Innovative Usage Of Information Systems: Does Cio Role Effectiveness Matter?

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Abstract

This research draws upon the upper echelon theory to examine the relationship between role effectiveness of the Chief Information Officer (CIO) and organizational innovative usage of information systems (IS). A large-scale sample survey was conducted in Chinese organizations. Results from 129 CIOs and senior business executives provide robust evidence about the impacts of CIO strategic role effectiveness (i.e., IS strategist and information strategist) on organizational innovative usage of IS. Further, we find the intensity of relationship is much stronger in the organizations that articulate a transform IS vision. However, the operational role effectiveness (i.e., IT manager, integrator, and IS contract oversight) was not found to have significant impacts on organizational innovative usage of IS across all strategic IS visions. The relationship between operational role effectiveness and organizational innovative usage of IS is completely mediated by strategic role effectiveness. Surprisingly, the strongest relationship between operational role effectiveness and strategic role effectiveness occurs only in the organizations that espouse a transform IS vision. This research provides practitioners with a deeper understanding of organizational innovative usage of IS from the perspective of IS leadership.

Keywords: Chief Information Officer (CIO), Innovative Usage of Information Systems, Strategic Role Effectiveness, Operational Role Effectiveness, Strategic IS Vision.
1 INTRODUCTION

Given the significant impact that Information technology investments have on organizational success (Devaraj & Kohli 2003; Xue et al. 2008), most organizations in many countries are making significant investments in IS (Li et al. 2009). While investments in IS in these organizations are multiplied, not all of them are able to use IS effectively in their business activities (Sambamurthy & Zmud 1999; Feeny & Wilcocks 1998; Xue et al. 2008). To date, some researchers propose that the economic and strategic impact of IS are derived from the cumulative effects of ongoing initiatives to innovate its usage (Li et al. 2006). Hence, it is imperative that we understand the most significant factor to predict organizational innovative usage of IS.

In Prior studies, anecdotal narratives, prescriptive writings, and limited empirical research point to one influential factor: IS leadership. Several researchers profiled the salient roles of CIO leadership in facilitating the use of IS in organizations historically regarded for their IS innovation success (McKenny et al. 1995; Chun & Mooney 2009; Chen et al. 2010). Other writers suggest that it is essential to innovation success that CIOs perform well in strategic activities (Synnott 1987; Rockart et al. 1982; Earl 1989; Armstrong & Sambamurthy 1999; Smaltz et al. 2006). However, little rigorous empirical research has examined how CIO role effectiveness influences organizational innovative usage of IS.

How do CIOs contribute to organizational success with the innovative usage of IS? Expectations about these questions have been varied. Furthermore, there is little consensus on the key roles of CIOs. Some researchers argue that CIOs tend to focus too narrowly on technical issues as opposed to how IS can add strategic value to the business as a whole (Kaharanna et al. 2009b; Chen et al. 2010). However, practitioner literature suggests that many CIOs may be experiencing problems performing up to expectations in China (Zuo & Mao 2005; Li et al. 2009). Overall, there are two gaps in the literature about how organizations can use IS innovatively from the perspective of CIO role effectiveness. First, empirical efforts are needed that investigate the multiplicity of CIO roles in firms. Second, research is also needed about what factors contribute to the organizational innovative usage of IS from the perspective of effectiveness of CIOs in these roles. Based on the upper echelon theory (Hambrick & Mason 1984), we seek to fill these gaps in the literature by examining two questions: (1) How does CIO role effectiveness influence organizational innovative usage of IS? (2) How does strategic IS vision moderate the relationship between CIO role effectiveness and organizational innovative usage of IS?

The rest of the paper is organized as follows. In the next section, we develop our conceptual model and research hypotheses. Subsequent section presents details of the research methodology. In the fourth section, the paper presents data analysis procedure and the results of the model testing. This paper concludes with a discussion about our findings and directions for future research.

2 CONCEPTUAL MODEL AND RESEARCH HYPOTHESES

2.1 Conceptual Model

The conceptual model underlying our research draws upon the upper echelon theory which argues that the organization is the reflection of its top manager team (Hambrick & Mason 1984). At present there are two main directions about the theoretical research of top management team based on the upper echelon theory: the first direction is researching the relationship between observable managerial characteristics (such as demographic characteristics and personality traits) and strategic choices in organizations (such as product innovation, marketing expanding, and administrative complexity) (e.g., Finkelstein &Hambrick 1990; Haley & Stumph 1989; Lawrence 1997); The second direction is researching the relationship between unobservable managerial success of strategic leaders (such as
cooperation, behavior integration, effectiveness, leadership, and job performance) of top management team and the enterprise strategy choice (Wu et al. 2008; Chen et al. 2010;). Li et al. (2006) have examined both demographic characteristics and personality traits of the CIO as potential sources of effects on the organizational innovative usage of IT. However, several organizational researchers have noted its inadequacy in teasing out the true explanations for the effects observed in demographic and personality on organizational strategic choice (Wang 2009; Xu 2011). Wu et al. (2008) propose CIO role effectiveness has positive impacts on IT assimilation in organizations. Chen et al. (2010) argue that CIO leadership influence IT contribution to organizational performance. To date, some practical researchers argued that role effectiveness as an influential reflection of CIO’s characteristics can predict organizational innovative usage of IS (Li et al. 2008).

In extant literature, organizational innovative usage of IS is defined as the pioneering exploitation of IS in new tasks and settings, relative to industry practices, with the aims toward developing/improving products and services, strengthening interorganizational relationships with customers as well as suppliers, and enhancing intraorganizational efficiency and effectiveness (Li et al. 2006). CIO role effectiveness is defined as the extent to which the CIO effectively performs his/her most salient roles within a particular organization, particularly as assessed by the CEO and other members of the top management team (TMT) (Smaltz et al. 2006). As such, we define CIO operational role effectiveness as the top business executives’ assessments of the extent to which the CIO leads the IT function to exploit existing IT resources to meet ongoing known business needs. In contrast, the CIO strategic role effectiveness is defined as the top business executives’ assessments of the extent to which the CIO leads the entire firm in exploring IT-enabled innovations and new strategic opportunities. To address this interesting contention, we seek to examine both strategic and operational role effectiveness as potential sources of effects on the organizational innovative usage of IS. Fig. 1 depicts the conceptual model. Our main proposition is that organizational innovative usage of IS varies with the CIO role effectiveness, even after controlling for organizational variables such as the organization’s industry context, organization size, and IS budget relative to revenue.

![Figure 1](image_url)

**Figure 1. Research Model**

### 2.2 CIO Role Effectiveness and Innovative Usage of IS

In prior studies, Some researchers argue that CIO’s salient roles are to be both a technical manager and strategic business leader (e.g., Applegate & Elam 1992; Applegate et al. 1993; Broadbent & Kitzis 2005); Others argue that CIOs should perform well as an operational manager and a strategic executive in the organizations (Karahanna et al. 2009; Chen et al. 2010). Furthermore, they suggest...
that there is a dynamic nature to these roles – that lower function roles such as the technologist and higher-function roles, perhaps more strategic roles, such as innovator or strategist.

Welbourne et al. (1998) argue that employee performance and effectiveness should be linked with the salient role expectations at that firm. Drawing upon their theoretical arguments, some researchers propose that the effectiveness of CIOs should be gauged in terms of their performance against specific roles that are viewed as important at a firm (Smaltz et al. 2006; Chen et al. 2010). Hence, a deeper understanding of CIO multiple roles is needed. As will be discussed later, our operationalization of CIO role effectiveness elicits a variety of roles and adopts a role-based performance perspective.

Some researchers suggest that CIO role effectiveness should be judged according to the specific context, such as organizational IS vision (Smaltz et al. 2006; Chen et al. 2010). Specifically, some organizations are likely to view IS as a strategic asset and place a premium on its internal management and use as a strategic differentiator. Others are likely to view IS as a necessary resource to be managed productively and economically, particularly through outsourcing relationships. Therefore, strategic IS vision should be considered when we examine CIO role effectiveness.

Earl and Feeny (1994) contend that the CIO is personally instrumental in organizational exploitation of IS. This contention is consistent with general leadership theories which propose that effective leaders have performance impacts on organizational innovation. In other words, a high performing CIO is an important reason that the IS function delivers innovative value to the entire organization. Broadbent & Kitzis (2005) concluded that the only way for an organization to develop a competitive advantage via innovative usage of IS is through the development of CIO role effectiveness.

Based on the above discussion, we propose that both CIO strategic and operational role effectiveness have direct impacts on the organizational innovative usage of IS. Since an effective CIO is responsible for both strategic and operational aspects of the IS function, he or she should be credited with all types of value that IS function could contribute to the entire organizational innovative usage of IS. Therefore, we propose:

Hypothesis 1: Organizational innovative usage of IS is positively associated with CIO operational role effectiveness.

Hypothesis 2: Organizational innovative usage of IS is positively associated with CIO strategic role effectiveness.

2.3 Mediating Effects of Strategic Role Effectiveness

To be an effective IS leader, a CIO is expected to excel in both the strategic oriented roles (i.e. strategist) and operational oriented roles (i.e. IS service provider). As summarized by Chen et al. (2010), an effective CIO is both a “facilitator-participant of demand-leader envisioning of IS-based strategic initiatives” and a “supply-leader of an effective IS management”. For example, in the stage of IS implementation, CIO should be effective in operational roles, such as IT manager, integrator, and IS contract oversight. However, CIO should also be effective in strategic roles, such as IS strategist and information strategist in the stage of IS use. CIO’s excellent performance in operational roles will help him or her to be qualified as a strategic IS leader (Broadbent & Kitzis 2005). Therefore, we propose:

Hypothesis 3: The influence of CIO operational role effectiveness on organizational innovative usage of IS is completely mediated by CIO strategic role effectiveness.

2.4 Moderating Effects of Strategic IS Vision

The emerging IS literature suggests that strategic IS vision may be a significant factor moderating some of the above-mentioned relationships discussed earlier. Scott-Morton(1991) describes strategic IS vision as evolving from automate to informate and, finally, to transform. He also defines automate IS vision as the shared, aspired IS targets that organizations use information technology to replace the expensive and undependable human resources. Informate IS vision is defined as the shared, aspired IS
targets that information systems provide TMT or employees with information resources and effectively help them play the controlling and coordinating functions to the full; Transform IS vision is described as the shared, aspired IS targets that information systems are basic methods to fundamentally changed competitiveness and the industry structure in which the company belongs to.

The intensity of relationship between CIO role effectiveness and innovative usage of IS will vary across different IS visions (Doty et al. 1993). When organizations articulate a transform vision, the taken-for-granted reality is that IS as a key driver or an integral element of the organizational value proposition (Armstrong & Sambamurthy 1999). At the polar opposite end, organizations with an automate vision view IS to be an expense that must be carefully managed. In these organizations, most IS initiatives are likely to be shaped as a reaction to key business needs for cost control and cost avoidance (Armstrong & Sambamurthy 1999).

In organizations that espouse a transform vision, the IS-related uncertainties could become amplified because of tighter coupling between IS initiatives and competitive actions. Vitale (1986) provides examples of growing risks and uncertainties when IS assumes the role of a strategic resource. The strategic contingencies theory argues that organizations seek to manage key uncertainties related to innovation in their business environments by according greater power and influence to units or individuals that enable the organization to effectively manage the sources of these uncertainties (Hickson et al. 1971). As these IS-related business risks, uncertainties, and opportunities grow, CIOs are more likely to be recognized as key organizational members and their role effectiveness is expected to be recognized as vital to the organizational competitive success. On the contrary, in organizations that espouse an automate vision, the IS-related uncertainties are likely to be buffered from, or subordinated to, business uncertainties; therefore, the impact of the CIO role effectiveness is not expected to fundamentally impact the organizational innovative success (Armstrong & Sambamurthy 1999).

Overall, we anticipate that relationships between CIO role effectiveness and organizational innovative usage of IS will be strongly coupled in organizations of developing countries that espouse a transform vision; whereas, they could be the weakest in firms that espouse an automate vision. Our expectations have support in the writings of Feeny et al. (1992), who suggest that firms rated as having effective IS leadership possessed a transform IS vision. Similarly, Chen et al. (2010) found that while IS contribution to organizational strategic growth is an outgrowth of an effective IS executives, the importance of this relationship is dependent upon the strategic importance of IS in the organization or the industry. Therefore, we hypothesize that:

Hypothesis 4: The relationship between CIO strategic role effectiveness and organizational innovative usage of IS will significantly vary across strategic IS visions.

Hypothesis 5: The relationship between CIO operational role effectiveness and organizational innovative usage of IS will significantly vary across strategic IS visions.

Hypothesis 6: The relationship between CIO strategic role effectiveness and operational role effectiveness will significantly vary across strategic IS visions.

3 RESEARCH DESIGN

Survey methodology provides a basis for establishing generalizability, allows replicability, and has statistical power (Straub 1989). Our research model is tested by data collected through large scale survey because our research questions were about identifying relationships between two variables (Pinsonneault & Kraemer 1993).

3.1 Operationalization of Constructs

As there were many validated measures in prior studies, we adapted all measures from those validated and used in prior studies.
We first compiled a list of items representing different CIO role expectations on the basis of the emerging literature. Exploratory factor analysis was applied to these ratings to generate the multidimensional structure about CIO role effectiveness. The first exploratory factor analysis revealed two-dimensional factor structure (i.e., strategic role effectiveness and operational role effectiveness).

1) **CIO Strategic Role Effectiveness**: We adapted the variable “strategic role effectiveness” mainly from McLean & Smits (2003) and Smaltz et al. (2006). Based on the items of CIO strategic role effectiveness in the first exploratory factor analysis, we conducted the second exploratory factor analysis. Our second exploratory factor analysis revealed two specific categories of strategic roles as important for CIOs. These roles are: 1) IS strategist; 2) information strategist. We discuss these roles and establish their connections with the literature.

- **IS strategist**: We defined it as a role to be able to partner with TMT to fully leverage the potential value of IT investments. As an IS strategist, which is mapped to the strategist role proposed by Smaltz et al. (2006), CIO is increasingly being called on to take part in organization level strategic planning and decisions, and actually help shape the organization’s mission and vision.

- **Information strategist**: We defined it as a role focused on developing information strategy that aligns with the business strategy. As an information strategist, which is mapped to the informaticist role proposed by Smaltz et al. (2006), CIO assures stewardship of and leveraged use of the organizations data and information resources.

2) **CIO Operational Role Effectiveness**: We adapted the variable “operational role effectiveness” mainly from McLean & Smits (2003) and Smaltz et al. (2006). Based on the items of CIO operational role effectiveness in the first exploratory factor analysis, we conducted the second exploratory factor analysis. Our second exploratory factor analysis revealed three specific categories of strategic roles as important for CIOs. These roles are: 1) IT manager; 2) integrator; (3) IS contract oversight. We discuss these roles and establish their connections with the literature.

- **IT manager**: As described as the role of classic IT support/utility provider proposed by Smaltz et al. (2006), we defined it as a role focused on operating IT function plan effectively and enabling the development and leveraging of IS human capital.

- **Integrator**: We defined it as a role focused on integrating the enterprise systems across the various business units in all organizations with multiple lines of business since many organizations operate in a highly disassociated manner. This role is mapped to the integrator role proposed by Smaltz et al. (2006).

- **IS Contract Oversight**: We defined it as a role focused on oversight of IS contractual arrangements since more organizations outsource portions of their services. This role is mapped to the IS contract oversight role proposed by Smaltz et al. (2006).

3) **Organizational innovative usage of IS**: We developed this scale based on definitions and concepts used in the IS impact literature (Li et al. 2006). Our exploratory factor analysis revealed that IS could be innovatively applied to three main areas: 1) creating/improving product or services; 2) enhancing internal processes, or work design, decision-making; and 3) improving relationships with business partners. We anchored all questions on a 1-to-7 Likert scale (1= conservative; 7= innovative).

4) **Strategic IS vision**: We adapted this scale mainly from Armstrong & Sambamurthy (1999). CIO and other TMT respondents were presented with a brief description of three kinds of IS visions that were derived from Schein (1992).

5) **Control Variables**: We adapted the control variables mainly from Li et al. (2006). We measured organization size by asking respondents to provide the estimated number of employees of their organizations. We measured industry by asking respondents to indicate the industry type to which their organizations belong. We measured IS budget by asking the respondents to indicate the percentage range in which their organization’s IS spending relative to its revenue would fall.

### 3.2 Field Survey

The sampling frame was developed by cross-listing items from Chinese Entrepreneurs Database. This policy resulted in a sampling frame of 960 small to large Chinese firms from seven industries,
including manufacturing (n=41), retail (n=25), finance (n=22), transportation (n=17), utilities (n=13), hospital (n=11), and petroleum (n=10). Data were gathered through a large sample field survey that trapped responses from CIOs and business executives such as the CEO or other formal members of the top management team. Separate questionnaires were developed for the CIO and the TMT members.

Consistent with prior research, the CIO is defined as the highest-ranking IS executive within the organization (Armstrong and Sambamurthy 1999; Grover et al. 1993). Top business executives include CEOs and business executives who are either formal members of the organization’s top management team and/or report directly to the organization’s CEO. To test the validity of our proposed measurement items of constructs, we employed a field survey methodology to collect data for the research instrument. Because the definition of role effectiveness suggests that is assessed by CEO or others of TMT, A dual-stage matched sampling strategy was employed for the distribution of the CIO and business executive surveys.

In the first stage, a total of 2000 surveys were sent to a list of CIOs from organizations headquartered in China with branches covering over 30 provinces including Hong Kong and Macao. The firm’s enterprise system was comprised by CRM and SCM, which were quite mature and have been in use over two years. A total of 376 CIO surveys were returned for a total response rate of 18.8 percent for the first stage survey. In the second stage, a second instrument was sent to the selected top business executives of each organization for which we had received a completed CIO questionnaire. Business executives were contacted within three months of collecting the CIO data. A total of 129 of the 376 organizations returned at least one business executive survey yielding an organizational response rate of 34.3 percent for the second stage survey. Our assessment revealed no issues with regard to response bias. In total, we derived responses from 129 matched pairs of CIOs and corresponding top business executives within the organization. For these 129 firms, the averages of the multiple responses were used in the analysis.

We conducted an exploratory factor analysis using the responses from both the CIO and business executives from the 129 organizations to assess the psychometric properties of the scales in terms of item loadings and discriminant validity. In addition, the results suggest that the CIOs and the business executives are consistent in their responses to the questionnaire.

To assess potential threats of non-response bias, the respondent and non-respondent firms were compared on sales, net income, and the number of employees through data gathered from WIND database, a famous database of Chinese firms. While no significant differences were found relative to net income and number of employees, the sum-sample of responding firms was found to have significantly higher sales revenue than the non-responding firms (t-test=3.01, p<0.01). These comparisons indicate that our study sample might be raised toward lager firms. Further, the distribution of responses across the seven industries was examined. The manufacturing industry was found to be slightly over represented in the respondent group and the utilities industry was slightly under presented.

4 DATA ANALYSES AND RESULTS

Out of the sample of 139 firms where we had complete responses, we eliminated responses of TMT members whose answer was found to be "not well informed" (n=10). These criteria resulted in a final dataset of 129 complete observations.

The Cronbach’s alpha, indicator loadings, and average variance extracted were shown in Table 1. There was adequate reliability because the Cronbach’s alpha of all the constructs exceeded the recommended score of 0.7 (Nunnally 1978). For item reliability, all indicators had loadings greater than 0.707, suggesting that more than 50% of the variance in the construct was explained. All the constructs demonstrated strong convergent validity, as indicated by higher loadings of inter-factors than intra-factor.
The correlation matrix of three dependent variables and the independent variable were shown in Table 2 with the average variances extracted along the diagonals included. The square root of average variance extracted for a construct was larger than its correlations with other constructs, suggesting adequate discriminant validity (Fornell & Larcker 1981). Diagonals versus non diagonals in Table 2 suggested that all the constructs in our model fulfilled this criterion. Furthermore, the results of factor analyses showed that the loadings of items on their corresponding factors were much higher than cross loadings on other factors (see Table 2). Consequently, all the constructs demonstrated adequate discriminant validity.

We examined the structural model to assess explanatory power of the constructs and significance of the paths with Amos Graph 7.0. Hypothesis testing was performed by examining the size and the significance of path coefficients in the structural model. We first ran the model with control variables and they were not significant (p>0.05) so that they were excluded from further analysis.

Table 4 showed final structural model without control variables. The fit statistics for the model confirmed that it fit the data quite well (IFI=0.979, CFI=0.979, NFI=0.961, TLI=0.974, RMESA=0.039). Inconsistent with Hypothesis 1, no support was found for the hypothesized influence of CIO operational role effectiveness on innovative usage of IS. A significant relationship was found between CIO operational role effectiveness and strategic role effectiveness, as well as the relationship between CIO strategic role effectiveness and innovative usage of IS. However, the relationship between CIO operational role effectiveness and innovative usage of IS was not significant. Hence Hypothesis 2 was supported and Hypothesis 3 was supported.

One-way ANOVA tests revealed significant differences in role effectiveness across firms with different IS visions. Table 3 illustrates the means and standard deviations of different constructs for the overall sample and the sub-samples of organizations categorized according to their strategic IS visions. Subsequent pairwise contrast analysis showed that CIOs' strategic role effectiveness was significantly higher in firms with a transform vision. No significant differences in role effectiveness were found among firms with the other two types of IS visions (automate and informate). Similarly, CIO operational role effectiveness was found to be significantly higher in organizations with an informate IS vision.

Hypothesis 4 postulates that effects of strategic role effectiveness on innovative usage of IS will be the strongest in organizations that articulate a transform vision compared with organizations that articulate the other visions. Table 4 reveals that the path coefficient from strategic role effectiveness to innovative usage of IS is highly significant only in the category of organizations with the transform vision or informate vision, but not in the organizations with an automate vision. These results support the assertion of Hypothesis 4 that the strongest relationship between strategic role effectiveness and innovative usage of IS will occur in organizations with a transform vision.

Hypothesis 5 anticipates that the effects of operational role effectiveness will be the strongest on organizational innovative usage of IS in organizations that have a transform vision. However, we did not find support for this hypothesis, since the relationship was not found to be significant in all IS visions.

Hypothesis 6 anticipates that the effects of operational role effectiveness will be the strongest on organizational innovative usage of IS that have a transform vision. Table 4 reveals that the path coefficient from operational role effectiveness to strategic role effectiveness is highly significant only in the category of firms with the transform vision, but not in the organizations with one automate vision or informate vision. These results support the assertion of Hypothesis 6 that the strongest relationship between operational role effectiveness and strategic role effectiveness will occur in organizations with a transform vision.
Items & Cronbach’s α & Loadings & F1 & F2 & F3
Innovative Usage of IS & .871 & & & &
OIUI1 & .861 & .257 & .831 & .125 &
OIUI2 & .795 & .261 & .709 & .484 &
OIUI3 & .934 & .193 & .711 & .253 &
OIUI4 & .912 & .156 & .765 & .466 &
OIUI5 & .767 & .411 & .801 & .087 &
OIUI6 & .821 & .201 & .731 & .165 &
OIUI7 & .780 & .115 & .773 & .430 &
Strategic Role Effectiveness & .840 & & & &
SRE1 & .887 & .134 & .197 & .847 &
SRE2 & .871 & .202 & .289 & .890 &
SRE3 & .722 & .110 & .507 & .742 &
SRE4 & .902 & .009 & .301 & .730 &
SRE5 & .843 & .408 & .007 & .735 &
SRE6 & .727 & .301 & .451 & .731 &
Operational Role Effectiveness & .794 & & & &
ORE1 & .691 & .705 & .406 & .209 &
ORE2 & .790 & .882 & .211 & .419 &
ORE3 & .749 & .743 & .232 & .112 &
ORE4 & .861 & .827 & .457 & .138 &
ORE5 & .704 & .724 & .103 & .170 &
ORE6 & .831 & .879 & .236 & .472 &
ORE7 & .776 & .717 & .505 & .090 &
ORE8 & .801 & .692 & .301 & .502 &
ORE9 & .765 & .804 & .006 & .457 &
Variance (%) & 48.231 & 24.071 & 15.240 &
Cumulative Variance (%) & 48.231 & 72.303 & 87.543 &

Table 1. Results of Convergent and Discriminant Validity

<table>
<thead>
<tr>
<th>Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Organizational Innovative Usage of IS</td>
<td>(.771)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Strategic Role Effectiveness</td>
<td>.643</td>
<td>(.851)</td>
<td></td>
</tr>
<tr>
<td>3 Operational Role Effectiveness</td>
<td>.541</td>
<td>.596</td>
<td>(.767)</td>
</tr>
</tbody>
</table>

Table 2. Correlations among Dependent and Independent Variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>Overall (N=129)</th>
<th>Automate (N=23)</th>
<th>Informate (N=59)</th>
<th>Transform (N=47)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>S.D.</td>
<td>Mean</td>
<td>S.D.</td>
<td>Mean</td>
</tr>
<tr>
<td>1 Strategic Role Effectiveness</td>
<td>3.69</td>
<td>0.68</td>
<td>3.41</td>
<td>0.84</td>
</tr>
<tr>
<td>2 Operational Role Effectiveness</td>
<td>3.71</td>
<td>0.74</td>
<td>3.26</td>
<td>0.82</td>
</tr>
<tr>
<td>3 Organizational Innovative Usage of IS</td>
<td>3.10</td>
<td>0.71</td>
<td>2.86</td>
<td>0.76</td>
</tr>
</tbody>
</table>

Table 3. Summary Statistics on Research Variables
Paths | Path Coefficients
--- | ---
| Overall (N=129) | Automate (N=23) | Informate (N=59) | Transform (N=47)
Strategic Role Effectiveness to Organizational Innovative Usage of IS | .49(.06)* | .20(.21) | .51(.18)* | .67(.07)*
Operational Role Effectiveness to Organizational Innovative Usage of IS | .07(.11) | .08(.27) | .16(.12) | .17(.21)
Operational Role Effectiveness to Strategic Role Effectiveness | .40(.13)* | .21(.17) | .29(.15) | .61(.20)*

Table 4. Results of the PLS Models

Note: Figures in parenthesis represent standard errors; all parameters marked by an * indicate significance at the 0.05 level.

Following are the highlights of our study. CIO strategic role effectiveness has a significant synergistic relationship with the organizational innovative usage of IS. This influence was found to be significant organizations with both a transform vision and an informate vision. CIO operational role effectiveness did not have a significant influence on organizational innovative usage of IS. This influence was not found to be significant across organizations with all IS visions. CIO operational role effectiveness has a significant influence on strategic role effectiveness. This influence was found to be significant in organizations with a transform vision. Furthermore, organizational size, IS budget, and industry type did not have direct impacts on organizational innovative usage of IS.

5 DISCUSSIONS AND IMPLICATIONS

This study examined the impacts of CIO role effectiveness on organizational innovative usage of IS. Further, the study also examined the moderating impacts of strategic IS vision.

5.1 Discussions of Findings

The results of this study throw light on effects of CIO role effectiveness on organizational innovative usage of IS empirically. Specifically, organizations with more effective strategic CIOs will exhibit higher level of innovative usage of IS, while the relationship between CIO operational role effectiveness and innovative usage of IS is not significant. H1 is not supported and H2 is supported, in partial consistence with the upper echelon theory (Hambrick & Mason 1984). These findings demonstrate that we should consider the specific organizational context when we apply upper echelon theory in the context of information system.

Our findings about significant relationship between CIO strategic role effectiveness and innovative usage of IS are consistent with others recommendations (Broadbent & Kitzis 2005; Chen et al. 2010). CIOs who perform well in strategic roles, such as IS strategist and information strategist have many opportunities to participate in innovative activities. In these activities, as an effective IS strategist, he or she drives the business strategy with IS strategy. As an effective information strategist, CIO applies IS to realize the business intelligence, which is the most important innovation activities driven by information.

However, we did not find CIO operational role effectiveness to be a significant influence on innovation usage of IS. The relationship between operational role effectiveness and organizational innovative usage of IS is completely mediated by strategic role effectiveness. This finding is not consistent with others suggestions in extant literature. For example, Wu et al. (2008) argue that CIOs perform well in salient roles including IT strategist, integrator, and IS contract oversight will enhance organizational performance. These results in our study might in part be due to the nature of our sample in China. In China, most CIOs are not the formal members of top management team (Li et al. 2009). They have no opportunities to be involved in organizational innovative activities. Hence, as an operational IS manager, his or her role effectiveness is not the predictor of organizational innovative usage of IS.
We also find that strategic IS vision would present significant differences in impacts of strategic role effectiveness on organizational usage of IS across the organizations in the informatize or transform vision. These results suggest that strategic role effectiveness has robust effects on innovative usage of IS. On the contrary, CIO operational role effectiveness did not have a significant influence on innovative usage of IS across all IS visions. However, CIO operational role effectiveness has a strong influence on strategic role effectiveness only when organizations have a transform IS vision.

5.2 Limitations and Future Research

There are a number of limitations in this paper. First, given the data collection in a Chinese companies and small sample size of our study, we must be careful when we generalize the findings to other contexts. Second, given the fact that data is collected on both independent and dependent measures through self-reporting at a single point in time, this approach might have given rise to common method bias. Especially, our dependent variable is measured through self-reporting response. Finally, we acknowledge that the relationship between strategic role effectiveness, operational role effectiveness, organizational innovative usage of IS, and strategic IS vision may unfold through mutual causation links. Our cross-sectional study does not permit an examination of this rich cycle of mutual causation.

5.3 Theoretical Contributions

Besides addressing the limitations of this paper, there are also several theoretical contributions. First, this is the first study, to the best of our knowledge, that examines CIO role effectiveness in China. We examine the dimensions of CIO salient roles, and find two kinds of strategic roles (i.e., IS strategist and information strategist) and three kinds of operational roles (i.e., IT Strategist, integrator, and IS contract oversight).

Second, this study extends the upper echelon theory by providing the evidence that CIO role effectiveness plays an important role in determining innovative usage of IS. Especially, this paper stress the importance of strategic role effectiveness variables in influencing innovative usage of IS. However, operational role effectiveness is not positively related to innovative usage of IS. The results will significantly enrich this theory by revealing the inside mechanism of how CIO role effectiveness affects innovative usage of IS across organizations in different IS visions.

Third, this study also examines the moderating effects of strategic IS visions marked by diversity or difference in organizations of developing countries. Hence, these findings also contribute to the extant literature by showing relationship is moderated by strategic IS visions.

5.4 Practical Implications

For practitioners, our study reinforces the growing role for CIOs in their firm's senior leadership. Further, such CIOs must perform well in strategic roles to enhance innovative usage of IS. The above ideas extend the findings of McKenney et al. (1995) that sustained IS-based innovation requires an effective IS leader who is willing to sponsor competitive use of IS, a IS visionary who can direct IS-based innovation activities, and a team that can implement innovations. CIO may be a more critical influence on organizational innovative usage of IS compared with the CEO and additional senior business executives.

References


