanna's (2009a) research, organizational characteristics and CIO individual characteristics were analyzed as control variables for IS strategic alignment. Organizational characteristics included organizational size, geographic location and industry and CIO individual characteristics included age, gender, functional background, organizational tenure, and tenure in the CIO position (Preston & Karahanna, 2009a). Based on their analysis, none of the control variables were significant, so they were dropped from their research model (Preston & Karahanna, 2009a). The Smaltz et al. (2006) research conducted an ANOVA "using the categorical control variables as independent variables (i.e., tax status, strategic orientation, and organization type) and CIO role effectiveness as a dependent variable" (p. 215). Since the results from this analysis were insignificant, the control variables were excluded from further analysis. In line with findings from Preston & Karahanna (2009a), Li et al. (2006), and Smaltz et al. (2006) studies, this research study identified age, gender, tenure in the organization, and tenure in the position as control variables.

Scatter plots were created to evaluate the homoscedasticity, normality, and linearity of the results. In addition, multicollinearity was used to detect high correlation between two or more independent variables used in a multiple regression model. Multicollinearity is detected by examining the variance inflation factor (VIF) for each independent variable. The presence of multicollinearity is identified when the VIF is greater than 10. Multicollinearity is not a serious problem if the purpose is to predict the future of the dependent variable. (Sekaran & Bougie, 2013, p. 319). In this research study, the goal was to identify variables that have a relationship with the level of IS strategy definition.

Resources Used

To prepare for the implementation of the research study, IRB approval was obtained, an integrated survey was developed based on literary research. The CINC and AFCEA Directory were used as the source for collecting completed surveys.

The web-based survey was launched using the SurveyMonkey® services. Survey data was exported to Excel for statistical analysis. The NOVA Southeastern University online library and Google Scholar were used for literature review.

Summary

In this research study, a web-based survey instrument applying a five-point Likert scale was developed from validated survey instruments. To verify and validate the survey questions, the questionnaire was sent to a small group for comment and then sent out as a pilot to a sampling of the target population. The target audience consisted of Department of Defense and business senior leaders located in the Washington DC area.

Pearson Correlation, linear regression and multiple linear regression analysis were applied to assess the data collected from the survey instrument. The same analysis was conducted for all three research questions and the main question. Completed survey responses were gathered from two sources: 52% through the Cint database and 35% through the AFCEA data source. Multiple linear regression was used to determine the relationship between the independent variables (CAP, REL, and OM) and dependent variable (ISSD). The intent of the analysis was to identify variables which contribute towards identifying factors which may lead toward development of a poorly defined IS strategy. Finally, this chapter provides a description of resources used to conduct this study.

Chapter 4

Results

This chapter discusses the results of the research study that explored the relationship between CIO capabilities (CAP); relationships between the CIO and TMT; organizational mindfulness (OM); and information system strategy definition (ISSD). The first section presents the results of the pilot survey. Next, the pre-analysis data screening is discussed and followed by the descriptive statistical analysis of the demographic results. The research question statistical analysis is presented in the next section and followed by the chapter summary.

Data Collection and Analysis

Data Collection

To decrease the chance of confusing words and phrases in the survey instrument which can lead to response set answers, the survey instrument for this research study used questions validated through previous studies. Similar to Preston and Karahanna (2009a) research, this research study used a semi-structured interview environment with three CIO and business subject matter experts to individually review and provide comments to the survey instrument. Two key points were incorporated into the design of the survey instrument: 1) Since individuals stated that the survey was too long, similar questions were deleted to shorten the survey from 55 to 50 survey questions; and 2) Since some terms such as CIO were unclear to business subject matter

experts, the term was written out to provide clarity. Overall, the subject matter experts felt that the survey instrument was valid.

A pilot should be conducted to ensure the respondent can easily navigate through the survey, understand the questions, and complete the survey in a reasonable amount of time (Fink, 2013). In addition, the pilot should be conducted in the same medium and environment as the official survey and provide the desired information (Fink, 2013). In this research study, a pilot was conducted from August 25 to October 27, 2014 to evaluate the survey instrument created in SurveyMonkey®, a web-based survey application. Sixteen individuals representing government and non-government CIO and business experts were selected to complete the web-enabled survey instrument.

Cronbach's *alpha* was computed for the pilot responses to test the internal consistency of the survey instrument. The responses were exported from SurveyMonkey® to Excel to apply the Cronbach's *alpha* testing and to conduct follow-on statistical analysis. Cronbach's *alpha* is one of the most frequently used statistical tools to determine the internal consistency of the questionnaire (Salkind, 2009). "Internal consistency examines how unified the items are in a test" (Salkind, 2009, p. 116). The Cronbach's reliability coefficients should be as close to 1.0, as possible (Sekaran & Bougie, 2013). Coefficients below .60 equate to poor, .70 equates to acceptable, .80 equates to good, and 1.0 would be excellent (Sekaran & Bougie, 2013).

The initial Cronbach's *alpha* analysis results were low for the factors organizational mindfulness (OM) and level of IS strategy definition (ISSD). The individual survey items in factors OM and ISSD were reviewed to ensure scales were written in the same construct (Tavakol & Dennick, 2011), either all in a negative or all in a positive. After close review, four survey items (USTRAT1, USTRAT2, USTRAT3, and OMRSI4B) were found to have been

written in a negative construct. To ensure alignment, the responses for these questions were reversed (i.e., 1's changed to 5s and 5s changed to 1) and a follow-on Cronbach's *alpha* was conducted. The final Cronbach's *alpha* reliability analysis results for the pilot ranged from acceptable to excellent: 0.998 (CAP); 0.89 (CIO/TMT Relationship); 0.755 (OM); and 0.716 (ISSD).

The official web-based survey instrument was launched using SurveyMonkey®, an online survey application service. A message containing consent information and a link to the survey was provided to individuals associated with AFCEA directory and Cint. The AFCEA survey instruments were available from 10 November 2014 to 12 January 2015 to allow individuals adequate time to complete the surveys. The Cint survey instrument was available from 29 – 30 December 2014.

Pre-Analysis Data Screening

Pre-analysis data screening is useful in identifying and resolving irregularities of the data (Levy, 2006); validating the accuracy and completeness of the data (Mertler & Vanatta, 2010); and identifying any outliers (Mertler & Vanatta, 2010). In this research study, the data was exported from SurveyMonkey® to Excel for statistical analysis and reviewed for accuracy, outliers, and consistency.

A web-based survey application, SurveyMonkey®, was used to collect data. Based on Cooper and Schindler (2006), surveys administered through a web-based application significantly increases data quality and reduce data inaccuracy concerns. To limit erroneous input to the web-based survey instrument, 47 of the 50 survey items used buttons to select the option; one question used a drop down menu; one question allowed the participant to type in

their "current position title" if it wasn't an option available on the list; and type in the number of years and months that they have worked in their current position. In addition, all questions needed to be completed which resolved the potential issue of missing data.

Fifty-seven of the 138 responses were eliminated because they did not meet the position title criteria: President, Vice President, Director Level, General Manager, Chief Information Officer, or Other C-Level Officer. For individuals from the AFCEA group, reminder messages were sent out to remind participates to complete the survey.

Since outlier responses can distort survey analysis, responses must be reviewed before conducting final analysis of survey results (Hair, Anderson, Tatham, & Black, 1984). The mean +/- two standard deviations (SD) was applied to determine if outliers should be retained or excluded from the final analysis. One outlier was found by reviewing the linear regression scatter diagrams which consistently identified at least one outlier on each diagram. The respondent that selected "strongly disagree" for 95% of the items was eliminated from the data set which resulted in a final data set of 80 survey responses.

The survey instrument included 41 items from four factors: CIO capabilities (CAP), CIO/TMT Relationship (REL), Level of organizational Mindfulness (OM), and level of IS strategy definition (ISSD). CIO capabilities included CA1 and CA2; CASHL1 through CASHL3; OP2 through OP4; EXT2 through EXT4; PS2 and PS3; CIOSBK1 through CIIOSBK7; and TMTITK1 through TMTITK3. CIO/TMT Relationship included RELH, RELTR1, RELTR2, RELF1, RELF2, RELI4 and RELI5. Level of Organizational Mindfulness included OMRSI1 through OMRSI4; and OMTMS1, OMTMS5, and OMTMS6. Lastly, level of IS strategy definition included USTRAT1, USTRAT1B, USTRAT2, USTRAT2B, and

USTRAT3. The Cronbach's *alpha* reliability results for each factor and variables are displayed in Table 11.

Table 11.

Cronbach's alpha Reliability Results

Factors/Variables	Reliability	Total Number of Items	Number of Items
CIO capabilities (CAP)	0.924	23	
Communication Ability (CA)	0.746		5
Openness (OP)	0.638		3
Extraversion (EXT)	0.851		3
Political Savvy (PS)	0.621		2
Knowledge of Business Strategy (CIOSBK)	0.903		7
Knowledge of IS Strategy (TMTITK)	0.746		3
CIO/TMT Relationship (REL)	0.751	6	
Trusting Relationship (TR)	0.496		2
Informal Interaction (I)	0.727		2
Formal Interaction (F)	0.591		2
Level of Organizational Mindfulness (OM)	0.840	6	
Reluctance to Simplify Interpretations (RSI)	0.691		3
Top Management Support (TMS)	0.825		3
level of IS strategy definition (ISSD)	0.731	5	5

Note. Number of responses = 80

Demographics

Between November 10, 2014 to January 12, 2015, 352 individuals associated with AFCEA and Cint were contacted. Of which a total of 80 usable responses were used in the analysis yielding a 23% response rate: AFCEA - 254 individuals were contacted with 29 usable responses yielding a 11% response rate; and Cint - 98 individuals were contacted with 51 usable responses yielding a 52% response rate. Survey participants were asked to respond to demographic questions focusing on position title, reporting level between CIO and CEO, CIO being a formal member of the TMT, gender, age range, years with firm, time in current position, and firm's principal industry and recent attendant to strategic training.

The strategy training question (they had completed strategy training within the last 90 days) was originally identified as the discriminating question. Since the respondents that answered yes to this question were the same individuals that held qualifying position titles required for this research study, this question was not used as the discriminating question. Instead the position title question was used as the discriminating question. If the respondent did not select one of the following position titles (President, Vice President, Director Level, General Manager, Chief Information Officer, or Other C-Level Officer), then their response was excluded from further analysis.

Ninety-four percent of the responses were from senior business executives and 6% were Chief Information Officers. Interestingly 70% of the CIO's were a formal member of the TMT, of which only 39% worked directly for the CEO. The median age range was 50-59 years comprising 28% of the respondents; 68% were male; the median years with the firm was 6-10 years; and the average years in the current job was 7.6 years. Approximately 65% of the respondents fell into the following principal industries: Government (19%),

Telecommunications, Technology, Internet & Electronics (18%), and Manufacturing (11%), Healthcare & Pharmaceuticals (9%), and Business Support & Logistics (8%). A summary of the demographics are displayed in Table 12.

Table 12

Demographics

	Demographics	Frequency	Percentage
My current position title	President/Chief Executive Officer	19	24%
	Vice President	16	20%
	General Manager	1	1%
	Chief Information Officer	5	6%
	Other C-Level Officer	8	10%
	Director Level	31	39%
How many reporting levels are between the CIO & CEO?	Two or more	34	43%
	One	15	19%
	Direct report	31	39%
CIO is formal member of TMT	Yes	70	88%
	No	10	13%
Gender	Male	54	68%
	Female	26	33%
Age Range	21-29	8	10%
	30-39	15	19%
	40-49	25	31%
	50-59	22	28%
	60 or older	10	13%

Note. Number of responses = 80

Table 12 (continued).

Demographics

	Demographics	Frequency	Percentage
Years with firm	< 1 Year	1	1%
	1-2 Years	5	6%
	3-5 Years	17	21%
	6-10 Years	24	30%
	11-15 Years	16	20%
	> 15 Years	17	21%
Average Years in current job		7.6	
Firm's principal industry	Advertising & Marketing	1	1%
	Agriculture	1	1%
	Airlines & Aerospace (including Defense)	3	4%
	Automotive	1	1%
	Business Support & Logistics	6	8%
	Construction, Machinery, and Homes	4	5%
	Education	4	5%
	Entertainment & Leisure	2	3%
	Finance & Financial Services	3	4%
	Government	15	19%
	Healthcare & Pharmaceuticals	7	9%
	Insurance	2	3%
	Manufacturing	9	11%
	Nonprofit	3	4%
	Retail & Consumer Durables	3	4%
	Real Estate	1	1%
	Telecommunications, Technology, Internet & Electronics	14	18%
	Utilities, Energy, and Extraction	1	1%

Note. Number of responses = 80

Data Analysis

For each variable, the mean and standard deviation was calculated. This survey instrument used a five-point Likert scale which ranges from (1) "strongly disagree" to (5) "strongly agree". Table 13 lists the summary ranges, means, and standard deviation for each variable.

Table 13

Ranges, Means, and Standard Deviations of the Variable

Factors/Variables	Range	Mean	SD
CIO capabilities (CAP)			
Communication Ability (CA)	1.11 - 5.00	3.76	0.88
Openness (OP)	1.78 - 5.00	4.17	0.80
Extraversion (EXT)	1.14 - 5.00	3.92	0.92
Political Savvy (PS)	1.75 - 5.00	4.04	0.76
Knowledge of Business Strategy (CIOSBK)	1.24 - 5.00	3.96	0.91
Knowledge of IS Strategy (TMTITK)	1.00 - 5.00	3.74	1.04
CIO/TMT Relationship (REL)			
Trusting Relationship (TR)	1.76 - 5.00	4.11	0.78
Informal Interaction (I)	1.51 - 5.00	3.69	1.14
Formal Interaction (F)	1.00 - 5.00	4.09	0.86
Level of Organizational Mindfulness (OM)			
Reluctance to Simplify Interpretations (RSI)	2.13 - 5.00	3.77	1.17
Top Management Support (TMS)	1.49 - 5.00	4.02	0.84
level of IS strategy definition (ISSD)	1.00 - 5.00	3.34	1.22

Note. The Range can be no less than 1 and no higher than 5.

The highest means scores were identified with Openness and Trusting Relationship, which suggests that the participants agree with these variables. The mean scores on Openness ranged from a minimum of 1.78 to a maximum of 5.00 (M = 4.17, SD = 0.80); and the mean scores on trusting relationship ranged from a minimum of 1.76 to a maximum of 5.00 (M = 4.11; SD = 0.78). The lowest mean scores were identified with Informal Interaction, reluctance to

simplify interpretations, and knowledge of IS strategy which suggests that the participants agreed the least with these variables. Detailed analysis for each variable is discussed in the following sections: communication ability, Openness, Extraversion, Political Savvy, Knowledge of business Strategy, knowledge of IS strategy, trusting relationship, Informal Interaction, Formal Interaction, reluctance to simplify interpretations, top management support, and level of IS strategy definition.

Communication Ability

The overall mean score for communication ability ranged from a minimum of 1.11 to a maximum of 5.00 (M =3.76, SD = 0.88). The means and standard deviations for the five CA variables are presented in Table 14.

Table 14

Means and Standard Deviations for Communication Ability (CA)

	Item	Mean	SD
CA1	The CIO effectively uses nontechnical terms when making presentations to the senior executives	3.76	1.01
CA2	The CIO effectively uses business terms familiar to the other senior executive team members	3.90	0.76
CASHL1	CIO and senior executives share a common language in our conversations	3.83	0.92
CASHL2	CIO primarily uses business terminology when interacting with senior executives	3.70	0.82
CASHL3	The CIO avoids using technology jargon when interacting with senior executives	3.59	0.87
	Overall Mean	3.76	

Note. SD = Standard Deviation; Number of survey responses = 80

Openness

The overall mean score for Openness (OP) ranged from a minimum of 1.78 to a maximum of 5.00 (M =4.17, SD = 0.80). The means and standard deviations for the three OP variables are presented in Table 15.

Table 15

Means and Standard Deviations for Openness (OP)

	Item	Mean	SD
OP2	The CIO is quick to understand things	4.30	0.58
OP3	The CIO thinks up new ways of doing things	4.21	0.79
OP4	The CIO challenges the norm	4.00	0.95
	Overall Mean	4.17	

Note. SD = Standard Deviation; Number of survey responses = 80.

Extraversion

The overall mean score for Extraversion (EXT) ranged from a minimum of 1.14 to a maximum of 5.00 (M =3.92, SD = 0.92). The means and standard deviations for the three EXT variables are presented in Table 16.

Table 16

Means and Standard Deviations for Extraversion (EXT)

	Item	Mean	SD
EXT2	The CIO talks to a lot of different people at parties	3.84	0.99
EXT3	The CIO knows how to captivate people	3.90	0.77
EXT4	The CIO is skilled in handling social situations	4.01	0.91
	Overall Mean	3.92	

Note. SD = Standard Deviation; Number of survey responses = 80

Political Savvy

The overall mean score for Political Savvy (PS) ranged from a minimum of 1.75 to a maximum of 5.00 (M =4.04, SD = 0.76). The means and standard deviations for the two PS variables are presented in Table 17.

Table 17

Means and Standard Deviations for Political Savvy (PS)

	Item	Mean	SD
PS2	The CIO acts with tact when confronted with potentially contentious situations.	4.03	0.81
PS3	The CIO has developed a good rapport with most people	4.06	0.72
	Overall Mean	4.04	

Note. SD = Standard Deviation; Number of survey responses = 80

Knowledge of Business Strategy

The overall mean score for Knowledge of Business Strategy (CIOSBK) ranged from a minimum of 1.24 to a maximum of 5.00 (M =3.96, SD = 0.91). The means and standard deviations for the seven CIOSBK variables are presented in Table 18.

Table 18

Means and Standard Deviations for Knowledge of Business Strategy (CIOSBK)

	Item	Mean	SD
CIOSBK1	The CIO is knowledgeable about the firm's present and future products, markets, business strategies, and business processes	4.06	0.85
CIOSBK2	The CIO is knowledgeable about the firm's industry practices	4.08	0.87
CIOSBK3	The CIO is knowledgeable about the firm's competitors	3.93	0.99
CIOSBK4	The CIO is knowledgeable about the Information Systems being applied by the competitors	3.93	0.91
CIOSBK5	The CIO knows how to utilize the firm's infrastructure to meet the firm's needs	4.11	0.86
CIOSBK6	The CIO identifies relevant emerging technology to enable the firm's products, business strategy, and business processes	3.81	0.94
CIOSBK7	The CIO guides the firm's decisions related to the timing and level of investment in emerging technologies	3.83	0.91
	Overall Mean	3.96	

Note. SD = Standard Deviation; Number of survey responses = 80

Knowledge of IS Strategy

The overall mean score for Knowledge of IS Strategy (TMTITK) ranged from a minimum of 1.00 to a maximum of 5.00 (M =3.74, SD = 1.04). The means and standard deviations for the three TMTITK variables are presented in Table 19.

Table 19

Means and Standard Deviations for Knowledge of IS Strategy (TMTITK)

	Item	Mean	SD
TMTITK1	Senior executives are knowledgeable about the potential and limitations of current information systems within the firm	3.89	1.10
TMTITK2	Senior executives are knowledgeable about the potential and limitations of the "next generation" Information Technology available to enhance their industry	3.69	1.03
TMTITK3	Senior executives are knowledgeable about information systems being applied by the firm's competitors	3.65	0.98
	Overall Mean	3.74	

Note. SD = Standard Deviation; Number of survey responses = 80

Trusting Relationship

The overall mean score for Trusting Relationship (RELTR) ranged from a minimum of 1.76 to a maximum of 5.00 (M =4.11, SD = 0.78). The means and standard deviations for the two RELTR variables are presented in Table 20.

Table 20

Means and Standard Deviations for Trusting Relationship

	Item	Mean	SD
RELTR1	I trust the Chief Information Officer (CIO) to act in the senior executive team member's best interest. The senior executive team comprises of the Chief Executive Officer (CEO), Chief Financial Officer (CFO), just to name a few.	4.15	0.73
RELTR2	The CIO is dependable during critical situations impacting the business operations	4.08	0.84
	Overall Mean	4.11	

Note. SD = Standard Deviation; Number of survey responses = 80

Informal Interaction

The overall mean score for Informal Interaction (RELI) ranged from a minimum of 1.51 to a maximum of 5.00 (M =3.69, SD = 1.14). The means and standard deviations for the two RELI variables are presented in Table 21.

Table 21

Means and Standard Deviations for Informal Interaction

	Item	Mean	SD
RELI4	I have informal contact with the senior executive team	4.03	1.04
RELI5	The CIO socializes with the senior executive team members at social gatherings, golfing, tennis, etc.	3.35	1.15
	Overall Mean	3.69	

Note. SD = Standard Deviation; Number of survey responses = 80

Formal Interaction

The overall mean score for Formal Interaction (RELF) ranged from a minimum of 1.00 to a maximum of 5.00 (M =4.09, SD = 0.86). The means and standard deviations for the two RELF variables are presented in Table 22.

Table 22

Means and Standard Deviations for Formal Interaction

	Item	Mean	SD
RELF1	Which of the following best describes your involvement with the senior executive team?	4.04	0.89
RELF2	The CIO interacts with the senior executive team on a formal basis (e.g., official meetings, work related phone calls, etc.).	4.15	0.83
	Overall Mean	4.09	

Note. SD = Standard Deviation; Number of survey responses = 80

Reluctance to Simplify Interpretations

The overall mean score for Reluctance to Simplify Interpretations (OMRSI) ranged from a minimum of 2.13 to a maximum of 5.00 (M =3.77, SD = 1.17). The means and standard deviations for the three OMRSI variables are presented in Table 23.

Table 23

Means and Standard Deviations for Reluctance to Simplify Interpretations

	Item	Mean	SD
OMRSI1	Senior executives believe complex responses are needed in complex environments	3.53	0.90
OMRSI3	Senior executives are open to new ideas even when they come from outside our organization	3.96	0.93
OMRSI4B	Senior executives routinely simplify interpretations of complex information system issues	3.81	0.83
	Overall Mean	3.77	

Note. SD = Standard Deviation; Number of survey responses = 80

Top Management Support

The overall mean score for Top Management Support (OMTMS) ranged from a minimum of 1.49 to a maximum of 5.00 (M =4.02, SD = 0.84). The means and standard deviations for the three OMTMS variables are presented in Table 24.

Table 24

Means and Standard Deviations for Top Management Support

	Item	Mean	SD
OMTMS1	Senior executives involvement with the information system function is strong	3.83	0.87
OMTMS5	Senior executives consider information systems as a strategic resource	4.14	0.82
OMTMS6	Senior executives understand information systems can provide opportunities for the firm	4.09	0.81
	Overall Mean	4.02	

Note. SD = Standard Deviation; Number of survey responses = 80

Level of IS Strategy Definition

The overall mean score for IS Strategy Definition ranged from a minimum of 1.00 to a maximum of 5.00 (M =3.34, SD = 1.22). The means and standard deviations for the three USTRAT variables are presented in Table 25.

Table 25

Means and Standard Deviations for level of IS Strategy Definition

	Item	Mean	SD
USTRAT1	Our organization does not have definitive long-term information system goals	3.01	1.23
USTRAT1B	Our organization has clearly defined long-term Information System goals	3.79	1.06
USTRAT2	Our organization does not have an articulated Information System strategy	3.76	1.11
USTRAT2B	Our firm has a detailed Information System strategy	3.16	1.27
USTRAT3	Our organization does not have a consistent pattern of behavior regarding information systems	2.99	1.19
	Overall Mean	3.34	

Note. SD = Standard Deviation; Number of survey responses = 80;
*Since the question was in a negative construct, responses in data set were reversed to maintain positive construct.

Correlation Analysis

Pearson's correlation analysis was applied to examine the strength between the 12 variables. A perfect relationship is identified with a 1 or -1; and no relationship is identified with a 0. Values between 0 and 1 identify varying degrees of relationship; the closer the number is to zero the weaker the relationship and the closer the number is to 1 or -1, the stronger the relationship between the two variables. Based on Salkind (2009), interpreting the Pearson

Correlation Coefficient breaks out accordingly: Correlations between 0.8 and 1.0 have a very strong relationship; between 0.6 and 0.8 have a strong relationship; between 0.4 to 0.6 have a moderate relationship; between 0.2 to 0.4 have a weak relationship; and between 0.0 to 0.2 have a very weak relationship. Analysis results are provided in Table 26.

A summary of the Pearson Correlation Matrix which includes 66 variables shows that 37 (56%) of the correlations fit in the Moderate to Very Strong categories and 29 (44%) of the correlations fit in the very weak to weak categories. For all variables, a weak relationship exists with ISSD.

- CA had a moderate – strong relationship with all independent variables except with OP, EXT, RELI, and RELF.
- OP had a moderate – strong relationship will all independent variables except with CA, CIOSBK, RELTR, RELI, and OMRSI.
- EXT had a moderate – strong relationship with all independent variables except with CA and TMTITK. A very strong relationship exists between EXT and OMTMS.
- PS had a moderate – strong relationship with all independent variables except with RELI and RELF.
- CIOSBK had a moderate – strong relationship with all independent variables except with OP and RELF.
- TMTITK had a moderate – strong relationship with all independent variables except with EXT, RELI, and RELF.
- RELTR had a moderate – strong relationship with all independent variables except with OP, RELI, and RELF.

- RELI had a moderate – strong relationship with all independent variables except with CA, OP, PS, TMTITK, and RELTR.
- RELF had a moderate – strong relationship with all independent variables except with CA, PS, CIOSBK, TMTITK, RELTR, OMRSI, and OMTMS.
- OMRSI had a moderate – strong relationship with all independent variables except with OP and RELF.
- OMTMS had a moderate – strong relationship with all independent variables except with RELF. A very strong relationship exists between OMTMS and EXT.

Table 26

Pearson's Correlation Matrix

Variable	CA	OP	EXT	PS	CIOSBK	TMTITK	RELTR	RELI	RELF	OMRSI	OMTMS	ISSD
CA	1.00											
OP	0.24	1.00										
EXT	0.33	0.60	1.00									
PS	0.53	0.45	0.44	1.00								
CIOSBK	0.62	0.33	0.50	0.61	1.00							
TMTITK	0.61	0.42	0.33	0.53	0.69	1.00						
RELTR	0.43	0.33	0.42	0.56	0.71	0.49	1.00					
RELI	0.32	0.30	0.48	0.33	0.46	0.36	0.31	1.00				
RELF	0.11	0.47	0.52	0.37	0.30	0.31	0.26	0.65	1.00			
OMRSI	0.73	0.29	0.46	0.51	0.74	0.67	0.48	0.42	0.21	1.00		
OMTMS	0.60	0.41	0.89	0.58	0.68	0.74	0.47	0.50	0.31	0.64	1.00	
ISSD	-0.02	-0.08	-0.08	0.11	0.34	0.27	0.28	-0.13	-0.05	0.13	0.36	1.00

Notes: CA = Communication Ability, OP = Openness, EXT = Extraversion, PS = Political Savvy, CIOSBK = Knowledge of Business Strategy, TMTITK = Knowledge of IS Strategy, RELTR = Trusting Relationship, RELI = Informal Interaction, RELF = Formal Interaction, OMRSI = Reluctance to Simplify Interpretations, OMTMS = Top Management Support, and ISSD = Level of IS Strategy Definition; Number of survey responses = 80.

Analysis of Research Questions

Multiple regression analysis was used for all the research questions. These questions focused in identifying levels of CIO-TMT relationship to adoption of an IS strategy; levels of organizational mindfulness correlated to the adoption of an IS strategy, and levels of CIO capabilities correlated to the adoption of an IS strategy. The overarching question focused on the relationship of the three factors to the level of IS strategy definition.

Research Question 1

The first research question was "Are levels of CIO-TMT relationship correlated to the adoption of an IS strategy?"

The first step in the analysis was to assess the assumptions of linearity, homoscedasticity, and normality. For each CIO-TMT relationship variable, linearity was assessed with scatter plots and in each case the assumption was met. Homoscedasticity for each CIO-TMT relationship variable was assessed with a residual plot and the assumption was met. The absence of multicollinearity was assessed through examination of the variance inflation factor (VIF) for each independent variable. The presence of multicollinearity is identified when the VIF is greater than 10 (Sekaran & Bougie, 2013, p. 319). Since the VIF value for each CIO-TMT relationship variable was below 1.0, the assumption of no multicollinearity was met.

In this analysis, CIO-TMT relationship which changes based on the relationship of the individuals was used as the independent variable and ISSD was the dependent variable. The coefficient of determination (R^2) was calculated as .161. The overall model explained 16% of the variance in the CIO Relationship (REL), which was statistically significant $F(4, 75) = 3.593$,

p<0.01. An inspection of individual predictors revealed that the variable trusting relationship of the trust relationship (β = 1.122, p<.005) was a significant and positive predictor of IS strategy definition. In other words, high levels of trusting relationship results in higher level of the level of IS strategy definition. However, the CIO's position in relationship with the CEO (p = .123), Formal Interaction with the top management team (p = .817), and Informal Interaction with the top management team (p =.071) were not significant predictors of IS strategy definition. The multiple linear regression results of the CIO's Position (RELH), trusting relationship (RELTR), Formal Interaction (RELF), and Informal Interaction (RELI) variables predicting the level of IS strategy definition (ISSD) are presented in Table 27.

Table 27.

Multiple Linear Regression of RELH, RELTR, RELF, and RELI Predicting ISSD

Variable	VIF	*St Error*	β	*t*	*p*
RELH	0.076006	0.250905	0.391075	1.558661	0.123287
SUM RELTR	0.076182	0.354456	1.122424	3.166608	0.00223
SUM RELF	0.125706	0.402628	-0.0933	-0.23172	0.81739
SUM RELI	0.122221	0.296104	-0.54233	-1.83155	0.07099

Note. $F(4, 75) = 3.59$, $p < .01$, $R^2 = 0.161$

Research Question 2:

The second research question "Are levels of organizational mindfulness correlated to the adoption of an IS strategy?"

The first step in the analysis was to assess the assumptions of linearity, homoscedasticity, and normality. For each organizational mindfulness variable, linearity was assessed with scatter plots and in each case the assumption was met. Homoscedasticity for each organization mindfulness variable was assessed with a residual plot and the assumption was met. Since the variance inflation factor (VIF) for each organizational mindfulness variable was below 1.0, the absence of multicollinearity assumption was met.

In this analysis, organizational mindfulness relationship which changes based on the individual holding a top leadership position within a company was used as the independent variable and ISSD was the dependent variable. The coefficient of determination (R^2) was calculated as .178. The overall model explained 17.8% of the variance in organizational mindfulness, which was identified to be statistically significant $F(3, 76) = 5.49$, $p<0.005$. An inspection of individual predictors revealed that top management support ($\beta = 0.904$, $p<.001$) was a significant and positive predictor of IS strategy definition. In other words, high levels of top management support results in higher level of IS strategy definition. However, the CIO's position in relation to the CIO ($p = .121$) and the Reluctance to Simplify Interpretations ($p = .26$) were not significant predictors of IS strategy definition. The multiple linear regression results of Position of the CIO (RELH), Reluctance to Simplify Interpretations (OMRSI), and Top Management Support (OMTMS) variables predicting the level of IS strategy definition (ISSD) are presented in Table 28.

Table 28.

Multiple Linear Regression with OMRSI Predicting ISSD

Variable	*VIF*	*St Error*	*β*	*t*	*p*
RELH	0.072035	0.236049	0.369501	1.56536	0.121653
SUM OMRSI	0.121951	0.265292	-0.30246	-1.1401	0.257826
SUM OMTMS	0.120625	0.256203	0.904884	3.531903	0.000705

Note. F (3, 76) = 5.49, p<0.005, R^2 = 0.178

Research Question 3:

The third research question "Are levels of CIO capabilities correlated to the adoption of an IS Strategy?"

The first step in the analysis was to assess the assumptions of linearity, homoscedasticity, and normality. For each CIO capabilities (CAP) variable, linearity was assessed with scatter plots and in each case the assumption was met. Homoscedasticity for CAP was evaluated with a residual plot and the assumption was met. Since the variance inflation factor (VIF) value for each CAP variable was below 1.0, the absence of multicollinarity assumption was met.

In this analysis, CIO capabilities (CAP) which are unique to a given individual holding the CIO position within a company were used as independent variables. The ISSD which is impacted by these variables was identified as the dependent variable. The coefficient of determination (R^2) was calculated as .3174. This means that the overall model explained 32% of the variance in the CAP, which was identified to be statistically significant $F(7, 72) = 4.784$, p<0.01. An inspection of individuals predictors revealed that the CIO Communication Ability (β = -0.518, p< .01) was significant and was a negative predictor for the level of ISSD and the

CIO's Knowledge of Business Strategy (β = 0.456, p<.001) was significant and a positive predictor of ISSD. High levels of CIO Communication Ability negatively impacted the level of ISSD; whereas high levels the CIO's Knowledge of the Business Strategy positively impacted the level of ISSD. The other variables which included Position of the CIO (p = .392), Openness (p = .257), Extraversion (p = .094), Political Savvy (p = .999), and the Top Management Team's Knowledge of IS Strategy (p = .079) were not significant predictors of IS strategy definition. The multiple linear regression results of Position of the CIO (RELH), Communication Ability (CA), Openness (OP), Extraversion (EXT), Political Savvy(PS), Knowledge of Business Strategy (CIOSBK) and the Top Management Team's Knowledge of IS Strategy (TMTITK), predicting the level of IS Strategy Definition (ISSD) are presented in Table 29.

Table 29

Multiple Linear Regression with RELH, CA, OP, EXT, PS, CIOSBK, and TMTITK predicting the level of ISSD

Variable	*VIF*	*St Error*	*β*	*t*	*p*
RELH	0.097441	0.240701	0.207494	0.862043	0.391526
SUM CA	0.179199	0.190718	-0.51815	-2.71684	0.008249
SUM OP	0.1548	0.303831	-0.34752	-1.14379	0.256498
SUM EXT	0.161141	0.229913	-0.39054	-1.69866	0.093701
SUM PS	0.158844	0.426433	-0.00068	-0.0016	0.998731
SUM CIOSBK	0.227914	0.132293	0.45578	3.445227	0.000955
SUM TMTITK	0.199042	0.245532	0.437282	1.780962	0.079137

Note. $F(7, 72) = 4.784$, $p<0.001$, $R^2 = 0.317$.

Overarching Research Question

The overarching research question was "What are the contributing factors that lead firms to develop a poorly defined IS strategy?"

To understand the relationship of all factors in predicting the level of IS strategy definition, multiple linear regression was applied. The first step in the analysis was to assess the assumptions of linearity, homoscedasticity, and normality. For each CIO capabilities (CAP) variable, linearity was assessed with scatter plots and in each case the assumption was met. Homoscedasticity for CAP was evaluated with a residual plot and the assumption was met. Since the VIF for each variable was below 1.0, the absence of multicollinearity assumption was met.

The CIO capabilities, CIO-TMT Relationship, and level of organizational mindfulness were used as independent variables; and level of IS strategy definition (ISSD) was used as a dependent variable. The coefficient of determination (R^2) was calculated as .501. This means that the overall model explained 50% of the variance for all factors (CAP, OM, and REL), which was identified to be statistically significant $F(12, 79)=5.62$, $p<0.001$. An inspection of individuals predictors revealed that the CIO Communication Ability ($\beta = -0.507$, $p< .01$) and Informal Interactions ($\beta = -0.774$, $p<.01$) were significant and were negative predictors for the level of ISSD; and the CIO's Knowledge of Business Strategy ($\beta = 0.386$, $p<.01$) and Top Management Support ($\beta = 0.998$, $p< .001$) were significant and positive predictors for the level of ISSD. High levels of CIO Communication Ability and Informal Interaction negatively impacted the level of ISSD; whereas high levels the CIO's Knowledge of the Business Strategy and Top Management Support positively impacted the level of ISSD. The other variables which included Position of the CIO ($p = .0746$), Openness ($p = .098$), Extraversion ($p = .392$), Political Savvy ($p = .322$), Top Management Team's Knowledge of IS Strategy ($p = .533$), Trusting Relationship ($p = .374$), Formal Interaction ($p = .92$), and Reluctance to Simplify Interpretations ($p = .778$) were not significant predictors of ISSD. The multiple linear regression results of Position of the CIO (RELH), Communication Ability (CA), Openness (OP), Extraversion (EXT), Political Savvy(PS), Knowledge of Business Strategy (CIOSBK) and the Top Management Team's Knowledge of IS Strategy (TMTITK), Trusting Relationship (RELTR), Formal Interaction (RELF), and Informal Interaction (RELI), Reluctance to Simplify Interpretations (OMRSI), and Top Management Support (OMTMS) predicting the level of ISSD are presented in Table 30.

Table 30

Multiple Linear Regression with RELH, CA, OP, EXT, PS, CIOSBK, TMTITK, RELTR, RELF, RELI, OMRSI, and OMTMS predicting ISSD

Variable	VIF	*ST Error*	*β*	*t*	*p*
SUMRELH	1.376	0.228	0.412	1.811	0.0746
SUM CA	2.796	0.190	-0.507	-2.677	0.0093
SUM OP	2.031	0.277	-0.464	-1.676	0.0984
SUM EXT	2.368	0.222	-0.191	-0.862	0.3916
SUM PS	2.164	0.396	-0.395	-0.997	0.3224
SUM CIOSBK	4.244	0.144	0.386	2.685	0.0091
SUM TMTITK	3.141	0.245	0.154	0.627	0.5329
SUM RELTR	2.206	0.407	0.364	0.896	0.3736
SUM RELF	2.422	0.377	0.036	0.097	0.9231
SUM RELI	2.199	0.268	-0.774	-2.890	0.0052
SUM OMRSI	3.409	0.309	-0.087	-0.283	0.7783
SUM OMTMS	2.785	0.272	0.998	3.677	0.0005

Note. $F(12, 69)=4.62$, $p<0.001$, $R^2 = 0.501$.

Government versus Non-Government Firms

To determine which industry significantly influenced the level of IS strategy definition; multiple regression analysis was applied against government and non-government groups. The results found that the government group did not have any variables which could be identified as a significant predictor for the level of IS strategy definition.

When analyzing responses from the non-government group, the coefficient of determination (R^2) was calculated as .524. This means that the overall model explained 52% of the variance for all factors (CAP, OM, and REL), which was identified to be statistically significant $F(12, 52) = 4.775$, $p<0.001$. An inspection of individuals predictors revealed that CIO Communication Ability ($\beta = -0.639$, $p<01$) was significant and a negative predictor for the level of ISSD; and top management support ($\beta = 1.29$, $p<001$) was significant and a positive predictor for the level of ISSD. High levels of communication ability negatively impacted the level of ISSD; whereas high levels the top management support positively impacted the level of ISSD. The other variables which included Position of the CIO ($p = .051$), Openness ($p = .508$), Extraversion ($p = .465$), Political Savvy ($p = .961$), Knowledge of Business Strategy ($p = .073$), the TMT's Knowledge of IS Strategy ($p = .723$), Trusting Relationship ($p = .861$), Formal Interaction ($p = .624$), Informal Interaction ($p = .107$) and Reluctance to Simplify Interpretations ($p = .470$) were not significant predictors of ISSD. The multiple linear regression results of Position of the CIO (RELH), Communication Ability (CA), Openness (OP), Extraversion (EXT), Political Savvy (PS), Knowledge of Business Strategy (CIOSBK) and the TMT's Knowledge of IS Strategy (TMTITK) , Trusting Relationship (RELTR), Formal Interaction (RELF), and Informal Interaction (RELI), Reluctance to Simplify Interpretations (OMRSI), and Top Management Support (OMTMS) predicting the level of ISSD are listed in Table 31.

Table 31

Multiple Linear Regression for Non-Government responses determining predictors of RELH, CA, OP, EXT, PS, CIOSBK, TMTITK, RELTR, RELF, RELI, OMRSI, and OMTMS to ISSD

Variable	*β*	*St Error*	*t*	*p*
SUMRELH	0.5525	0.2762	2.0002	0.0507
SUM CA	-0.6394	0.2301	-2.7782	0.0076
SUM OP	-0.2096	0.3149	-0.6656	0.5086
SUM EXT	-0.2023	0.2747	-0.7365	0.4647
SUM PS	-0.0223	0.4578	-0.0487	0.9613
SUM CIOSBK	0.3288	0.1795	1.8321	0.0727
SUM TMTITK	0.0996	0.2800	0.3558	0.7235
SUM RELTR	-0.0936	0.5325	-0.1758	0.8612
SUM RELF	-0.2403	0.4867	-0.4938	0.6235
SUM RELI	-0.5199	0.3168	-1.6408	0.1069
SUM OMRSI	-0.2529	0.3472	-0.7285	0.4695
SUM OMTMS	1.2912	0.3250	3.9725	0.0002

Note. $F(12, 52) = 4.775$, $p<0.001$, $R^2 = 0.524$.

Control Variable Analysis

Like Preston & Karahanna (2009a), Li et al. (2006), and Smaltz et al. (2006) studies, the goal of this study was to determine if any of the control variables significantly influenced this research study. The goal was to determine if any of the control variables have a statistical impact, especially since this research study is integrating variables from four different factors (CAP, REL, OM and ISSD) derived from many different studies. The control variables identified for analysis were age, gender, tenure in the organization, and tenure in the position. Since age, tenure in the organization, and tenure in the position were subdivided into several categories which resulted in low numbers of respondents for each category, these control variables were not further analyzed. Since age only had two subcategories (male and female), this control variable was further analyzed.

When just analyzing responses from the male gender, the coefficient of determination (R^2) was calculated as .528. This means that the overall model explained 53% of the variance for all factors (CAP, OM, and REL), which was identified to be statistically significant $F(12, 41) = 3.831$, $p<0.001$. An inspection of individuals predictors revealed that Informal Interaction ($\beta = -0.988$, $p<01$) was significant and a negative predictor for the level of ISSD; and top management support ($\beta = 1.032$, $p<01$) was significant and a positive predictor for the level of ISSD. High levels of Informal Interaction negatively impacted the level of ISSD; whereas high levels the top management support positively impacted the level of ISSD. The other variables which included Position of the CIO ($p = .036$), CIO Communication ($p = .122$), Openness ($p = .071$), Extraversion ($p = .711$), political savvy ($p = .560$), knowledge of business strategy ($p = .0384$), the TMT's knowledge of IS strategy ($p = .968$), trusting relationship ($p = .850$), Formal Interaction ($p = .218$), and reluctance to simplify interpretations ($p = .896$) were not significant

predictors for the level of ISSD. The multiple linear regression results of Position of the CIO (RELH), Communication Ability (CA), Openness (OP), Extraversion (EXT), Political Savvy (PS), Knowledge of Business Strategy (CIOSBK) and the Top Management Team's Knowledge of IS Strategy (TMTITK), Trusting Relationship (RELTR), Formal Interaction (RELF), and Informal Interaction (RELI), Reluctance to Simplify Interpretations (OMRSI), and Top Management Support (OMTMS) predicting the level of ISSD are presented in Table 32.

Table 32

Multiple Linear Regression of male responses determining predictors of RELH, CA, OP, EXT, PS, CIOSBK, TMTITK, RELTR, RELF, RELI, OMRSI, and OMTMS to ISSD

Variable	*β*	*St Error*	*t*	*p*
SUM RELH	0.614343	0.283398	2.167777	0.036034
SUM CA	-0.36408	0.230264	-1.58114	0.12153
SUM OP	-0.7661	0.414167	-1.84973	0.07157
SUM EXT	-0.10858	0.29106	-0.37305	0.711033
SUM PS	-0.27099	0.461447	-0.58726	0.560251
SUM CIOSBK	0.385914	0.180448	2.138643	0.03847
SUM TMTITK	-0.01331	0.331961	-0.04009	0.968214
SUM RELTR	-0.0948	0.49958	-0.18976	0.850432
SUM RELF	0.555533	0.444382	1.250124	0.218343
SUM RELI	-0.98837	0.327313	-3.01966	0.004341
SUM OMR	-0.04951	0.375594	-0.13181	0.895779
SUM OMTMS	1.032048	0.354575	2.910659	0.005807

Note. $F(12, 41) = 3.831$, $p<0.001$, $R^2 = 0.528$.

Summary

This chapter presented the statistical analysis results for the research questions in the study. A review of the survey instrument was conducted with Department of Defense CIO and business subject matter experts to identify grammar errors, typographical errors, and clarity of survey items. Following, a pilot was conducted to analyze the internal consistency of the survey instrument. After the survey data was obtained, pre-analysis data screening was conducted, and then followed by statistical analysis to evaluate data accuracy and missing data.

To ensure survey items were internally consistent with each other, Cronbach's *alpha* reliability tests were conducted for each survey factor (CIO capabilities, CIO/TMT Relationship, Level of organizational mindfulness, and level of IS strategy definition). The reliability results ranged from acceptable to excellent. In addition, the means and standard deviations for the eleven variables were calculated. The highest mean scores were depicted for Openness and trusting relationship which implies that top management leaders agree with these variables. On the other hand, the lowest mean scores were identified with Informal Interaction, reluctance to simplify interpretations, and knowledge of IS strategy which suggests that the participants agreed the least with these variables.

Multiple linear regression was used to answer all three research questions. Each question was asking if a particular factor (CIO capabilities, CIO-TMT Relationship, or organizational mindfulness) correlated to the adoption of an IS strategy. Using regression analysis, Top Management Support (β = 0.904, p<.001), Trusting Relationship (β = 0.076, p<.005), and CIO Knowledge of Business Strategy (β = 0.4558, p<.001) were significant and positive predictors of the level of IS strategy definition (ISSD); whereas communication ability (β = -0.518, p< .01) was significant and was a negative predictor to the level of ISSD. In addition, the multiple linear regression analysis applied against the overarching research question identified information

interaction (β = -0.774, p<.01) as a significant and negative predictor to the level of ISSD. The other variables (Openness, Extraversion, Political Savvy, Knowledge of IS Strategy, Informal Interaction, Formal Interaction, and Reluctance to Simplify Interpretations) were not statistically significant and, in turn, did not provide a significant contribution toward the level of ISSD.

Chapter 5

Conclusions, Implications, Recommendations, and Summary

This chapter provides a summary of this research study which analyzed the relationship between CIO capabilities, CIO-TMT relationship, and organizational mindfulness to the level of IS strategy definition. The first section provides a summary and interpretation of the results. The next section addresses the limitation of the research. The last sections provide recommendations for future research which is based on the results of this study and then summarizes the chapter.

Conclusions

This research study examined the relationship between CIO capabilities, CIO-TMT relationship, and organizational mindfulness to the level of IS strategy definition. The intent of this study was to identify factors which impacted the level of IS strategy definition. Each factor comprised of several variables. The CIO capabilities factor included six variables: communication ability, openness, extraversion, political savvy, knowledge of business strategy, and knowledge of IS strategy. The CIO-TMT relationship factor included three variables: trusting relationship, informal interaction, and formal interaction. The organizational mindfulness factor included two variables: reluctance to simplify interpretations and top

management support. All variables, along with position of the CIO in relation to the CEO were statistically analyzed to determine their predictability to the level of IS strategy definition.

To study the different factors, a survey instrument comprising of survey items related to each variable and demographics was administered to individuals working in firms associated with AFCEA or Cint. The survey instrument was delivered via a web-based survey provider. All survey items, except for the demographics, applied a five-point Likert scale. Eighty TMT members including CIOs responded to the survey yielding a 23% response rate.

The first research question was "Are levels of CIO-TMT relationship correlated to the adoption of an IS strategy?" The results of the multiple linear regression analysis indicated trusting relationship of the CIO (B = 0.076, $p<.005$) as a significant and positive predictor to the level of IS strategy definition. High levels of CIO trust results in higher level of the level of IS strategy definition. However, the CIO's position in relationship with the CEO ($p = .123$), Formal Interaction with the top management team ($p = .817$), and Informal Interaction with the top management team ($p = .071$) were not significant predictors to the level of IS strategy definition. The CIO-TMT relationship explained 16% of the variance in the Level of IS strategy definition.

The result of the CIO's position in relation with the CEO not being a significant predictor to the level of IS strategy definition is contrary to recent studies which found that when the CIO reports to the CEO and is a member of the TMT, a moderate to high shared vision exists between the CIO and TMT (Preston & Karahanna, 2009b). In addition, Schobel and Denford (2013) research of three case studies in the public sector found that if the relationship between the CIO and CFO is positive, then their individual contribution is positive toward the development of aligned IS and business strategies. Since studies have indicated different results related to the position of the CIO variable, further research is necessary on this topic

The result of the formal interaction not being a significant predictor of the level of IS strategy definition is contrary to recent studies which found that when the CIO is a formal member of the TMT, a moderate to high shared vision exists between the CIO and TMT (Preston & Karahanna, 2009b). In addition, their study found that the formal relationship between the CIO and TMT was significant. Since the Preston and Karahanna (2009a) study results found that formal interaction had a positive relationship to the level of IS strategy definition which is contrary to this research study, further research is necessary on this topic.

The second research question was "Are levels of organizational mindfulness correlated to the adoption of an IS strategy?" This organizational mindfulness relationship had not been previously applied to the level of IS strategy definition. The results of the multiple linear regression analysis indicated top management support (B = 0.904, $p<.001$) was a significant and positive predictor of IS strategy definition. However, the CIO's position in relation to the CEO ($p = .121$) and the reluctance to simplify interpretations ($p = .26$) were not significant predictors of IS strategy definition. Organizational mindfulness explained 17.8% of the variance in the level of IS strategy definition. Since this study found that the top management support variable was a significant and positive predictor of the level of IS strategy definition and since statistical analysis of determining a relationship between reluctance to simplify interpretations to level of IS strategy definition has not been previously applied, more research is necessary for this specific topic.

The third research question was "Are levels of CIO capabilities correlated to the adoption of an IS Strategy?" The results of the multiple linear regression analysis indicated communication ability (B = -0.518, $p< .01$) was significant and was a negative predictor to the level of IS strategy definition and the CIO's knowledge of business strategy (B = 0.4558,

$p<.001$) was significant and a positive predictor to the level of IS strategy definition. The other variables which included the CIO's position in relation to the CEO ($p = .392$), openness ($p = .257$), extraversion ($p = .094$), political savvy ($p = .999$), and the TMT's knowledge of IS strategy ($p = .079$) were not significant predictors to the level of IS strategy definition. The CIO capability accounted for 32% of the variance in the level of IS strategy definition.

The result of communication ability having a negative predictor to the level of IS strategy definition is contrary to Preston & Karahanna's (2009a) study which found that CIOs who "articulated issues in business terms…and avoided technical jargon were more likely to build a common strategic view of IT" (p. 3). However, the Smaltz et al. (2006) study found that the "Interpersonal Communication Skill" was the lowest predictor toward CIO Role effectiveness which includes IS and business strategy alignment. Further, in Lane and Koronios (2007) study, CIO's highly recommended the "ability to communicate" as a critical CIO competency. Due to the wide range of results, communication ability requires future research.

The result of the political savvy, openness and extraversion not being a significant predictor to the level of IS strategy definition is contrary to recent studies. In the Preston & Karahanna (2009a) and Smaltz et al. (2006) research studies, a CIO with political savvy characteristics was able to increase the TMT's knowledge of IS resulting in IS and business strategy alignment. In addition, Li et al. (2006) research found that openness appeared to provide a "significant role in influencing the level of organizational innovative usage of IT" (p. 185) and extraversion appeared to obtain the TMT's buy-in for the proposed IS strategy. Since Li et al. (2006) research was conducted in Singapore; the results may be impacted by national culture and therefore may not be applied in in the United States until further research has been

conducted. With all the conflicting findings, more research is necessary to determine the relationship of openness, extraversion, and political savvy to the level of IS strategy definition.

The result of the TMT knowledge of IS strategy not being a significant predictor to the level of IS strategy definition is contrary to the Preston and Karahanna (2009a) study which found that TMT strategic IS knowledge directly impacts a shared vision. Due to the wide range of results, TMT knowledge of IS strategy requires further research.

The overarching research question was "What are the contributing factors that lead firms to develop a poorly defined IS strategy?" The results of the multiple linear regression indicated communication ability (β = -0.507, p< .01) and informal interactions (β = -0.774, p<.01) were significant and negative predictors to the level of IS strategy definition; and the CIO's knowledge of business strategy (β = 0.386, p<.01) and top management support (β = 0.998, p< .001) were significant and positive predictors to the level of IS strategy definition. High levels of communication ability and Informal Interaction negatively impacted the level of IS strategy definition; whereas high levels the CIO's knowledge of the business strategy and top management support positively impacted the level of IS strategy definition. The other variables which included position of the CIO (p = .0746), openness (p = .098), extraversion (p = .392), political savvy (p = .322), TMT's knowledge of IS strategy (p = .533), trusting relationship (p = .374), Formal Interaction (p = .92), and reluctance to simplify interpretations (p = .778) were not significant predictors to the level of IS strategy definition. The overall model explained 50% of the variance for all factors (CAP, OM, and REL).

Since the results of the multiple linear regression for the overarching research question indicated communication ability (β = -0.507, p< .01) and informal interaction (β = -0.774, p<.01) were significant and negative predictors to the level of IS strategy definition; and the

CIO's knowledge of business strategy (β = 0.386, p<.01) and top management support (β = 0.998, p< .001) were significant and positive predictors of IS strategy definition; multiple linear regression was applied toward the control variable "gender" and two groupings of industry (government and non-government). Findings from the multiple linear regression for just the male gender revealed that Informal Interaction (β = -0.988, p<01) was significant and a negative predictor to the level of IS strategy definition; and top management support (β = 1.032, p<01) was significant and a positive predictor to the level of IS strategy definition. Findings from the multiple linear regression for just non-government organizations revealed that communication ability (β = -0.639, p<01) was identified as a significant and a negative predictor to the level of IS strategy definition; and top management support (β = 1.29, p<001) was significant and a positive predictor to the level of IS strategy definition. Future research needs to be conducted for the control variables and industry because these findings were based on low observation numbers.

Implications

A theoretical model "Factors contributing to the level of IS strategy definition" was developed. In this model, CIO capabilities, CIO-TMT relationship, and organizational mindfulness were analyzed to identify variables which have a relationship with the level of IS strategy definition. The results from this research study requires future research; especially the communication ability and informal interaction variables which were identified as negative predictors to the level of IS strategy definition.

The results suggest that CIO capabilities factor had the strongest relationship with the level of IS strategy definition. The CIO capabilities factor accounted for 31.7% of the explained

variance in the level of IS strategy definition. The organizational mindfulness accounted for 17.8% explained variance and the CIO-TMT relationship accounted for 16.1% explained variance in the level of IS strategy definition. No other research study analyzed the relationship of CIO capabilities, organizational mindfulness, and CIO-TMT relationship to the level of IS strategy definition. Further research involving CIO-TMT relationship, CIO capabilities, and organizational mindfulness is warranted.

The conclusion of this study should assist CEOs and TMT members with key variables to consider when hiring and retaining CIOs. Based on this research study, hiring and retaining a CIO that is knowledgeable about the business industry and able to share IT strategy with the TMT in business terms is extremely significant. This is based on the results that communication ability and informal interaction can be a negative predictor to the level of IS strategy definition.

Limitations

Several limitations were identified in this research study. The addresses available on the AFCEA Directory were not as complete as expected. Some firms did not provide email addresses, other firms just provided an email address for a group address box or the AFCEA Point of Contact, several addresses were invalid, and very few firms provided a CIO email address. Since only 5% of the small business AFCEA firms completed the survey, the results of the study may not be generalized to the AFCEA senior leader population. A limitation to the Cint survey instrument pertains to the survey only being available for the respondents for two days, December 29-30, 2014; during the holiday season.

Another issue is that this survey which was sent to the AFCEA email addresses was designed to work on a computer, not on a mobile device. This design may have eliminated

potential individuals who could have completed the survey while riding public transportation (i.e., subway or vanpool). The survey which was sent out to the Cint community was broken into 16 pages so that it could be accessed via a mobile device, in turn, potentially contributing to the high response rate.

Recommendations

Findings from this study can be applied to future research. While the results of the multiple linear regression of all variables showed that informal interaction was significant, this was not the results of just the CIO-TMT relationship factor where trusting relationship, not informal interaction, was the significant predictor. Further research exploring the impact of a trusting relationship and informal interaction needs to be conducted.

Another possibility for future research involves the topic "reluctance to simplify interpretations" which is a subset of organizational mindfulness. Reluctance to simplify interpretations requires an organization to analyze a proposed technology or solution to ensure it fits into the firms processes prior to implementing the solution. In this research study, reluctance to simplify interpretations (RSI) was not identified as a significant predictor. Since this is a new topic associated with IS strategy definition, more research is required to understand the RSI context and perhaps developing more refined questions.

Another recommendation would be to conduct a qualitative study focused on interviewing CIOs and TMT members with the goal of obtaining an understanding of the different factors including CIO capabilities, CIO-TMT relationships, organizational mindfulness, and level of IS strategy definition. A qualitative research study may help identify reasons as to

why some of the variables were not significant predictors and may provide the opportunity to develop additional questions.

Lastly, by incorporating demographics into the analysis would also determine the significance of specific variable by demographic. The results of this analysis could be used to increase training for individuals who would like to be CIOs or training TMT members on what capabilities are available through the CIO to improve the level of IS strategy definition.

Summary

This study focused on investigating the relationship of CIO capabilities, CIO-TMT relationship, and organizational mindfulness to the level of IS strategy definition. According to the Diamond Management & Technology Consultants Incorporated of Chicago study, 87% of the business executives believe information systems are a critical enabler to their firms' strategic realization, yet only 33% of business executives involve the Chief Information Officer (CIO) in their firm's strategy development (Worthen, 2007). The CIO plays a vital role in the ability of a firm to garner business value from information technology (Preston, Leidner, & Chen, 2008). Furthermore, based on the CIO Magazine's "State of the CIO 2014: The Great Schism" only 25% of the CIO's are involved with developing business strategy and are part of the CEO team, whereas 48% are focused on internal IT operations supporting cost centers or service providers (Nash, 2014). In other words, at least 48% of the CIOs are not involved with strategic thinking and development. With business executives and CIOs recognizing the importance of IS strategy, additional research is recommended to further identify factors which impact the level of IS strategy definition.

The results of this study should assist CEOs and TMT members with focusing on specific factors which are most relevant in hiring and retaining CIOs. Based on these results,

communication ability, trust, informal interaction, top management support, and the CIO's knowledge of the firm's industry may be key predictors for levels of IS strategy definition. Lastly, hiring someone that is knowledgeable about the firm's industry and able to share IS strategy with the TMT in business terms is extremely significant. A CIO unable to share IS innovations and strategy with the TMT does more damage in aligning the IS and Business strategies. Most importantly, these factors require future research.

The main research question was "What are the contributing factors that lead firms to develop a poorly defined IS strategy?" The three additional research questions were:

1. Are the levels of CIO-TMT relationship correlated to the adoption of an IS strategy?
2. Are levels of organizational mindfulness correlated to the adoption of an IS strategy?
3. Are levels of CIO capabilities correlated to the adoption of an IS Strategy?

Top management team members including CIOs were used in this research study. A web-based survey instrument using a 5-point Likert-type scale was developed from previously validated survey instruments. The survey consisted of 50 items including 9 demographic items. The remaining 41 items from four factors: CIO capabilities (CAP), CIO/TMT relationship (REL), level of organizational mindfulness (OM), and level of IS strategy definition (ISSD). CIO capabilities included CA1 and CA2; CASHL1 through CASHL3; OP2 through OP4; EXT2 through EXT4; PS2 and PS3; CIOSBK1 through CIIOSBK7; and TMTITK1 through TMTITK3. CIO/TMT relationship included RELH, RELTR1 and RELTR2; RELF1 and RELF2; and RELI4 and RELI5. level of organizational mindfulness included OMRSI1 through OMRSI4; and OMTMS1, OMTMS5, and OMTMS6. Lastly, level of IS strategy definition included USTRAT1, USTRAT1B, USTRAT2, USTRAT2B, and USTRAT3.

Before the pilot was administered, three CIO and business subject matter experts (SME) from within the Department of Defense completed the web-based survey and participated in a semi-structured interview which contributed toward further evaluation of the content validity and understandability of the survey instrument. The pilot involving sixteen information system and business experts was conducted to evaluate internal consistency of the survey instrument. Following the survey instrument was sent to small business AFCEA members and Cint members of which 80 responded yielding a 23% response rate. Pre-analysis data screening was conducted to test for data accuracy and missing data and then statistical analysis was performed.

Multiple linear regression was used to answer the main question and all three research questions. The overall model explained 50% of the variance for all factors (CAP, OM, and REL), which was identified to be statistically significant $F(12, 69)=4.62$, $p<0.001$. An inspection of individuals predictors revealed that the CIO communication ability ($\beta = -0.518$, $p< .01$) and Informal Interactions ($\beta = -0.774$, $p<.01$) were significant and were negative predictors of IS strategy definition; and the CIO's knowledge of business strategy ($\beta = 0.386$, $p<.01$) and top management support ($\beta = 0.272$, $p< .001$) were significant and positive predictors of IS strategy definition. High levels of communication ability and informal interaction negatively impacted the level of IS strategy definition; whereas high levels the CIO's knowledge of the business strategy and top management support positively impacted the level of IS strategy definition. A summary of the overarching question and three research questions follows:

1. Are the levels of CIO-TMT relationship correlated to the adoption of an IS strategy? The overall model explained 16% of the variance in the CIO-TMT relationship which is statistically significant $F(4, 75) = 3.593$, $p<0.01$. Trusting relationship of the CIO ($\beta =$

1.122, p<.005) was a significant and positive predictor to the level of Information System strategy definition.

2. Are levels of organizational mindfulness correlated to the adoption of an IS strategy? The overall model explained 17.8% of the variance in organizational mindfulness, which was identified to be statistically significant $F(3,76) = 5.49$, p<0.005. Top management support (β = 0.904, p<.001) was a significant and positive predictor to the level of Information System strategy definition.
3. Are levels of CIO capabilities correlated to the adoption of an IS Strategy? This overall model explained 32% of the variance in the CIO capabilities which is statistically significant $F(7, 72) = 4.784$, p<0.01. Communication ability (β = -0.518, p< .01) was significant and was a negative predictor to the level of IS strategy definition and the CIO's knowledge of business strategy (β = 0.4558, p<.001) was significant and a positive predictor to the level of IS strategy definition.
4. The overarching research question was "What are the contributing factors that lead firms to develop a poorly defined IS strategy?" This overall model explained 50% of the variance for all factors (CAP, OM, and REL), which was identified to be statistically significant $F(12, 79)=5.62$, p<0.001. Communication ability (β = -0.507, p< .01) and informal interactions (β = -0.774, p<.01) were significant and negative predictors to the level of IS strategy definition; and the CIO's knowledge of business strategy (β = 0.386, p<.01) and top management support (β = 0.998, p < .001) were significant and positive predictors to the level of IS strategy definition.

After completing the linear regression and multiple linear regression analysis, the results of the research questions were compared with the CIO capabilities, CIO-TMT relationship, and organizational mindfulness literature. Next, implications of the study, future research, and limitations of the study were discussed. Lastly, future research suggestions that could contribute to the body of knowledge on factors which predict the level of IS strategy definition were addressed.

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Appendix A

Summary of Studies since 2004

Summary of Studies since 2004

Author (s)	Bassellier and Benbasat (2004)	Johnson and Lederer (2010)
Purpose	Develop a model depicting business competency requirements for IT Professionals which enable partnerships between IT and business partners.	Assess the impact of the CEO and CIO relationship to IS strategic alignment
Research Context	North America	United States
Target Respondents	IT Professionals at all hierarchical levels	CEOs and CIOs
Methodology	Survey	Survey (postal)
Sample	109 Questionnaires to IT Professionals with two organizations within the insurance industry	202 pairs of CEOs and CIOs from U.S. Chamber of Commerce and other directories in adjacent states.
Instrument/Category	Five-point Likert scale	Five-point Likert scale. Separate survey's sent to CEOs and CIOs.
Main findings or contribution	IT Professionals require a range of non-IT skills to successfully communicate with business counterparts within the firm.	The study confirmed the importance of CIOs to cultivate a mutual understanding with the CEO on the future use of information systems and conversely the importance of the CEOs to establish an information system role within the firm. CEO/CIO mutual understanding about the role of IT enabled greater IS strategic alignment for seven of the eight dimensions analyzed.

Summary of Studies since 2004 (continuation)

Author (s)	Khan, Lederer, and Mirchandani (2013)	Lane and Koronios (2007)
Purpose	This study applies the mindfulness theory to ascertain top management's influence on information system performance	Evaluate 16 competencies for the CIO role.
Research Context	A large Midwestern state in the United States	Australia
Target Respondents	CEO	CIOs
Methodology	Survey (Paper and Web-based)	Survey
Sample	47 CEOs of for-profit firms	46 CIOs in a broad range of industry sectors which include education, health, information technology, mining, media, retail, finance and banking.
Instrument/Category	A five-point Likert scale	16 questions associated with the critical competencies used a five-point Likert scale.
Main findings or contribution	This study empirically validated an instrument for measuring collective mindfulness in relation to information systems. The greater interest and understanding of information systems by senior leaders (CEO) leads to increased appreciation for the value of information systems and associated risks of information systems.	Results show that the CIO's role is increasingly strategic and business focused (Lane & Koromikos, 2007)

Summary of Studies since 2004 (continuation)

Author (s)	Leidner, Lo, and Preston (2011)	Li and Tan (2013)
Purpose	Assessed an empirical model for linking IS strategy to firm performance	Companies CIO characteristics to different business strategies.
Research Context	United States	Asia
Target Respondents	CEOs	CIOs
Methodology	Survey	Survey which has been endorsed by the IT Management Association; a non-profit organization in Asia.
Sample	263 CEOs from U.S. Credit Unions	81 CIOs
Instrument/Category	Multi-item scales	Seven-point Likert scale
Main findings or contribution	The study empirically validated that firms with defined IS strategies perform better than firms without defined IS strategies. In addition, firms without defined IS strategies have a negative relation with firm performance.	Results reveal that an innovative (prospector strategy) firm is more likely to have a CIO which has higher levels of extraversion and openness than a conservative firm focused on daily operations (defender strategy).

Summary of Studies since 2004 (continuation)

Author (s)	Li, Tan, Teo, and Tan (2006)	Preston and Karahanna (2009)
Purpose	Examine the relationships between the characteristics of the CIO and the firms usage of information systems	The purpose of this study was to empirically investigate the relationship between a shared understanding and business/IS strategy alignment.
Research Context	Singapore	United States
Target Respondents	Information technology professionals and managers	CIO's and TMTs
Methodology	Survey	Interviews and surveys
Sample	89 CIOs	243 paired responses
Instrument/Category	Firm information, respondent's demographics, and a seven-point Likert scale.	Most questions were in the Five-point Likert scale; one section used the seven-point Likert scale.
Main findings or contribution	The study empirically validated that the CIO's personality traits (openness and extraversion) and CIO's demographic characteristic (educational level) have a strong impact on the firms innovative use of IT.	A shared vision between the CIO and TMT is critical in establishing and maintaining an aligned IS strategy within a firm.

Summary of Studies since 2004 (continuation)

Author (s)	Preston, Karahanna, and Rowe (2006)	Samaltz, Sambamurthy, and Agarwal (2006)
Purpose	Compares the shared understanding characteristics between CIOs and TMT in the United States and France.	What are the roles and effectiveness of CIO's in the Healthcare Sector
Research Context	United States and France	Health Care Sector in North America
Target Respondents	CIOs and TMT	CIOs and TMT
Methodology	Survey	Field Survey
Sample	163 CIOs in the United States and 44 CIOs in France.	100 firms - Dual Stage Responses
Instrument/Category	Five-point Likert scale	A five-point Likert scale to indicate the CIOs performance for each role.
Main findings or contribution	CIOs in the United States are more likely to be TMT members and have a better shared understanding associated with the information system role within the firm, whereas in France the CIO is more likely to establish a shared understanding through "a deeper level of socialization outside of the immediate work environment" (Preston, Karahanna, and Rowe, 2006).	The study resulted in providing an empirical approach for assessing the effectiveness of the CIOs roles. This study empirically validated six CIO roles and the assessment of CIO role effectiveness.

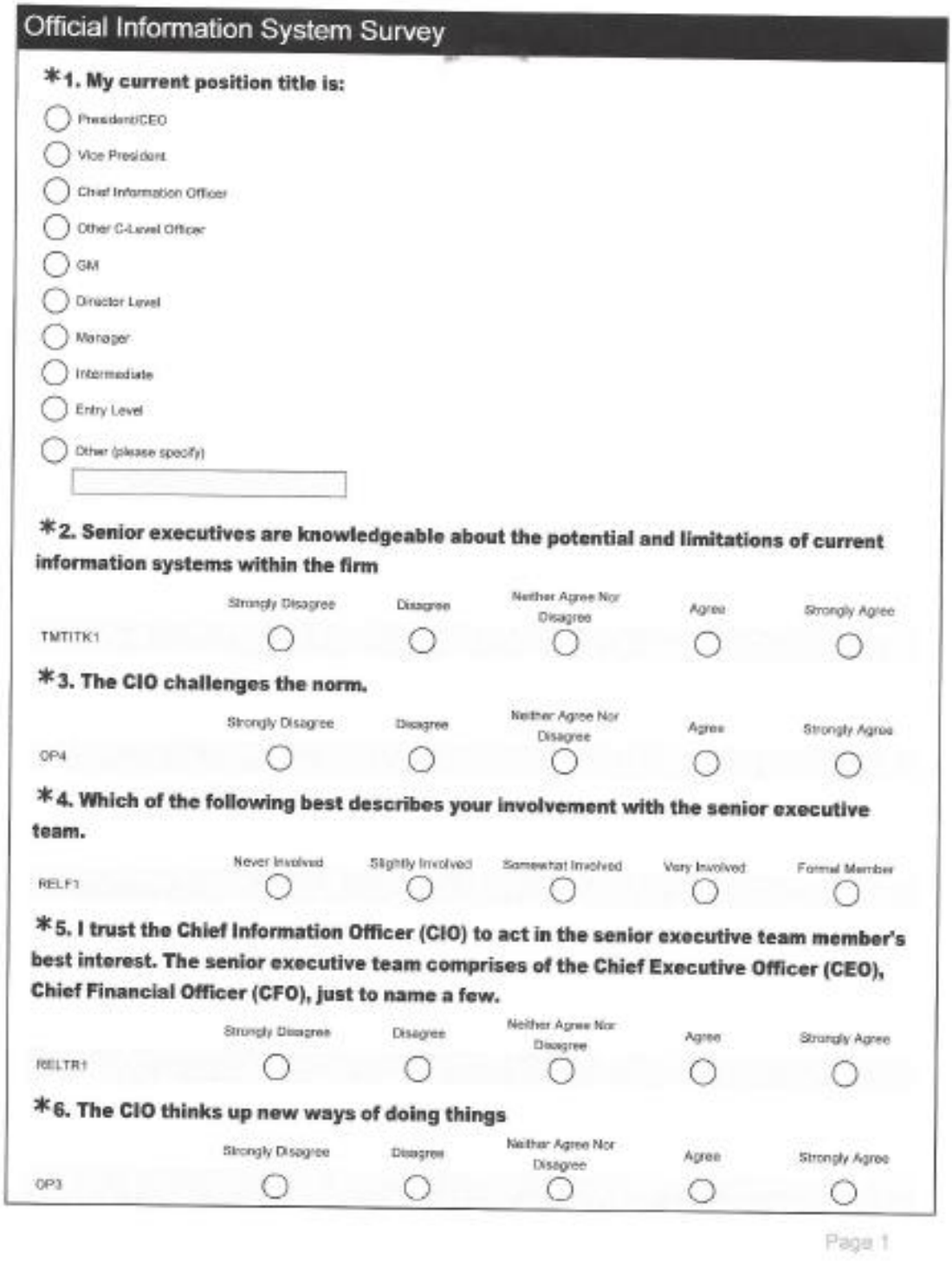
Summary of Studies since 2004 (continuation)

Author (s)	Schobel and Denford (2013)
Purpose	Analyzes the CIO-CFO relationship in relation to individual effectiveness and strategic alignment
Research Context	Ontario, Canada
Target Respondents	CIOs and CFO
Methodology	Three case studies of firms in the public sector
Sample	3 firms: School Board, Children's Charity, and Public University
Instrument/Category	Interviews, open ended questions
Main findings or contribution	Results reveal that trust and shared understanding are the key dimensions contributing toward an effective relationship between a CIO and CFO. Lack of trust resulted in use of tactics to meet mission. Physical location of CIO and CFO appears to impact communication opportunities which impact trust and a shared understanding.

Appendix B

Official Information System Survey

Survey Instrument



Official Information System Survey

***1. My current position title is:**

- President/CEO
- Vice President
- Chief Information Officer
- Other C-Level Officer
- GM
- Director Level
- Manager
- Intermediate
- Entry Level
- Other (please specify)

***2. Senior executives are knowledgeable about the potential and limitations of current information systems within the firm**

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
TMTITK1	○	○	○	○	○

***3. The CIO challenges the norm.**

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
OP4	○	○	○	○	○

***4. Which of the following best describes your involvement with the senior executive team.**

	Never Involved	Slightly Involved	Somewhat Involved	Very Involved	Formal Member
RELF1	○	○	○	○	○

***5. I trust the Chief Information Officer (CIO) to act in the senior executive team member's best interest. The senior executive team comprises of the Chief Executive Officer (CEO), Chief Financial Officer (CFO), just to name a few.**

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
RELTR1	○	○	○	○	○

***6. The CIO thinks up new ways of doing things**

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
OP3	○	○	○	○	○

Page 1

Official Information System Survey

***7. Senior executives believe general interpretations of events or phenomena may not always apply to our organizational situations**

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
OMRSI2	◯	◯	◯	◯	◯

***8. Our organization does not have an articulated Information System strategy**

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
USTRAT2	◯	◯	◯	◯	◯

***9. The CIO effectively uses nontechnical terms when making presentations to the senior executives**

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
CA1	◯	◯	◯	◯	◯

***10. The CIO identifies relevant emerging technology to enable the firm's products, business strategy, and business processes**

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
CIOSBK6	◯	◯	◯	◯	◯

***11. The CIO has developed a good rapport with most people**

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
PS3	◯	◯	◯	◯	◯

***12. The CIO knows how to utilize the firm's infrastructure to meet the firm's needs**

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
CIOSBK5	◯	◯	◯	◯	◯

***13. How many reporting levels are between the CIO and the Chief Executive Officer (CEO)?**

◯ two or more; in other words, there are several layers of management between the CIO and the CEO.

◯ one; in other words, there is one level of management between the CIO and CEO

◯ direct report; in other words, the CIO works directly for the CEO

***14. The CIO knows how to captivate people**

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
EXT3	◯	◯	◯	◯	◯

Official Information System Survey

***15. Senior executives are open to new ideas even when they come from outside our organization**

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
OMRSI3	○	○	○	○	○

***16. I have informal contact with the senior executive team**

	never	once a year or less	monthly	weekly	daily
RELI4	○	○	○	○	○

***17. CIO primarily uses business terminology when interacting with senior executives**

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
CASHL2	○	○	○	○	○

***18. The CIO is knowledgeable about the firm's present and future products, markets, business strategies, and business processes**

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
CIOSBK1	○	○	○	○	○

***19. The CIO is quick to understand things**

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
OP2	○	○	○	○	○

***20. Senior executives consider information systems as a strategic resource**

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
OMTMS6	○	○	○	○	○

***21. The CIO is skilled in handling social situations**

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
EXT4	○	○	○	○	○

***22. The CIO avoids using technology jargon when interacting with senior executives**

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
CASHL3	○	○	○	○	○

***23. Our organization does not have definitive long-term information system goals**

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
USTRAT1	○	○	○	○	○

Official Information System Survey

***24. The CIO is knowledgeable about the Information Systems being applied by the competitors**

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
CIOSBK4	○	○	○	○	○

***25. Senior executives routinely simplify interpretations of complex information system issues**

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
OMRSI4B	○	○	○	○	○

***26. The CIO is knowledgeable about the firm's competitors**

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
CIOSBK3	○	○	○	○	○

***27. The CIO talks to a lot of different people at parties**

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
EXT2	○	○	○	○	○

***28. The CIO interacts with the senior executive team on a formal bases (e.g., official meetings, work-related phone calls, etc.).**

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
RELF2	○	○	○	○	○

***29. Senior executives involvement with the information system function is strong**

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
OMTMS1	○	○	○	○	○

***30. CIO and senior executives share a common language in our conversations**

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
CASHL1	○	○	○	○	○

***31. Our firm has a detailed Information System strategy**

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
USTRAT2B	○	○	○	○	○

Official Information System Survey

***32. The CIO acts with tact when confronted with potentially contentious situations.**

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
PS2	○	○	○	○	○

***33. The CIO is dependable during critical situations impacting the business operations**

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
RELTR2	○	○	○	○	○

***34. Senior executives believe complex responses are needed in complex environments**

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
OMRSI1	○	○	○	○	○

***35. The CIO is knowledgeable about the firm's industry practices**

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
CIOSBK2	○	○	○	○	○

***36. Senior executives are knowledgeable about the potential and limitations of the "next generation" Information Technology available to enhance their industry**

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
TMTITK2	○	○	○	○	○

***37. Senior executives understand information systems can provide opportunities for the firm**

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
OMTMS6	○	○	○	○	○

***38. Our organization does not have a consistent pattern of behavior regarding information systems**

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
USTRAT3	○	○	○	○	○

***39. Senior executives are knowledgeable about information systems being applied by the firm's competitors**

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
TMTITK3	○	○	○	○	○

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***40. The CIO guides the firm's decisions related to the timing and level of investment in emerging technologies**

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
CIOSBK7	◯	◯	◯	◯	◯

***41. The CIO is a formal member of the Senior Executive Team (i.e., Chief Executive Officer, Chief Financial Officer, and Chief Operations Officer)**

◯ Yes

◯ No

***42. The CIO effectively uses business terms familiar to the other senior executive team members**

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
CA2	◯	◯	◯	◯	◯

***43. Our organization has clearly defined long-term Information System goals**

	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
USTRAT1B	◯	◯	◯	◯	◯

***44. The CIO socializes with the senior executive team members at social gatherings, golfing, tennis, etc.**

	never	once a year or less	monthly	weekly	daily
RELI5	◯	◯	◯	◯	◯

***45. Are you male or female?**

◯ Male

◯ Female

***46. Which category below includes your age?**

◯ 18-20

◯ 21-29

◯ 30-39

◯ 40-49

◯ 50-59

◯ 60 or older

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***47. How long have you worked for this firm?**

- ◯ < 1 Year
- ◯ 1-2 Years
- ◯ 3-5 Years
- ◯ 6-10 Years
- ◯ 11-15 Years
- ◯ > 15 Years

***48. About how long have you been in your current position?**

Years

Months

***49. Have you taken an Information System strategy course within the last 60 days?**

- ◯ Yes
- ◯ No

***50. Which of the following best describes the principal industry of your organization?**

Appendix C

Variable Code Breakout

Variable Code Breakout by Question

Code	Code	Question
CAP-CA1	CAP-CA1	The CIO effectively uses nontechnical terms when making presentations to the senior executives
CAP-CA2	CAP-CA2	The CIO effectively uses business terms familiar to the other senior executive team members
CAP-CASHL1	CAP-CASHL1	CIO and senior executives share a common language in our conversations
CAP-CASHL2	CAP-CASHL2	CIO primarily uses business terminology when interacting with senior executives
CAP-CASHL3	CAP-CASHL3	CIO avoids using technology jargon when interacting with senior executives
CAP-CIOSBK1	CAP-CIOSBK1	The CIO is knowledgeable about the firm's present and future products, markets, business strategies, and business processes
CAP-CIOSBK2	CAP-CIOSBK2	The CIO is knowledgeable about the firm's industry practices
CAP-CIOSBK3	CAP-CIOSBK3	The CIO is knowledgeable about the firm's competitors
CAP-CIOSBK4	CAP-CIOSBK4	The CIO is knowledgeable about the Information Systems being applied by the competitors
CAP-CIOSBK5	CAP-CIOSBK5	The CIO knows how to utilize the firm's infrastructure to meet the firm's needs
CAP-CIOSBK6	CAP-CIOSBK6	The CIO identifies relevant emerging technology to enable the firm's products, business strategy, and business processes
CAP-CIOSBK7	CAP-CIOSBK7	The CIO guides the firm's decisions related to the timing and level of investment in emerging technologies
CAP-EXT1	CAP-EXT1	I feel comfortable around people
CAP-EXT2	CAP-EXT2	I talk to a lot of different people at parties
CAP-EXT3	CAP-EXT3	I know how to captivate people
CAP-EXT4	CAP-EXT4	I am skilled in handling social situations
CAP-OP1	CAP-OP1	I love to read challenging material
CAP-OP2	CAP-OP2	I am quick to understand things
CAP-OP3	CAP-OP3	I love to think up new ways of doing things
CAP-OP4	CAP-OP4	I like to challenge the norms
CAP-PS2	CAP-PS2	The CIO acts with tact when confronted with potentially contentious situations.
CAP-PS3	CAP-PS3	The CIO has developed a good rapport with most people

Variable Code Breakout by Question (continuation)

Code	Code	Question
CAP-TMTITK1	CAP-TMTITK1	Senior executives are knowledgeable about the potential and limitations of current information systems within the firm
CAP-TMTITK2	CAP-TMTITK2	Senior executives are knowledgeable about the potential and limitations of "next generation" IT
CAP-TMTITK3	CAP-TMTITK3	Senior executives are knowledgeable about information systems being applied by the firm's competitors
ISSD-USTRAT1	ISSD-USTRAT1	Our organization does not have definitive long-term information system goals
ISSD-USTRAT1B	ISSD-USTRAT1B	Our organization has clearly defined long-term Information System goals
ISSD-USTRAT2	ISSD-USTRAT2	Our organization does not have an articulated Information System strategy
ISSD-USTRAT2B	ISSD-USTRAT2B	Our firm has a detailed Information System strategy
ISSD-USTRAT3	ISSD-USTRAT3	Our organization does not have a consistent pattern of behavior regarding information systems
ISSD-USTRAT3B	ISSD-USTRAT3B	Our firm has a consistent pattern of behavior regarding Information Systems
OMRSI1	OMRSI1	Senior executives believe complex responses are needed in complex environments
OMRSI2	OMRSI2	Senior executives believe general interpretations of events or phenomena may not always apply to our organizational situations
OMRSI3	OMRSI3	Senior executives are open to new ideas even when they come from outside our organization
OMRSI4	OMRSI4	Senior executives are reluctant to simplify interpretations of complex information system issues
OMRSI4B	OMRSI4B	Senior executives routinely simplify interpretations of complex information system issues
OMTMS1	OMTMS1	Senior executives involvement with the information system function is strong
OMTMS2	OMTMS2	Senior executives support the information systems function
OMTMS5	OMTMS5	Senior executives consider information systems as a strategic resource
OMTMS6	OMTMS6	Senior executives understand information systems can provide opportunities for the firm

Variable Code Breakout by Question (continuation)

Code	Code	Question
RELF1	RELF1	Which of the following best describes your involvement with the senior executive team
RELF2	RELF2	I interact with the senior executive team on a formal bases (e.g., official meetings, work-related phone calls, etc.).
RELI4	RELI4	I have informal contact with the senior executive team
RELI5	RELI5	I socialize with the senior executive team members at social gatherings, golfing, tennis, etc.
RELTR1	RELTR1	I trust the CIO to act in the senior executive team member's best interest
RELTR2	RELTR2	The CIO is dependable during critical situations impacting the business operations
Demographic	Demographic	Are you male or female?
Demographic	Demographic	Have you taken a strategy course within the last 6 months?
Demographic	Demographic	How long have you worked for this firm?
Demographic	Demographic	How many reporting levels are between you and the Chief Executive Officer?
Demographic	Demographic	My current position title is:
Demographic	Demographic	The CIO is a formal member of the Senior Executive Team (i.e., Chief Executive Officer, Chief Financial Officer, and Chief Operations Officer)
Demographic	Demographic	Which category below includes your age?
Demographic	Demographic	Which of the following best describes the principal industry of your organization?
Demographic	Demographic	About how long have you been in your current position?

Appendix D

Cover Memo for the "Official Information System Survey"

To: [Email]

From: "lacaden@nova.edu via surveymonkey.com" <member@surveymonkey.com>

Subject: Survey

Body: Please accept this invitation to participate in a research survey focused on identifying factors which may impact, positively or negatively, the quality of a firm's Information System strategy.

This online survey being conducted by Karen Lacaden, a doctoral candidate at NOVA Southeastern University, takes approximately 15 minutes.

Participation in this study is entirely voluntary. The survey questions address several areas including the relationship of the Chief Information Officer (CIO) and Business Executives; and the information system and business knowledge of executives. There is no right or wrong answer. Your completed survey will be consolidated with other survey results. Presentations or publications of this research study will be based on grouped data and will not reveal your identity.

The knowledge gained from your participation may help the information technology community better understand how a variety of factors impact the development of the firm's Information System strategy.

Your participation in this research study is extremely important. I would appreciate you taking the time to complete and submit this online survey by _____.

Here is a link to the survey: https://www.surveymonkey.com/s.aspx

This link is uniquely tied to this survey and your email address. Please do not forward this message.

Should you have any further questions, please feel free to contact me by phone or email.

Thanks for your participation!

Sincerely,
Karen Lacaden
Doctorate student at NOVA Southeastern University
Phone (301)225-3210

Email: lacaden@nova.edu

Please note: If you do not wish to receive further emails from us, please click the link below, and you will be automatically removed from our mailing list.
https://www.surveymonkey.com/optout.aspx