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Abstract

IT assimilation has been one critical indicator of strategic and effective use of IT. Extant research has documented the importance of Top Management Team (TMT) knowledge of IT on IT assimilation and the influence of the IT competence of line management by taking the role of IT championship. However no research has been looking at the fit of IT knowledge between the two management levels. The objective of this study is to examine the development of the IT knowledge "fit" concept between TMT and line management and its influence on IT assimilation. Using knowledge-based view and contingency theory, the paper posits that the extent of IT assimilation is contingent upon the IT knowledge fit between TMT and line management. An empirical study plan is reported and expected results are listed.

Keywords: Top Management Team (TMT), Line Management, IT Assimilation, Knowledge, Chief information officer (CIO)

Introduction

Contemporary IS researchers have increasingly directed their interest and attention toward factors that influence success in the strategic and innovative use of IT (Feeny & Willcocks, 1998; Fichman, 2000; Mata, Fuerst, & Barney, 1995; Sambamurthy, 1994). In particular, narrative case studies and limited empirical research produced two research streams. One stream focuses on the quality of Top Management Team (TMT) and its critical influence on IT assimilation (Armstrong & Sambamurthy, 1999; Jarvenpaa & Ives, 1991; Rockart & Earl, 1996). Strong partnerships between the CIO and senior business executives are also expected to contribute to firms' IT assimilation. Overall, the knowledge of the TMT and the interactions among them has a significant influence on firms' IT assimilation (Armstrong & Sambamurthy, 1999). The underlying assumption is that all the decisions about IT and IT goals made by the senior leadership will be achieved by the line managers. The TMT is seen to function as "back-seat" driver, blessing IT managers' initiatives, signaling the importance of IT to line management and providing general business directions. The middle management has all the knowledge and resources to implement the strategies and integrate IT to the value-creation activities. However the drawback of this stream is that the underlying assumption is hard to be found in reality since the middle management might not have required IT competences or systems of learning IT knowledge in the organization.

Another line of research focuses on the notions of line-technology leadership and technologically competent managers. Since the mid-1980s, as the strategic impact of IT became evident, researchers and practitioners alike have argued that the management of IT and leadership in IT must be a shared endeavor between IT professionals and line managers (Boynton, Zmud, & Jacobs, 1994; Keen, 1991; Rockart & Earl, 1996; Sambamurthy, 1994).Business managers are now expected to deploy IT effectively and strategically.

Bassellier et al (2001)explored IT competence of individual business managers. The IT competence of business managers is defined as the set of IT-related explicit and tacit knowledge that a business manager possesses that enables him or her to exhibit IT leadership in his or her area of business. Basselier et al (2003) developed a framework that identified that the factors that motivate the line managers to champion IT and provided empirical supports. The championship initiated by line managers helps the TMT identify the strategic value of potential information technology so that the TMT can adjust IT strategy and integrate with the business strategy. This research stream assumes that the TMT team has the knowledge to grasp the strategic value of potential Information technology. However this assumption is weak in reality too. Not every TMT has the required IT knowledge.

Realizing the complexity of organization and the different emphasis of these research streams, I argue that a firm's IT assimilation should be influenced by both the TMT and the line-technology leadership. However no empirical research has examined IT assimilation incorporating both management levels yet. The following research question frames this research:

How does the IT knowledge 'fit' between TMT and line management influence the firm's ability to assimilate IT in their business strategy and value-chain activities?

The next section reviews the two streams of IT assimilation literature and explores the influence of the interaction between senior leadership and line-technology leadership on firm's ability to assimilate IT. Research hypotheses will be developed. Subsequently, I present the research methodology. Finally the paper presents the expected results and discusses the implications of the study for research and practice.

Literature Review and Hypotheses development

Knowledge-based and Resource-based view and IT assimilation

IT assimilation represents an important outcome in firms (DeLone & McLean, 1992; Jarvenpaa & Ives, 1991). While most firms are making significant investments in IT, not all of them are able to apply IT effectively in their business activities. Armstrong and Sambamurthy (1999)define IT assimilation as the effective application of IT in supporting, shaping, and enabling firms' business strategies and value-chain activities.

Drawing upon the resource-based and knowledge-based theories of the firm (Grant, 1996; Penrose, 1995), Mata et al. (1995) argue that the ability to blend business and IT knowledge through a mosaic of strong intraorganizational relationships lies at the heart of firms' superior ability to assimilate IT.

Cohen and Levinthal (1990) argue that the ability of a firm to recognize the value of new, external information, assimilate it and apply it to commercial ends is critical to its innovative capabilities. This capability is a firm's absorptive capacity and largely a function of the firm's level of prior related knowledge. Absorptive capacity theory (Cohen & Levinthal, 1990), when applied to the domain of IT use, suggests that an organizational ability to effectively apply IT is dependent on the development a mosaic of IT-related knowledge and processes that bind together the firm's IT and business managers at different levels. The theoretical insights of the theory of absorptive capacity thus provide a strong basis from which to examine the nature and importance of IT and business managers in information exchanges, relationships and partnerships within the firm.

TMT and IT assimilation

Spender (1996) identifies two distinct components of the structures for knowledge integration: objective and systems of knowing. Objective knowledge refs to the explicit, visible knowledge possessed by individual members. Systems of knowing refer to structures of interaction among members for sharing their perspectives, pooling of knowledge, and development of shared understanding.

Two forms of objective knowledge of TMT are important for IT assimilation (See Table 1): strategic IT-related knowledge and business knowledge (Armstrong & Sambamurthy, 1999; Boynton et al., 1994; Cooprider, 1993). Strategic IT-related knowledge encompasses the potential and limitations of an organization's IT infrastructure, strategic IT actions of its competitors, and the potential of emerging information technologies for an organization's business (Armstrong & Sambamurthy, 1999). Both CIO and other TMT members should have strategic IT knowledge. CIOs with a high strategic IT knowledge can better advise their TMT members about IT issues. The other TMT members should be able to recognize the strategic implication of the IT issues. Otherwise they could not fully explore or exploit the potential strategic value of IT. It is also hard for them to align the IS strategy and the business strategy.

Business knowledge refers to knowledge of business strategies, organizational work processes, firm's products and services, industry recipes for success, and competitor strengths, weaknesses, and potential actions. Prior IS literature advocates the need for CIOs to possess a general-business orientation (Boynton et al., 1994; Rockart & Earl, 1996). Knowledge of business strategies help the CIO to form the IS strategy and achieve the fit with business strategy.

Grant (1996)argues that firms are an economic structure for integrating the knowledge of different individuals in the superior production of value-added products and services. The TMT can be viewed as an organizational structure for integrating members' knowledge (Spender & Grant, 1996).

Armstrong and Sambamurthy (1999) reviewed the previous literature about systems of knowing and outlined three structures: (1) hierarchical distance from the CEO, evaluated in terms of the hierarchical level of the CIO in the firm; (2) extent of the CIO's participation in the top management team; and (3) frequency of informal interactions between the CIO and TMT members. (See Table 1)

Systems of knowing enable the TMT to develop a better appreciation for the "business of the business": the firm's value proposition, its competition, and its industry forces. Further, the TMT is also able to better understand the "IT business of the business" and enhance their IT-related strategic knowledge.

Table 1. IT knowledge of TMT and Line Management

	Top Management Team	Line Management
Objective Knowledge	• CIO IT knowledge • CIO business Knowledge • TMT IT knowledge	• Explicit IT knowledge of Line Managers • Tacit IT knowledge of Line Managers • Business knowledge of IS managers (Organization specific and Interpersonal & management knowledge)
Systems of Knowing	• Extent of CIO's participation in the TMT • Hierarchical Distance of the CIO to the CEO • Information Interaction of the CIO with the TMT	• Communication frequency • Richness of Communication Channel • Coordination Mode (Impersonal, personal, group)

Note: Adapted from (Armstrong & Sambamurthy, 1999; Bassellier & Benbasat, 2004; Bassellier et al., 2003; Bassellier et al., 2001; Lind & Zmud, 1991; Nidumolu, 1996; Van De Ven & Delbecq, 1976)

Line-Technology Leadership and IT assimilation

According to Rockart et al. (1996), line managers are more likely to assume leadership in regard to IT when they have the appropriate IT education and training. Reich and Benbasat (2000) observed that shared knowledge between business managers and IT professionals is an important enabler of the alignment of business and IT objectives.

Shared knowledge (between line and IT management) supports IT success (Nelson & Cooprider, 1996; Sambamurthy, 1994). Bassellier (2004; 2001) developed and validated measures the IT-knowledge of business managers (See Table 1). It tests a model of the IT knowledge and experience of business managers and their contribution to intentions to champion IT in their organizations. In addition, Bassellier and Benbasat (2004) developed the dimensions of the business competence of IT professionals (See Table 1) and reported an significant relationship between the business competence of IT professionals and intentions to develop the IT-business partnership.

Reviewing literature of systems of knowing for the line managers, the following three structure has been examined: (1) communication frequency (2) richness of communication channel (Lind & Zmud, 1991). (3) Coordination mechanism (Galbraith, 1977; Thompson, 1967; Van De Ven & Delbecq, 1976). Lind and Zmud (1991) found that rich interactions between technical and managerial personnel contributed to increased levels of IT-based innovativeness. According to information processing theory (Galbraith, 1977) coordination mechanism has been studied as a means for information flow (Thompson, 1967). Van de Ven (1976) classified alternative modes for coordinating work activities as impersonal, personal and group modes. All these alternative coordination modes provide a structure for the IS managers and line managers to communicate in IS development project and daily supporting activities. Andres and Zmud (2001) argued that the use of different coordination mechanism is contingent upon task interdependence. Therefore coordination mechanism is an appropriate item of systems of knowing for line management.

IT Knowledge Fit between TMT and Line Management

Alignment between Business strategy and IS strategy has been one important research topic in the field. However, alignment requires involvement of both parties. As firms consider their future in an information era of superhighways, multimedia, and information richness, IT executives should contribute more positively to management thinking by identifying the business

threats and opportunities that IT poses. It is evident that technology influences strategy as well as vice versa. The knowledge and systems of knowing in the TMT will be critical for this alignment.

TMT's interests are not always targeted at information systems. Chief executives often still need to be convinced of the potential strategic impact of information systems (Lederer & Mendelow, 1988a, 1988b). Line managers are motivated to champion the IT for firms to achieve the competitive advantage (Genevieve. Bassellier et al., 2003). The extant knowledge and systems of knowing are vital for the TMT to pick up the messages from the line manages and adapt the strategies to the changing environment.

Therefore the extents of knowledge at both management levels are critical for implementing IT strategies. The fit between the extents of knowledge at both management levels is important for IT assimilation. So what is the meaning of "Fit"? Floyd and Wooldridge (1992) proposed a concept of "strategic consensus." Strategic consensus is achieved when managers act on a common set of strategic priorities and strive to achieve the strategic goal by shared understanding and common commitment. Based on "strategic consensus," I argue that the "fit" of the IT knowledge between the top and middle managers means the level of shared understanding and common commitment to achieve the IT assimilation. Although the knowledge of these two groups is a continuous variable, it would be easier to understand the interaction by only examining the extremes of the extent of knowledge in TMT and line management. Table 2 illustrates the interactions.

Table 2. IT Knowledge Fit Between TMT and Line Management

		Knowledge of TMT	
		High	**Low**
Knowledge of Line Management	**High**	IT assimilation (H)	Championship; issue selling
	Low	Involvement in Strategic Implementation	IT assimilation (L)

A high level of knowledge of TMT team can identifying the business threats and opportunities that IT poses, the IT implications of business decisions, and they can take an organization-wide perspective in decisions on IT resources. The high level of knowledge of line management can sufficiently integrate the IT with value-creation activities and effectively work with IT department to explore any opportunities that can increase work productivity or reduce costs. Therefore, Hypothesis 1 is:

H1: Controlling other factors, the fit between high level of knowledge of top management team and high level of knowledge of line management will have a positive impact on IT assimilation.

Low level of knowledge of top management team is unable to grasp the strategic implication of IT and cannot achieve the alignment between business and IT strategies. Low level of knowledge of line management has high barriers in integrating IT with business activities and usually has low relationship with IS department. IS projects cannot be developed successfully. The firm has very low ability in exploiting the current IT resources. Therefore, the level of IT assimilation will be low too. Hypothesis 2:

H2: Controlling other factors, the fit between low level of knowledge of top management team and low level of knowledge of line management will have a negative impact on IT assimilation.

A frequent complaint from the TMT is that middle managers do not take actions necessary to implement strategy. TMT has high level of knowledge of the Information technology and its strategic importance and sets it up as a strategic move to assimilate IT in the business operations. However often middle managers cannot articulate the same goal as the top management. Sometimes it is because of lack of the objective IT knowledge, and sometimes it is because of lack of understanding of the influence of IT. This is an opportunity for a process of system of knowing between the two management levels. In such a situation TMT should involve the middle management in the strategic decision-making process and increase the quality of strategic conversations in the organization. This means more than increasing the formal opportunities to communicate strategy. Regular workshops are useful, but shared understanding relies on continuous discussions of strategy (Floyd & Wooldridge, 1992). The ongoing conversation between the two levels of management will increase the shared understanding and commitment of middle managers in implementing IT strategy. Therefore the level of IT assimilation will be increased. Therefore Hypothesis 3 is phrased as:

H3: Controlling other factors, the misfit between high level of IT knowledge of TMT and low level of IT knowledge of line management will have a negative impact on IT assimilation, and strategic involvement of middle management will increase the "fit" and have a positive impact on IT assimilation.

When TMT has low level of IT knowledge and middle managers have high level of IT knowledge, middle managers should be encouraged to raise the strategic issues to TMT and get their attention to solve the issues and commit resources to implement strategies. Dutton and Ashford (1993) have been arguing that it is often the middle managers rather than the top managers who have their hands on the "pulse of the origination." These links give them knowledge of what strategic issues require attention. Thus, middle managers play a pivotal role in detecting new ideas and in mobilizing resources around these new ideas. Therefore the issue selling process of middle managers will get the attention of TMT and increase their knowledge. Therefore the level of IT assimilation will be increased because of TMT's understanding and commitment. Hypothesis 4 is phrased as:

H4: Controlling other factors, the misfit between low level of IT knowledge of TMT and high level of IT knowledge of line management will have a negative impact on IT assimilation, and the success of issue selling by the middle management will increase the "fit" and have a positive impact on IT assimilation.

Research Design

Data will be gathered through mail survey. A firm's CEO and CIO will be contacted for the surveys. Line management participants will be identified by the recommendation of the CEO or CIO. One IS Executive database will be identified and used to determine CIOs' names. CEO will be identified from the Standard and Poor's Register of Executives. The possible industries will be manufacturing, transportation, utilities, retail, banking and financial services, petroleum, food, and insurance.

Operalionization

Dependent Variable

IT Assimilation. The focus of our research is upon understanding superior firm performance in the use of IT in value-chain activities and business strategies. Therefore, a set of items that described the use of IT in different value-chain activities and business strategies (Armstrong & Sambamurthy, 1999). TMT members will be asked to first think of firms in their industry that they considered the most successful in applying IT for those activities and strategies. Relative to this ideal firm, they are asked to rate their own firm's performance. The rationale is that senior business executives should be aware of their rivals and their relative success with different initiatives. Data on IT assimilation were also gathered from CIOs using the same scales. The line management and IT managers will also be asked to rate their own firm's performance comparing with the most successful firm in applying IT.

Independent Variables

Knowledge of TMT. CIOs will be asked to indicate their TMT's IT-related strategic knowledge, whereas TMT respondents provided measures of the CIO's business and IT-related strategic knowledge. Items for each dimension of knowledge will be drawn from Armstrong and Sambamurthy (1999). Each item was measured on a five-point Likert scale, with the cues ranging from "extremely well informed" to "not well informed." In addition, line management questionnaire will also be asked to indicate their perception of the knowledge of the top management team.

Systems of Knowing of TMT. The hierarchical distance of the CIO from the CEO will be measured by asking CIOs to indicate the position of their immediate superior. Next, the Standard and Poor's Register of Corporations, Directors, and Executives will be consulted to assess the distance between the CIO's superior and the CEO. The extent of CIO participation in the TMT will be assessed through a response from TMT members via a single-item question. The frequency of informal interactions will be assessed from CIOs, using a five-point Likert scale. A similar assessment will be also obtained from the TMT respondents.

Knowledge of line management: IT managers will be asked to indicate their business managers' IT competence, whereas business managers will be asked to measure the IT manager's business knowledge. Items will be drawn from Bassellier (2004; 2003; 2001). In addition, TMT respondents will also be asked to indicate their perception of the IT competence of business managers and their perception of business knowledge of IT managers.

Systems of Knowing of line management: The frequency of communication will be assessed from IT managers, using a five-point Likert scale. The coordination mechanism will be asked from IT managers (Nidumolu, 1996). In addition, a similar assessment will also be obtained from business managers.

Control variables

Organizational size. Organization size will moderate the relationship between the level of knowledge and IT assimilation. Large organizations usually have more complex structures and relationships. The level of knowledge will be hard to be evaluated and compare if the size of TMT or size of line management is big. COMPUSTAT data are gathered on three commonly accepted indicators of organizational size: sales revenue, net income, and number of employees.

IT infrastructure Sophistication: IS researchers also view IT infrastructures as a critical resource of the firm (Keen, 1991). IT infrastructure sophistication refers to the extent to which a firm has diffused key information technologies into its base foundation for supporting business applications (Armstrong & Sambamurthy, 1999). A sophisticated infrastructure provides the flexibility to alter business strategies in response to competitive pressures. In fact, Sambamurthy and Zmud (1996)found that a sophisticated IT infrastructure enhanced the ability and willingness of business managers to shape innovative applications of IT. CIOs and IT managers will be presented with a list of four key information technologies and asked to indicate the extent to which their firm had diffused these technologies into their organizational IT infrastructures.

Strategic IT vision: The emerging IS literature suggests that the strategic IT vision could be a significant factor moderating some of the relationships discussed earlier. Strategic IT vision is defined as the shared, aspired state of the role that IT should play in the firm. Strategic IT visions evoke organizational images of the role that IT will play in the firms' business activities and competitive strategies. Schein (1992)identifies four major categories of strategic IT visions: automate, informate up, informate down, and transform. The intensity of relationship between senior leadership's knowledge and systems of knowing and IT assimilation will vary across different strategic IT visions (Armstrong & Sambamurthy, 1999). TMT respondents will be presented with a brief description of the four strategic IT visions that were derived from Feeny et al. (1992). They will be asked to identify the vision that best described the business role of IT in their firm. When multiple TMT responses are received, the response of the highest-ranking TMT member will be used in the analysis.

Expected results

It is expected that all the hypotheses will find supports when other factors are controlled. An in-depth understanding of the misfit situation will be gained.

Conclusion

This paper conceptually explores the impact of the fit of different levels of knowledge in TMT and line managers on the IT assimilation. It fills the gap between the two research streams and helps the practitioners understand the reasons for misfit and take actions by increasing the intensity and richness of communication between two levels of management and influence the firm's performance in applying IT positively.

References:

Andres, H. P., & Zmud, R. W. (2001). A Contingency Approach to Software Project Coordination. *Journal of Management Information Systems, 18*(3), 41.

Armstrong, C. P., & Sambamurthy, V. (1999). Information Technology Assimilation in Firms: The Influence of Senior Leadership and IT Infrastructures. *Information Systems Research, 10*(4), 304.

Bassellier, G., & Benbasat, I. (2004). Business Competence of Information Technology Professionals: Conceptual Development and Influence on IT-Business Partnerships. *MIS Quarterly, 28*(4), 673-694.

Bassellier, G., Benbasat, I., & Reich, B. H. (2003). The Influence of Business Managers' IT Competence on Championing IT. *Information Systems Research, 14*(4), 317-336.

Bassellier, G., Reich, B. H., & Benbasat, I. (2001). Information Technology Competence of Business Managers: A Definition and Research Model. *Journal of Management Information Systems, 17*(4), 159.

Boynton, A. C., Zmud, R. W., & Jacobs, G. C. (1994). The influence of IT management practice on IT use in large corporations. *MIS Quarterly, 18*(3), 299.

Cohen, W. M., & Levinthal, D. A. (1990). Absorptive Capacity: A New Perspective on Learning and Innovation. *Administrative Science Quarterly, 35*(1), 128-152.

Cooprider, J. G., K.M. Victor. (1993). *The contribution of shared knowledge to IS group performance.* Paper presented at the Fourteenth International Conference of Information Systems, Orlando, fl.

DeLone, W. H., & McLean, E. R. (1992). Information Systems Success: The Quest for the Dependent Variable. *Information Systems Research, 3*(1), 60.

Dutton, J. E., & Ashford, S. J. (1993). Selling issues to top management. *Academy of Management Review, 18*(3), 397.

Feeny, D. F., & Edwards, B. R. (1992). Understanding the CEO/CIO relationship. *MIS Quarterly, 16*(4), 435.

Feeny, D. F., & Willcocks, L. P. (1998). Core IS capabilities for exploiting information technology. *Sloan Management Review, 39*(3), 9.

Fichman, R. G. (2000). The Diffusion and Assimilation of Information Technology Innovations. In R. W. Zmud (Ed.), *Framing the Domains of IT Management* (pp. 105). Ohio, Cincinnati: Pinnaflex Education Resources, Inc.

Floyd, S. W., & Wooldridge, B. (1992). Managing strategic consensus: the foundation of effective implementation. *Academy of Management Executive, 6*(4), 27.

Galbraith, J. R. (1977). *Organization Design*. Reading, MA: Addison-Wesley.

Grant, R. M. (1996). Toward A Knowledge-Based Theory of The Firm. *Strategic Management Journal, 17*, 109-122.

Jarvenpaa, S. L., & Ives, B. (1991). Executive involvement and participation in the management of information technology. *MIS Quarterly, 15*(2), 205.

Keen, P. G. W. (1991). *Shaping the future: Business Design Through Information Technology*. Boston, MA: Harvard Business School Press.

Lederer, A. L., & Mendelow, A. L. (1988a). Convincing Top Management of the Strategic Potential of Information Systems. *MIS Quarterly, 12*(4), 524.

Lederer, A. L., & Mendelow, A. L. (1988b). Information Systems Planning Top Management Takes Control. *Business Horizons, 31*(3), 73.

Lind, M. R., & Zmud, R. W. (1991). The Influence of A Convergence in Understanding Between Technology Providers and Users on Information Technology Innovativeness. *Organization Science, 2*(2), 195.

Mata, F. J., Fuerst, W. L., & Barney, J. B. (1995). Information technology and sustained competitive advantage: A resource-based analysis. *MIS Quarterly, 19*(4), 487.

Nelson, K. M., & Cooprider, J. G. (1996). The contribution of shared knowledge to IS group performance. *MIS Quarterly, 20*(4), 409.

Nidumolu, S. R. (1996). A comparison of the structural contingency and risk-based perspectives on coordination in... *Journal of Management Information Systems, 13*(2), 77.

Penrose, E. (1995). The Theory of the Growth of the Firm.

Rockart, J. F., & Earl, M. J. (1996). Eight Imperatives for the New IT Organization. *Sloan Management Review, 38*(1), 43.

Sambamurthy, V., R.W. Zmud. (1994). *IT Management Competency Assessment: A Tool for Creating Business Value Through IT*. Morristown, NJ: Financial Executives Research Foundation.

Sambamurthy, V., R.W. Zmud. (1996). *Information Technology and Innovation: Strategies for Success*. Morristown, NJ: Financial Executives Research Foundation.

Schein, E. H. (1992). *The role of the CEO in teh management of change: The case of information technology.* Oxford: Oxford University Press.

Spender, J.-C., & Grant, R. M. (1996). Knowledge and The firm: Overview. *Strategic Management Journal, 17*, 5-9.

Thompson, J. D. (1967). *Organizations in Action*. New York: McGraw-Hill.

Van De Ven, A. H., & Delbecq, A. L. (1976). Determinants of Coordination Modes within Organizations. *American Sociological Review, 41*(2), 322-338.