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# User acceptance of second life: An extended TAM including hedonic consumption behaviours

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# IT IMPACTS ON OPERATION-LEVEL AGILITY IN SERVICE INDUSTRIES

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## Abstract

*This study examines the relationship between operation-level agility and firm performance in service industries. The study is augmented by investigating the role of IT resources and competence to achieve this specific type of agility. As of to date, most of the published literature in this stream of research has focused on manufacturing industry. This research is an early attempt to examine the strategic value of IT-enabled operational capabilities in service industry. We propose a theory-based model of the positive relationships among IT service competence, operation-level agility, and firm performance. Survey data of medium to large-size enterprises in service industries in the United States were used to validate the proposed model. The results indicate that operation-level agility is a significant driving force of firm performance in the service industries and that IT service competence significantly determines the operation-level agility. The results emphasize that IT-supported operation-level agility significantly leads to a better performance.*

*Keywords: Operation-Level Agility, IT Competence, IT Resources, Firm Performance*

# 1 INTRODUCTION

Globalization and the advancement of information technology (IT) have produced an intensely competitive, dynamic, and unstable business environment. This competitive landscape is often shaped by escalating competition and strategic maneuvering based on price-quality positioning, attempts to establish market advantage, and pressure of new knowledge creation (Hitt & Keats & DeMarie 1998, McNamara & Vaaler & Devers 2003, Shi & Kunnathur & Ragu-Nathan 2005). For example, industries such as electronic goods and finance face challenges by short lifecycle of products and rapid technology diffusion.

Agility, the ability to rapidly respond to external changes, has been proposed as a solution to such changing environment (D'Aveni 1994, Sambamurthy & Bharadwaj & Grover 2003). Agility has been examined at various levels in the literature, such as enterprise-level agility, business function-level agility, project-level agility, and system-level agility (Lee & Banerjee & Lim & Kumar & van Hillegersberg & Wei 2006, Overby & Bharadwaj & Sambamurthy 2006, Prewitt 2004, Sambamurthy et al. 2003). In this study, we focus on agility at the operational level, the ability of a firm to achieve speed, accuracy, and cost economy to realize emerging opportunities for operational innovations.

During the last two decades, operation-level agility has received considerable attention in the manufacturing industry (Narasimhan & Swink & Kim 2006). In manufacturing settings, agility has been emphasized in terms of leanness and flexibility of operational processes, such as resource procurement, manufacturing, quality control, and product delivery (Burgess 1994, Ettl 1998, Gerwin 1993, Llorénsa & Molinaa & Verdúb 2005). This capability has been discussed as a driving force for firms' exploitation of changing market opportunities, thus leading to competitive market position. The capability of people to exploit their knowledge to cope with market demands, internal process changes, and interactions with suppliers has been addressed as another factor impacting business process agility (Grover & Cheon & Teng 1996, Hamel 1994, Pavlou & El Sawy 2006). Research on agility in service industries, however, remains sparse while there has been a pressing need to cope with growing and evolving service sector of the economy (Roth & Menor 2003).

The service industry is different from manufacturing in many ways. As pointed out by Roth and Menor (2003), business processes in manufacturing firms affect consumers mainly through their products which are usually physical goods. Hence, in the manufacturing settings, operation-level agility is usually restrained by physical constraints such as locations, resource availability, and delivery time. In contrast, the service offerings and delivery involve processes enhanced by support amenities, facilitating information, and implicit services, e.g., psychological benefits (Menor & Roth & Mason 2001). Moreover, while the direct interaction with customers in the service settings makes it easier to collect market intelligence, the customers' demands are more complex and likely to change due to the dynamics of direct interaction with individual customers (Roth & Menor 2003). Due to the rapidity of change in competition, market dynamics, and customer preferences, the breadth and pattern of responses required in the service settings are much broader, more frequent, and sometimes more unpredictable (Beidleman & Ray 1998, Menor et al. 2001). To the best of our knowledge, little has been done to understand operation-level agility in the service industry. Menor et al. (2001) investigated agility in banks. However, by treating agility as a one-facet concept in their study, they could not fully explain the role of operation-level agility in competitive performance of service firms. Due to the lack of research on operation-level agility in the service industries, the role of IT as an enabler for this significant business capability is also unclear.

In this research we address these knowledge gaps by answering the following research questions:

- What is agility at the operational level in the service industries?
- What is the organizational influence of operation-level agility?
- As essential assets in current business, what are the IT competences that support operation-level agility?

This paper is organized as follows: Section 2 defines the key constructs and develops the hypotheses and research model; Section 3 discusses research methodology followed by the discussion on data analysis. The paper is concluded with implications and discussions.

## 2 RESEARCH MODEL AND HYPOTHESES

Figure 1 shows the research model of the study.

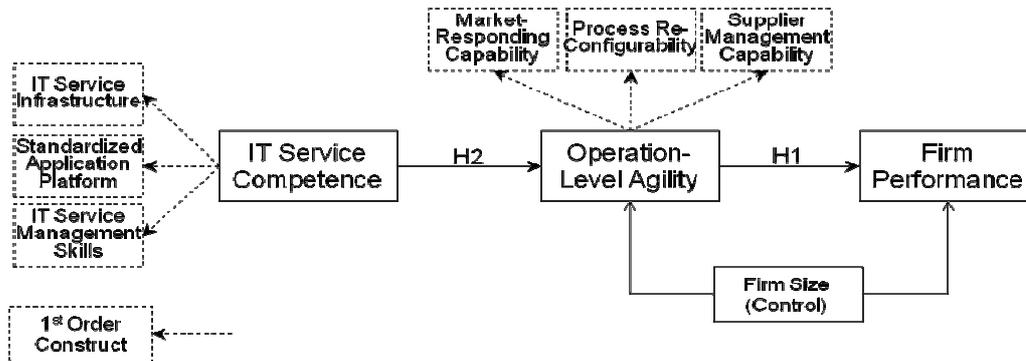


Figure 1. Research Model

### 2.1 Operation-level agility and firm performance

The notion of agility has been discussed extensively in the literature. There is a general agreement that when facing a turbulent environment, enterprises must adapt to changes. Otherwise, they lose their competitive advantages. In service industries where competition is severe, a key business competence is to acquire market information and respond to changes in an effective and timely manner (Overby et al. 2006). Prior research has proposed agility at different organizational levels. For example, Sambamurthy et al. (2003) describe enterprise agility as one of the important dynamic capabilities in a turbulent environment. In their study, agility is defined as “the ability to detect opportunities for innovation and seize those competitive market opportunities by assembling requisite assets, knowledge, and relationships with speed and surprise” (p. 245). According to this conceptualization, agility encompasses the capabilities related to interactions with customers, deployment of internal operations, and utilization of its external business partners. Similarly, Overby et al. (2006) define agility as “the ability of firms to sense environmental change and respond readily” (p. 121). This definition emphasizes two capabilities: sensing and responding. Hence, agility includes the ability to detect, anticipate, and sense market opportunities, evolving conditions, and other environmental changes. At the same time, it also includes the ability to seize the opportunity with speed and implement new solutions. Similar to the study done by Sambamurthy et al. (2003), Overby et al. (2006) argue that agility applies to both strategic and operational levels within a firm.

In this study, we focus on agility at an operational level, namely *operation-level agility*, which is defined as the ability of a firm to achieve speed, accuracy, and cost economy to realize emerging opportunities for operational innovations (Cao & Dowlatshahi 2005, Sambamurthy et al. 2003). It emphasizes the effectiveness and efficiency of a firm’s actions in response to changes in their daily operations. For the purpose of this study, we define operation-level agility as a composite of three interrelated capabilities: market responding capability, process reconfigurability, and supplier management capability. We argue that these capabilities combined would enable a firm to seize opportunities, respond to internal and external changes, and sustain its competitive operational edge.

*Market responding capability* refers to the ability of firms to sense emerging opportunities and threats and respond to the market to deliver products and services valued by their customers (Grewal &

Tansuhaj 2001, Wang & Ahmed & Worrall 2004). Operation-level agility is the response to changes in the market. It requires firms to be aware of changes and then seize the opportunities by tailoring their business solutions. Hamel (1994) has argued the market-related capability is one of the core competences in the business. It allows a firm to stay close to its customers, identify emerging needs quickly, and deliver new services in a timely manner (Hamel 1994, Ravichandran & Lertwongsatien 2005, Wang et al. 2004). As an organizational capability, market responding capability integrates multiple functional capabilities such as intelligence collecting, market research, and customer relationship management to tailor services for new tastes of customers. This capability is necessary to help firms sense and realize emerging opportunities for operational innovations.

*Process reconfigurability* refers to the ability of firms to transform and reconfigure their resources and processes in order to accommodate changes (Pavlou & El Sawy 2006). Transformation and reconfiguration of resources are catalysts for change. While market responding capability helps the firm identify the necessity for change, process reconfigurability allows it to deploy new configurations of functional competences that better match the environment (Pavlou & El Sawy 2006) and ensures that the firm can rapidly redesign and modify existing processes for new market conditions (Sambamurthy et al. 2003). Firms' ability to integrate and combine existing resources into "novel" combinations to better match their product-market areas helps them respond to changes and deliver new services effectively.

*Supplier management capability* refers to the ability of a firm to modify or adapt its extended enterprise network (e.g., supply chain) when it needs access to assets, competences, or knowledge not currently resident in its business itself (Dyer & Singh 1998, Sambamurthy et al. 2003). When implementing changes, firms may not possess all the required knowledge, skills, and resources. Nowadays, more and more businesses have decided to outsource some of their business functions and focus on their core competences (Shi et al. 2005). To better leverage the resources of their suppliers and/or clients, businesses form strategic alliance with their business partners to coordinate across firm boundaries and exploit opportunities together (Grover et al. 1996). Therefore, the capabilities to manage suppliers are more important than ever in the current business environment. Any internal changes may require corresponding changes in suppliers in a timely manner. Building missing resources will cause delay and loss of opportunities. To be effective in the acquiring and/or cooperating process, firms need supplier management capability to quickly locate needed resources, negotiate terms, and be able to trust and rely on partners for speed and quality. Therefore, in order to respond quickly to changes, firms must not only reconfigure internal resources and processes, i.e., process reconfigurability, but also acquire high-quality products/services from their partners in time to accomplish the changes. This capability also helps firms respond to changes at the operational level.

In all, we argue that operation-level agility focusing on change implementation in business operations is made up of (a) market responding capability, (b) process reconfigurability, and (c) supplier management capability. This operation-level agility is deemed critical to firms' performance. Specifically, in fast-cycle industries, operation-level agility leads to more competitive actions in a rapid pace leading to an improved business performance (Meyer 2001, Sambamurthy et al. 2003, Venkatraman & Camillus 1984, Weill & Subramani & Broadbent 2002). In contrast, lack of operation-level agility implies a lack of responsiveness to the environment and the presence of inappropriate, outdated business activities and processes, thus resulting in poor performance. Therefore, especially in service industries where uncertainty and unpredictability are normal, the performance of a firm highly depends on its operation-level agility.

*H1. A higher level of operation-level agility will lead to a higher level of firm performance in service industries.*

## **2.2 IT service competence and operation-level agility**

IT is fundamental to the growth of a business. IT has the potential to provide competitive advantages for businesses (Ravichandran & Lertwongsatien 2005). However, IT *per se* may not generate a

sustainable advantage since it can be easily acquired and imitated (Carr 2003). Also, investments in IT may not result in better firm performance since some IT investments can be wasted (Davern & Kauffman 2000). Instead, the implementation of IT competence, the extent to which a firm is knowledgeable about and effectively utilizes information technologies within specific business contexts, can create competitive advantage (Tippins & Sohi 2003).

Recent researchers argue that the relationship between IT competence and business values can be deconstructed through the presence of business competences. For example, Soh and Markus (1995) examine the need for effective deployment of appropriate IT assets to create business value. They argue that the effective use of these IT assets leads to intermediate effects, such as better business competences and processes, which, in turn, influence firm performance. Similarly, Ravichandran and Lertwongsatien (2005) argue that IT capabilities which support core competences of the firm such as market access competence, integrity-related competence, and functional-related competence can contribute to better performance. Tippins and Sohi (2003) confirm that business competences, such as organizational learning capability, mediates the relationship between IT competence and performance. These studies emphasize the importance of understanding the relationship between IT competence and business competences when understanding how IT influence business performance.

In this study, we argue that *IT service competence*, defined as the extent to which a firm can effectively utilize IT to support their businesses and facilitate operation, plays an important role in enhancing business performance by improving operation-level agility. We conceptualize IT service competence as a second-order construct, formed by IT service infrastructure, standardized application platform, and IT service management skills, arguing that IT service competence is central to operation-level agility.

*IT service infrastructure* is the sharable technical and common enterprise-wide platform, such as networking, database services, and standardized operation support, which enables initiatives, such as cycle time improvement and cross functional processes (Bharadwaj 2000). As the foundation of shared IT capabilities upon which the entire business depends, IT service infrastructure is crucial to operation-level agility (Byrd & Turner 2000). It links business units, implements common transaction processing, expedites business operations, allows to quickly access and share business data across the firm, and creates synergies across business units (Bharadwaj 2000, Ravichandran & Lertwongsatien 2005). A non-integrated IT infrastructure can severely restricts an organization's business choices and slow down business process, thus hindering operation-level agility.

*Standardized application platform* refers to enterprise-wide integrated software application platform and standard IT applications (Bharadwaj 2000). Developing standards for IT platform has been considered a priority in both research and professional communities (Markus & Steinfield & Wigand & Minton 2006 ). By providing uniform technical specifications, interfaces and criteria, it makes it easier to integrate new IT components and improve synergies between work units. It also has been long recognized that modularization is a good software development practice (Byrd & Turner 2000, Ravichandran & Lertwongsatien 2005). It constructs software from separate parts, called modules that separate logical boundaries between components. Such approach allows easy modification for new business processes and integration of new technologies with existing platforms, thereby allowing the IT unit to deliver new capabilities quickly and cost effectively, thus improving operation-level agility

*IT service management skills* refer to the skill set of IT personnel to manage IT resources to deliver organizational IT services (Tippins & Sohi 2003). It includes knowledge and experiences of IT workers in dealing with daily operation of information systems (IS), handling requests from business users, and monitoring performance of IS to ensure that they meet business needs. Strong IT service management skills can help communication between the IT division and business users, integrate IT and business processes effectively, improve reliability and quality of IT, reduce cost of development and maintenance, and decrease delivery cycle time (Bharadwaj 2000, Byrd & Turner 2000). Therefore, IT service management skills are important part of IT service competence in the context of operation-level agility.

In all, we argue that IT service competence formed by (a) IT service infrastructure, (b) standard application platform, and (c) IT service management skills can support and enhance operation-level agility.

*H2. A higher level of IT service competence will lead to a higher level of firm performance in service industries.*

### 3 RESEARCH METHOD

A large-scale cross-sectional survey to collect firm-level data was conducted in the United States.

#### 3.1 Measurement development

The measurement development process involved three stages: (1) operationalization of research constructs, (2) item development, and (3) validity tests. First, research constructs were operationalized based on the definition of each construct as well as of relevant constructs in the literature. Second, every attempt was made to make use of existing measurements which have good psychometric measurement properties. Modifications of the existing items were also made to suit the context of the study. Table 1 provides a summary of the measurement items used in this study and their sources.

Constructs	Summary of Measurement Items	Sources
Firm Performance	Competitive measures of customer retention, sales growth, profitability, and return on investment	Adopted from Tippins & Sohi (2003)
Market Responding Capability	Organizational capability to obtain real time information about market changes, respond quickly to market requirements, and deliver products and services on time	Adapted from Grewal & Tansuhaj (2001) and Wang et al. (2004)
Process-Reconfigurability	Organization capability to quickly reallocate resources, combine existing resources, and timely redesign / reconfigure business processes	Adopted from Pavlou & El Sawy (2006)
Supplier Management Capability	Organization capability to change volume allocation among suppliers, acquire services and products from potential suppliers, and quickly change suppliers	Adapted from Swafford & Ghosh & Murthy (2006)
IT Service Infrastructure	Technology infrastructure to electronically link business units and partners, technology infrastructure to expedite business operations, network capacity and speed, and corporate data access	Adopted from Ravichandran & Lertwongsatien (2005) and Weill et al. (2002)
Standardized Application Platform	Application infrastructure to allow reuse, modularization, integration, and standardization of common application components	Adopted from Bhatt & Grover(2005) and Lee et al. (2008)
IT Service Management Skills	IT staff's skills to prioritize and manage IT service requests, possession of well-defined service quality criteria for IT support, and possession of performance standards	Adopted from Tippins & Sohi 2003 (2003)
Firm Size <sup>1</sup> (Control)	The number of full-time employees	Adopted from Tanriverdi (2005)

*Table 1. Measurement Sources for Research Constructs*

<sup>1</sup> This variable was adopted to control the potential compounding effect of available resources or managerial diseconomies on organizational high-level capabilities and performance (Tanriverdi 2005).

### 3.2 Research design

We conducted a large-scale cross-sectional survey with firms in service industries in the United States. The United States has experienced a fast growth of service industries and a nation-wide industrial transformation from manufacturing to service. Hence, it is considered as a viable background for examining the research framework of this study.

We applied a series of criteria congruent with the context of the study for the selection of the target samples. First, we focused on service industries which to a significant extent require IT support for their business operations, such as banking/finance, insurance, healthcare/medical, and consulting. Second, we excluded companies with fewer than ten employees from our target sample because such small companies do not provide a background appropriate for investigating capabilities in their operations and IT service.

After the target samples were defined, a cross-sectional survey was conducted using a web-based survey tool. Survey invitations were made to business executives, e.g., president, chief executive officer, chief operating officer, business director, and IT executives, e.g., chief information officer, chief technical officer, and IT director, of the sample firms in the target industries. Around 700 executives in an industrial respondent pool were invited to participate in this survey and a total of 147 complete data samples were achieved after removing small companies, incomplete data, and other inappropriate data, such as non-management positions and non-full-time employees. The final data represents 7 service industry types, such as healthcare/medical (70), banking/finance (32), consulting (21), insurance (17), and others (7). Their firm size varies; less than 250 (55), between 251 and 1000 (26), more than 1000 (66).

## 4 RESULTS AND ANALYSES

Partial least squares (PLS), a structural equation modeling technique, was used to analyze the data. This technique does not require a large sample size (Chin 1998). In addition, it is appropriate for early stages of theory development (Howell & Higgins 1990). Given that this study is an early attempt to develop a theoretical model that explains how a firm's competence in IT services enables its operation-level agility leading to firm performance, PLS was considered to be appropriate for this study.

### 4.1 Measurement model evaluation

The validity of the measurement model was established prior to testing the structural model (Byrne 1998). The convergent validity of the reflective measures is determined in three ways: (1) the item reliability of each item, (2) the composite reliability of the construct, and (3) the average variance extracted (AVE) by the construct.

Construct	Number of Items	Item Reliability	Composite Reliability	AVE
Firm Performance (FPER)	4 items	.654 ~ .863	.881	.651
Market Responding Capability (MRES)	4 items	.763 ~ .882	.892	.674
Process-Reconfigurability (RCPR)	4 items	.852 ~ .917	.936	.784
Supplier Management Capability (SMGC)	3 items	.773 ~ .824	.841	.639
IT Service Infrastructure (ITSI)	4 items	.862 ~ .914	.938	.792
Standardized Application Platform (STAP)	4 items	.826 ~ .898	.923	.749
IT Service Management Skills (ITMS)	4 items	.860 ~ .919	.938	.791

Table 2. Result of Convergent Validity Test

Based on the results reported in Table 2, it was concluded that all the items demonstrated adequate convergent validity. Table 3 shows that the square root of the AVE for each construct was larger than the correlations between itself and the other constructs. This implies that each of the constructs shared greater variance with its own block of measures than with other constructs representing a different block of measures (Chin 1998). Therefore, this result demonstrates that there is good discriminant validity for the items used in this study.

	FPER	MRES	RCPR	SMGC	ITSI	STAP	ITMS	SIZE
FPER	<b>.807</b>							
MRES	.547	<b>.821</b>						
RCPR	.483	.674	<b>.885</b>					
SMGC	.213	.305	.365	<b>.799</b>				
ITSI	.248	.341	.415	.203	<b>.890</b>			
STAP	.363	.445	.450	.253	.699	<b>.944</b>		
ITMS	.254	.286	.270	.199	.588	.581	<b>.889</b>	
SIZE	-.035	-.168	-.189	-.120	-.047	-.004	.037	<b>1.000</b>

Table 3. Result of Discriminant Validity Test

#### 4.2 Structural model analyses

The estimated path effects and the associated t-values were calculated using the Bootstrapping routine in PLS-Graph (version 03.00 build 1126). Since the operation-level agility and IT service competence were formulated as second-order constructs, the latent scores for each of the first-order constructs were calculated and used as measures for each construct (Chin & Gopal 1995). Figure 2 shows the results of the model analysis.

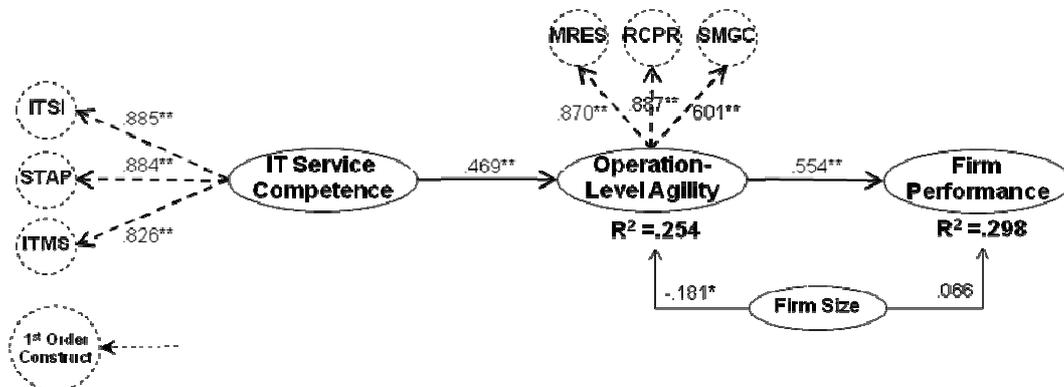


Figure 2. Result of Model Test

Note: \*  $p < 0.05$ , \*\*  $p < 0.01$

As shown in Figure 2, all paths were significant. The operation-level agility ( $\beta = .554$ ,  $t = 6.981$ ) was found to be a significant determinant of firm performance at the .01 level. It explained 29.8% of the variances of firm performance. On the other hand, the IT service competence ( $\beta = .469$ ,  $t = 6.191$ ) was found to be a significant determinant of the operation-level agility at the .01 level. It explained 25.4% of the variances of operation-level agility. All second-order loadings (loadings of the 1<sup>st</sup> order constructs) were highly significant. Therefore, all hypotheses H1 and H2 are supported. Interestingly, firm size, the control variable, was negatively significant ( $\beta = -.181$ ,  $t = 2.359$ ) at the .05 level in determining operation-level agility while it was not a significant determinant of firm performance.

### 4.3 Implications

The results indicate that a specific set of IT resources forms service organizations' IT competence to support business needs, hence leading to a higher level of agility in their operations. In turn, this operation-level agility positively influences the competitive performance of the firms. To confirm these causal relationships among IT service competence, operational-level agility, and firm performance, we further conducted a post-hoc analysis of mediator test. Following Baron and Kenny's (1986) four steps, we stepwise tested (1) the significant effect of IT service competence (IV) on firm performance (DV) without operation-level agility (MV) ( $\beta = .344$ ,  $t = 4.478$ ,  $p < .01$ ), (2) the significant effect of the IV on the MV ( $\beta = .468$ ,  $t = 6.587$ ,  $p < .01$ ), (3) the significant effect of the MV on the DV ( $\beta = .553$ ,  $t = 10.298$ ,  $p < .01$ ), and (4) the insignificant effect of the IV on the DV in the copresence of the MV ( $\beta = .099$ ,  $t = 1.060$ ). According to Baron and Kenny (1986), the results indicate that operation-level agility is the full mediator between IT service competence and firm performance. Therefore, the post-hoc analysis results also confirm our research model proposed in this study.

In particular, our study shows that a firm's IT service competence, formed by IT service infrastructure, standardized application platform, and IT service management skills, is a significant driving force for the firm's agile operations which are represented by its rapid market responses, flexible process reconfiguration, and effective supplier management. The findings are consistent with Bharadwaj's (2000) perspective that a firm's IT resources, technology and human IT resources, are the sources of its latent capacity to build and provide the requisite IT services. Furthermore, the findings also provide an empirical evidence of the conceptual premise that IT is a digitized platform of business agility (Overby et al. 2006, Sambamurthy et al. 2003).

The study also shows that IT-supported operation-level agility significantly leads to a better performance, particularly in terms of sales growth, profitability, return on investment, and customer retention. The findings are consistent with the premise of the role of IT-enabled agility in generating higher performance of a firm in a turbulent environment. Considering the context of the study, i.e., the service industries, the findings are deemed important as well as useful to both academics and practitioners. Traditionally, the value of operation-based capabilities has been discussed in manufacturing settings. For example, many techniques of operational leanness and flexibility have been suggested under the settings of manufacturing, such as just-in-time manufacturing (JIT), total quality management (TQM), and lean manufacturing (Burgess 1994, Ettlief 1998, Gerwin 1993, Llorénsa et al. 2005). However, with regards to the recent catastrophe in the financial industries in the United States, it is likely to be more true that operational capabilities, such as operation-level agility, are crucial for firm success under the settings of service industries.

## 5 CONCLUSION

In this study, we concentrated on the service industries and theoretically proposed a positive relationship among IT service competence, operation-level agility, and firm performance. To capture the combinative values of IT resources and operation-level capabilities which form IT service competence and operation-level agility respectively, the second-order approach was adopted in conceptualizing the core research constructs. Survey data of small- to large-size enterprises in service industries of the United States were used to validate the proposed model. The results indicate that operation-level agility, consisting of market responding capability, process reconfigurability, supplier management capability, is a significant driving force of firm performance. The results also indicate that IT service competence, consisting of IT service infrastructure, standardized application platform, and IT service management skills, serves as a base for the operation-level agility.

This study has several limitations which involve cross-sectional research design and single respondent survey approach. First, this study used a cross-sectional research design. Such a snap-shot approach

may have limitations in terms of studying the causal relationships or time effects between research variables, such as the lead-time of the IT impact (Bharadwaj 2000). Second, single respondent bias has been discussed as a potential source of common method variance (Podsakoff & Organ 1986). To avoid this, various techniques have been suggested in the literature, such as separating survey questionnaire to ask specific expertise with different positions (Lee & Lim & Sambamurthy & Wei 2007). While our sample data are not thought to suffer from this issue<sup>2</sup>, multiple-respondent survey may provide more generalizable findings.

Regardless of the aforementioned limitations, this study makes several contributions to the literature. First, this study, both theoretically and empirically, reveals how firms can develop their operation-based agility. The findings of the study indicate the significant role of IT competence in achieving this specific type of agility. Since prior studies in IT-enabled agility have seldom provided empirical evidence, the theory-based models and the empirical findings of the study are both interesting and useful to academics in this research area. Second, this study has a potential contribution to the literature by addressing an unexplored, yet emerging issue of the role of operational capabilities in service industries. Since most of prior studies in operational capabilities have focused on the settings of manufacturing industries, this study may open a new area of discussion among academics and practitioners. Lastly, through this study, we develop new measurements having good psychometric properties. The measurements used in this study can serve as a base for further research in this research area. This study also has some practical contributions by providing guidance for practitioners to strategically invest their IT resources to achieve their agility at operational level.

This study can be extended in several directions. First, this study mainly focuses on operation-level agility in the service industry. Future research can examine another type of agility such as strategic agility. Second, this study investigates IT service competence, including IT service infrastructure, standardized application platform and IT service management skills. Future research can continue to study IT skills of business users that may also have influence on agility. Third, the unit of analysis of this study is the organization. It evaluates overall agility and its impact on the performance of an organization. However, in some large organizations, some divisions may be more agile than others. Future study can explore the topic at department or team levels. Fourth, our study adopts the survey methodology and measures the performance of an organization using historical/present data. Future research can develop a longitudinal study following the effectiveness of business capabilities.

## Reference

- Baron, R.M. and Kenny, D.A. (1986). The Moderator-Mediator Variable Distinction in Social Psychological Research: Conceptual, Strategic and Statistical Considerations. *Journal of Personality and Social Psychology*, 51, pp. 1173-1182.
- Beidleman, C. and Ray, M. (1998). The agility revolution, In *The Quality Yearbook* (Eds, Cortada, J. W. and Woods, J. A.). McGraw-Hill, New York, pp. 98-104.
- Bharadwaj, A.S. (2000). A Resource-Based Perspective on Information Technology Capability and Firm Performance: An Empirical Investigation. *MIS Quarterly*, 24 (1), pp. 169-196.
- Bhatt, G.D. and Grover, V. (2005). Types of Information Technology Capabilities and Their Role in Competitive Advantage: An Empirical Study. *Journal of Management Information Systems*, 22 (2), pp. 253-277.

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<sup>2</sup> Harman's single-factor analysis was conducted to test a potential of common method variance in our sample data. This test involves an exploratory factor analysis (EFA) of all measurements to determine whether the majority of the variance is accounted for by one general factor. The principal component analysis using varimax rotation revealed that a total of seven distinct factors emerged with Eigen value of over 1. The results revealed that each of the seven principal components explained similar amounts of the total variance of 76%, ranging from 5% to 14%. This result indicates that our data does not suffer from common-method bias as indicated by Podsakoff et al. (2003).

- Burgess, T.F. (1994). Making the Leap to Agility: Defining and Achieving Agile Manufacturing through Business Process Redesign and Business Network Redesign. *International Journal of Operations & Production Management*, 14 (11), pp. 23-34.
- Byrd, T.A. and Turner, E.D. (2000). Measuring the Flexibility of Information Technology Infrastructure. *Journal of Management Information Systems*, 17 (1), pp. 167-208.
- Byrne, B.M. (1998). *Structural Equation Modeling with LISREL, PRELIS and SIMPLIS: Basic Concepts, Applications, and Programming*. Erlbaum, Mahwah, NJ.
- Cao, Q. and Dowlatshahi, S. (2005). The Impact of Alignment between Virtual Enterprise and Information Technology on Business Performance in an Agile Manufacturing Environment. *Journal of Operations Management*, 23 (5), pp. 531-550.
- Carr, N.G. (2003). IT Doesn't Matter. *Harvard Business Review*, 81 (5), pp. 41-50.
- Chin, W.W. (1998). The Partial Least Squares Approach to Structural Equation Modeling, In *Modern Methods for Business Research* (Ed, Marchoulides, G. A.). Lawrence Erlbaum Associates, Mahwah, NJ, pp. 295-336.
- Chin, W.W. and Gopal, A. (1995). Adoption Intention in GSS: Relative Importance of Beliefs. *Data Base for Advances in Information Systems*, 26 (2 & 3), pp. 42-64.
- D'Aveni, R.A. (1994). *Hypercompetition: Managing the Dynamics of Strategic Maneuvering*. The Free Press, New York.
- Davern, M.J. and Kauffman, R.L. (2000). Discovering potential and realizing value from information technology investments. *Journal of Management Information Systems*, 16 (4), pp. 121-144.
- Dyer, J.H. and Singh, H. (1998). The Relational View: Cooperative Strategy and Resources of Interorganizational Competitive Advantage *Academy of Management Review* 23 (4), pp. 660-679.
- Ettlie, J.E. (1998). R&D and Global Manufacturing Performance. *Management Science*, 44 (1), pp. 1-11.
- Gerwin, D. (1993). Manufacturing Flexibility: A Strategic Perspective. *Management Science*, 39 (4), pp. 395-410.
- Grewal, R. and Tansuhaj, P. (2001). Building Organizational Capabilities for Managing Economic Crisis: The Role of Market Orientation and Strategic Flexibility. *Journal of Marketing*, 65 (2), pp. 67-80.
- Grover, V., Cheon, M.J. and Teng, J.T.C. (1996). The Effect of Service Quality and Partnership on the Outsourcing of Information Systems Functions. *Journal of Management Information Systems*, 12 (4), pp. 89-116.
- Hamel, G. (1994). The concept of core competence, In *Competence-Based Competition* (Eds, Hamel, G. and Heene, A.). John Wiley & Sons, Chichester, UK, pp. 11-33.
- Hitt, M.A., Keats, B.W. and DeMarie, S.M. (1998). Navigating in the New Competitive Landscape: Building Strategic Flexibility and Competitive Advantage in the 21st Century. *Academy of Management Executive*, 12 (4), pp. 22-42.
- Howell, J.M. and Higgins, C.A. (1990). Champions of Technological Innovation. *Administrative Science Quarterly*, 35 (2), pp. 317-341.
- Lee, O.-K.D., Banerjee, P., Lim, K.H., Kumar, K., van Hillegersberg, J. and Wei, K.-K. (2006). Aligning IT Components to Achieve Agility in Globally Distributed System Development. *Communications of the ACM*, 49 (10).
- Lee, O.-K.D., Lim, K.H., Sambamurthy, V. and Wei, K.K. (2007). IT-Enabled Organizational Agility and Firms' Sustainable Competitive Advantage. In the Twenty-Eighth International Conference on Information Systems, Montreal, Canada.
- Lee, O.-K.D., Lim, K.H., Sambamurthy, V. and Wei, K.K. (2008). Information Technology Exploitation and Exploration in a Fast Growing Economy. In the Twelve Pacific Asia Conference on Information Systems, Suzhou, China.
- Llorénsa, F.J., Molinaa, L.M. and Verdúb, A.J. (2005). Flexibility of Manufacturing Systems, Strategic Change and Performance. *International Journal of Production Economics* 98 (3), pp. 273-289.

- Markus, M.L., Steinfield, C.W., Wigand, R.T. and Minton, G. (2006 ). Industry-Wide Information Systems Standardization as Collective Action: The Case of the U.S. Residential Mortgage Industry. *MIS Quarterly* 30 (Supplement), pp. 439-465.
- McNamara, G., Vaaler, P.M. and Devers, C. (2003). Same as It Ever Was: The Search for Evidence on Increasing Hypercompetition. *Strategic Management Journal*, 24 (3), pp. 261-278.
- Menor, L.J., Roth, A.V. and Mason, C.H. (2001). Agility in Retail Banking: A Numerical Taxonomy of Strategic Service Groups. *Manufacturing & Service Operations Management*, 3 (4), pp. 273–292.
- Meyer, C. (2001). The Second Generation of Speed. *Harvard Business Review* 79 (4), pp. 24-26.
- Narasimhan, R., Swink, M. and Kim, S.W. (2006). Disentangling Leanness and Agility: An Empirical Investigation. *Journal of Operations Management*, 24 (5), pp. 440–457.
- Overby, E., Bharadwaj, A. and Sambamurthy, V. (2006). Enterprise Agility and the Enabling Role of Information Technology. *European Journal of Information Systems* 15 (2), pp. 120-131.
- Pavlou, P.A. and El Sawy, O. (2006). From IT Leveraging Competence to Competitive Advantage in Turbulent Environments: The Case of New Product Development. *Information Systems Research* 17 (3), pp. 198-22.
- Podsakoff, P.M. and Organ, D.W. (1986). Self-Reports in Organizational Research: Problems and Prospects. *Journal of Management*, 12 (4), pp. 531-544.
- Prewitt, E. (2004). The Agile 100. *CIO Magazine*, 17 (21).
- Ravichandran, T. and Lertwongsatien, C. (2005). Effect of Information Systems Resources and Capabilities on Firm Performance: A Resource-Based Perspective. *Journal of Management Information Systems*, 21 (4), pp. 237-276.
- Roth, A.V. and Menor, L.J. (2003). Insights into Service Operations Management: A Research Agenda. *Production and Operations Management*, 12 (2), pp. 145-164.
- Sambamurthy, V., Bharadwaj, A. and Grover, V. (2003). Shaping Agility through Digital Options: Reconceptualizing the Role of Information Technology in Contemporary Firms. *MIS Quarterly*, 27 (2), pp. 237-263.
- Shi, Z., Kunnathur, A.S. and Ragu-Nathan, T.S. (2005). IS Outsourcing Management Competence Dimensions: Instrument Development and Relationship Exploration. *Information & Management*, 42 (6), pp. 901-919.
- Soh, C. and Markus, M.L. (1995). How IT Creates Business Value: A Process Theory Synthesis. In *Sixteenth International Conference on Information Systems Association for Information Systems*, Atlanta, pp. 29-41.
- Swafford, P.M., Ghosh, S. and Murthy, M. (2006). The Antecedents of Supply Chain Agility of a Firm: Scale Development and Model Testing. *Journal of Operations Management* 24 (2), pp. 170-188.
- Tanriverdi, H. (2005). Information Technology Relatedness, Knowledge Management Capability, and Performance of Multibusiness Firms. *MIS Quarterly*, 29 (2), pp. 311-334.
- Tippins, M.J. and Sohi, R.S. (2003). IT Competency and Firm Performance: Is Organizational Learning A Missing Link? *Strategic Management Journal*, 24, pp. 745–761.
- Venkatraman, N. and Camillus, J.C. (1984). Exploring the Concept of "Fit" in Strategic Management. *Academy of Management Review*, 9 (3), pp. 513-525.
- Wang, Y., Ahmed, P.K. and Worrall, L. (2004). Understanding Inter-firm Network: A Theoretical Review. *International Journal of Management Concepts and Philosophy*, 1 (1), pp. 73-98.
- Weill, P., Subramani, M. and Broadbent, M. (2002). Building IT Infrastructure for Strategic Agility. *MIT Sloan Management Review*, 44 (1), pp. 57-65.