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# Unpacking the Black Box of IT Capabilities

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## *ABSTRACT*

IT Capabilities are vital to the competitive performance of firms in contemporary business environment. Firms can no longer have competitive advantages by obtaining affordable information technology resources. Rather organizational IT capabilities are often cited as one of the most important factors that influence firm performance. The purpose of this paper is to enhance the understanding of IT capabilities and find out how the differences in IT capabilities explain the variation of firm performance. By using concepts from resource-based view of firms, this paper argues that IT capabilities influence firm performance through information system-business processes successes and enabling institutional forces and that firms should combine their technical capabilities, sourcing capabilities and implementation capabilities in such a way to generate synergy effect which can be described as assimilation capabilities. Therefore, opening the black box of IT capabilities has implications for both practitioners and researchers.

**KEY WORDS:** IS function, IS department, IT people, IT capabilities, firm performance,

## **INTRODUCTION**

Both technology and the business environment are continually changing requiring organizations' appropriate responses to be made. Thus the role of IS function in companies has kept in changing through times. One of the most significant change is that IS department has transformed from a traditional manufacturing role which was mainly responsible for developing and maintaining internal software applications, towards a management-oriented role that primarily focuses on IT adoption and deployment, information systems management, and IT sourcing activities.

The purpose of this paper is to find out the roles of IS department in current business environment and

their relationships to firm performance. The connections between IT and firm performance are fundamental to the study of information systems and thus is a long-standing research topic in IS field. As technology imperative perspective became less capable of interpreting the relationships between IT and firm performance, researchers tended to pay much more attention on people related issues and organizational complementarity. The resource-based view is one of the most frequently used theories in this area. When using resource-based view, researches tend to view IT capabilities as black box, and investigate the relationship between IT capabilities and firm performance (Bharadwaj, 2000, Radhika Santhanam, and Edward Hartono, 2003). However, different firms have different levels of IT capabilities. Little literature concentrates on how these differences contribute to the variation of firm performance. An attempt is made herein to narrow a gap in the literature to open the black box of IT capabilities and illustrate IT capabilities derived from IT department and their contributions to firm performance.

## LITERATURE REVIEW

### Resource-based view of firm (RBV)

Resource-based theory was developed to understand the situation in which firms are able to gain and sustain competitive advantages (Amit and Schoemaker, 1993). Resource based view of firm suggests that resources hold by a large number of firms cannot explain variance in firm performance (Ray et al, 2005). What gives a company the capacity to have competitive advantage is not ubiquity but scarcity. The **price** of IT is becoming increasingly lower, and organizations can afford increasingly more technologies which can lead to overall increase in their IT usage. Like railroads, telegraphs and even electricity, the affordable information technology will become part of general business infrastructure (Carr, 2003). Therefore, only purchasing IT resources will not ensure good firm performance (Barney 1997). Carr explains how IT resources have reached a stage that it should no longer be considered in a strategic point of view. IT resources 'becomes invisible' (Carr, 2003). In other words, IT recourses are necessary condition, but not sufficient condition, for good firm performance (Wade, 2004).

Rather, it is the ways in which firms leverage their IT investments to create capabilities that impact a firm's overall performance (demon and Row, 1991). For example, IT capabilities were an important factor for banks with good firm performance in 1980s ( Nolan, 1994). Grant (1995) describes a hierarchy of organizational capabilities, where specialized capabilities are integrated into broader functional capabilities such as marketing, manufacturing, and IT capabilities.

As for the connections between IT capabilities and firm performance, Ross and Beath (1996) provide illustrative case examples to underscore the idea that a firm's IT capability can indeed provide competitive advantages and enhance a firms' performance. Bharadwaj (2000) conceptualize IT as an organizational capability and empirically examines the association between IT capability and firm performance.

### IS Function

At the early stage of IS using, most executives looked down on computers as proletarian tools. Later on Chief executives might talk about the strategic value of information technology. In the 1960s/1970s, the main task of IS department was to deal with data processing (Cross et al, 1997). In 1980s IS departments

mainly supported individual users or small group of user. In 1990s organizations rethought the role of IS function and begin to seek for competitive advantages through IS (Cross et al, 1997). Recently, the role of IS department has become to coordinate the IS management network involving external vendors, internal user departments and itself (Angell and Smithson, 1991). On one hand, IS department needs to know the business requirements of internal user departments and support their business activities from all strategic, tactical and operational levels; one the other hand, they also need to deal with external outsourcers, including selecting vendors, negotiating and monitoring contracts, and building partnership etc.

So IS department is now becoming the **primary node** in IS management network which includes **IS department, user departments and vendors** (Angell and Smithson, 1991). IT department should plan and coordinate the network, support all the involved nodes, and share goals, priorities, trusts, rewards and expertise both internally and externally (Angell and Smithson, 1991). Due to outsourcing, some of the roles which IS department once have are not necessarily still in them and the previous large function has become a lean team. However, smaller size doesn't mean that IT department is becoming less important. IT department can help organizations make suitable outsourcing **decisions** to achieve organizations' strategic goals (Angell and Smithson, 1991). IT department also have indispensable roles to play in the deployment of information systems and the eventual IT assimilation within organization. Therefore, firms utilize the IT capabilities derived from IT department to achieve better outcomes in their efforts to leverage the potential of information systems in business activities and strategies and to improve business processes performance. These information systems & business processes successes contributes to good firm performance.

### **Assimilation Gap and absorptive capabilities**

The term "assimilation gap" is put forward by Fichman (1999). It means "the difference between the pattern of cumulative acquisitions and cumulative deployments of an innovation across a population of potential adopters." When later events in the assimilation process do not follow quickly from earlier events, the result is assimilation gap (Fichman, 1999). Fichman also added that increasing return to adoption and knowledge barriers impede IT adoption and lead to assimilation gap. What is more, the 'troubled marriage' between IT department and user departments is a longstanding problem. Different domain knowledge and different slang are cited as the reasons for communication gap. Peppard's case study shows that the gap cannot be narrowed by third parties. Neither can be done by bought in. This means that IS department has unique roles to play in bridging the gap.

Zahra and George (2002) define absorptive capabilities as a daynamic capabilities pertaining to knowledge creation and utilization. Malhorta, Gosain, & El Sawy (2005) also conceptualize "absorptive capabilities" as the set of organizational routines and processes by which organizations acquire, assimilate, transform, and exploit knowledge to produce dynamic organizational capabilities (Malhotra, Gosain, & El Sawy, 2005). Generally speaking, absorptive capabilities are knowledge based, while IT capabilities are more task or process related capabilities in this paper. As a high level of IT capabilities, assimilation capabilities can be regarded as a specific form of absorptive capabilities.

### **RESEARCH MODEL**

A company can have good firm performance when it achieves information systems and business processes successes. This successful mutual assimilation of information systems and business process can be realized through the company's IT capabilities. In other words, a company's good firm performance is based on its sensible IT sourcing or buying decisions, creative deployment of information systems at different business units and final assimilation of IT.

When discussing information systems and firm performance, people should not be neglected, otherwise we might risk fulfill our own worst prophecies of technological determinism. IT people within IT department are playing indispensable role in firm's performance. IT people's role is mainly capability building to ensure successful mutual assimilation of information systems and business processes. In order to maintain IT capabilities, firms have to keep IT people's codified ways of communicating and institutionalized professional role, because individual may come and go, but institutionalized knowledge stays within organizations and do not change very easily (Subramaniam, 2005). IT department, in this paper, refers to body of individuals providing information technology resource and services to the business. Included are IT department, Data Processing department, Management Information Systems department, IS services, and IS function.

In a word, IT people with IT capabilities make sense of IT resources to generate integration of information systems and business processes, which, in turn, lead to firm performance.

Figure 1

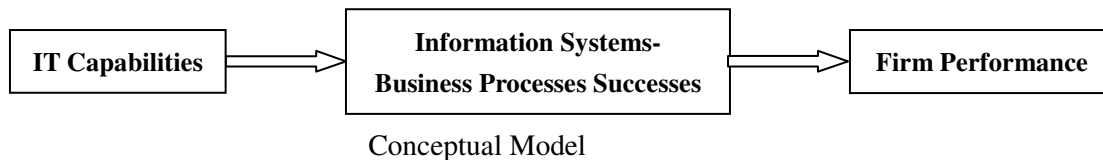
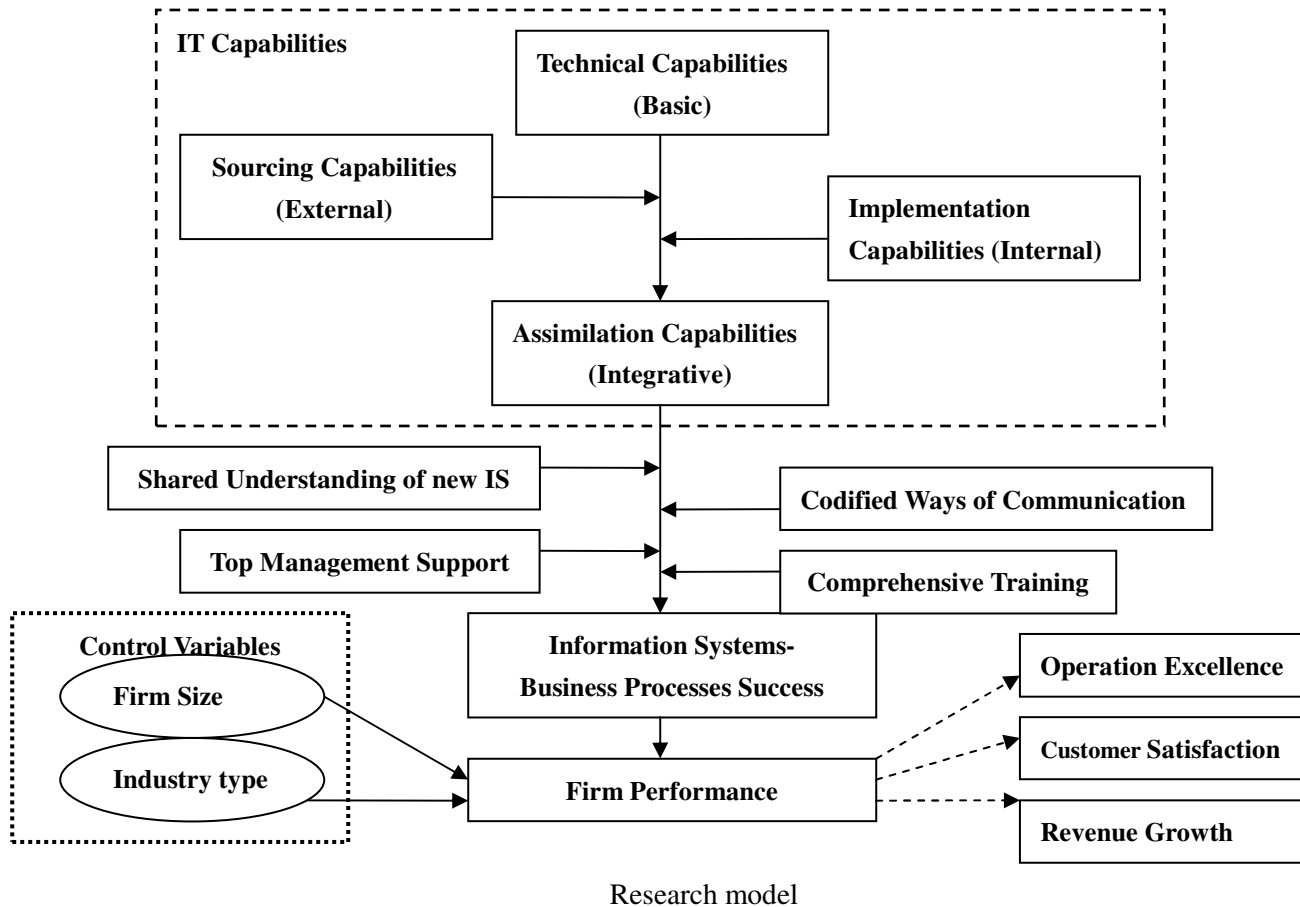


Figure 2

<b>Information Technology Management Phenomenon</b>		
<b>Antecedent</b>	<b>Enactment</b>	<b>Outcomes</b>
<b>Information Technology Management Processes</b>		
<b>Sourcing or Buying</b>	<b>Implementation /Deployment</b>	<b>Assimilation</b>

Conceptual Model of IT Capabilities

Figure 3.



## IT Capabilities

Based on Bharadwaj's definition of IT capability (2000) and Sambamurthy's definition of IT competence (2003), this paper defines IT capabilities as a firm's ability for IS deployment by virtue of IT resources and complementary resources. This paper concentrates on IT capabilities derived from a firm's IT department; therefore firms' IT department is the unit of analysis. After reviewing previous research on IT capabilities, this paper categorizes various different IT-related skills into four essential IT capabilities: technical capabilities, sourcing capabilities, implementation capabilities, and assimilation capabilities. Moreover, the relationships between those four IT capabilities are also examined to show IT people's role in different stages of IS deployment.

Technical capabilities refer to general, explicit skills possessed by the firm's IT people that are needed to support organizational IT applications. Technical capabilities support other three IT capabilities and therefore are basic IT capabilities. Technical capabilities include programming, systems analysis and design, systems integration, database development, IT infrastructure maintenance and competencies in emerging technologies. (Bharadwaj, 2000).

Sourcing capabilities refer to outsourcing/insourcing-oriented abilities possessed by firms' IT people that are needed to negotiate sourcing contract, facilitate, monitor and evaluate sourcing activities, and access performance of the outsourced IT operation. Sourcing capabilities are advanced IT capabilities, and they effect firms' communications with external firms (Vendors). Sourcing capabilities include informed buying, contract facilitation (Feeny and Willcocks, 1998), contract monitoring (Feeny and Willcocks, 1998) and vendor management and vendor-client relationship building.

Implementation capabilities refer to organizational IT adoption and deployment abilities possessed by firms' IT people that are needed to support initial enactment between IT and non-IT users (inter-organizational level). Implementation capabilities are advanced IT capabilities, and they effect communications among departments within firms. Implementation capabilities include effective management of IS functions, coordination and interaction with internal user departments (non-IT people within firms and their partners), leadership skills in IT applications, implementation training and problem solving, skills and expertise sharing, (Sabherwal, 2006), and project management.

Assimilation capabilities refer to gap-bridging abilities possessed by firms' IT people that are needed to narrow the assimilation gap during IT assimilation process and narrow gap between IT people and non-IT people. Assimilation capabilities are integrative IT capabilities, and they affect organizational IT usage and ultimate institutionalization of integration between information systems and business processes. Assimilation capabilities include cultural fit between firms and their vendors, trust relationships (informal) with user departments, IS-business partnership (formal).

The relationships between those capabilities are: the impact of technical capabilities (basic capabilities) on assimilation capabilities (integrative capabilities) will be positively moderated by sourcing capabilities (external capabilities) and implementation capabilities (internal capabilities).

### **Institutional forces, Information Systems-Business Processes Successes & Firm Performance**

Institutional forces can be regarded as organizational complementarity. Enabling institutional forces include top management support, shared understanding of new information systems, codified ways of communicating, and suitable training. IT people also have a role to play in building and maintaining enabling institutional forces that welcome new information systems within user departments, and monitoring assimilation process by enforcing top management initiatives and providing feedback to top management.

As applications of information systems have go beyond firm level to inter-organizational level, process within supply chain makes better sense than business process within firms. Business processes refer to activities underlying value generating processes within a supply chain. It includes inbound logistics, manufacturing, sales, distribution, customer services, etc. Business processes provide a context within which to examine the locus of direct resource exploitation (Meiville, 2004).

Good integration of information systems and business processes is labeled as information systems-business processes success. IT assimilation is an important outcome in the efforts of firms to leverage the potential of information technology in their business activities and strategies (Armstrong and Samburthy, 1999). Therefore, it is an instantiation of Information systems – businesses processes successes. Assimilation of IT is actually a mutual process.

In this paper, only three important and frequently used dimensions of firm performance will be examined. Operational excellence, revenue growth, and customer relationships are regarded as important dimension of firm performance (Rai, Patnayakuni, & Seth, 2006). Operation excellence is defined as a focal firm's responsiveness to customer and improvement in productivity. Customer relationships focus on the loyalty and connection between a focal firm and its customers. Revenue growth means the focal firm's increase in sales from current and new products.

So the relationship between assimilation capabilities and firm performance can be describe as follows: Assimilation capabilities, in the presence of institutional forces, will significantly enhance information systems-business processes successes. And the level of information systems-business processes successes will positively related to the level of good firm performance.

## **Methodology**

Due to the complexity of the phenomenon, the interpretive epistemology and a qualitative research method will be used. Qualitative research methods are developed in the social science to help researchers study people and social and cultural phenomena (Myers, 1997). There are several qualitative research methods: case study research, action research and ethnography. The underlying epistemology of qualitative research includes being interpretive, positivist, and critical (Myers, 1997). Case study research is the most common qualitative method used in information systems (Orlikowski and Baroudi, 1991). This research question mainly needs explanatory answers, thus this paper prefers an interpretive approach. As for data collection methods, semi-structured interviews were chosen as the primary basis for this case study. These interviews were conducted with the purpose of gaining insight into the formation of assimilation capabilities and how it related to firm performance. Furthermore, some other data collection techniques will be applied, such as study of various documents and reports: corporate brochures, newspaper, magazine and so on. Myers (1997) points out that a case study researcher uses interviews and documentary materials first and foremost.

## **EXPECTATIONS AND FUTURE RESEARCH DIRECTION**

Researches tend to view IT capabilities as black box, and investigate the relationship between IT capabilities and firm performance (Bharadwaj, 2000, Radhika Santhanam, and Edward Hartono, 2003). However, different firms have different level of IT capabilities. An attempt is made herein to use some concepts from resource-based view of firms to open the black box of IT capabilities and illustrate IT



capabilities derived from IT department and their contributions to firm performance.

This paper has started the theorizing of the hierarchy of IT capabilities in contemporary business environment. Empirical researches will be needed. Institutional theory might also be needed to better interpret the relationship between IT capabilities and information systems-business processes successes. As “the tentacles of the e-business octopus reach every corner of the organization and all along the supply chain to suppliers and final consumers” (Clegg et al., 2005), firms are now facing institutional forces from themselves, business partners, vendor, consultancy company, and so on. So the interplay of different of institutional forces deserves more research attentions.

## CONCLUSION

As technology and the business environment are experiencing dramatic changes, the role of IS function in companies has kept in changing through times. The size of IT department is becoming smaller, but the role of IT department is becoming more important. Different IT capabilities derived from IT department help IT department maintain its primary position in IT management network. High level of assimilation capabilities can enhance IT assimilation or information systems-business processes successes and eventually lead to good firm performance. In other words, IT people with IT capabilities make sense of IT resources to generate integration of information systems and business processes, which, in turn, lead to firm performance.

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