Information Technology Governance in Information Technology Investment Decision Processes: The Impact of Investment Characteristics, External Environment, and Internal Context

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Abstract

This study identifies governance patterns for information technology investment decision processes and explores the impact of organizations' investment characteristics, external environment, and internal context on the shaping of those patterns. By identifying the lead actors of the initiation, development, and approval stages in IT governance, the patterns of 57 IT investment decisions at 6 hospitals are analyzed. The results reveal seven IT governance archetypes: (1) top management monarchy, (2) top management–IT duopoly, (3) IT monarchy, (4) administration monarchy, (5) administration–IT duopoly, (6) professional monarchy, and (7) professional–IT duopoly. Each archetype is analyzed by taking into account four specific factors: IT investment level, external influence, organizational centralization, and IT function power. This study makes several contributions to IT governance theory and practice. First, IT governance is reframed to include pre-decision stages, highlighting the importance of participants other than the final decision maker. Second, the variation of IT governance archetypes suggests that even when top management approval is required, the IT department may not play a key role in the IT investment decision process. Third, governance of the pre-decision initiation and development stages is found to be jointly affected by several contextual factors, suggesting that the allocation of final decision rights is only a part of IT governance. While decision rights may be allocated by the organization a priori, the actual patterns of IT governance are contingent on contextual factors. It is important to understand how IT governance archetypes are shaped because they may affect desired outcomes of IT investments.

Keywords: IT investment, decision-making process, IT governance, centralization, IT function power, external environment, investment characteristics, monarchy, duopoly
Introduction

Given the significant impact that information technology investments and decision-making processes have on organizational success (Dean and Sharfman 1996; Devaraj and Kohli 2003), it is imperative that we understand how organizations govern their IT investment decisions. Weill and Ross argue that “effective IT governance is the single most important predictor of the value an organization generates from IT” (2004, pp. 3-4). Although research regarding information systems structure and IT governance (e.g., Brown 1997, 1999; Brown and Magill 1994, 1998; Clark et al. 1997; Sambamurthy and Zmud 1999) greatly contributes to our understanding of how organizations control IT investment decision making, prior studies mainly focus on decision rights rather than the governance of pre-decision activities. In this study, the IT investment decision process is studied in its entirety, from pre-decision stages to the final decision.

Based on capital investment research, an IT investment decision can be described as a complex, multistage process involving a variety of actors at different levels within a firm (Bower 1970). An IT investment decision process consists of a sequence of actions that begins with the identification of an IS-related crisis, problem, or opportunity and culminates in the approval of an IT project (Boonstra 2003). During this process, various organizational actors can exercise their power, intentionally or unintentionally, to influence the final decision. To ensure alignment with the firm’s overall vision and goals, IT governance is the practice that allocates decision rights and establishes the accountability framework for IT investment decisions (Weill and Ross 2004). Since a variety of organizational actors influence the decision-making process, it is inadequate for an organization to only appoint or consider the final decision makers. Instead, all major participants in the decision process should be held accountable for the outcome of IT investments. Therefore, this paper delineates IT governance in terms of responsibilities for each stage of the entire IT investment decision process, considering both the final approval authority and those with pre-decision involvements such as the initiation and development of IT investment proposals.

To date, research that investigates IT governance in light of the staged process of IT investment is rare. The extant IT governance literature focuses on the allocation of decision rights within firms. Based on the distribution of decision rights, IT governance has been categorized into different archetypes such as centralized, decentralized, federal, and hybrid (Brown 1997; Brown and Magill 1994). Weill and Ross (2004) found six IT governance archetypes after studying more than 250 organizations in 23 countries. Although their archetypes are still based on the allocation of decision rights, they point out that IT governance should consider both decision rights and input rights. Input rights determine who have input to a decision (Weill 2004), which are embodied in pre-decision activities such as the initiation, development, and management of the proposal. However, the governance of stages prior to the final decision has not been formally incorporated into IT governance theory.

A stage-based approach to understanding IT governance offers several benefits over the current way of defining IT governance. First, only considering final decision makers masks a large variety of other actors’ involvement in pre-decision stages, thus oversimplifying the complicated IT investment decision process. Second, defining IT governance across stages makes it possible to identify better fits between IT governance types and certain conditions. For example, the governance for low level projects may be more efficient by leaving out top management involvement and the governance for cross-unit investments may result in better outcomes when IT departments play an integrative role in the pre-decision stages. Finally, the stage-based approach helps to reveal potential risks introduced by the involvement of different actors to the IT project. For example, projects governed solely by the IT department may be less aligned with business needs and decisions that are overlooked by or unknown to the IT department. This study contributes to IT governance theory and practice by showing that even when top management approval is required, the IT department may not play a key role in the IT investment decision process and that governance of the pre-decision initiation and development stages is jointly affected by the IT investment characteristics, external environment, and internal context of organizations. Thus, the allocation of final decision rights is only part of IT governance; while decision rights may be allocated by the organization a priori, the actual patterns of IT governance are contingent on contextual factors.

The objective of this study is to increase our knowledge about IT governance of the IT investment decision process by taking a stage-based approach. Specifically, we seek answers to the following two questions: What IT governance patterns exist in the overall IT investment decision-making processes in organizations and how are these governance patterns influenced by their the IT investment characteristics, external environment, and internal context?

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2 We thank the associate editor for providing specific comments regarding these arguments.
It is important to understand how IT governance archetypes are shaped because they may affect desired outcomes of IT investments. For example, involving IT professionals in the decision process tends to increase procedural rationality (Dean and Sharfman 1996), letting functional managers initiate IT investment proposals contributes to the alignment between business needs and IT investments (Bower and Gilbert 2005), and decreasing the number of decision participants can shorten the organization’s response time to external threats and opportunities (March and Olsen 1976). With an enhanced understanding of how IT governance archetypes are shaped by contextual factors, organizations may be able to select the most appropriate IT governance archetype to achieve desired outcomes within specified contexts.

In the following sections this article first justifies the IT governance concept and identifies influential contingency factors based on extant literature. It then presents an empirical investigation constituting field studies of 57 IT investment decision-making processes in 6 Chinese hospitals. Following that, it provides an in-depth analysis of seven IT governance archetypes and proposes five propositions. After discussing theoretical and practical implications, limitations, and future research, the article concludes with a short summary.

Research Framework

Organizational decision making has long been studied by strategy, management, economics, and psychology researchers, resulting in an extensive body of literature. This study is limited to the governance of IT investment decision processes. Taking a theory building approach (Eisenhardt 1989), we justify our concept of IT governance and our selection of factors influencing IT governance in the following sections.

IT Governance in IT Investment Decision Processes

While organizational decision making appears highly complex and unstructured, researchers suggest that decision patterns can be identified and analyzed (Boonstra 2003; Mintzberg et al. 1976). Two approaches have been utilized to describe the patterns demonstrated by organizational decision processes: attribute-based and stage-based (Sabherwal and King 1995). The attribute-based approach contends that the overall decision-making process can be described by a set of key attributes such as analysis, planning, procedural rationality, and politics (Bourgeois and Eisenhardt 1988; Dean and Sharfman 1996; Hickson et al. 1986; Miller 1987; Pettigrew 1973; Stein 1981). Most IS research on IT decisions has taken this approach (Ranganathan and Sethi 2002; Sabherwal and King 1992, 1995). While attribute-based research offers a rich understanding of decision making, it does not delineate responsibilities of organizational actors in the decision-making process. Thus it is difficult to merge this stream of research with the notion of IT governance.

In contrast, the stage-based approach views the investment decision as a complex, multistage process (Bower 1970; Bower 1986; Maritan 2001). Largely influenced by Simon’s (1965) intelligence–design–choice trichotomy, most prior research supports multistage models. Table 1 summarizes different stage models presented in the literature. Despite differing labels, the decision stages are substantively similar. The three-stage models are proposed by early studies that focus on general resource allocation or strategic decision making. A recent capital investments study (Maritan 2001) provides a four-stage decision model. In the initiation stage, organizations recognize, specify, and diagnose the stimuli that trigger an IT investment proposal. In the development stage, the proposal results from activities such as search, design, judgment, evaluation, analysis, and negotiation. In the management stage, the proposal is guided through the organizational hierarchy by a manager who champions the project. Finally, appropriate organizational authorities approve the requested authorization and funding after reviewing the proposal.

The stage-based view of decision processes helps researchers look beyond the final decision makers by focusing on other actors who perform pre-decision activities. It has been widely recognized that IT decisions are affected by not only the final decision maker, but also other organizational actors who initiate, develop, and manage the investment proposals (Bower 1970; Carter 1971; Maritan 2001; Mintzberg et al. 1976; Weill and Olson 1989). Carter (1971) emphasizes the impact of organizational hierarchy in organizational decision making and recognizes the contributions from people with a wide range of expertise across multiple organizational levels to obtain and comprehend all of the information needed for a decision. Weill and Olson (1989) find that the IT investment decision processes can be triggered from the top, middle, or bottom levels within organizations, evolving from the corporate strategy of senior executives (top-down), from divisional goals of middle level managers (middle-down), or from the operational requirements of front-line knowledge workers and specialists (bottom-up). The resulting path reflects the technical, economic, and political complexities within organizations (Bower 1970; Carter 1971; Weill and Olson 1989). Bower (1970) identifies five different levels of decision-
Table 1. Summary of Stage-Models of Decision Processes

<table>
<thead>
<tr>
<th>Model</th>
<th>Stages</th>
<th>Description</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Three-stage</td>
<td>1. Intelligence</td>
<td>Gather information</td>
<td>Simon (1965)</td>
</tr>
<tr>
<td></td>
<td>2. Design</td>
<td>Determine variables and dimensions</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Choice</td>
<td>Selection of a choice</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1. Project definition</td>
<td>Investment projects are identified which will correct discrepancies or prosecute business opportunities</td>
<td>Ackerman (1970) Bower (1970)</td>
</tr>
<tr>
<td></td>
<td>2. Impetus</td>
<td>Projects are moved toward funding</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Authorization</td>
<td>Project funding is secured</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1. Identification</td>
<td>Opportunities, problems, and crises are recognized and diagnosed</td>
<td>Mintzberg et al. (1976)</td>
</tr>
<tr>
<td></td>
<td>2. Development</td>
<td>Search for ready-made solutions or design customized or modified solutions</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Selection</td>
<td>Screen, evaluate, and finally authorize decisions</td>
<td></td>
</tr>
<tr>
<td>Four-stage</td>
<td>1. Proposal initiation</td>
<td>A proposal is initiated in response to a need or problem</td>
<td>Maritan (2001)</td>
</tr>
<tr>
<td></td>
<td>2. Proposal development</td>
<td>Costs and benefits are estimated and alternatives are evaluated</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Proposal management</td>
<td>The investment proposal is guided through the organization</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4. Project approval</td>
<td>Project is approved</td>
<td></td>
</tr>
</tbody>
</table>

makers involved in the investment decision making processes of a large diversified corporation. Hence, previous research corroborates that all of the organizational actors involved in the decision process ought to be taken into account by IT governance research so that a heightened understanding can be achieved.

The responsibilities of various actors at different decision stages represent an organization’s IT-related authority pattern, that is, its IT governance pattern (Sambamurthy and Zmud 1999). According to Maritan (2001), a key actor (or a key actor group) usually plays the leading role at each decision stage. IT governance in this study is delineated by those who initiate, develop, and manage the proposal respectively and who finally approve the investment. IT governance patterns reveal the outcome of rational and political activities because the decision process must be carried out within the governance practices of the organization. Hence, IT governance is viewed as the de facto driver of decision-making processes within organizations. The nature of IT governance is contingent on the nature of the decision and the context in which the decision is made.

In contrast, this study examines the entire decision process and identifies the authority at each stage of the process. This stage-based view assumes that the leading actors can differ at each stage of the decision process. This conceptualization complements previous research and enhances our understanding of IT governance.

Influencing Factors of IT Governance

A comprehensive review of the literature fails to reveal any investigations of IT governance that involve a stage-based view of the IT decision process. Therefore, the identification of influencing factors for IT governance is derived from a variety of sources. After synthesizing prior research (e.g., Boonstra 2003; Brown and Magill 1994; Sabherwall and King 1992; Sambamurthy and Zmud 1999), we propose three broad factors that could affect IT governance: an organization’s IT investment characteristics, its external environment, and its internal context. Their possible influences on IT governance are summarized in Table 2.

Characteristics of IT Investments

IT investments have been categorized according to their complexity or business impact (Irani and Love 2002; Maritan
Table 2. Summary of Influencing Factors of IT Governance

<table>
<thead>
<tr>
<th>Influencing Factors</th>
<th>Impact on IT Governance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Characteristics of IT investments</td>
<td>Because IT investments at different levels have different functional scope and boundary spanning requirements, they will require different organizational actors to govern the decision processes.</td>
</tr>
<tr>
<td>External environment</td>
<td>(1) Competitive pressures force organizations to make quick decisions to allocate IT resources to business areas where intense competition arises.</td>
</tr>
<tr>
<td></td>
<td>(2) Institutional forces such as coercive, mimetic, and normative pressures compel organizations to invest in known information systems which require little involvement of the IT department.</td>
</tr>
<tr>
<td></td>
<td>(3) External resources strengthen the power of the recipients within the organization and encourage them to participate in the investment decision processes.</td>
</tr>
<tr>
<td>Internal context</td>
<td>(1) Organizational centralization which specifies the level of concentration in decision-making rights and reflects the internal pattern of relationships, authorities, and communications inevitably impacts IT investment decision processes.</td>
</tr>
<tr>
<td></td>
<td>(2) IT function power enables the IT department to influence other organizational units through its hierarchical position, information, and expertise. Powerful IT departments are likely to participate in IT investment decision processes.</td>
</tr>
</tbody>
</table>

2001; Turner and Lucas 1985; Weill and Olson 1989). Based on their functional scope and boundary spanning requirements, IT investments can be characterized according to four organizational levels: departmental, interdepartmental, enterprise, and interorganizational. Each organizational level involves a different set of organizational actors and boundary spanning requirements. For example, a financial management system affects primarily the finance department, while an enterprise resource planning system (ERP) spans most departments in an organization, and an electronic data interchange system (EDI) spans organizations. IT investments for each level of organization require different levels of resources and types of capabilities (Venkatraman 1994). Departmental systems are generally localized, providing a certain level of autonomy and requiring minimal interface with more complex business processes. While interdepartmental systems span functional lines or business processes, they are generally less complex than enterprise-level investments. Enterprise systems that integrate all internal business activities and processes often require total business process redesign (Davenport 1998). Interorganizational systems that cross organizational boundaries typically expand business networks and redefine business domains (Venkatraman 1994). Therefore, we would expect IT governance to be affected by the different requirements and scopes of IT investments.

External Environment

An organization’s external environment comprises customers, suppliers, competitors, governments, industry associations, and other social and economic forces which impact organizational governance of decision-making processes (Ansoff 1965; Bourgeois 1984; Hitt and Tyler 1991; Porter 1980). IS researchers find that the changing external IT environment often influences IS-related management processes in organizations (Benamati and Lederer 2001; Benamati et al. 1997; Ives et al. 1980). Based on prior studies, we expect the external environment to impact IT governance patterns based on the resource and capability requirements they impose on an organization.

In this study, we will limit the external environment to include competitive pressures, institutional pressures, and access to external resources. First, sensing competitive pressures from the marketplace, organizations may attempt to improve operational efficiency by investing in information systems that create sustainable advantages over their competitors (King et al. 1989). Prior research shows that competition affects the allocation of IT decision rights within corporations (Brown 1997). For example, Bourgeois and Eisenhardt (1988) find that decision rights tend to be centralized in the
CEO for organizations in high velocity, competitive environments. Second, institutional effects on IT decisions have been supported by conceptual research (Gosain 2004; Swanson 1997; Swanson and Ramiller 2004) and empirical studies (Flanagin 2000; Liang et al. 2007; Teo et al. 2003; Tingling and Parent 2002) in the IS literature. Three types of institutional pressures have been identified by DiMaggio and Powell (1983). Coercive pressures (Pfeffer and Salancik 1978) derive from such sources as government regulations and powerful business partners (Liang et al. 2007). Mimetic pressures cause organizations to imitate their successful competitors to save search costs or avoid first mover risks (Teo et al. 2003). Normative pressures cause people in different firms who share a common set of values and norms to exhibit behavioral similarities in decision making. Institutional theory suggests that organizational governance and decision making are strongly influenced by the need for institutional legitimacy (DiMaggio and Powell 1983; Meyer and Rowan 1977). Thus, we predict that both competitive and institutional pressures will influence IT governance patterns. Third, as open social systems, organizations can obtain critical resources from the external environment to sustain their operations (Astley and Aschdeva 1984). Boundary-spanning organizational actors can obtain critical resources through contracts, grants, and even personal relationships (Jamison 1981; Park and Luo 2001; Peng and Luo 2000; Pfeffer and Salancik 1974). Access to external resources provides organizational actors with power to influence the IT decision process. Thus, external resources are likely to affect IT governance.

Although competitive and institutional pressures and external resources appear different in nature, the logic underlying the mechanism through which they affect IT governance is similar, which can be illustrated by drawing on resource dependence theory (Pfeffer and Salancik 1978). First, competitive pressures focusing on a certain business area tend to impact the power of the department specializing in that area. The organization facing the competitive pressures usually relies on its specialized department that controls the relevant resources (information, knowledge, people, and assets) to cope with the pressures. Consequently, the specialized department will likely dictate the IT investment decision. Second, institutional pressures tend to reduce the IT department’s power. With coercive pressures, organizations are forced to implement a certain information technology. When mimetic and normative pressures arise, organizations either imitate their successful peers or follow the industrial norms in making IT investments. In such situations, the IS solution is known and IT expertise is not a critical resource for decision making. Since IT function power derives mainly from its IT expertise, the IT department is unlikely to govern IT decisions when institutional pressures are a dominant influence. Finally, external resources can strengthen the recipient’s power within the organization. For example, organizational actors who are able to obtain free or discounted consulting or implementation services from IT vendors tend to be heavily involved in the decision process. Because they can substitute external resources for resources controlled by the IT department, they are likely to influence how the IT investment decision is governed. In summary, while the three external influences are different, they all affect IT governance by altering the power balance between IT professionals and other organizational actors.

Internal Context

Organizational centralization and IT function power are two salient internal contextual factors that are likely to influence IT investment decisions. Organizational centralization specifies the level of concentration in decision-making rights and evaluation activities (Fredrickson 1986). It reflects the internal pattern of relationships, authorities, and communications (Thompson 1967) which inevitably impact the decision-making process in organizations (Ackerman 1970; Bower 1970; Burgelman 1983; Gilbert 2002a, 2002b). IS research shows that centralized IT governance is associated with a centralized organizational structure while decentralized IT governance is associated with a decentralized organizational structure (Ahituv et al. 1989; Brown and Magill 1994; Earl 1989; Sambamurthy and Zmud 1999).

IT function power refers to the ability of the IT department to influence other organizational units through its hierarchical position, information, and expertise (Jasperson et al. 2002; Lucas 1984; Saunders 1981). Organizational decision making includes both boundedly rational and political processes (March 1962) which result from the competing objectives and limited cognitive capabilities of decision makers (Eisenhardt and Zbaracki 1992; Simon 1976). Within the governance process, power can be acquired from sources such as hierarchical position, resource control, and specialized knowledge such as IT and medicine (Astley and Aschdeva 1984; Bloomfield and Coombs 1992). In political processes, organizational actors try to exercise their power to achieve partisan goals rather than the organizational goal (Pfeffer and Salancik 1974). In the IS field, researchers have long recognized the important role of power and politics (Jasperson et al. 2002; Markus 1983; Sabherwal and King 1992; Sillince and Mouakket 1997). Power determines the capability an organizational unit has to influence the behavior of other units and the organizational decision process (Lucas and Palley 1987). Rationally, one would expect IT investment decision processes to be led by the IT function. Yet, the political view suggests that
the governance of IT investment decision processes depends on the power of the IT function.

In summary, three broad factors can influence the governance of IT investment decisions. The identification of these factors provides a framework that guides data collection and theory development. Because the IT governance concept in this study differs from that in previous studies, the relationships between these factors and IT governance patterns are yet to be revealed.

Methodology

Research Design

We investigate IT governance in IT investment decision processes by using multiple case studies (Yin 2003). The unit of analysis is a single investment decision. Each case study describes an investment and its related decision-making process. The multiple-case design follows theoretical replication and literal replication logic (Yin 2003). A total of 58 IT investments and related decision processes were studied across six state-owned Chinese hospitals. The selection of six hospitals is intentional, limiting the study to one industry to control for external variance and to allow for more accurate comparisons and conclusions (Yin 2003). Furthermore, the selection of multiple IT investments within each hospital ensures that the research identifies the variety of IT investment decision processes that may exist within a single organization. The selection of research organizations resulted from consultation with an expert panel consisting of government officials and professors in China. As recommended by the panel, multiple research sites were selected to enhance case depth, comparability, and data quality. Six general hospitals were selected according to two variables: location and level of government classification. Two hospitals are located in Beijing, the capital of China, and four hospitals are in Jiangyin, a pioneering city driven by China’s economic reforms. These two cities were selected to account for potential biases associated with geographical, cultural, or contextual differences. The two large hospitals in Beijing are classified at Level III (Hospitals A and B). The four hospitals in Jiangyin include two Level II (Hospitals C and D) and two Level I (Hospitals E and F) hospitals. The selection of three hospital levels assures diversity among the internal contexts of these hospitals. Previous surveys by China’s Ministry of Health (MOH) indicate that the size and location of hospitals significantly influence their information systems development.

This study was conducted with help from the International Center of Medical Administration (ICMA) at Beijing University and the Jiangyin City Bureau of Health (JCBH). The director of the ICMA and the director of JCBH issued explicit permission to conduct the research and made general recommendations regarding hospital site selection. Both parties allowed further research activity arrangements to be made directly with the selected hospitals’ top managers. After the research sites were selected, invitation letters along with necessary background information and the study requirements were sent to the current top manager of each hospital. Upon approval, further arrangements were made regarding visit dates, interviewee contacts, and research procedures. A pilot study was conducted at Hospital A before the formal data collection began.

Pilot Study

The purpose of the pilot study was to familiarize the authors with the research environment, to assess the feasibility of the research, and to provide conceptual clarification of the research design (Yin 2003). The pilot study had an impact on our conceptualization of the investment decision stages. Initially we used the three stages proposed by Bower (1970), which included project definition, impetus, and authorization. However, respondents had difficulty understanding the definitions and impetus stages. One of the top managers of Hospital A said: “Impetus stage? What do you mean?...I’m not sure how to clearly identify such a stage. Actually, we never used this term to talk about our IT investment decisions.”

To avoid further confusion, we tested Maritan’s (2001) four-stage labels: proposal initiation, proposal development, proposal management, and project approval. Even though the respondents were better able to understand these labels, they...
suggested that there was no clear boundary between proposal development and proposal management. In Chinese hospitals, when an investment proposal is being developed, it is being managed by the lead actor as it moves through the organizational hierarchy, usually through informal communication channels. Respondents argued that, since the two stages took place simultaneously, it would cause unnecessary confusion if we defined them as separate stages. The IT manager of Hospital A said: “The [proposal] development process is also a management process. We need to talk to our leaders and keep important stakeholders informed so that the project can be finally approved.” Based on the findings from the pilot study, the proposal management stage was merged into the proposal development stage. Thus, we used three stages to describe IT investment decision processes throughout the subsequent cases (i.e., proposal initiation, proposal development, and project approval).

**Data Collection**

In this study, an IT investment is defined as a hospital’s allocation of financial and/or human capital on a specific information system. Before specific investments could be identified for study, a list of hospital-related information systems was required. From extensive communications with hospital information systems and management experts and a review of publicly available articles and government reports regarding hospital IS development, a list of hospital information systems was compiled.

To investigate IT governance practices, appropriate respondents in the hospitals were identified for each IT investment project. Hospitals are complex organizations encompassing a large number of occupational groups that perform specialized tasks requiring a variety of technical skills (Lyon and Ivancevich 1978). The Chinese human resources management system classifies hospital employees into two categories: healthcare professionals and administrative personnel. Healthcare professionals include doctors/physicians, nurses, pharmacists, lab technicians, and medical department managers (elected from physicians), while administrative personnel consist of top managers and administrative department staff and managers. Administrative departments include accounting, human resources, logistics, personnel records, statistics, medical devices, IT, and library. Previous research indicates that top management significantly influences IT development (Armstrong and Sambamurthy 1999; Chatterjee et al. 2002; Jarvenpaa and Ives 1991) and IT professionals also influence IT investment processes (Weill and Olson 1989). After a short focus group discussion (including the authors, two healthcare human resources professionals, and one healthcare management expert), top management and IT professionals were separated from the administrative personnel category due to their distinct roles in the governance of IT decision making processes. Therefore, top management, IT professionals, the administrative group, and healthcare professionals were identified as four groups of potential participants of IT decisions. The lead actor controlling each stage of an IT investment decision process comes from these four groups.

The data collection of this study started in January 2002 and concluded in June 2004 (30 months). Within the 6 hospitals, a total of 58 IT investments were studied. They included 16 IT investments made during the 30 month study period and 42 investments made before 2002. For the 16 new IT investments, a longitudinal study approach was taken. For the 42 former IT investments, a retrospective approach was applied. All of the 58 IT investments were investigated by gathering data from multiple sources including semi-structured interviews with multiple participants, field surveys, archival records, field notes, site observations, and organizational documents.

To improve the accuracy of retrospective reports, the guidelines recommended by Huber and Power (1985) were followed. First, hospital IT managers and engineers were asked to help us identify all of the IT investments made by their hospital. Then at least one nontechnical person (including top or middle-level managers, administrative personnel, or healthcare professionals) and one IT professional (an IT manager or IT engineer) who were actually involved in each specific IT investment decision process were interviewed. To obtain data about historical IT investment decisions, several retired or relocated hospital presidents, managers, administrative personnel, and healthcare and IT professionals were located and interviewed. Data collected from respondents were compared and, if discrepancies were found, one or more additional respondents were interviewed to resolve the discrepancies.

A case study protocol, containing semi-structured interview questions (Appendix A), procedures, and general rules, was created. A total of 193 respondents were interviewed by the first author. Table 3 shows the number of respondents in different positions and hospitals. The interviews lasted from 10 minutes to 4 hours. Some key informants (such as hospital presidents, IT managers, department managers, and principal IT engineers) were interviewed multiple times. All of the interviews were tape-recorded and transcribed unless the interviewees refused to be recorded. Detailed field notes were

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5 Only those IT investments for which detailed decision-making information was gathered from multiple sources were included in this study.
Table 3. Respondents Interviewed in the Six Hospitals

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top managers (presidents and former presidents)</td>
<td>4</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>5</td>
<td>22</td>
</tr>
<tr>
<td>IT professionals (managers and engineers)</td>
<td>9</td>
<td>9</td>
<td>3</td>
<td>6</td>
<td>1</td>
<td>–</td>
<td>30</td>
</tr>
<tr>
<td>Healthcare professionals (managers and staff)</td>
<td>21</td>
<td>11</td>
<td>12</td>
<td>28</td>
<td>5</td>
<td>2</td>
<td>78</td>
</tr>
<tr>
<td>Administrative personnel (managers and staff)</td>
<td>10</td>
<td>17</td>
<td>11</td>
<td>14</td>
<td>7</td>
<td>3</td>
<td>63</td>
</tr>
<tr>
<td>Total of respondents</td>
<td>44</td>
<td>40</td>
<td>30</td>
<td>53</td>
<td>16</td>
<td>10</td>
<td>193</td>
</tr>
<tr>
<td>Number of IT investments</td>
<td>16</td>
<td>16</td>
<td>12</td>
<td>9</td>
<td>3</td>
<td>2</td>
<td>58</td>
</tr>
</tbody>
</table>

Operationalization of Constructs

This section describes how IT governance and factors of investment characteristics, external environment, and internal context are operationalized (see Table 4). IT governance is measured by a path consisting of the organizational actors who played the leading roles in the three stages of an IT investment decision. Actors can be of four types: top management (TM), IT professionals (ITP), the administrative group (AG), and healthcare professionals (HCP). To identify the lead actors for each decision stage, at least two people who actually participated in that decision process were interviewed (Appendix A). First, the top manager, the IT manager, or the manager of the primary department that used or was using the information system was asked to help us identify the leading actors for each stage of the investment decision. The leading actors were then interviewed to confirm their role. Once the leading actors were identified, paths were constructed to represent IT governance archetypes. For example, an AG–ITP–TM path indicates that the investment proposal was initiated by AG and developed by ITP, and the project was approved by TM.

The IT investment characteristic was measured by organizational level (departmental, interdepartmental, enterprise, or interorganizational) because this categorization captures the functional scope and business impact of the focal IT investment. These data were collected from system specifications, technical reports, and the scope of system usage. For example, a pharmacy automation system at the departmental level was only used by the pharmacy department; a picture archiving and communications system at the interdepartmental level was used by the radiology, outpatient, and inpatient departments; a hospital information management system at the enterprise level was used by most units in the hospital; a telemedicine system at the interorganizational level was used by at least two hospitals. In the data analysis, the departmental level was coded as low and other levels as high.

For the external environment, data regarding external pressures and resources were collected by semi-structured interviews. Respondents (who participated in the actual IT decision-making process) were asked to provide a narrative about what competitive pressures and institutional pressures (mimetic, coercive, and normative) were faced by the hospital and what resources were available to the hospital before and during the decision process. We requested the interviewees to rank the external influences as high or low. Under high external influence, there were strong competitive pressures (e.g., competition for patients), institutional pressures (e.g., regulations, government advocacy, peer influences), or available resources (e.g., funding, free software, free services). Under low external influence, the pressures were weak or the resources were scarce. During the case analysis, we found that even though the external forces were heterogeneous, they had similar effects on IT governance patterns. That is, external forces tended to keep IT professionals out of the decision process. Hence, we used an aggregate variable, external influence, to represent the impact of the external environment (Appendix D). This choice was motivated by the desire for parsimony in theory building research (Eisenhardt 1989). While this aggregate variable may not afford a precise explanation of the phenomena observed, in-depth analysis of specific external forces were conducted as necessary. For example, we analyzed the influence of coercive pressures.

Internal context was measured by organizational centralization and IT function power. First, data regarding centralization were retrieved from interviews with hospital presidents and middle-level managers. Based on interview results and
Table 4. Operationalization of Constructs

<table>
<thead>
<tr>
<th>Construct</th>
<th>Operationalization</th>
<th>Theoretical Support</th>
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<td>IT governance</td>
<td>A path consisting of three organizational actors who played the leading role in the three stages of an IT investment decision. The lead actors can be of four types: top management (TM), IT professionals (ITP), administrative group (AG), and healthcare professionals (HCP).</td>
<td>Bower 1986, Maritan 2001</td>
</tr>
<tr>
<td>IT investment characteristics</td>
<td>An investment’s organizational level (departmental, interdepartmental, enterprise, or interorganizational), functional scope, and business impact.</td>
<td>Boonstra 2003, Venkatraman 1994</td>
</tr>
<tr>
<td>External influence</td>
<td>The overall influence imposed by the external environment on the firm. An aggregate measure is used to capture the influence of competitive pressures, institutional pressures, or available resources.</td>
<td>Brown 1997, Gosain 2004, Swanson 1997, Swanson and Ramiller 2004</td>
</tr>
<tr>
<td>Centralization</td>
<td>The extent to which decision rights are concentrated at the top. Based on interviews and hospital organizational charts, the degree of centralization of each hospital was determined (Appendix B).</td>
<td>Ahituv et al. 1989, Brown and Magill 1994, Earl 1989, Sambamurthy and Zmud 1999</td>
</tr>
<tr>
<td>IT function power</td>
<td>The extent to which the IT department can influence other organizational units. IT function power was measured by (1) the IT manager’s hierarchical distance from top management; (2) the IT manager’s and staff’s self-perception of power; (3) the role of IT in the hospital strategy; and (4) the administrative personnel’s and medical professionals’ perceptions of the IT department’s influence (Appendix C).</td>
<td>Jaspersen et al. 2002</td>
</tr>
</tbody>
</table>

hospital organizational charts, the degree of each hospital’s centralization was determined (Appendix B). Second, IT function power was evaluated by data from multiple sources. Given that functional power can fluctuate over time, we evaluated IT function power in each hospital at different time periods. Specifically, (1) organization charts were reviewed to determine the IT manager’s hierarchical distance from the president; (2) managers and employees in the IT department were interviewed to elicit their self-perception of their power; (3) top management members were interviewed regarding whether IT was incorporated into the hospital strategy; and (4) administrative personnel and medical professionals were interviewed about their perceptions of the influence of the IT department in the hospital. We coded IT function power as high when the IT manager reported directly to top management, had close personal relationships with top managers, or when IT development was part of the hospital’s strategy. Otherwise, it was coded as low (Appendix C). Our evaluations were validated by the interviews.

6The six hospitals we studied are state-owned. Besides the organizational structure, a hospital also has a Communist Party structure. The charts of both structures were drawn by top management of each hospital during interviews. The organizational structures were validated with middle-level managers.

Data Analysis Procedures

Our tape recordings represented over 150 hours of interviews. One author translated each interview into English while another author verified each translation before putting it into the raw material database. All documents collected from the six hospitals that related to IT investment decision making were entered into the database as well. Data reduction, data display, and conclusion drawing and verification were concurrently carried out in data analysis, as suggested by Miles and Huberman (1994).

First, the information regarding each IT investment was put into a Microsoft Word file. Two of the authors independently coded the IT governance patterns in these decision processes using a common coding scheme. For each decision process, a path linking the three leading actors at the three stages was drawn to depict the IT governance pattern. The two authors compared their paths and agreed on 53 of the 58 patterns. The 91.4 percent inter-rater agreement was compared to the chance classification accuracy of 88.9 percent using Cohen’s (1960) kappa. The kappa measure (0.889, with a standard error of 0.047, producing a z-score of 18.915) showed that the agreement between the two authors was significantly greater...
The labels for the governance archetypes are clearly inspired by the terminology of Weill and Ross (2004). They use monarchy and duopoly to describe some of the IT governance archetypes they find, such as business monarchy, IT monarchy, and IT duopoly. Generally consistent with Weill and Ross, monarchy is used in this study to identify one-party control and duopoly to represent two-party arrangements. However, our conceptualization of these terms differs greatly from that of Weill and Ross. While they primarily describe the pattern of decision rights in a broad array of IT decisions, we focus on IT investment decisions across three decision stages, specifying the lead actors who are responsible for the initiation and development stages in addition to the final decision makers. Furthermore, since this study focuses only on IT investment decisions that require top management approval, our IT governance archetypes are significantly moderated by governance across the initiation and development stages. Hence, the difference between the terminology used by Weill and Ross and by this study is clear. For example, by IT monarchy, Weill and Ross mean that IT professionals make the IT decisions, whereas we mean that IT professionals initiate and develop the proposals and top managers approve the decisions. The seven archetypes are revealed in Table 5.

**Top Management Monarchy**

The TM–TM–TM path is named as top management monarchy because top management controls every stage of the decision-making process. Eight investments used this governance archetype: four in hospital C, one in hospital D, two in hospital E, and one in hospital F. These four hospitals had similar organizational and communist party structures which had remained highly centralized. All power stayed at the top management level of the organization. The IT manager’s position in the organizational hierarchy was low, with some hospitals still lacking an independent IT department. External pressures and resources were high during the decision processes. The external pressures emerged from market competition and coercive forces from the government advocating the use of IT in healthcare. The external resources were provided by IT vendors who sought to expand their market by selling their systems to hospitals at low prices or offering free installation and training services. The eight IT investments include high level interdepartmental, enterprise, and inter-organizational investments.

As an example of the TM monarchy archetype, we describe a hospital information system (HIS) investment decision process in Hospital C. The decision process started with a top management member being approached by a sales representative of a local HIS vendor. The vendor was eager to increase its market share. Hospital C is a traditional Chinese

(p < 0.001) than the agreement expected due to chance alone (Bakeman and Gottman 1986). Regarding the five discrepancies, agreement was achieved between the authors after referring back to the raw material database.

Second, for data display, the IT investments in each hospital were numbered and plotted in a chronological order in a Microsoft Visio file. A Microsoft Excel workbook was created consisting of 11 spreadsheets: one summary sheet, one characteristics of IS category sheet, six hospital IT investment decision making category sheets, and three influencing factors analysis sheets.

Finally, we constructed chains of evidence describing the IT governance of each IT investment decision. We aggregated the IT investment decision processes that were similar and grouped them according to the four contextual factors (IT investment level, external influence, centralization, and IT function power) to allow relationship patterns to emerge. We also created a decision tree graph to reveal relationships between IT governance and the interaction of the four contextual factors. Following Eisenhardt (1989), we took an iterative approach to validate relationships between IT governance archetypes and the influential factors. Several tentative propositions were developed to describe the relationships. These propositions were then used to explain the data from various cases by using the replication logic (Eisenhardt 1989). If the propositions did not fit the data, we revisited the tentative propositions and applied them back to the data again. This process continued until we no longer found counterevidence to the propositions.

**Results of Analyses**

**IT Governance Archetypes for IT Investment Decisions**

In this study we focus on IT investments that need top management approval. The data of the 58 IT investments are summarized in Table 5. One investment was excluded because it was approved by the IT department. Thus, our analysis is based on 57 TM-approved IT investments. The IT governance patterns are described in terms of the lead actors (TM, ITP, AG, or HCP) governing each of the three stages: initiation, development, and approval. As a result of this stage–actor framework, we observe the following seven IT governance archetypes: top management monarchy (TM–TM–TM), top management–IT duopoly (TM–ITP–TM), IT monarchy (ITP–ITP–TM), administration monarchy (AG–AG–TM), administration–IT duopoly (AG–ITP–TM), professional monarchy (HCP–HCP–TM), and professional–IT duopoly (HCP–ITP–TM).
Table 5. IT Governance of IT Investment Decision Processes

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**Note:** TM = Top Management; ITP = IT Professional; AG = Administration Group; HCP = Health Care Professional

medicine (TCM) hospital. The vendor had never installed its system in TCM hospitals before, so it was very interested in Hospital C and presented an attractive offer to the hospital’s top manager. The total price was 30 percent cheaper than the regular price of the HIS. Perceiving this offer as a valuable external resource, the hospital’s top management tried to make a quick decision to seize the opportunity. As a result, they developed a proposal to verify that a HIS system was needed and approved it.

**Top Management–IT Duopoly**

The top management–IT duopoly archetype represents the TM–ITP–TM decision path, in which top management initiates the investment project and IT professionals develop the proposal. With 22 investments following this pattern, it is the most popular IT governance archetype. Eleven cases were found in Level III hospitals (five in Hospital A and six in Hospital B), and another 11 in Level II hospitals (five in...
Hospital C and six in Hospital D). These hospitals were larger and less centralized than Level I hospitals (Hospital E and F). Independent IT departments had existed in these hospitals for over 10 years. The investments resulting from this archetype were high level (interdepartmental, enterprise, or interorganizational). Only four of the IT investment decisions were made when external influences were high as a result of market competition or government advocacy.

Hospital B demonstrated an example of TM–IT duopoly. One of the objectives of China’s national “863 Plan” was to encourage the independent development of large-scale hospital information systems. The central government sought to use pilot hospitals to demonstrate how this objective could be accomplished. The chosen hospital would be subsidized by government funding. In 1995, the president of Hospital B brought this information to other top managers. Interested in becoming a pilot hospital, Hospital B’s top management discussed with its IT manager the feasibility of developing a large-scale HIS in-house. To create a reasonable investment proposal, the IT manager and his subordinates surveyed several key departments including the outpatient, billing, pharmacy, and accounting departments. The IT department then prepared a proposal and submitted it to top management for approval. Hospital B eventually became a pilot hospital and developed its own HIS.

**IT Monarchy**

The ITP–ITP–TM decision path is called IT monarchy, suggesting that IT professionals initiate and develop proposals with top management making the final decision. Five investments followed this path: three in Hospital B, one in Hospital C, and one in Hospital D. Hospitals C and D had relatively high centralization and Hospital B had low centralization. The investments generally required that IT professionals were in a high power position during the investment period. They occurred at each of the four investment levels.

We provide an example of this archetype as follows. In 1988, Hospital D’s president sent the hospital’s prospective IT manager to Beijing to pursue a college degree in bioinformatics. The person graduated in 1992 and returned to Hospital D to supervise IT management. Ambitious to show his talents, he planned to roll out an IT project. While computer utilization in Chinese hospitals was at a low level then, pricing information systems were being hyped for hospitals. Since there was no commercial pricing software available, the IT manager decided to internally develop a pricing information system. He discussed this idea with the president and proposed building a system based on the FoxBASE database. The president approved the project.

**Administration Monarchy**

The administration monarchy archetype represents an AG–AG–TM decision path. There were 13 such IT investments across all six hospitals: six in Hospital A, two in Hospital B, two in Hospital C, and one in each of Hospitals D, E, and F. In these cases, the IT department possessed relatively less power than the administrative departments involved. Even when the IT department had high power, the administration monarchy archetype still prevailed if external pressures (government coercive pressures) supported the administrative departments. Investments showing this archetype were all found at the low departmental level.

An example of administration monarchy is described as follows. Hospital A adopted a finance management system in 1993 and a large-scale HIS in 1997. To improve system integration, it adopted another financial management system from the HIS vendor in 1998. In 2002, the government enacted new financial regulations which greatly changed content and format requirements of financial reports. Since the existing financial management system could not adapt to this regulatory shift, the finance staff spent much time recalculating items and reformatting reports. Concerned about this regulation–system mismatch, the finance manager suggested adopting a new finance management system and started preparing a proposal for the IT investment in spite of the IT manager’s opposition. The finance manager eventually proposed purchasing a best-of-breed finance system and got the hospital president’s approval.

**Administration–IT Duopoly**

The administration–IT duopoly governance archetype denotes an AG–ITP–TM decision path, indicating that the investment proposal is initiated by administrative department managers, developed by IT professionals, and approved by top management. Three investments demonstrated this archetype: two in Hospital A and one in Hospital B. Hospitals A and B were less centralized and their administrative departments had autonomy in choosing their own information systems. IT function power in these hospitals was also relatively high, enabling IT professionals to govern proposal development activities. These IT investments took place exclusively at the low departmental level to address local administrative needs and experienced low external influences.

An example of administration–IT duopoly can be found in Hospital A. Hospital A initially arranged doctor appointments for patients by phone, an error-prone and inefficient process that required appointment data to be manually entered into the
HIS. The outpatient department personnel wanted a new outpatient appointment management system that included an automated telephone appointment function to electronically communicate with the HIS, but they lacked the expertise to propose such an investment. They sought help from the IT department, which took the lead in developing the proposal. The proposal was approved in 2000.

**Professional Monarchy**

The professional monarchy archetype depicts the HCP–HCP–TM decision path, where healthcare professionals initiate and develop IT investment proposals. Two investment decisions in Hospital A and one in Hospital B followed this governance archetype. These investments were related to medical practices, necessitating the governance by HCP in initiating and developing the proposals. Hospitals A and B were relatively decentralized. External pressures and resources helped HCP circumvent IT involvement in developing the proposals. In one case the IT investment imitated other successful hospitals and in two cases the development of the proposal was actually completed by IT vendors who worked closely with HCP. The IT investments showing this archetype were all at the departmental level.

An example of professional monarchy is provided as follows. In 2000, Hospital A installed a laboratory information system (LIS). Constant usage problems required the lab’s HCP to frequently contact the LIS vendor for technical support. In 2002, the LIS vendor developed a new version of the LIS. After comparing the new LIS with the older version and other types of LIS on the market, the HCP concluded that the new LIS was their best option. The HCP developed a proposal which was approved by the top management. Since the LIS vendor promised to provide implementation services, IT professionals were not directly involved.

**Professional–IT Duopoly**

We use professional–IT duopoly to describe the HCP–ITP–TM decision path. There were three such investments: one in Hospital A and two in Hospital B. Since the need for these investments stemmed from healthcare practice, healthcare professionals initiated the proposals. The development stage involved IT professionals due to the technological complexities of the project. With the degree of centralization in Hospitals A and B being low, IT function power was high and external resources were unavailable, requiring healthcare professionals to rely on IT professionals to develop the proposals.

Hospital A provided an example of professional–IT duopoly. In 2000, Hospital A’s pharmacy department suggested modifying the pharmacy automation system (a module of the hospital’s HIS implemented in 1998) because its pharmacists hated using keyboards to input data. The HIS was managed by the IT department and only IT professionals understood the technical complexities associated with its modification. Hence, the IT department developed a touch screen system proposal, in collaboration with the pharmacy department which was approved by the top management.

**Factors Influencing IT Governance Archetypes**

To examine how IT governance is affected by the investment characteristics, external environment, and internal context, we group the 57 decisions by each influential factor. Analyzing the factors independently helps to illustrate how each factor influences organizational actors’ participation in different decision stages. This is similar to testing the main effects of the factors. Moreover, we take a multiple contingency perspective to analyze the joint impact of these factors on the emergence of different IT governance archetypes. This is analogous to testing the interaction effects of the factors.

**Influence of IT Investment Characteristics**

IT investments that span organizational boundaries (e.g., interdepartmental, enterprise, and interorganizational) are considered to be high level. High level investments are generally more complex, demand more resources, and have larger organizational impacts and more uncertainties than low level ones (departmental). As Table 6 shows, TM initiated the majority of high level investments (30 out of 34) as compared to low-level investments which were all initiated and controlled at the departmental level (AG, HCP, and ITP). The TM involvement can be explained in terms of management perspectives (Cyert and March 1963). Top managers are better equipped to identify opportunities and discern the requirements of boundary-spanning investments. In contrast, departmental managers and specialists are mainly concerned with local performance needs based on their current experience within their specialized areas. In addition, TM has control of more resources and can take greater risks than lower-level managers (MacCrimmon and Wehrung 1986).

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7From Table 5, hospital type appears to be a factor influencing IT governance archetypes, yet our data analysis shows that its influence is mediated by centralization and IT function power. Specifically, Level III hospitals have lower centralization and higher IT function power relative to Level I and Level II hospitals. Analyses based on hospital type cannot provide insights in addition to those based on centralization and IT function power.
Table 6 also shows that ITP tends to govern the proposal development stage for high level TM-initiated IT investments. ITP is less often involved with the development of low level (initiated by AG or HCP) IT investments. A plausible explanation is that high level boundary-spanning investments are more complex and resource intensive and require the integrative capabilities of ITP for proper development of the proposals. Low level departmental investments are more likely to fall within the knowledge domain and expertise levels of AG and HCP, which gives them the power to develop their own IT proposals.

Influence of the Internal Context

Table 8 shows that the involvement of TM in the initiation and development stages is weakly affected by centralization. In hospitals with a high level of centralization, TM initiated the decision process in 19 cases and also governed the development stage in 8 cases. As hospitals become more decentralized, other actors such as ITP, AG, and HCP are more involved in the early decision stages. As Table 8 shows, low centralization allowed 20 of 31 cases in the initiation stage and all 31 cases in the development stage to be governed by ITP, AG, or HCP. These findings suggest that centralization is positively related to TM control and negatively related to ITP, AG, and HCP control of the pre-decision stages.

As shown in Table 9, high IT function power is related to ITP control of the development stage. ITP govern the development stage in 26 of 34 IT investment decisions when IT function power is high, but only govern the development stage in 7 of 23 decisions when IT function power is low. Only when their power is high can ITP initiate investment proposals (5 of 34 cases). Hence, the strength of IT function power predicts the use of IT monarchy and various forms of IT duopoly governance archetypes. TM monarchy and administration monarchy occur most often when IT function power is low.
Table 7. IT Governance Archetypes Grouped by External Influence

<table>
<thead>
<tr>
<th>Stage</th>
<th>High External Influence</th>
<th>Low External Influence</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Initiation</td>
<td>Development</td>
</tr>
<tr>
<td>TM</td>
<td>6</td>
<td>6</td>
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<tr>
<td></td>
<td>2</td>
<td>2</td>
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<td></td>
<td>4</td>
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<tr>
<td>ITP</td>
<td>3</td>
<td>4</td>
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<td></td>
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<td>3</td>
</tr>
<tr>
<td>AG</td>
<td>13</td>
<td>43</td>
</tr>
<tr>
<td>HCP</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

Note: Two TM monarchies and 13 administration monarchies (in bold) are under coercive pressures.

Table 8. IT Governance Archetypes Grouped by Centralization

<table>
<thead>
<tr>
<th>Stage</th>
<th>High Centralization</th>
<th>Low Centralization</th>
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<tbody>
<tr>
<td></td>
<td>Initiation</td>
<td>Development</td>
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<tr>
<td>TM</td>
<td>8</td>
<td>5</td>
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<tr>
<td></td>
<td>11</td>
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<tr>
<td>ITP</td>
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<td>2</td>
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<tr>
<td></td>
<td>11</td>
<td>11</td>
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<tr>
<td>AG</td>
<td>5</td>
<td>5</td>
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<tr>
<td>HCP</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>
An Integrated Perspective of Factor Influences on IT Governance

While independent analyses of the influential factors provide useful insights, some IT governance archetypes require additional analyses and explanations. Since the investment characteristics, external environment, and internal context exist simultaneously, we need to consider their interactions that drive each IT governance archetype. More specifically, we hypothesize that IT governance archetypes are a function of IT investment characteristics, external influence, organizational centralization, and IT function power, and

\[ IT\ governance\ archetype = f(organizational\ level\ of\ investment,\ external\ influence,\ centralization,\ IT\ function\ power) \]

Figure 1 shows how each IT governance archetype relates to the four factors. Based on the data analyses, five propositions are developed as follows:

Proposition 1: TM Monarchy = f(high-level investment, high external influence, high centralization, low IT function power)

As Figure 1 shows, the TM monarchy archetype proves unique to highly centralized organizations that have to deal with high-level investment projects initiated through external influences. This archetype requires top management to take leadership in the investments when the IT department is not strong enough to govern the development stage. TM monarchy is determined by the interplay of all of the four variables and altering any variable could lead to a different prediction. For example, ceteris paribus, if the external influence is changed from high to low, the IT governance archetype will become TM–IT duopoly. This suggests that external influence plays a critical role in determining whether ITP can lead the development stage of high level IT investment decisions in centralized organizations which have an impotent IT organization. Therefore, no one variable should be viewed to have a definite effect on TM monarchy without considering the other three.

Proposition 2: TM–IT Duopoly = f (high-level investment, low external influence)

The TM–IT duopoly governance does not necessarily require a strong IT organization to deal with high-level investments when there is no strong external influence. It seems that the absence of external influence is a critical predictor of this IT governance archetype for high-level investments. As Figure 1 shows, even if IT function power is low, there are seven cases of TM–IT duopoly when the external influence is low. Due to the absence of external pressures or resources, TM either...
lacks motivation to carry out the decision making quickly or has inadequate capabilities of developing the proposal by itself. As a result, IT professionals are appointed to control the development stage regardless of their power levels.8

Proposition 3: The absence of IT Monarchy = f (low IT function power)

IT monarchy has no clear relationship with the investment level, external influence, and centralization, because it occurred under both high and low conditions of these variables. While Figure 1 shows that all five cases of IT monarchy are under high IT function power, high IT function power is not a sufficient condition to predict IT monarchy since other IT governance archetypes also occur under this condition. For example, various IT duopolies and professional monarchy are still possible when IT function power is high. However, IT monarchy was never found when IT function power was low, suggesting that high IT function power is a necessary condition for IT monarchy. IT professionals are not likely to initiate and develop IT investment proposals unless they have power in the organization. However, when they do have high power, it is not guaranteed that they will govern the early stages of investment decisions. Their governance role also depends on other contingency factors.

Proposition 4: Administration Monarchy = f (low-level investment, high coercive external pressure)

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Note: N/A represents “not applicable.” We did not find IT investment decisions under these conditions. It does not mean that these N/A cases are unlikely. It might be due to our unique search settings.
Administration monarchy occurs when administrative departments face strong coercive pressures from governments or supervising agencies to implement departmental IT projects. Coercive pressures in isolation do not predict administration monarchy, because we also found two cases of TM monarchy that occurred under coercive pressures. Our analysis reveals that coercive pressures give rise to a monarchy type of IT governance and the IT investment level further determines the specific archetype—administration monarchy is practiced for low-level investments and TM monarchy for high-level investments. Coercive pressures differ from other external forces in that organizations must comply with externally imposed deadlines. Therefore, they have limited time to perform planning and analysis, which probably explains why IT professionals are not involved in such investment decisions. Based on the investment level, TM or administrative department managers seize control of the initiation and development of investment proposals to expedite the decision process.

Proposition 5: Administration/Professional–IT Duopoly = f
(low-level investment, low external influence, low centralization, high IT function power)

Administration–IT duopoly is used when administrative departments need to improve staff capabilities through the implementation of departmental information systems, while professional–IT duopoly occurs when healthcare professionals need to improve professional capabilities through the implementation of small-scale clinical information systems. Administrative and professional IT investments often arise from local operational needs or problems. There is no strong external pressure forcing such investments, and no external resources readily available that enable non-IT actors to develop proposals independently. These archetypes occur in organizations with a low level of centralization in which administrative and clinical departments are empowered to identify and propose IT investments. High IT function power is necessary for the autonomous administrative and clinical departments to be willing to delegate the proposal development authority to the IT department.

Discussion

This research identifies 7 IT governance archetypes from 57 IT investment decisions in 6 hospitals. Each governance archetype consists of a lead actor at each of three decision-making stages for IT investments: initiation, development, and approval. This stage-based approach to describing IT governance reframes the governance concept as it applies to the IT investment decision-making process. The use of each governance archetype to an IT investment was found to be contingent on the organizations' IT investment characteristics, external environment, and internal context. As the five propositions demonstrate, no IT governance archetype can be sufficiently predicted by a single factor. Even though Proposition 3 only involves one factor (low IT function power), IT function power does not predict the presence of IT monarchy; rather, it predicts the absence of IT monarchy. While prior research has shown that IT governance is affected by multiple contingencies (e.g., Sambamurthy and Zmud 1999), this study extends prior research by showing that the initiation and development stages of IT investment decisions are also influenced by multiple contingencies and are essential elements of IT governance.

The literature argues that ITP should participate in IT investment decisions because of their expertise and ability to make rational choices (Weill 2004). However, this study shows that IT monarchy is rarely used for IT governance. Instead, IT-based duopolies are more common archetypes for ITP involvement, in which ITP play the lead role in completing the development stage. This appears to be a rational role for ITP involvement, since managers are more likely to understand their business and departmental needs, and are likely to initiate IT investment proposals. The findings show that high IT function power is necessary for ITP to control the development stage.

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1 Centralization and IT function power also need to be considered for TM monarchy, as suggested by Proposition 1.

2 Similar to administration monarchy, the professional monarchy archetype is used for low-level investments in which external influence is high but not coercive. Figure 1 suggests that Professional monarchy = f (low-level investment, high external influence, low centralization, high IT function power). We did not make this relationship a formal proposition because only three cases replicated it in a restricted condition (low centralization and high IT function power). Future research is needed to confirm the existence of this relationship.

11 One case of professional–IT duopoly was found for a high-level IT investment: an outpatient information system in Hospital B. Given that the system consisted of a set of modules of a large-scale HIS, a replacement or customization of this system affected its interface to other HIS modules. Therefore, we identified this investment as high-level. However, it could be argued that the system is departmental because it was primarily used by the outpatient department and its interdepartmental impacts were limited. Focusing on its departmental impact, it is justifiable to categorize this investment as low level. There would then be no exception to Proposition 5.
This study also finds that under low external influence ITP are likely to govern the development stage and under high external influence different monarchies tend to occur. However, under high external influence, there are seven cases (four TM–IT duopolies and three IT monarchies) in which ITP govern the development stage. These cases are particularly valuable because most contemporary organizations are surrounded by a turbulent environment and face considerable external influences, so knowing how to get ITP involved in IT investment decisions under high external influence has many practical merits. As Figure 1 shows, the seven cases are influenced by a common set of conditions, suggesting that in a situation in which ITP are not expected to govern the development stage ITP can actually take the lead role if the organization is decentralized and has a strong IT department.

Although high IT function power tends to result in ITP playing a lead role in the development stage, administration or professional monarchies could occur under high IT function power. Figure 1 reveals that strong external influences, especially coercive pressures, contribute ITP losing the lead role in the development stage. This suggests that even with a strong IT department, administrative and professional departments could control the development stage without the involvement of ITP. Combining the preceding discussions, we induce that IT function power and external influence seem to negate each other’s effect on the involvement of ITP in the decision process. While IT function power tends to make ITP the lead actor in the development stage, external influence tends to deprive ITP of their governance role in the decision process.

**Implications for Theory**

This study extends IT governance theory beyond organizational authority patterns of IT decision rights (Sambamurthy and Zmud 1999; Weill 2004). Our findings demonstrate that even when a top management approval is required, a wide variety of IT governance archetypes may be used. In several archetypes, the IT organization is not involved in the initiation or development stages of the IT investment decision process. In addition to the final authority of top management, other organizational actors are found to be involved in IT governance by initiating and developing IT investment proposals. This conceptualization considers the entire decision process and makes it possible to gain insights into how IT decisions are governed in organizations.

The stage-based approach to IT governance used in this study helps to explain the linkage between IT investments and IT performance. It suggests that all of the lead actors of the initiation, development, and approval stages can contribute to the outcome of the IT investment decision. Researchers have long noticed that the decision process is related to the decision outcome (Jamison 1981; Weill and Ross 2004), yet it is unclear which organizational actors are responsible for the investment’s outcome. Our stage-based approach decomposes the decision process and examines the specific influence that each lead actor has on the subsequent decision outcome and ultimate responsibility for implementation. Taking this approach, the influential factors of IT decision processes such as politics and procedural rationality (Dean and Sharfman 1996; Jaspersen et al. 2002; Markus 1983; Sabherwal and King 1992; Sillince and Mouakket 1997) can be revisited to generate in-depth understandings. Research can be conducted to identify the actors who have a political or rational affect on the design of an organization’s IT governance.

**Implications for Practice**

Recent IS literature calls attention to the importance of IT governance. Weill and Ross (2004) point out that IT governance remains a mystery to most organizations. This study finds that multiple organizational actors can be involved in the governance of IT investments, confirms that IT investment decision process consists of multiple stages, and demonstrates how lead actors account for inputs at differing stages of the decision process. The resultant IT governance archetypes identified in this study were emergent in the hospitals, rather than predefined. The hospitals were unaware of the variety of IT governance archetypes being used. If an *a priori* understanding of the IT governance archetypes is achieved, appropriate measures can be taken to assess the variety of decision processes used for IT investments, to adjust IT governance patterns to prevent ill-advised IT investments, and to design effective IT governance for future decision processes. As Weill and Ross (2005) suggest, effective IT governance can limit the negative impact of organizational politics in IT-related decisions and improve organizational performance.

While the nature of this study is descriptive and explanatory, we offer some prescriptive insights regarding the IT governance archetypes based on theory and our observations. First, when there are strong external influences, top management monarchy seems to be appropriate for high level IT investments and administration/professional monarchy appropriate for low level IT investments. Our cases show that these archetypes led to quick decisions. This is consistent with previous research, which suggests that quick decisions are desirable in high velocity environments (Bourgeois and
Eisenhardt 1988), that limited analyses lead to quick decisions (Mintzberg 1973), and that involvement by many participants lengthens the decision process (March and Olsen 1976). The advantage of using monarchies is that the organization can quickly catch opportunities or fix problems, leading to short-term success. The disadvantage is that without inputs from the IT department, the information systems resulting from the quick decisions may cause long-term problems such as the lack of system integration.

Second, given that IT professionals seek to share or reuse existing IT resources among business units and to standardize the organizational IT architecture (Weill 2004), their involvement in IT governance usually incorporates IT-related information and analysis into the decision process, thus enhancing procedural rationality of decision making (Dean and Sharfman 1996). Hence, for business-oriented IT investments, top management–IT duopoly, administration–IT duopoly, and professional–IT duopoly should be practiced. Our cases suggest that the information systems resulting from these archetypes tend to perform well. Prior research shows that knowledge inside organizations is dispersed and should be integrated to improve decision making (Bower and Gilbert 2005; Maritan 2001). Business managers, therefore, should initiate the proposal to specify their business needs and IT professionals should develop the best IT solutions to fulfill those needs. The disadvantage of these duopolies is that conflicts are likely to occur and conflict resolution may slow down the decision process.

Finally, IT monarchy is appropriate for decisions on IT infrastructure that is not highly related with specific business needs. This archetype may not be appropriate for business-oriented IT investments because excessive governance by IT professionals may lead to biased decisions. For example, it is possible that an IT investment governed by IT monarchy is not well aligned with the business needs due to the lack of business-oriented inputs.

**Limitations and Future Research**

This study has several limitations. First, this study is based on IT investments in a specific type of state-owned enterprise (hospitals) in an emerging economy (China). Given its specialized context, the generalizability of its findings to other organizational settings may be a concern. Because heavily regulated hospitals share many characteristics of state-owned enterprises such as top managers being appointed by the government, soft budgets, incentive structures not relating to performance, and inertia to change (Peng 2003; Peng and Luo 2000), our findings are most likely to be generalizable to state-owned enterprises in emerging economies that lack formal IT governance policies. Moreover, it should be noted that in this case research we intend to build theory by using analytical generalization that is distinctly different from statistical generalization (Yin 2003). Following replication logic, the IT governance archetypes and their relationships with the context factors are confirmed in multiple cases, showing strong external validity (Yin 2003). The final product is a theory about IT governance that can be tested in other contexts.

Second, we only analyzed IT investments that were approved by top management. The hospitals included in this study have central budgeting systems and resource allocation decisions have to be approved by top management. This is different from many multidivisional companies that have distributed some budgeting decisions to divisional managers. With more decentralized decision makers, IT governance archetypes will likely be more heterogeneous. Third, the IT investments studied in this research were all approved. We had no access to the projects that were rejected. Therefore, it should be cautioned that we only examined the subset of IT investment decisions approved by top management. Fourth, we did not find the situation involving equal departmental power in the IT investment decisions we studied. Yet it is possible that sometimes two organizational actors have equal power and both play the lead role in a certain decision stage. Finally, we merged the proposal development and management stages because there was no clear boundary between them. This might be due to the nature of our research contexts. Attempts to generalize our findings should be made carefully by keeping this limitation in mind.

This paper offers several ideas for future research. First, research is needed to investigate IT governance patterns by applying the stage-based view in other organizational settings to confirm or improve the findings of this study. IS researchers have called for attention to the different logic of generalizations between case study research and survey research, given that case study research is an important methodology for theory building (Lee and Baskerville 2003). Generalizability of case study research results from continued replication which improves or disproves such theory. Second, while it is important to investigate approved IT investments, it is also important to understand which IT investments do not make it through the decision process and why. Particular attention should be paid to examining how proposal initiation and development affect the organization’s commitment to the project. Finally, although analyzing the relationships between such outcomes and IT governance archetypes is beyond the scope of this paper, it is an important issue and should be addressed by future research. The outcome measures could
include the organization’s IT agility, operational efficiency, or financial performance. Identifying which governance archetype leads to the best outcome will provide useful advice to organizations regarding IT governance design.

Conclusions

This theory-building study investigates IT governance patterns for 57 IT investment decisions in 6 Chinese hospitals. Specifying the lead organizational actors at each of the three stages of the decision process (i.e., initiation, development, and approval), we identify seven IT governance archetypes: top management monarchy, top management–IT duopoly, IT monarchy, administration monarchy, administration–IT duopoly, professional monarchy, and professional–IT duopoly. We demonstrate how these IT governance archetypes are influenced by the interaction of the organization’s IT investment characteristics, external environment, and internal context, thus providing an enriched understanding of the complex phenomena of IT governance. Such an understanding suggests that IT governance should be designed to ensure that every stage of the decision process is properly governed. This study contributes to IS research and practice by reframing IT governance to include pre-decision stages, by revealing that even when top management approval is required the IT department may not play a key role in the IT investment decision process, and by showing that governance of the pre-decision initiation and development stages is jointly affected by several contextual factors. In addition, prescriptive insights are provided regarding fits between IT governance archetypes and specific contextual factors.

Acknowledgments

An earlier version of this paper was presented at the Academy of Management meeting in 2005. We would like to thank the three anonymous reviewers, the associate editor, and the senior editor for their invaluable comments which helped us considerably improve the paper. The associate and senior editors have done an excellent job in guiding us through the challenging revision process. We are also grateful to Carol Brown, Terry Byrd, Sharon Oswald, Daniel Robey, and Jeanne Ross for their helpful suggestions and comments.

References


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Appendix A

Semi-Structured Interview Questions

Lead actors in IT governance
Respondents: top managers, IT managers
1. Could you tell me about the entire process of the investment decision?
2. How was the proposal initiated and developed?
Respondents: various lead actors
1. How were you involved in the decision process?
2. How was the proposal initiated and developed?
3. Did your (your department) take the lead in initiating/developing the proposal?

Organizational structure
Respondents: top managers (e.g., president, vice president)
1. Could you describe your hospital’ organizational structure?
2. Could you describe how a typical capital investment decision was made in your hospital?
3. Did department managers have authority to allocate monetary resources inside their departments?
Respondents: middle level managers, e.g., IT managers, administrative managers, clinical managers
1. Could you describe how a typical capital investment decision was made in your hospital?
2. Did you have authority to allocate money for your department?

IT function power
Respondents: top managers
1. What was your hospital’s strategy? Was IT part of your strategy?
2. How important did you think IT was for your hospital’s development?
Respondents: IT professionals (e.g., IT managers, IT staff)
1. What is the “social rank” of IT department in your hospital?
2. Did you have opportunities to provide inputs to strategic decision making?
3. Do you feel that you were valued by your hospital?
4. How important was your job to other departments?
Respondents: administrative and clinical staff (e.g., administrative managers, pharmacy managers, physicians)
1. Tell me how you think/thought about the role of IT in your hospital
2. What is/was the “social rank” of IT department in your hospital?
3. Do you think that IT is/was an important function for your hospital?
4. How is/was your job dependent on IT?

External influence
Respondents: lead actors at each stage
1. Could you tell me about the entire process of the investment decision?
2. Could you tell me about the hospital’s external environment before and during the investment?
3. Did you think that the external environment strongly influenced the investment decision?
4. Which external factors had the greatest impact on the investment project? Why?
## Appendix B

### Examples of the Assessment of Centralization

<table>
<thead>
<tr>
<th>High Centralization</th>
<th>Low Centralization</th>
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</thead>
<tbody>
<tr>
<td><strong>Example: Hospital E</strong></td>
<td><strong>Example: Hospital A</strong></td>
</tr>
</tbody>
</table>
| Hospital E has a relatively vertical structure and its organizational chart shows that the president directly manages the hospital’s finance department. There is one vice president in charge of hospital medical services and human resources. The Communist Party chart demonstrates that the president and vice president are the only two members in the leadership committee. Decision rights in Hospital E are totally controlled by the two top managers. There are no formal meetings regarding IT investments in Hospital E. The president or the vice president decides the process and outcome of organizational decision making.  

The vice president: “I’m in charge of human resources. Any monetary spending has to be approved by the president….Sometimes he talks with me about capital investments; sometimes he makes decisions on his own.”  

The IT manager: “Any IT investments must be approved by the president….Our responsibilities are mainly technical support and system maintenance.” | Hospital A’s organizational chart shows that its labor division is based on hospital functions. Thus it has a more horizontal structure. Under the president, three vice presidents respectively oversee the hospital’s three core functions: medical services, teaching, and research. Another vice president is in charge of logistics. Hospital A’s decision rights largely locate at the top. However, organizational decisions cannot be made by a single top manager. Management meetings are held regularly where IT investment issues are discussed. Meeting participants include the president, all vice presidents, and some key department managers. Decisions are generally made collectively.  

The president: “We try to give more autonomy to our functional departments….Every department has certain authority to make decisions about its own development.”  

The IT manager: “Our department can spend small amounts of money without a formal application. For example, we can buy hardware devices and software, as long as it’s not too much [money].”  

The laboratory manager: “If our job needs some medical materials or equipment, we can write a report to request them….We can suggest trying new lab procedures. The president encourages us to innovate.” |
Appendix C

Examples of the Assessment of IT Function Power

<table>
<thead>
<tr>
<th>High IT Function Power</th>
<th>Low IT Function Power</th>
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<tbody>
<tr>
<td>Example: Hospital B</td>
<td>Example: Hospital C</td>
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</table>

As shown by Hospital B’s organizational chart (1998-2004) (Figure C1), Hospital B’s information center is under the direct control of the President’s Office. In reality, the IT manager directly reports to the acting vice president, who is also the Communist Party Secretary in the hospital. Our interviews with the IT manager and the acting vice president revealed that they have a very good personal relationship. They have personal exchanges outside work and have published several IT articles together. This information was confirmed by interviews with the president and the finance manager in Hospital B. We also have copies of their articles.

Hospital C’s organizational chart (1996-2002) (Figure C2) shows that the computer center is under the control of the Science and Education department, which is supervised by a vice president. The manager of the computer center is not a middle level manager and does not participate in middle level manager meetings. The vice president has no additional power over other vice presidents. He is only in charge of a branch in the Communist Party structure. It was not found that the computer center manager has a good personal relationship with any top managers. Hospital documents and interviews did not show that the IT development was part of the hospital strategy (1996-2002).

Figure C1. Organizational Chart of Hospital B During the Period 1998–2004
Appendix D

Examples of High External Influences

<table>
<thead>
<tr>
<th>External Influence</th>
<th>Respondent</th>
<th>Example Quotations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Competition-based pressures</td>
<td>Director of the President’s Office, Hospital A</td>
<td>“One of the major reasons we decided to have telemedicine in 1997 was because lots of patients in rural areas don’t have access to the advanced healthcare services provided in big cities. There are many large hospitals in Beijing. We wanted to distinguish our hospital from others by providing telemedicine services to patients so that they can see specialists located in Beijing. That was an opportunity to increase our hospital’s reputation.”</td>
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<tr>
<td>Mimetic pressures</td>
<td>Manager of the Patient Record Department, Hospital A</td>
<td>“Our statistics management system was first developed by [Hospital B]. We became aware that they were using the software when we met colleagues from that hospital in a meeting. They told us how wonderful the software was. We are sister hospitals. We felt we couldn’t lag behind. So we installed the same system they were using.”</td>
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<tr>
<td>Coercive pressures</td>
<td>Project leader, human resources management system, Hospital A</td>
<td>“We are an affiliated hospital of a university. We need to submit our personnel reports to the university which then reports to other higher authorities such as Beijing Bureau of Personnel. These authorities change their reporting systems from time to time, and we definitely need a human resources management system that can be easily upgraded to meet the changing requirements.”</td>
</tr>
<tr>
<td>External Influence</td>
<td>Respondent</td>
<td>Example Quotations</td>
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| Normative pressures     | Manager, Information Center, Hospital B  | “When we had the third China-Japan-Korea joint symposium on medical informatics in Japan in 2001, we noticed that the LIS in Japan’s hospitals had reached a high level. Once the medical testing results were available in the laboratory testing department, all other HIS subsystems could retrieve the results at different terminals.”

“A group of China’s medical informatics professionals, including me, went to Korea to study the PACS development in Korean hospitals. We noticed that some Korea hospitals had implemented hospital-wide PACS systems….We thought these are good practices, and we decided to use these advanced information technologies.”  

<table>
<thead>
<tr>
<th>Government resources</th>
<th>Acting vice president, Hospital B</th>
<th>“In 1995, the central government announced the ‘Golden Health’ project. Its goal was to encourage the development of information systems and networks. This was the main driver of our hospital’s decision to develop the large-scale HIS. This project was the first attempt to develop a large-scale HIS for general hospitals in China….Of course, it’s impossible for us to start building the large HIS without guidance and support from the Ministry of Health and Ministry of Finance.”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vendor resources</td>
<td>Manager of the Science and Education Department, Hospital C</td>
<td>“The vendor of our module-based hospital information system (HIS) never sold its products to a traditional Chinese medicine (TCM) hospital like us before. They tried to use this opportunity to develop their own system tailored for TCM hospitals so that they can have more TCM hospital customers. So they offered us a good deal….The contract between the vendor and us was only 700,000 RMB yuan, including hardware, software, and services, while the original price was at least over one million yuan….All of our leaders thought that 700,000 yuan for a large-scale HIS was a good deal for us and wanted to seize that opportunity.”</td>
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