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Rui Huang
University of Oklahoma

Robert Zmud
University of Oklahoma

R. Price
University of Oklahoma

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Evaluating the Effects of IT Governance Structures in Small and Medium-Sized Enterprises

Rui Huang

University of Oklahoma
rhuang@ou.edu

Robert W. Zmud

University of Oklahoma
rzmud@ou.edu

R. Leon Price

University of Oklahoma
rlprice@ou.edu

ABSTRACT

The existing research on IT governance focuses on understanding enterprise-wide governance, including the major IT-related decisions to be made, the location of decision rights, and governance mechanisms that facilitate decision-making processes in large organizations. Our knowledge about the effects of IT governance structures on IT-use in small- and medium-sized enterprises (SME), however, is limited. This study represents an initial effort to link IT governance to the efficiency and the breadth in IT use in SMEs. Through interviews with executives from three organizations with relatively small IT workforces and firm sizes, a combination of quantitative and qualitative analysis was conducted. The study found that the loci of IT-related decisions have a direct impact on the efficiency and the breadth in IT use. In addition, the effects of the decision loci are moderated by top management participation in and the communication of IT governance structures.

Keywords

Decision loci, Efficiency in IT use, Breadth in IT use.

INTRODUCTION

Over the past decades, scholars in the MIS field have put tremendous effort in studying the governance of information technology (IT) in business organizations, which primarily involves the important IT decisions to be made, the accountability of decision rights, and the nature of the governance mechanisms applied (Weill and Ross, 2004). Given the increasing reliance of organizations on IT to facilitate the achievement of their business objectives, IT governance becomes a critical IT management issue. An effective IT governance structure will help organizations align overall enterprise visions and values with the concrete IT planning and implementations; and ensure the compliance of organizational members' IT usage with the organization's intentions with the technologies.

Robust IT governance structures are especially important in large, complex organizations (Weill and Ross, 2004). However, the examination of the role of IT governance in small and medium sized enterprises (SMEs) is limited. SMEs are associated with some unique organizational characteristics, including flat organizational hierarchies, high degrees of internal transparency, organizational flexibility, and rich informal networks amongst organizational units (Street and Meister, 2004). With a high level of transparency and flexibility of operational tactics and strategies across the firm, the imposition of robust and comprehensive formal governance structures could impose unnecessary bureaucracy and cost. But on the other hand, smaller firms are challenged by financial and human resource constraint. Given the limitation of technological knowledge, skills and other resources, managers of SMEs tend to under-estimate the amount of time and effort required for IS implementation. They also tend to be less mature with regard to their process and decision structures, potentially leading to a lack of rigor and consistency in decision making abilities (Thong, 1999). Considering that smaller firms are associated with higher failure possibilities because of resource and managerial limitations, we argue that smaller firms will as well benefit from IT governance structures in order to effectively link IT investments and actions to business. The purpose of this study, therefore, is to investigate the specific effects of IT governance structures on the efficiency in IT use and the breadth in IT use in SMEs, accounting for other factors including top management participation in IT decision-making processes and communication about IT policies and procedures.

RESEARCH MODEL AND RESEARCH HYPOTHESES

In this section, we will explore the nature of the research constructs and conceptualize their interrelationships. The efficiency and the breadth in IT use are the focal dependent variables. We examined both the direct impact of decision loci and the moderating effects of top management participation and communication of IT policies and procedures. The proposed research model is presented in Figure 1, followed by detailed discussions of each posited relationship.

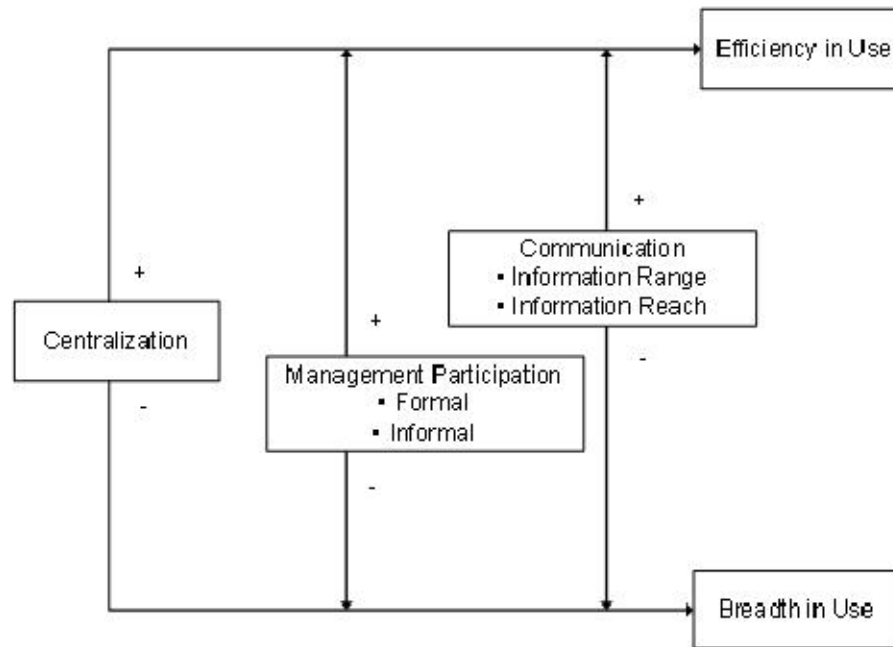


Figure 1. Research Model

Evaluating IT Use

IT has been used in many ways in business firms to generate economic benefits. To assess the organizational success in IT use, two factors are most relevant in SMEs: the impact of computers on organizational performance, and the extent to which information system is used in meaningful ways (DeLone, 1988). To measure these two factors, we rely on the efficiency in IT use and the breadth in IT use. The *efficiency in IT use* refers to the extent to which IT has been efficiently utilized to support organizational functions, in the areas where it is needed. In other words, efficiency evaluates whether the firm is taking advantage of resources and leveraging its investments in IT. The *breadth in IT use* is another evaluation dimension, which captures the extent to which IT is used in a variety of ways in different parts of the organization (Sambamurthy and Zmud, 1992). Underlying the breadth in use are two distinct but related concepts: one is the breadth in current use of IT, and the other one is the breadth in potential use of IT.

Decision Centralization

The baseline loci of IT decisions reflect a bi-polar notion of centralization and decentralization, each of which has its advantages and shortcomings in terms of organizational IT management. In a centralized decision-making structure, the control and management of important IT decisions are centrally located with the top management of the organization, such as corporate and IT executives. Thus, a centralized decision authority will help identify the scale of one unit's problem by weighing it against the problems of other units, and prioritize IT projects/investments corporate-wide, consequently encouraging more appropriate use of IT across the organization.

H1a: There will be a positive relationship between IT decision centralization and the efficiency in IT use.

In comparison, a decentralized structure delegates decision-making authorities to managers at lower levels of organizational hierarchies and gets business units and even individual IT users involved in IT decisions. Decentralization allows for customization of IT solutions for each business unit and helps to stimulate the use of IT at the unit level. By decentralizing IT decisions, business unit leaders must become accountable for acquiring the technological knowledge and skills in order to implement needed IT applications. With improved appreciation of IT, unit leaders could improve and expand information

systems to implement new applications or services for the particular purposes of their units (Boynton and Zmud, 1987). To this end, we propose:

H1b: There will be a negative relationship between IT decision centralization and the breadth in IT use.

Top Management Participation

Top management participation refers to personal interventions of executive managers in the contribution of ideas to and ultimate decision makings in IT-related issues. The participation of executives in IT decisions can be either informal or formal. Top management plays a critical role in SMEs in shaping firm performance (Weinzimmer, 1997). In order to for the SMEs to use technologies well, top management participation is a crucial factor, because “if the small business is to succeed in its computer use, the chief executive must be willing to commit substantial personal energy to the realization of the aim” (DeLone, 1988, p. 57). To this end, top management participation in IT decisions enhances the efficiency in IT use.

When important IT decisions are decentralized, duplicated systems are likely to be utilized across several units, which damages organizational efficiency in IT use. In such circumstances, top management participation in the decision-making processes of individual units will help convey the anticipation of IT at the enterprise-level; it will also help facilitate the coordination among units with similar needs of IT. Thus, top management participation will mitigate the negative effects of decision decentralization on the efficiency in IT use. By the same token, we suggest:

H2a: Top management participation will amplify the positive relationship between decision centralization and the efficiency in IT use.

In addition to usage efficiency, top management participation also motivates the progressive use of IT, because the intervention of executives signals the strategic values of the technology and generates incentives for functional areas to explore it (Javenpaa and Ives, 1991). The signals sent by top management influence the cognition and behavior of organizational actors (Lewis, Agarwal and Sambamurthy, 2003); whereas individual beliefs about the usefulness of the technology anticipate actual use of the technology. As it is suggested, application growth tends to take place in SMEs where top management is enthusiastic toward the technology (Cragg and King, 1993). Therefore, when IT decisions are centralized at the enterprise level, top management participation motivates individual units to implement the technology in different areas. Thus, we propose:

H2b: Top management participation will mitigate the negative association between decision centralization and the breadth in IT use.

Communication of IT Governance Structures

In addition to top management participation, we suggest that communication of IT policies and procedures to organizational employees also moderates the relationship between decision centralization and IT use. Although SMEs have tight communication within the firm, such organizations are typically challenged by the shortage of technological knowledge (DeLone, 1988). Effective communication of IT policies and procedure thus helps establish governance awareness and make it understood enterprise-wide about IT governance decisions, processes, and related desirable behaviors. We examine the effects of communication by considering two factors: information range and information reach. *Information range* refers to the number of channels used to communicate IT governance policies and procedures; while *information reach* indicates to what extent information may be received by employees enterprise-wide.

Both information range and information reach will increase corporate-wide awareness of IT governance structures, and communication of IT policies and procedures through greater information range and reach helps clarify the roles of individual units; through carrying out those roles, business units will have a better understanding about IT. With the help of effective communication of governance arrangements, the use of IT will thus be more efficient throughout the organization when IT decisions are decentralized, because the inconsistency of IT utilization across business units will be remedied. For the same reason, effective communication will also strengthen the positive effects of decision centralization on the efficiency in IT use.

H3a: Communication information range will amplify the positive relationship between decision centralization and the efficiency in IT use.

H3b: Communication information reach will amplify the positive relationship between decision centralization and the efficiency in IT use.

Also, with a clarified understanding about IT policies and procedures, business units will be encouraged to engage in IT-related activities specified by governance arrangements, which will be associated with increased IT use in different areas.

The importance of the technology implied by extensive communication will also motivate business units to progressively experiment with IT in the areas not previously explored. With a lack of decentralized decision structure, the use of IT is expected to be limited at the unit level as we suggested earlier. However, effective communication about IT governance structures will offset the negative impacts of decision centralization on the breadth of IT use.

- H4a: Communication information range will mitigate the negative relationship between decision centralization and the breadth in IT use.
- H4b: Communication information reach will mitigate the negative relationship between decision centralization and the breadth in IT use.

RESEARCH DESIGN

The study was empirically examined applying a positivist qualitative research design. Data was collected through structured interviews to surface interviewees' understandings of the firm's IT governance structure and IT use. Given our interest in small- and medium-sized enterprises, the target organizations were restricted to those with an information system group of less than 20 people, and with a firm size of less than 400 employees. Three business firms with industry variety were identified. Demographic data of the three sites are displayed in Table 1. Three to five interviewees were drawn from each of the selected organizations.

	HealthCare	Agriculture	Pharma
Firm Size	182	300	360
Industry	Health Care Management	Non-Profit	Pharmaceutical
IS Size	12	14	10
Interviewees	CIO and 4 divisional VPs	CIO and 2 divisional directors	CIO, 1 divisional VP, and controller

Table 1: Demographic information about the three sites

All interviewees were asked questions about their understandings of the firm's business tactics and strategies, IT governance structures, and IT use. To capture the efficiency in IT use, there was one question in the interview directly surfaced the interviewees' evaluation of their firms' efficiency in IT use. The question states as "Overall, how efficient do you believe your unit has been in the use of IT?" Three questions in the interview primarily dealt with the informants' perceptions of their firms' breadth in IT use.

DATA ANALYSES

Transcriptions of the interviews were coded using a coding scheme¹. To capture the independent variables, transcript comments from the CIOs were used because they are the informant who have a comprehensive understanding of their firms' IT governance structures, the management involvement in IT decision-making processes, as well as the communication mechanisms employed to communicate IT governance policies. The dependent variables on the other hand were based on the perceptions of unit leaders, because they have the knowledge regarding how IT is implemented within a business unit. This method also helps avoid common method bias (Campbell and Fiske, 1959).

The unit of analysis is the IT decisions for which all three firms had developed IT governance policies and procedures: decisions related to IT investment and prioritization, and decisions related to business applications. Based on the operationalization of each variable (Table 2), the answers that are associated with each variable are aggregated across interviewees of each firm.

¹ The analyses of the study are currently based on the coding from one coder. However, another coder will be added, and inter-rater reliability will be provided to increase the reliability of analysis results.

Construct	Sub-Category	Description
Decision Loci	Centralization	Decisions are made by IT executives
	Hybrid	Decisions are made by both the IT leaders and the business leaders. Business leaders could be either corporate executives or unit leaders.
	Decentralization	Decisions are made by business unit leaders
Top Management Participation	Formal	The number of executive managers that are involved in steering committees as decision contributors
	Informal	The number of executive managers that are involved in informal groups as decision contributors
Communication	Information range	The total numbers of the communication channels used to communicate IT governance decisions, processes, and desirable behaviors throughout the enterprise.
	Information reach	The number of broadband channels (e.g. emails, Internet) used to communicate IT policies and procedures
IT Use (averaged by the # of respondents)	Efficiency in IT use	How efficient the firm has been in its use of IT (a 5-point scale with 5 representing the highest efficiency)
	Breadth in current IT use	The number of areas that have been identified as current areas of IT use
	Breadth in potential IT use	The number of areas that have been identified as future areas of IT use

Table 2: Variable Operationalization

EMPIRICAL RESULTS

We first examined the summarized data in light of the relationships proposed in the research model (Table 3).

	HealthCare		Agriculture		Pharma	
Decision Type	Invest.	App.	Invest.	App.	Invest.	App.
Decision-Making Structure	Hybrid		Centralized		Hybrid	Centralized
Decision Authority	CIO & Corporate Executives		CIO		CIO & Unit Leaders	CIO
Formal Mgt Participation	4	4	0	0	5	0
Informal Mgt Participation	0	0	4	4	0	1
Information Range	2	2	1	1	0	3
Information Reach	1	1	0	0	0	1
Efficiency in IT Use	3		4		5	
Breadth in Current IT Use	2		3.5		4	
Breadth in Potential IT Use	3		0.5		1	

Table 3: Summarized Results

Decision Structures in SMEs

The governance structures employed by all three firms are either centralized or hybrid; whereas there is a lack of decentralization in SMEs. Studies of SMEs reveal that smaller firms tend to have more centralized structures (Montazemi, 1988). As the IT governance structures are usually aligned with organizational structures (Sabherwal, Hirschheim and Goles, 2001), it is reasonable that decentralized IT governance structures are less common in SMEs.

Association between Breadth in Potential IT use and IT Efficiency

Note that there seems to be a positive association between the efficiency in IT use and the breadth in current IT use. This observation implies that the extent to which a firm is perceived to be currently using IT is related to perceptions of the efficiency in the use of IT. The breadth in potential IT use reflects the extent to which the unit leaders think the firm should improve its use of IT. The variation between the efficiency in IT use and the breadth in potential IT use indicates that when a firm's executives recognize improvement is desired in its utilization of IT, the firm is perceived to be less efficient. For example, HealthCare reports a larger number of areas that the firm should take more advantage of IT. As indicated by the quote below, the informant with such realizations also anticipates improved efficiency in the firm's use of IT.

As the technology is evolving so quickly, our employees can be much more efficient if they use every aspect of a software or hardware program. There are more accounting functions and financial functions that IT has offered but employees do not take advantage of.

Divisional V.P. 1 HealthCare

To be more explicit, we will now look at more evidence drawn from the interview transcripts to reveal patterns that emerged regarding efficiency in IT use and breadth in potential IT use. Interviewees from HealthCare pointed out limited numbers of areas where the firm was currently using IT well; whereas in comparison, they identified the largest number of areas where the firm could potentially use IT better, as represented by the following comment:

Currently the department is using SharePoint exceptionally well and most team activities are virtually based, with people working outside around different places on teams to build best practice HR processes...The areas that need improvement include benefits, distribution of enrollment, payroll, recruiting, performance management systems, and succession planning.

Divisional V.P. 4 HealthCare

Regarding the efficiency in IT use, on average, interviewees at HealthCare reported relatively low efficiency. For example, one of their divisional V.P.s said:

Our department utilizes IT 100% of the time. But based on the in-house employee training, the overall efficiency of the department's use of IT is about 60%.

Divisional V.P. 1 HealthCare

Another V.P. commented that:

Up to now the overall efficiency of our department is probably about 30%. But it would be about 85% by the end of this November once the HRIS is implemented.

Divisional V.P. 4 HealthCare

Consistent with the earlier discussion, comments generated by the informants at HealthCare indicated that the realization of a greater potential of using IT leads to less contentedness with the firm's efficiency in IT use. This implication received further support from perceptions of the interviewees from Agriculture and Pharma, all of whom reported only a few areas where their firm should improve their use of IT. For instance, the controller at Pharma identified one area for potential improvement:

The area that needs improvement is SQL. Finance should be able to do more with SQL and standard queries if there are more tools. The current systems are based on flat files. Finance could harness the power of SQL and do a better job if they had a system that is more relational.

Controller Pharma

Similarly, one of the divisional directors from Agriculture also identified only one area where the firm should use IT better:

The division is not currently taking the potential of IT in terms of Extranet, and it is an area needs improvement. Lots of the client data are still entered by the division currently. With Extranet, clients of our division will be able to enter and retrieve relevant information themselves, and improve the efficiency of the division.

Divisional Director 1 Agriculture

However, informants from the latter two firms indicated more positive feelings toward their firms' efficiency in IT use. The divisional directors from Agriculture reported a moderate degree of efficiency compared to that rated by the interviewees from HealthCare:

On a scale of 1 to 10, our divisional use of IT might be at 7 or 8. Overall, the division is efficient in terms of IT's reliability on everything.

Divisional Director 2 Agriculture

Divisional V.P.s from Pharma implied highest efficiency in IT use among the three firms.

Overall, HR has been using IT very efficiently. IT is a time saving and cost saving issue for HR. HR is able to work with less man power because of the IT systems.

Divisional V.P. Pharma

Factors Impacting Efficiency in IT Use

To investigate the factors that influence the efficiency in IT use and the breadth in IT use across three firms, we plotted the independent and dependent variables in two diagrams. By connecting the data points, the association between decision loci and efficiency in IT use was revealed in Figure 2. We noticed an upward linear relationship between efficiency in IT use and decision centralization, supporting hypothesis 1, which suggests that the centralization of IT decisions is associated with perceptions of efficiency in IT use. A possible explanation for such association is that when IT decisions are managed at the unit level, IT activities may involve unnecessary repetition and redundancy, thereby hurting the firm’s efficiency in IT use. One of the informants’ comments clearly supported such a supposition.

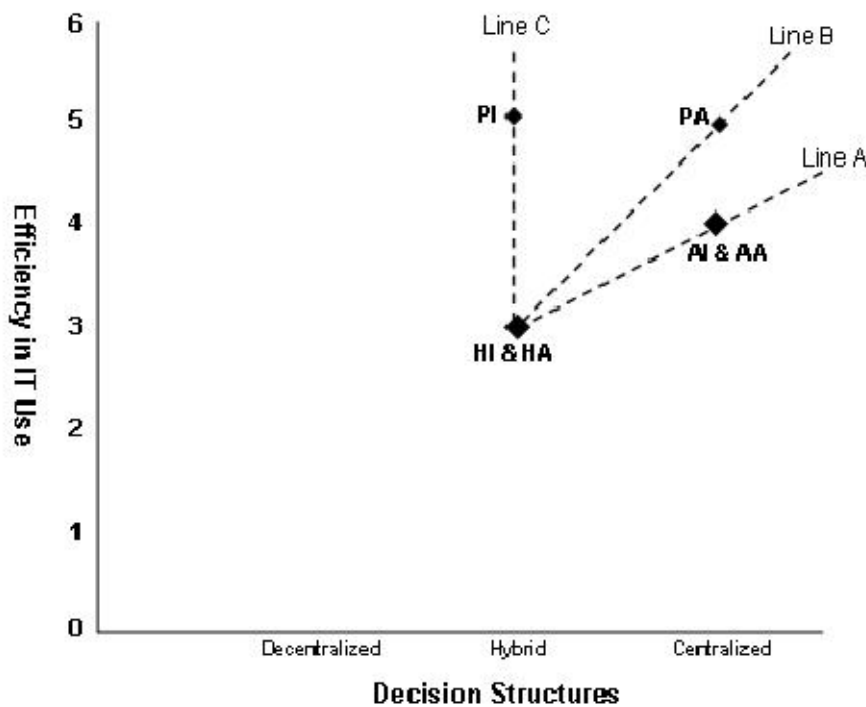


Figure 2: Decision Loci and Efficiency in IT Use

Moderating Effects of Communication: Line B had a steeper slope than Line A, indicating that a positive association between efficiency in IT use and decision centralization is weaker, or mitigated for Agriculture, as compared to Pharma. The IT decision involved in Pharma that fell onto Line A was the business application decision. Both this decision and the two decisions of Agriculture were centralized. These two firms all had top management informally involved as decision maker. Thus, top management participation was not the factor that resulted in the variance. However, the two firms were quite different regarding their communication of IT policies and procedures. In Agriculture, IT policies and procedures were communicated through a single channel, which was limited in its information reach. In comparison, Pharma used three channels to communicate, among which one was a broadband channel, to communicate its IT policies and procedures. Consistent with hypotheses 3a and 3b, both communication information range and communication information reach amplified the positive relationship between decision centralization and the efficiency in IT use for Pharma, resulting in a steeper positive slope in the diagram.

Executive Involvement vs. Unit Leader Involvement: Line C was perfectly vertical. The data points that formed this line included the investment decision of Pharma, the investment decision of HealthCare, and the application decision of HealthCare. All three decisions were associated with hybrid governance structures, which were expected to lead to reduced efficiency in IT use. However for Pharma, the investment decision was associated with a higher level of efficiency in IT use compared to the

decisions of HealthCare. With further examination, we found that the hybrid structure used by Pharma involved the CIO and unit leaders; whereas the one used by HealthCare involved the CIO and the corporate executives. The different impacts of these two types of hybrid structures indicated that the involvement of corporate executives as IT decision makers reduced the firm's efficiency in IT use.

Moderating Effects of Top Management Participation: By comparing Line C to Line B, we also found that top management was formally involved in the investment decision-making processes, but informally involved in the application decisions at Pharma. The formal participation of top management helped mitigate the negative effect of a less centralized decision structure, thus resulting in a steeper slope and supporting hypothesis 2a.

Factors Impacting Breadth in Potential IT Use

Figure 3 presents the relation between decision loci and the breadth in potential IT use. Consistent with our prediction, the diagram revealed a positive association between decision decentralization and the breadth in IT use.

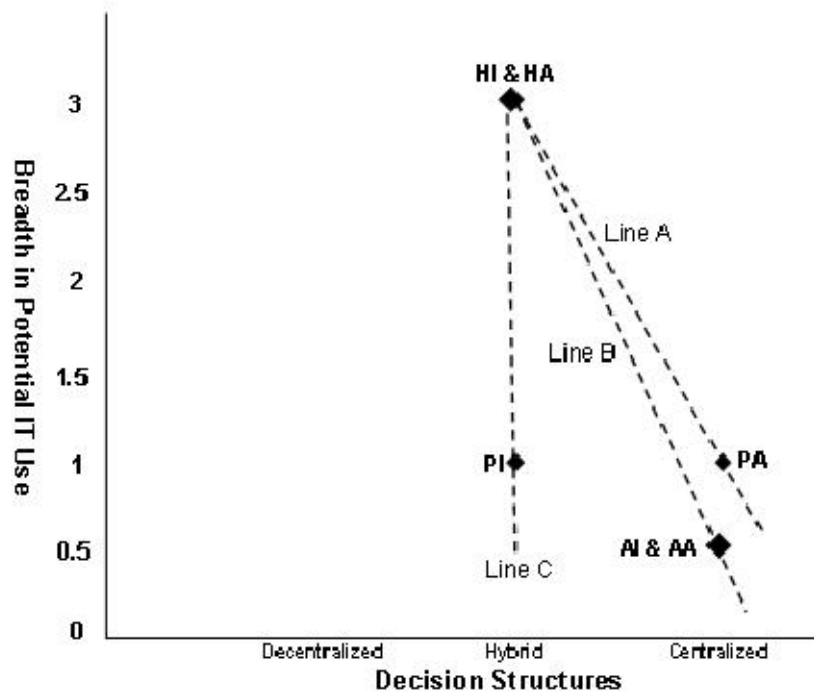


Figure 3: Decision Loci and Breadth in IT Use

Moderating Effects of Communication: Again, by connecting the data points in Figure 3, we noticed three different lines, with Line B having a steeper slope than Line A, and Line C perfectly vertical. First, by focusing on Line A and Line B, the diagram suggested that the negative relation between decision centralization and breadth in potential IT use was amplified for Agriculture as compared to Pharma. Having examined the factors that related to the breadth in IT use, these two firms all had top management informally involved in the decision-making processes. But we found that the two firms were different in their communication of the IT policies and procedures. As indicated earlier, Pharma had higher communication information range and information reach, leading to a higher degree of breadth in potential IT use. The results supported hypotheses 4a and 4b, which suggested that by enhancing the clarification of the roles of technologies, organizations encouraged business units to engage in different IT activities and the use of IT in a variety of areas.

Furthermore, by comparing Pharma's investment decision falling on Line C to the application decision that fell on Line A, the investment decision was associated with a lower degree of breadth in IT use even though the decision structure was less centralized. This result could also be explained by the moderating effect of communication of IT policies and procedures related to this decision. Pharma did not put in any effort to communicate important policies and procedures about investment decisions. Therefore, even though investment decisions were less centralized, the communication limitation mitigated the positive effect of the hybrid structure and resulted in a lower level of breadth in potential IT use. From Figure 3 however, we could not observe the moderating effect of top management participation. Therefore, hypothesis 2b did not receive support.

LIMITATIONS

The main effect of decision centralization and the moderating effects of top management participation and communication of IT governance on both efficiency in IT use and the breadth in IT use are consistent with our prediction. This study provides both practical and theoretical implications to the effects of IT governance structures in small- and medium-sized firms. However, the findings of the study should be interpreted with caution because of the limitation of sample size. Evidences from only three firms may not be representative for other organizations. In order to generalize the results, further quantitative studies should be conducted using larger sample sizes. Following upon the quantitative design however, another gap of the literature on IT governance is revealed. Currently, the field lacks a systematic instrument to measure, from various aspects, the factors that impact the effectiveness of IT governance structure. However, to increase our understanding of the degree to which IT governance matters in different organizations, a validated instrument is necessary, which is another opportunity for future studies on the topic of IT governance.

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