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Technician or Leader?
- A Review of the Evolving Role of the CIO

Saerom Lee*
Jinsoo Park**
Minjung Choi***

〈목 차〉

Information Technology (IT) has been changed over time. So has the role of Chief Information Officer (CIO). Failures of IT after the dot-com bubble coupled with its seemingly disappointing outcomes resulted in CIO roles being hidden under a cloud. With little research done investigating their roles, however, CIOs are challenged to conform to the business environments under continuous transformation. Thus, to achieve better CIO performance, researchers as well as practitioners need to recognize their renewed leadership. First, we review leadership from general perspectives to ameliorate the understanding of leadership needed in the IT department. Second, we suggest a leadership role framework, viewing the CIO role as a leader in dynamic business environments. Last, using this framework, we analyze the stream of CIO leadership in connection with the historical perspectives. The framework will contribute to providing a guideline for continuous examination of CIO leadership role.

* College of Business Administration at the Seoul National University
** Professor, Graduate School of Business at the Seoul National University
*** College of Business Administration at the Seoul National University

I. Introduction

Information Technology (IT) serves a key source of competitive advantage with controlling costs in the firms (Mata et al. 1995; Prattipati & Mensah, 1997; Roepke & Agarwal, 2000; Ross et al., 1996). At the macro level, IT is one of the driving forces toward globalization of the World economy. At the enterprise level, on the other hand, IT plays a crucial part in reengineering and restructuring of business processes in response to increased competition. Deploringly, however, companies seemed to have recognized risks present in IT investment such as failure of projects with greater costs and poorer quality than expected (Natovich, 2003; Soliman et al., 2003).

Organizations need guidance in making sense of emerging technologies, understanding their potential functionalities, and timing their investments in appropriate technologies. For this reason, they created a leadership position dedicated to managing IT, i.e., Chief Information Officer (CIO). CIO is defined as a corporate executive who is responsible and accountable for their firms' IT management practices (Enns & Huff, 1999; Feeny & Willcocks, 1998). For enhanced use of IT, CIOs are expected to perform multiple roles such as business strategist, infrastructure builder, organizational architect, and informed buyer of IT services (Earl & Feeny, 1995; Rockart et al, 1996; Ross & Feeny, 1999).

However, in spite of their existence, widespread dissatisfactions are growing on the performance of information systems in the organization. Wateridge (1995) quoted a survey that reports twice as many IT projects are considered to be less successful than are considered to be successful. De Marco (1986) had already put a torch on this argument by claiming "15% of all software development never delivers anything, and overruns of 100-200% are common in software projects." In fact, CIOs have struggled with noticeably short tenures (Rothfeder & Discoll, 1990) and lack of credibility within the executive team

or CEOs (Feeny et al., 1992).

With CIOs placed on the center of this controversy, there are continued questions about why many companies frequently complain about the failure of IT management even if they retain senior-level IT managers. What is the leadership role of the CIO? How can CIOs contribute to IT effectiveness? Although we do not impose the alleged ineffectiveness on the sole responsibility of CIOs, we want to explore what roles and required leadership style they should seek to succeed.

In the past, all that CIOs were asked to do was provide updated knowledge about IT as technological literacy was a luxurious asset to an organization. However, things have changed too fast to aptly adapt to. Technology alters everything including itself, making what was once innovation today's history. Developed IT services have elevated their strategic importance, challenging CIOs to present more sophisticated leadership. However, outsourcing made information systems indistinguishable and standardized, making it even harder for CIOs to find their niche. Evidently, all these changes led to requiring more than a mere informational role. The environments revolving around them are more complex and turbulent than those around other chief executives, owing to the subject matter they particularly deal with, i.e., information technology; accordingly, much more difficult is for CIOs to gratify the role expectations than their colleagues. The rationale behind our investigation stems from this diagnosis. CIOs necessitate a guideline showing the changed role to self-examine their current positions and envision future tasks.

Although literature acknowledges that CIO roles are evolving (Ross & Feeny, 1999), little research can we find examining recent changes in their roles in detail. We thus aim to suggest a framework that explores the relationship between leadership role and environment. We view a CIO as a leader in dynamic business environments. This leadership role framework will provide trends of leadership role. It also contributes to elevating our understanding of

leadership required in IT sectors. Next, using this framework, we analyze the stream of CIO leadership in connection with the historical perspectives. Finally, we conclude with a stress on the importance of continuous research.

In the following section, we review some of the key literature on the streams of leadership in general perspectives. We then turn to discussion of specific perspectives about leadership such as contingency behaviors perspectives which examine the role of the CIO as a leader's behavior.

Ⅱ. Leadership in General Perspectives

Leadership is seen as a key determinant of organizational effectiveness, but the causal effects of leader behavior in the organization that ultimately determine effectiveness are hardly described in any detail. Even though multiple interpretations of leadership phenomena exist, each remains an incomplete and inadequate explanation of complex leadership associated with complex environments (Karahanna & Watson, 2006). Organizations in the process of transformations and changes often find that the requirements for leadership have changed (Applegate & Elam, 1992).

Jago (1982) reviews the prominent trends in leadership with four typologies: (1) **Type 1** focuses on a universally appropriate set of leadership traits, (2) **Type 2** focuses on a universally appropriate behavioral style, (3) **Type 3** focuses on situational contingent leadership traits, and (4) **Type 4** focuses on situational contingent behavioral styles. 〈Table 1〉 characterizes these four dimensions. The categorization has two distinctions: focal leadership construct and theoretical approach. First, universal perspectives (Types 1 & 2) explain that effective leadership does not depend on the characteristics of situations. In contrast to universal perspectives, contingent perspectives (Types 3 & 4) explain that effective leadership is dependent upon the characteristics of the

situation in which the leader operates. Second, traits and behaviors perspectives indicate whether leadership can be viewed as stable and enduring characteristics of people. If leadership is viewed as traits, it could be measurable and quantifiable property (Types 1 & 3). Alternatively, it is possible to focus on observable leader behaviors rather than on inherent traits (Types 2 & 4).

〈Table 1〉 A Typology of Leadership Perspectives (Jago, 1982)

		Theoretical Approach	
		Universal	Contingent
Focal Leadership Construct	Leader Traits	Type 1	Type 3
	Leader Behaviors	Type 2	Type 4

Traditional management theories have often presented organizational phenomena in terms of "discrete and opposing categories" such as loose or tight, formal or informal, and creative or routine (Bobko, 1985). From Type 1 perspectives, earlier literature focused on examining leader "traits" such as how to motivate others or how to various leadership associated with traits (Bass & Stogdill, 1990). Later approaches examine "behaviors of leaders" related to Type 2 perspectives (Likert, 1967; Vroom & Yetton, 1973), characteristics and "behaviors of followers" (Green & Mitchell, 1979) and leadership process (Kipnis et al., 1980). These approaches examine the leadership with general perspectives in work place which has limitation to cover unique characteristics of CIOs' leadership who face with more complex environment.

As organizational environments become more complex, senior IT managers also faced with various problems that require a wide range of responses and capabilities. Research on Types 3 and 4 attempts to provide such theoretical and empirical elaboration by offering more complex leadership models that presumably come closer to representing the complexities of actual leadership effectiveness. From Type 4 perspective, Denison et al. (1995) review leaderships

and developed concept of "behavioral complexity" that plays various roles in complex environment. They define effective leadership as "the ability that leaders perform multiple roles and behaviors that circumscribe the requisite variety implied by an organizational or environmental context." We follow these perspectives when we review the CIOs' leadership.

Bass (1960), Blake & Mouton (1964), Lawrence & Lorsch (1967) examine effective leadership in workplace. They found that managers must simultaneously focus on integration, task and interpersonal aspects of leadership position. A more fruitful approach may be to attempt to define the portfolios of roles and behaviors that allow a leader to respond to complex demands rather than the complexity analysis by which a particular behavior is applied to a particular situation (Denison et al., 1995). Therefore, several authors have attempted to define leadership in terms of a complex of behaviors or a portfolio of roles (Mintzberg, 1973; Yukl, 1981). Central to these theories is often the notion that leaders can be classified in either one category or the other, or that certain styles and behaviors can be matched with particular situations to produce effective leadership (Denison et al., 1995).

Multiple leadership roles may coexist in group; each role serves a different leadership purpose or function (Benne & Sheats, 1948). Mintzberg, for example, describe ten leadership functions in his in-depth study of managerial behavior. He identifies three different role types such as interpersonal (*figurehead*, *leader* and *liaison*), informational (*monitor*, *disseminator* and *spokesperson*) and decisional (*entrepreneur*, *disturbance handler*, *resource allocator* and *negotiator*). 〈Table 2〉 indicates a description of each one. Yukl (1981) presented 19 categories of leader behavior based on both his own research and a review of the leadership literature (Denison et al., 1995). McCall & Segrist (1980) suggest six roles which exclude four of these roles (figurehead, disseminator, disturbance handler and negotiator) in Mintzberg's managerial role model.

〈Table 2〉 Mintzberg's Managerial Roles (Smaltz et al., 2006)

Role type	Role	Description
Interpersonal	Figurehead	• Outline future organizational goals to employees at company meetings • Open a new corporate headquarters building • State the organization's ethical guidelines and the principles of behavior employees are to follow in their dealings with customers and suppliers
	Leader	• Provide an example for employees to follow • Give direct commands and orders to subordinates • Make decisions concerning the use of human and technical resources • Mobilize employee support for specific organizational goals
	Liaison	• Coordinate the work of managers in different departments • Establish alliance between different organizations to share resources to produce new goods and services
Informational	Monitor	• Evaluate the performance of managers in different functions and take corrective action to improve their performance • Watch for changes occurring in the external and internal environments that may affect the organization in the future
	Disseminator	• Inform employees about changes taking place in the external and internal environment that will affect them and the organization • Communicate to employees the organization's vision and purpose
	Spokesperson	• Launch a national advertising campaign to promote new goods and services • Give a speech to inform the local community about the organization's future intentions
Decisional	Entrepreneur	• Commit organizational resources to develop innovative goods and services • Decide to expand internationally to obtain new customers for the organization's products
	Disturbance Handler	• Move quickly to take corrective action to deal with unexpected problems facing the organization from the external environment, such as a crisis like an oil spill, or from the internal environment, such as producing faulty goods or services
	Resource Allocator	• Allocate organizational resources among different functions and departments of the organization • Set budgets and salaries of middle and first-level managers
	Negotiator	• Work with suppliers, distributors and labor unions to reach agreements about the quality and price of input, technical and human resource • Work with other organizations to establish agreements to pool resources to work on joint projects

The logic of these models of leadership is to define a set of roles comprising the leadership task in a way that captures some of the inherent conflicts and contradictions of the simultaneous needs for both internal integration and external adaptation (Denison et al., 1995). Thus, the definition of effective leadership implied by the model is not only the capacity to be either a monitor, a director or an innovator, but also to perform all of these roles simultaneously. These tools make it possible to measure the role of the CIO even though they need to perform different roles compared to past. This approach reduce the limitation of CIOs' leadership when IT itself faces with role limitation such as commoditization or standardization by outsourcing or failure with great costs. In this regard, following sections, we suggest a leadership role framework for measuring the IT leadership effectiveness.

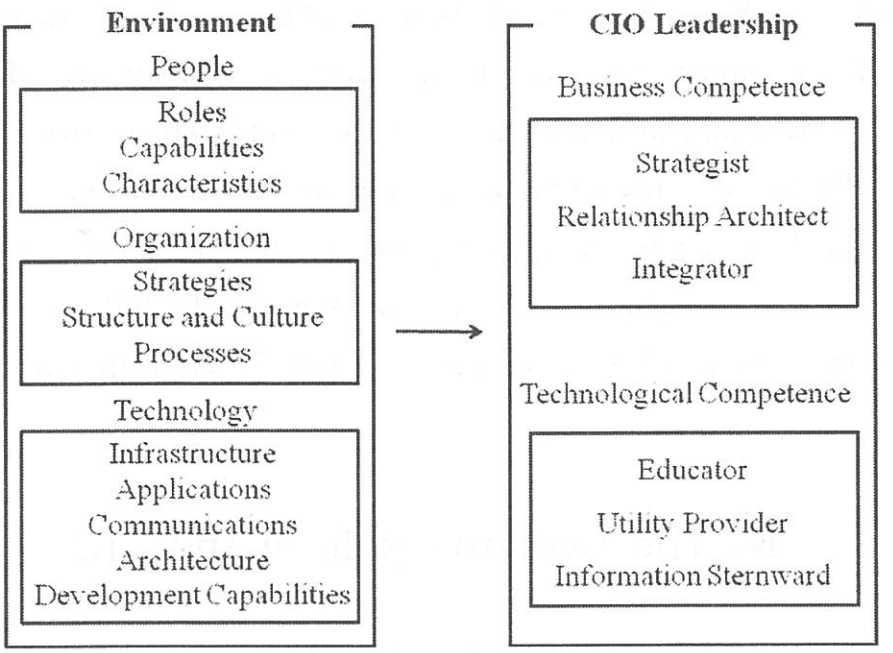
Ⅲ. The Framework for CIO Leadership

We establish a research model based on Mintzberg's managerial roles as shown in 〈Figure 1〉. This research model provides guideline in CIOs' roles. Environments suggested by Hevner et al. (2004) are composed of people, organization and technology (Silver et al., 1995). These components would make contingent situation and influence on the CIO leadership. In this context, we distinguish the leadership competence by their characteristics. "Business competence" consists of strategist, relationship architect and integrator, "Technological competence" consists of educator for IT knowledge and utility provider and information sternward.

Business competences emphasize that CIOs also require fulfilling managerial role to enhance IT effectiveness. Similar to Mintzberg's entrepreneur role, a "Strategist" needs to deal with the organizational desire such as getting valuable opportunities for IT-based innovation and business process redesign

(Smaltz et al., 2006). "Relationship Architect" is similar to Mintzberg's liaison role. In early 1990s, the biggest change in role of the CIO is related to the interpersonal skill. The extension of IT related partners makes CIOs perform not only the information provider but also the relationship architect to make persuade others (Gupta, 1991). Furthermore, CIOs fulfill "Integrator" role which provides leadership in the enterprise-wide integration of processes, information, and decision-support as digital options for the business (Sambamurthy et al., 2003).

〈Figure 1〉 Framework for CIO Leadership Competences



Technology competences focus on the knowledge of information system. First, "IT Educator" is an IT missionary who provides insight and information of key information technologies. CIOs can help the CEO or other executives to judge about the business value of IT appropriately by education. The role of the CIO as an "Information Sternward" who suggests insights and understanding about key information technologies is also critical. The information sternward

role refers to the desirability of an organizational sternward for high quality data and operationally reliable systems (Smaltz et al., 2006). "Utility Provider" is similar to monitor and resource allocator in Mintzberg's managerial roles. Processing information is a key part of the manager's job which is building, developing and taking responsive IT infrastructure services. These informational roles are particularly focused on knowledge of CIOs.

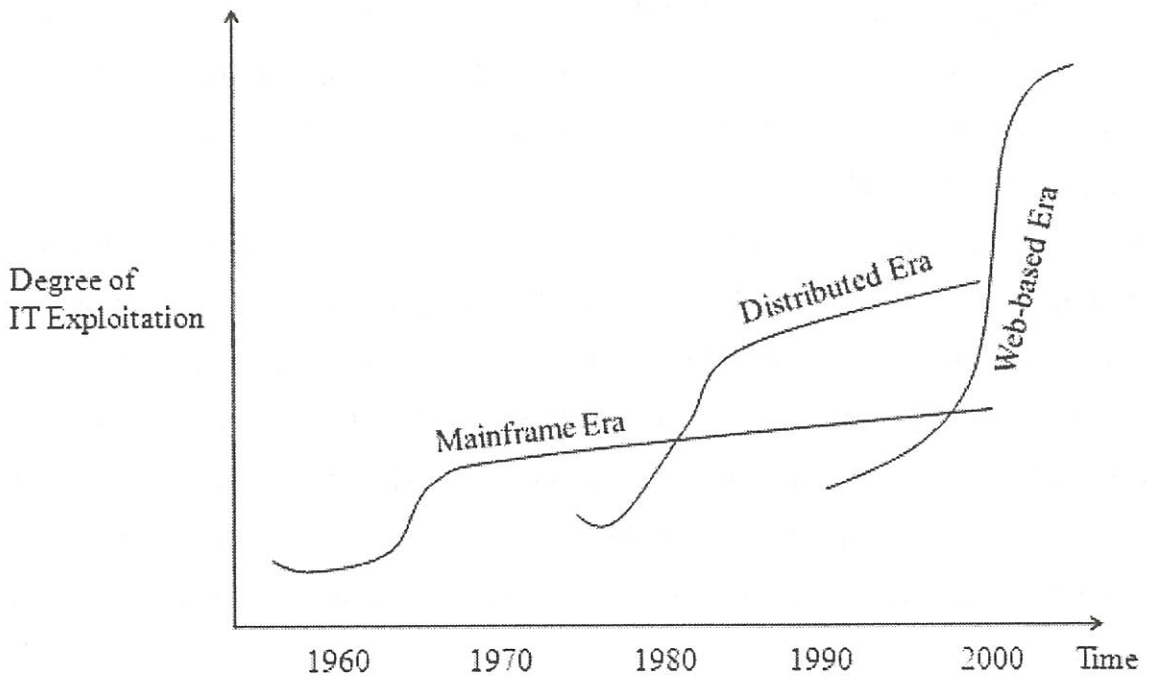
Environment will have an effect on the role of the CIO with many ways. For example, Ross and Feeny (1999) argue that CIOs' roles have been changed with technology and other elements. The point of their paper is that the evolution of roles is not directly related to the technology but evolved through interaction of three forces such as executive attitude, applications portfolio and dominant supplier. If companies outsource information technology according to their strategies, CIOs would perform *strategist* role which emphasizes the business knowledge. Therefore, this framework could find required roles related to the environments. In order to examine the role of the CIO, there are continuous efforts to observe the changes in IT environment. In following section, we review the changes in CIO leadership role with IT environments.

Ⅳ. The Evolving Role of the CIO

The role of the CIO was examined through several steps related to the evolution of IT environment for a better understanding of the potential sources of CIOs' value. Ross & Feeny (1999) take three steps of historical perspectives with the evolution of IT environment. Ross & Feeny distinguish the technological eras into mainframe era, distributed era and Web-based era. 〈Figure 2〉 indicates these three eras according to the historical perspectives. They write that "[t]he era is defined by major technological innovations, which provide vastly more powerful opportunities for business applications of IT than the earlier

technologies." In this paper, we reexamine CIOs' role through a historical perspective suggested by Ross & Feeny which could show the evolution of CIO leadership role.

〈Figure 2〉 Major Technical Era (Ross & Feeny, 1999)



4.1 Role of the CIO in mainframe era

Mainframe era mainly covering the 1960s into the early 1980s represented the first application of computing to business (Ross & Feeny, 1999). In this era, the key tasks demanded on IS leaders were to develop new systems and to operate existing ones with a high level of reliability as a technical expert and competent manager (Applegate & Elam, 1992). IBM was a dominant IT supplier of computing products during the mainframe era. Companies had no need to consider other entrance as a counterpart. As a result, CIOs did not feel the necessity of learning business knowledge or impersonal abilities. In

addition, in the mainframe era, interaction between CIOs and members of the top management team did not have a significant influence on IT assimilation. This is because business executives during the mainframe era viewed electronic data processing as a cost cutting tool. Although CIOs have many responsibilities, their main responsibilities are planning long-term IT project as a strategist and reporting IT knowledge and status to CEO or other executives as a reporter (Stephens et al., 1992). In this era, too many companies created CIO position simply by promoting their data-processing manager or information systems manager (Keen, 1991).

Therefore, the role of the CIO was inclined to have in-depth technology knowledge and individual manager had similar technical background. According to the Mintzberg's managerial role, CIOs' roles focus on "informational disseminator" role who informs employees about technology changes in their company or outside IT environment that will affect them and the organization. CIOs might be expected to have special characteristics that make them uniquely qualified for the position. These three roles less emphasize than interpersonal skill in distributed era.

Baschab & Piot (2003) called these technical roles the pre-promotion roles as shown in 〈Figure 3〉. The pre-promotion roles for most IT director candidates consists of managing applications or operations where in-depth technology knowledge is required and where the individual reports to a manager with a similar technical background. Post-promotion skills are of an entirely different nature, with an emphasis on leadership, communication, planning, financial control, selling and management after this era (Baschab & Piot, 2003).

4.2 Changing in role of the CIO in distributed era

Over the time, the increased turbulence, complexity, and competitiveness of organizational environments have made the identification, evaluation, and adoption

〈Figure 3〉 Pre-promotional skills of CIOs in mainframe era (Baschab & Piot, 2003)

Pre-promotion skills
• System requirements gathering and analysis • Programming and systems development • Application design and management • System configuration • Business process documentation • Technology implementation • Systems administration • Systems performance management • Technical, data, and applications architecture design and management • Limited project management • Upward reporting relationship with technical manager

of technological innovations which are critical determinant of organizational productivity, competition, and survival (Gerald et al., 1973; Morgan, 2003). In the distributed era, mainly covering late 1970s to 1990s, an individual computing system decentralized control over organizational computing (King, 1983). Decentralized computing systems with networking technologies led to a new emphasis and emerge on how to integrate decentralized information system and how to manage IT effectively. Over the past two decades, business dependence on IS has grown both operationally, as well as strategically.

Now, information systems are ubiquitous and pervasive across all organizational functions. Sustained competitive advantage requires not the development of a single system, but the ability to consistently deploy IT faster, cheaper, and more strategically than one's competitors (Ross et al., 1995). Therefore, at the distributed era, IT outsourcing emerged as the influential suppliers to overcome the increasing demand for IT applications and the inadequate supply of IT personnel (Kishore & McLean, 2002). The emergence of third party supplier greatly impacts on the IT environment and the role of the CIO. As a result, CIOs have trained interpersonal skill to communicate with strategic

partner in external company.

The role of the CIO extends the sphere of activity. Nontechnology related skills are especially presented as being important to the CIOs. Changing responsibilities demand CIOs to possess strong leadership and interpersonal skill (Applegate & Elam, 1992). However, Applegate & Elam (1992) pointed out that someone who has business background and leadership may not be able to manage the technology nature of the job, while technology-oriented person may lack of business skills. They emphasize that "[t]he ideal candidate for the senior IS position in a company is apparently an individual who has a combination of business, technology, and leadership skills. However, the ideal candidate may be hard to find."

As a result, CIOs have focused on their effort to develop personal ability. With emphasizing the importance of training various leadership roles, researchers try to measure the CIOs capability which influences on the use of IT. 〈Table 4〉 summarized major abilities of CIOs as an independent variable with IT effectiveness. A new and expanded set of responsibility demands that the executive responsible for IT throughout the corporation also possess strong leadership skills, power, and business expertise (Applegate & Elam, 1992).

As shown in Table 4, in the distributed era, CIOs' roles focused on interpersonal skills. Keen (1991) wrote, "IT successes generally reflect an effective relationship between business managers and information services managers and their staffs." Overall, the knowledge of the senior leadership and the interactions among them are expected to have a significant influence on firms' IT assimilation (Armstrong & Sambamurthy, 1999). The other IS research has examined the ways of ClOs' communication with other strategic partners for their relationship such as outsourcing venders (Karahanna & Watson, 2006). Benjamin et al. (1985) emphasized the importance of relationship between CIOs and off-shore outsourcing vendors.

〈Table 4〉 Analysis of CIO Roles in Distributes Era

	Dimension of CIO roles	Description of role	Support from prior literature
Business Competence	Strategist	• Intimately involved in business strategic planning and decisions • Intimately involved in shaping mission, vision • Provide expertise on multidiscipline BPI teams • Direct IT-enabled BPR • Develop metrics that reflect the value of IT to enterprise	Karahanna & Watson (2006), Ross & Feeny (1999), Smaltz et al. (2006)
	Relationship Architect	• Negotiate new IT contract with external vendors • Ensure contracts remain within scope and budget • Executive oversight for all external vendor IT contracts • Interact often with non IT managers throughout organization	Applegate et al. (1999), Earl (1993), Henderson (1990), Karahanna & Watson (2006), Keen (1991), Kotter (1999), Grover et al. (1993), Gupta (1991), Smaltz et al. (2006), Zaltman et al. (1973)
	Integrator	• Integrate enterprise applications • Develop an understanding of the business process	Smaltz et al. (2006), Broadbent & Weill (1997), Feeny & Willcocks (1994), Sambamurthy & Zmud (1997)
Technologic al competence	Educator	• Assist workers in improving its computer literacy • Champion computer literacy • Educate workers on new emerging technologies	Broadbent & Weill (1997), Feeny & Willcocks, (1994), Sambamurthy & Zmud, (1997), Smaltz et al. (2006)
	Utility Provider	• Establish responsive IT department • Establish electronic linkage throughout enterprise • Provide users with adequate IT tools to do their job	Kotter (1999), Smaltz et al. (2006)
	Information Sternward	• Keep key systems operational • Ensure confidentiality and security of enterprise data • Oversight for enterprise data quality • Build skilled IT staff	Gottschalk (2000), Smaltz et al. (2006)

Because of the decentralization of IT in the organization such as personal computer, CIOs need to integrate the usage of IT in the firms for effectiveness. IT achieves the benefits of the standards only if IT works hard to create a path of least resistance around the standard (Baschab & Piot, 2003). Therefore, CIOs' roles include "Integrator" who provides leadership in the enterprise-wide integration of processes, information, and decision-support as digital options for the business (Sambamurthy et al., 2003). Integrator requires understanding the organizational context such as unique business process or the usage of end users. Furthermore, after integrating information or IT for standardization, the overall approach to standard enforcement should be based on creating an environment where the standards are followed because adhering to them is the easiest course of action. Business users have little tolerance for IT standards when they could not understand it which appears arbitrary and capricious.

4.3 Web-based Era

We review the mainframe era and distributed era which are divided according to the historical perspectives. Web-based era, starting for most in the mid 1990s, grow rapidly and contribute to create new organization structures such as virtual organization and global organizations. These complex changes in organization structures led to the change in the roles of managers (Klenke, 1994). However, there are limitations when reviewing the CIOs' leadership role in the Web-based era. Even it is clear that Internet affects CIOs' role, Internet itself is too young to make significant trends in CIOs' role (Ross & Feeny, 1999). Since there is little research that focuses on the CIOs' role in the Web-based era, we suggest continuous research toward leadership competence in the Web-based era.

Especially, in the Web-based era, Internet drives new organizational structure

(Venkatranman & Hednerson, 1998). Researchers need to examine the CIOs' leadership role associated with these new organizational models. For example, if researchers focus on the global organizations during the Web-based era, it might be easy to find different culture in the companies, which causes new problems. Under these circumstances, researchers need to provide how the execution of these roles is affected by national culture, and thus how they must be modified to fit cultural differences. This CIO guide could also incorporate knowledge about how to play different CIO roles in varying cultures. Today's global economy requires CIOs to deal with factors that affect global organizations. These factors include working with business units, customers, and vendors located around the world. This globalization in the Web-based era increases the need for the CIO to be knowledgeable about cultural differences, geographical characteristics, and historical aspects.

V. Conclusion and Future Research

In summary, even CIOs work for IT in the firms, the role of the CIO evolves continuously with the changes in the environments. In the mainframe era, CIOs needed to provide IT knowledge as a specialized senior manager. However, in the distributed era, CIOs were required to possess interpersonal skill to deal with relationship with CEO or outsourcing vendors. Recently, in the Web-based era, CIOs work for global or virtual organizations as a managing the hole. We conclude that IS leadership is more than general leadership because it requires an extra dimension, IS intelligence. We feel that the leadership literature in general perspectives falls short of guiding the technical managers in the right direction as it ignores the dynamic changes taking place in IT. The results have important implications in training CIOs by providing useful clues on a suitable "role model."

Future research should consider a number of extensions to this study. We recommend conducting empirical validation for some prescriptive research (e.g., Karahanna & Watson, 2006; Ross & Feeny, 1999) regarding the effectiveness of CIOs' role. Additional studies are also needed to show how environments could impact on CIOs' role as a leadership to the ultimate success of IS executives in their organizations. It is important to reflect organizational context as a necessity condition which could indicate complex environment. Therefore, this article further argues that continuous empirical research in CIO leadership role associated with environments.

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기술자인가, 리더인가?
CIO의 역할 변화에 대한 고찰

이 새 롬*
박 진 수**
최 민 정***

요 약

2000년대 닷컴 버블의 붕괴와 함께 정보기술에 대한 투자비용에 비해 결과물이 명확하지 않다는 지적들이 잇따라 나오면서 기업은 정보기술의 기능을 의심하기 시작하였다. 정보시스템의 투자위험성을 줄이고 이를 보다 효율적으로 관리하기 위하여 고용한 최고정보책임자(Chief Information Officer, CIO)의 역할과 리더십의 중요성 또한 점차 간과되어 최근에 들어서는 관련 연구가 미비한 실정이다. 본 논문에서는 기업 내 IT 환경의 변화가 CIO의 역할에 영향을 미친다는 관점에 따라 리더십 역할과 환경과의 관계를 나타낸 프레임워크를 제시하고, 이를 바탕으로 현재까지의 CIO 리더십 역할의 변화를 탐색하였다. 첫째로, 문헌연구를 통해 리더에게 기대되는 다양한 역할을 리더십 역할(Leadership Role)이라 정의하였다. 둘째로, 정보기술이 발전함에 따라 CIO가 이행해야 하는 리더십 역할은 어떻게 바뀌는지를 체계적으로 알아보기 위해 리더십 역할 모델(Leadership Role Model)을 구축하였다. 마지막으로, 위에서 제시한 모델을 바탕으로 정보시스템의 변천과정을 시계열적으로 분석하여, 각 시대마다 CIO에게 요구되는 리더십 역할은 어떤 것이 있는지 살펴보았다.

* 서울대학교 경영대학 석사과정
** 서울대학교 경영대학/경영전문대학원 교수
*** 서울대학교 경영대학 석사과정