Understanding CIO Role Effectiveness: the Antecedents and Consequents

Daniel Q. Chen
Department of Information Systems and Supply Chain Management
Texas Christian University
Email: d.chen@tcu.edu

David S. Preston
Department of Information Systems and Supply Chain Management
Texas Christian University
Email: d.preston@tcu.edu

Abstract

This research-in-progress paper describes the development of a research model exploring the antecedents and consequents of CIO role effectiveness. Specifically, we argue that CIO managerial discretion (the latitude of actions available to CIOs), CIO capability (business knowledge, IT knowledge, political savvy, and communication skill), and CIO/CEO shared understanding of IT role in the organization are important antecedents of CIO role effectiveness. In addition, we posit that an effective CIO will increase the contribution of IS function to the firm in terms of strategic, operational and financial impacts. The paper also outlines a proposed CIO/CEO matched-pair field survey method to test the research model.

1. Introduction

Chief Information Officers (CIOs) are the highest-ranking executives in charge of their firms' information technology (IT) management practices. Given the increasingly dependence of contemporary firms on IT, both strategically and operationally [21], CIOs are frequently members of the top management team (TMT). In addition, the number of CIO positions created over the past two decades has grown at an increasing rate [3; 8].

However, research of information systems (IS) leadership, and particularly the nature of CIO roles, has received relatively little attention in the IS field [13]. Since the inception of the CIO position, there have been studies examining the traits, roles and responsibilities of effective CIOs, (e.g., [1; 4; 8; 11; 19; 23; 24]); the majority of these studies are descriptive in nature and generally provide only anecdotal support[1]. Researchers have made calls for more rigorous, theory-based empirical research to advance our knowledge in the domain of CIO effectiveness [13]. This work is an attempt to answer such calls by developing a research model that explores the antecedents and consequents of CIO role effectiveness. CIO role effectiveness is defined as the extent to which the CIO effectively performs his/her most salient roles within a particular organization [8; 23; 24]. Drawing upon existing literature from strategic leadership, IT management, and CIO studies, we propose that 1) CIO role effectiveness is determined by three primary antecedents, namely, CIO capability, CIO managerial discretion, and CIO/CEO shared understanding; and 2) Effective CIOs positively influence the overall IS functional contribution to their organizations.

Our ultimate goal is to validate the research model through a field survey methodology. In this paper, we report the theoretical rationale behind the research model, describe the design of our proposed field survey, and discuss the expected findings of our work.

2. Prior Studies of CIO Role Effectiveness

Our literature review suggests that there is not a universally accepted definition and measure of CIO role effectiveness. However, prior literature has provided a general consensus that CIOs are considered effective if they can add value to their organizations by simultaneously assuming the role as a business strategist as well as an IT services provider [3]. For example, the literature has found that CIOs are expected to take on the following responsibilities: weaving business and IT strategy together, focusing on

[1] The recent work of Smaltz et al. [23] (to be described later) is an exception.

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business imperatives, communicating in business language, building strong relationship with key non-IS executives, raising awareness of the IT value within the organization, interpreting IS success stories of other firms, maintaining close ties with external IT vendors, developing high performance internal IS professionals, and delivering rapid and effective IT services to support business processes [4; 8; 11; 14; 24].

Having realized the need for empirical validation of the dimensions of CIO role effectiveness, Smaltz et al. [23] recently conducted a field survey among CIOs and other top executives in the healthcare industry. According to their findings, healthcare organizations require that their CIOs are effective in the following six roles: strategist, relationship architect, integrator, IT educator, utility provider, and information steward (Table 1 provides the description of each role). These six roles cover most of the CIO role expectations described in prior literature and coincide with the dual strategic and operational aspects of IT function. In addition, Smaltz et al. [23] found that the capability of the CIO (interpersonal skills and knowledge) has a direct impact on the multi-dimensional CIO role effectiveness construct, and CIO/TMT engagement has an indirect effect on CIO role effectiveness through CIO capability. This work has provided an important contribution to IS leadership research as it provides empirical verification to the varieties of CIO role expectations suggested by the extant descriptive writings. It also provides a solid ground for future CIO role effectiveness assessment. Hence, this study is among the first that has identified the antecedents of CIO role effectiveness.

Despite the contribution of this study, it has limitations. First, the roles and research model in this study were specifically developed for the healthcare industry. Consequently, these roles of the CIO are relevant for the healthcare industry and may not necessarily apply to CIOs who are in other industries. It is necessary to develop an understanding of how CIO role effectiveness that is applicable to all industries. Second, as a result of this targeted study, the data was collected from a single industry. Further empirical works are required to examine the external validity of their findings. Third, whereas Smaltz et al. [23] focused on the CIO's individual capability to explain CIO effectiveness, prior literature suggests that CIO effectiveness is also contingent upon other factors [8; 20]. We assess a more expansive range of organizational antecedents of CIO effectiveness in addition to the specific individual characteristics of the CIO. Finally, in addition to the antecedents, immediate consequents of CIO role effectiveness also call for empirical validation [13].

Table 1: CIO Role Expectations (Smaltz et al.)

Role Dimension	Description
Strategist	The CIO is a strategic business leader who helps shape the organization's overall mission and vision and is heavily involved in overall business strategic planning and decisions
Relationship Architect	Ensures optimal strategic partnerships with external vendors and effectively accomplishes contract negotiation, management and oversight.
Utility Provider	The CIO ensures that the IT unit is operationally efficient and effective.
Integrator	The CIO ensures value-added integration among and between business units as well as with external partners.
Information Steward	The CIO develops a sound IT architecture, motivates and develops IT staff, aligns IT plans with business plans, and protects the organization's information assets.
IT Educator	The CIO is a champion for computer literacy throughout the organization and among TMT members, and provides insight into the value of current and emerging technology.

3. Research Model and Hypotheses

The goal of this research study is to develop and test the nomological network that involves both the antecedents and consequents of CIO role effectiveness. Figure 1 presents our research model.

First, based upon the arguments from IT management and CIO studies (e.g., [3-5]), we contend that CIO role effectiveness has direct and positive impacts on the contribution of a firm's IS function to the entire organization. Next, we will consider both organizational and individual level variables as antecedents to CIO role effectiveness. Specifically, we incorporate the concept of managerial discretion [7; 9] from strategic leadership literature as well as the level of CIO/CEO shared understanding of IT role from existing CIO studies [12; 18], both of which serve as organizational antecedents to CIO effectiveness in

addition to CIO capability. Through this approach, we establish a more comprehensive view of the forces shaping CIO role effectiveness.

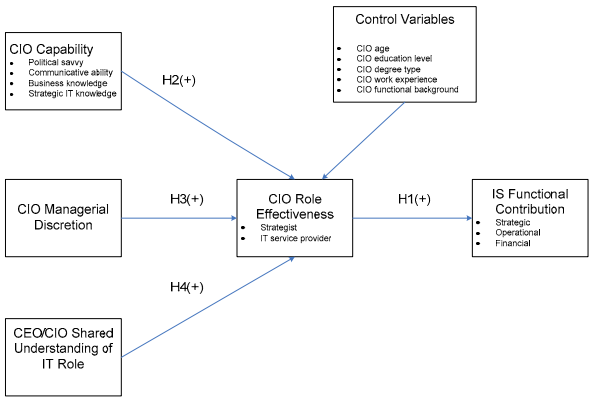

Figure 1: Research Model

3.1. CIO Role Effectiveness and IS Functional Contribution

To be assessed as effective, a CIO is expected to excel in both the strategic oriented roles (i.e. strategist) and operational oriented roles (i.e. IT service provider). As summarized by Chatterjee et al. [3], an effective CIO is both a "facilitator-participant of senior executive envisioning of IT-based strategic initiatives" and an "architect-leader of an effective IT management capability.

Earl and Feeny [4] contend that the CIO is personally instrumental in organizational exploitation of IT. This contention is consistent with general leadership theories [7; 28] which propose that effective leaders have performance impacts on their groups and organizations. As the leader of the organizational IS function, a high performing CIO is an important reason that the IS function delivers value to the entire organization since the CIO "determines the values and cultures of the IS function and instill the belief that an IS staff's first duty is to contribution to achieving business solutions ([5], p12)". Mata et al. [15] concluded that the only way for an organization to develop a competitive advantage via information systems is through the development and use of superior managerial IS skills.

Based on the above discussion, we propose that CIO role effectiveness has a direct and positive impact on the IS function's contribution to organizational performance. Though the criteria of IS functional contribution evaluation can change as organizational situation change [22], it is widely believed that IS functional contribution can be assessed along the lines of strategic direction, operational efficiency, and financial performance [17; 22]. Since effective CIOs are responsible for both strategic and operational aspects of the IS function, they should be credited with all types of value that IS function could contribute to the entire organization. Therefore,

> *H1: CIO role effectiveness is positively associated with IS function's contribution to organizational performance (strategic, operational, and financial).*

3.2. CIO Capability and CIO Role Effectiveness

We now describe the antecedents to CIO role effectiveness. First, we follow Smaltz et al. [23] to propose that CIO capability is one of the immediate determinants of CIO role effectiveness. CIO capability refers to the personal skills, knowledge, and abilities of the CIO. Smaltz et al. have demonstrated that CIO capability is a high order formative construct that comprises of four components: 1) political savvy; 2) communicative ability; 3) business knowledge; and 4) strategic IT knowledge. CIOs who are equipped with all four of these capabilities are likely to be more effective in performing their roles as they "will be able to blend business and IT skills, appreciate their role as a senior executive, and be effective as a change agent" ([23], p.212). In other words, to be effective a CIO of contemporary firms must have four types of intelligence: political, social, business, and IS [13].

> *H2: Higher level of CIO capability (political savvy, communicative ability, business knowledge, strategic IT knowledge) is positively associated with CIO role effectiveness.*

Smaltz et al. [23] found that CIO capability leads to several of the dimensions of CIO role effectiveness; however, the generalizability of these findings is limited to the healthcare industry. We include this key construct in our study in part to examine its influence on CIO effectiveness on an industry-wide basis. Smaltz et al.[23] also found that the influence of CIO/TMT engagements on CIO effectiveness is mediated by CIO capability. Since we wish to examine the direct influence of both individual (CIO capability) and organizational factors (managerial discretion and shared understanding) on CIO effectiveness, we do not include CIO/TMT engagements as an antecedent to CIO role effectiveness in our research model.

3.3. CIO Managerial Discretion and CIO Role Effectiveness

The individual capability of the CIO may be a determinant of CIO effectives [23]; however, this capability of an individual may not be sufficient for CIOs to be successful in an organizational context. Leadership theories suggest that in addition to individual characteristics there are many situational forces that determine whether CIOs are effective in their roles [28]. In particular, Stewart [25-27] posited that managerial role effectiveness is shaped by organizational and external environmental constraints, including bureaucratic rules, policies, regulations, resources, technologies, locations, customers, etc. He further pointed out that the performances of managers with same type of job could vary depending on the perceptions of the job holders in terms of how many choices or discretion they have under these constraints.

Hambrick and Finkelstein [9] advanced the concept of managerial discretion to the executive level. They define managerial discretion as latitude of managerial action available to an executive within the organization. For discretion to exist, an executive must have, and be aware of, multiple possible courses of action. Stated differently, the discretion is not absolute, but is a function of both contextual forces (task environment and organizational characteristics) as well as executives' cognitive limitations [9; 10].

The concept of managerial discretion sheds light in understanding how much impact executives can have on organizational outcomes. The core of Hambrick and Finkelstein's [9] idea is that managerial excellence is a function of sheer awareness of options (p.374). According to Finkelstein and Boyd [6], executives within a higher discretional context are expected to bring in greater "marginal product" as they face fewer constraints and have greater latitude of action than their counterparts in an environment with less discretion. Finkelstein and Boyd [6] found that a higher level of CEO discretion is positively linked with higher compensation, a reflection of managerial excellence.

Though many of the existing works on managerial discretion focus on CEOs, the concept also applies to other top managers [9]. In this work, we define CIO managerial discretion as the latitude of action that a CIO has in making strategic choices. Since CIOs are expected to devise a variety of organizational arrangements (i.e., structures, processes, staffing) and to address many challenge areas and manage their interdependencies [5] , we argue that CIOs who see a greater array of possible actions are more likely to identify appropriate pathways to take their jobs. Therefore,

H3: Higher level of CIO managerial discretion is positively associated with CIO role effectiveness.

3.4. CIO/CEO Shared Understanding of IT Role and CIO Role Effectiveness

In addition to the individual capability of the CIO and the discretion of the CIO to make strategic choices in the organization, we contend that there is a relational component that also contributes to the level of the CIO's effectiveness. This relational component is based on a shared convergence or understanding between the CIO and CEO of the organization. Mutual understanding between the CIO and CEO is critical to an organization's successful exploitation of IS [12; 18]. Extant research recognizes that a gap in understanding between the CIO and CEO is a major impediment to the successful contribution of IS to an organization. Johnson and Lederer [12] found that a mutual CIO/CEO convergence of the current role of IS in the organization positively influences the financial contribution that IS make to the organization [12].

Although the direct influence of this shared CIO/CEO understanding on IS contribution has been established to some degree [12], the nature of this link warrants further examination. The mechanism through which this shared understanding influences the contribution of IS to the organization is not well understood. Johnson and Lederer [12] argue that CIO/CEO convergence about the current role of IS creates a shared knowledge base of business/IS needs between the CIO and CEO, which thereby ensures that system resources are more effectively applied to address top management's objectives, which in turn leads to greater IS financial contribution. We concur with the line of argument provided by Johnson and Lederer [12]; however, their study tested the direct impact of this convergence on IS financial contribution without examining any intermediating mechanisms involved in this process. We contend that the CIO plays a critical role in this process. It is the responsibility of the CIO, as the top IS executive within the organization, to ensure that IS resources are deployed in accordance with organizational objectives [18; 23]. Smaltz et al. [23] specifically addressed the need for CIOs to manage resources to meet the strategic goals of the organization. To be effective in this capacity, the CIO and CEO must have a similar "mindset" or "mental model" regarding the role of IS in the organization [12]. Thus,

H4: A higher level of shared understanding between the CIO and CEO regarding the role of IS in the organization is positively associated with CIO role effectiveness.

4. Proposed Methodology

We will employ a dual stage matched-pair field survey method [23] to test the hypotheses described above. The targeted respondents for our survey will include CIOs and CEOs of U.S. based firms across an array of industries. This method includes using two survey instruments to collect data: 1) CIO instrument; and 2) CEO instrument. In stage 1, the primary questionnaire (CIO instrument) will be provided to the top IS executive (representative of the CIO) in the organization. In stage 2, for those organizations from which the CIO instrument is received, a second questionnaire (CEO instrument) will be sent to respective CEOs. We chose to collect cross-industry data in order to test the generalizability of our research model. The design of the study is described in below.

4.1. Instrument Development

There will be two survey instruments used to collect data: 1) CIO instrument; and 2) matched CEO instrument. Instrument measures that have been employed and validated in prior studies will be utilized where feasible and modified where necessary. For two of the key constructs (CIO role effectiveness, CIO managerial discretion) we developed items following the procedure suggested by Moore and Benbasat [16]. Smaltz et al. [23] developed and validated the instruments for a six-dimension CIO role effectiveness construct. However, these instruments are tailored to specifically measure the effectiveness of the CIOs in their required roles within the healthcare industry. To increase the external validity of our instruments, we decided to create effective CIO measures describing the two generic CIO roles: strategist, and IT services provider (a combination of utilities provider and information steward) based on the literature and our interviews with several CIOs.

Though there exist several empirical studies on managerial discretion (primarily on CEO discretion), there are no known research studies that directly measure managerial discretion through primary data[2]. Part of the difficulty of measuring managerial discretion may be related to the fact that CEO discretion is never explicit, and it is a function of person's own attributes as well as organizational context [9]. We will create our multiple-item CIO discretion measures based on the theoretical definition of this construct and CIO interviews. Table 2 outlines the instrument and the sources of items.

Table 2: Sources of Instrument Measures

Construct	#of items	Source
IS functional contribution to Organization		
Strategic contribution	3	[17; 22]
Operational contribution	3	[17; 22]
Financial contribution	3	[17; 22]
CIO Role Effectiveness		
Strategist role	4	created
IT service provider	4	created
CIO capability		
Political savvy	3	[23]
Communicative ability	3	[23]
Business knowledge	3	[2]
Strategic IT knowledge	3	[2]
CIO Managerial Discretion	4	created
CIO/CEO shared understanding of IT Role	4	[18]

In addition to the constructs displayed in the research model, we also include measures of several control variables in our questionnaires. These control variables are CIO age, education level, degree type (business vs. technical), work experience, functional background. These variables are suggested by previous literature that should be included as controls since they may influence CIO role effectiveness to some degree.

4.2. Sample Frame

The data collection process involves two phases. In the first stage, we will mail our CIO questionnaire to 3,700 IS executives with the title of "Chief Information Officer" from U.S. based organizations selected from Dun and Bradstreet's Million Dollar Database as well as a number of CIOs who are members of several professional industry associations that have agreed to sponsor this study. The CIOs are requested to provide answers to questions regarding CIO capability, CIO managerial discretion, shared understanding of organizational IS role, as well as the control variables. The CIO survey will be considered complete if each of the three criteria are met: 1) the questions are properly answered; 2) the respondent is confirmed to be the organization's most senior IS executive; and 3) the respondent has held their current

[2] A common approach to measure managerial discretion is to use secondary data as proxies (e.g., [6]).

position as the CIO within the organization for more than one year.

In the second stage, the CEO questionnaire will be sent to the corresponding CEO of each organization from which we have received a completed CIO questionnaire. The CEOs will be asked to assess the level of understanding they have with the CIO regarding the role of IS in the organization, their CIO's capability, their CIO's role effectiveness, as well as their IS function's contribution to the organization. The researchers will ensure that the CEO data is collected within three months of collecting the data from respective CIOs in order to reduce the chance of CIO turnover. Introductory letters and telephone calls will be conducted to encourage organizations to participate and to minimize non-response bias. In addition, a follow-up survey will be mailed to all CIOs and corresponding CEOs that do not respond to the initial mailing. The CIO and CEO will be asked to respond to questions that will provide a high level of respondent validity. Table 3 provides a summary of key informants for each construct.

Table 3: Summary of Informants for Constructs

Construct	Informant
CIO/CEO shared understanding of IT role	CIO and CEO
CIO role effectiveness	CEO
IS functional contribution to the organization	CEO
CIO capability	CIO and CEO
CIO managerial discretion	CIO
Control variables	CIO

4.3. Pre-test of Measurement Validity

The instruments will be validated in a two-step process: 1) instruments will be pre-tested via a panel of experts to assess content validity; and 2) instruments will be validated through an instrument item sorting exercise to qualitatively evaluate the discriminant validity of each of the measured constructs. In addition, as a pretest and to triangulate the results, interviews with several U.S. CIOs from different organizations will be conducted to gain a richer understanding of the research phenomenon and to assess the face validity of the instrument.

4.4. Data Analysis Approach

The data will be analyzed via structural equation modeling (SEM). Before we test the hypotheses, we will employ factor analyses to examine the measurement validity of each construct (including construct reliability, convergent validity and discriminant validity) and overall fit of the measurement model. We will also calculate the statistical power of our data.

Once the unidimensionality of the constructs are confirmed, we will employ partial least squares (PLS), a component-based SEM approach to run the causal model as we have both formative and reflective constructs. The model to be tested is a second-order factor model with reflective measures for the first-order factors and formative measures for the second-order factors. CIO capability, CIO role effectiveness, and IS functional contribution are modeled as second-order factors while all other variables are modeled as first-order factors.

5. Expected Contribution

We expect that the findings from this study will provide empirical evidence to allow insight into the phenomenon of CIO effectiveness. Through the development of a comprehensive set of individual, discretionary, and relational factors, we comprehensively examine distinct facets of the CIO's characteristics and the organizational environment that are posited to collectively influence the CIO's level of effectiveness.

The findings of this work will contribute to existing body of knowledge. First, our work is the first attempt to comprehensively assess industry-wide phenomena that influence CIO effectiveness and the direct influence of such effectiveness on IS contribution. Second, we developed items to directly measure an executive's individual perception of managerial discretion. Thirdly, this research opens the "black box" between CIO/CEO understanding and IS contribution by providing insight into the mechanism through which this relationship is based. Finally, this research also has several practical implications. This study provides a basis for which the strategic leaders of the organizations can facilitate the development of their CIOs.

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