

The Level of EC Utilization and its Impact on Firm Performance in SMEs

Byoung-Ho Jun*

Abstract

This study sought to explore how SMEs are utilizing EC. Drawing on existing research on IT and EC related field, this study presented the framework of EC utilization level and analyzed its affecting factors in the point of organizational perspectives; strategy and competency. The impact of EC utilization on firm performance was also examined by employing BSC. Structural equation model was applied to test the relationships among the theoretical constructs with data from 171 SMEs.

The results showed that the rate of EC utilization in SMEs is growing quite rapidly. However, manufacturing related firms still remain at a lower level compared to service related firms. As for the two affecting factors of EC utilization level, it was found that the level of EC utilization appeared to be driven not by strategy but by competency. This result implicates that EC utilization in SMEs doesn't reach to strategic purpose yet, while it is dependent on firm's competency. As far as the impact of EC utilization on firm performance, the study showed that the level of EC utilization has significant relationship with all perspectives performance indicators of BSC.

This study can provide the managers with current EC utilization pattern and the guidelines as to where to put the efforts in the EC utilization and how to get an effective EC utilization strategy in the future.

Keywords : Electronic Commerce (EC), Small and Medium-sized Enterprises (SMEs), Strategy, Competency, Performance, Balanced Scorecard (BSC)

1. Introduction

Internet-based new technologies have provided innovative ways for firms to do business. Much of the Electronic Commerce (EC) advances in the last decades have been in the ability to control, disseminate, and account for information speedily and effectively. This development has had a major impact on a wide range of business practices from online selling to procurement, and EC has become the organizational strategic core for survival and growth regardless of size as firms are expanding their on-line activities in order to leverage the potential of the Internet [Doukidis et al., 1992; Blili and Raymond, 1993; Thong et al., 1996; Kettinger and Hackbarth, 1997; Levy et al., 1999; Poon, 2000, Teo and Pian, 2004].

Firms may use Internet technology and EC in different extent and level depending on their organizational characteristics and objectives. That is, the level of EC utilization is different by firms. However, much research has been done on the factors affecting the adoption and diffusion of the Information technology (IT) and EC [Cragg and King, 1993; Vadapalli and Ramamurthy, 1998; Chung, 2001; Mehrtens et al., 2001; Han, Lee et al., 2002]. These studies have shown that the adoption of EC is influenced by several factors such as technical factors, organizational factors, and environmental factors (TOE framework). Not all those factors, however, are equally important, and the impact of adopting the Internet technology and EC differs among firms [Teo and Pian, 2003]. As EC has become the imperative for

firms, research on extent and level of EC as well as the adoption itself should be necessary. Although some studies examined the level of IT and EC in terms of volume and diversity [Emmerlhainz, 1990; McGowan and Ma-dey, 1998; Jun et al., 2006], a research considering objectives and strategies is necessary to reflect firm's real business situation.

EC is used in various ways and levels by different firms for different objectives and strategies ranging from simple web presence to business transformation. While the use of Internet in small and medium-sized enterprises (SMEs) has been increasing, EC implementation rate is far behind the large firms [MOCIE, 2005]. The actual usage of EC by SMEs doesn't reach a high level as that of electronic payment but remains at a low level as to provide product information [Chung, 2001; Jones et al., 2003]. It means that SMEs lack strategic approach to EC utilization despite the growing interest in Internet technology and EC. Although the potentials of Web-based EC are well documented, there is paucity of research dealing with the issue of how to effectively implement and utilize EC into SMEs' operations. EC can't drive firm performance with only specific Internet technologies, but it should be assimilated into business processes and used as a strategic tool for achieving the goals of the firms. Consequently, what extent have SMEs adopted and utilized EC and which factors influence the variation in the extent of EC utilization among SMEs should be examined. Examining the level of EC can help identify what firms are currently doing with

EC, what functions have been equipped with EC tools, and how intensive each business function has been implemented electronically. In addition, the impact of EC on firm performance is also a worthy issue to discuss. A successful EC utilization is ultimately determined by its ramifications on firm performance. Therefore, the main objectives of this study are as follows specifically :

- to investigate the level of EC utilization among SMEs;
- to examine the factors that are associated with the level of EC utilization;
- to examine the impact of EC on firm performance.

2. Literature Reviews

2.1 Level of IT and EC utilization

Various studies have proposed different types or levels of IT deployment [Nolan, 1979; Venkatraman, 1994; ITR, 2001; TIPA, 2005]. IT deployment means the adoption and diffusion of IT and on-line sales/marketing with the purpose of increasing productivity in firms, which accordingly can be considered analogous to EC [Kim et al., 2003]. According to these studies, role of IS has changed from its conventional function of supporting business operation to a new strategic tool. The level of IS utilization in firms is depending on the role of IS [McFarlan et al., 1983; Premkumar and Ramamurthy, 1992; Teo and Too, 2000].

<Table 1> shows the studies that have ex-

amined the level of EC utilization. Among these studies, e-adoption ladder model and emm@ model have been frequently applied to other various studies for measuring the level of EC usage [Martin and Matlay, 2001; Nam, 2001; Lewis and Cockrill, 2002; Kim et al., 2003; Martin, 2005; Park, 2005].

Rao et al. [2003] argued that the cost, technological demands, and complexity increase in the later stages and development is not necessary sequential. The level 1 (presence) is same as on-line presence, level 2 (portals) is same as on-line business, level 3 (transaction integration) is same as integrated on-line business, and level 4 (enterprise integration) is same as fully integrated on-line business and continuous evolution of emm@ model respectively. Teo and Pian [2003, 2004] and Teo [2007]'s study is the closest to emm@ and Rao's model and level 0 was newly added in. Some firms establish connectivity with customers and business partners using e-mail without independent domain names and Web sites. That's why level 0 was newly added as an initiating point of EC deployment.

Note that the above models of EC utilization can be linked to management strategies. Consequently, firms at a lower level are likely to use EC mainly for the management strategy of disseminating static information about products and service, while firms at higher level intend to leverage EC for the strategic goals such as an alternative channel for transaction activities and business transformation. Firms can get much benefits and performance as the level goes on [Venkatraman, 1994; DTI,

〈Table 1〉 Studies on the level of EC utilization

Researcher	Level	Note
DTI's e-adoption ladder model [2000]	<ol style="list-style-type: none"> 1) messages : using of e-mail to send text messages to communicate 2) on-line marketing of website to publish information 3) on-line ordering : interaction between businesses and customers for order placement 4) on-line payment : transaction completed online by electronic payment 5) order tracking : using of e-commerce to support the business relationship 6) e-business : integration of internal processes of a business through ICT 	6 Levels
PwC's emm@ model [2000]	<ol style="list-style-type: none"> 1) online presence : providing and collecting static information on a web site 2) online business : beginning to conduct business electronically 3) integrated online business : Integrating back-end systems with front-end of its web site linked to key suppliers and partners 4) fully integrated online business : sticking to core competencies through e-business and seamless integration 5) continuous evolution : developing new business processes and markets 	5 Levels
Rao et al. [2003]	<ol style="list-style-type: none"> 1) presence : having a Web site that provides information and primarily one-way communication to any potential user 2) portals : two way communication, customer or supplier order placing 3) transactions integration : financial transactions between partners, integration of internal processes 4) enterprises integration : complete integration of business processes, ideal concept for the "e-world" 	4 Levels
Teo and Pian [2003, 2004], Teo [2007]	<ol style="list-style-type: none"> 1) e-mail adoption : using an e-mail account 2) web presence : establishment its Web site, but only simple firm information and brochures on it 3) prospecting : extensive information of the firm and its products, feedback form, e-mail support and simple search 4) business integration : interactive marketing and sales, online communities, and secure online ordering, Internet strategy is to reduce cost and support business 5) business transformation : transforming the overall business model throughout the organization 	5 Levels

2001; Rao et al., 2003; Teo and Pian, 2004].

2.2 Business performance through EC

As the role of IT and EC in achieving business objectives continues to increase, evaluating IT/EC performance is becoming more important to managers.

Business performance through EC can be examined basically by looking at costs saving and the increase in business efficiency [Dear-

ing, 1990; Bergeron and Raymond, 1992; Iacovou et al., 1985; Jun et al., 2006]. Some studies analyzed the EC benefits in terms of customer and firm levels [Hoffman et al., 1995; Klein and Quelch, 1997; Teo and Too, 2000].

As long-term potential of EC has attained great attention, researches begin to consider not only financial performance such as costs saving and profits increasing but also non-financial performance such as improvement of credibility and customer service in the analy-

sis of EC benefits. Balanced Scorecard (BSC) is regarded as a holistic approach that can help balanced performance measurement including traditional financial evaluation and non-financial evaluation [Kaplan and Norton, 1996]. The use of the BSC in the field of IT has become widespread, because IT and EC have inherent characteristics that can not be directly measured by conventional input-output methods [Rhu, 2002]. Based on BSC, Martinson et al. [1999] developed a balanced IS scorecard and Hasan and Tibbits [2000] developed an EC scorecard. Many other studies measure the performance of IT and EC

applications using BSC [Nam, 2001; Kim et al., 2004; Kumar et al., 2004; Chand et al., 2005; Grembergen, 2005; Kumar et al., 2004; Côté et al., 2005; Jun et al., 2006; Park and Jung, 2007].

3. Research Model

3.1 Level of EC utilization

This paper identifies 5 levels of EC utilization taking into account a firm's strategy and functionality of EC utilization.

Note that this model is based on previous

<Table 2> Level of EC utilization

Level	External processes	Internal infra/processes
e-mail adoption	<ul style="list-style-type: none"> ◦ Using an e-mail to communicate with customers and business partners 	<ul style="list-style-type: none"> ◦ e-mail s/w and web browser
on-line presence	<ul style="list-style-type: none"> ◦ Providing static information about firm and products/services via on-line media ◦ Collecting information about customers and suppliers via on-line media 	<ul style="list-style-type: none"> ◦ PC and LAN infrastructure ◦ Sharing of basic computer resources like printer ◦ Domain name and Web site
on-line business	<ul style="list-style-type: none"> ◦ Beginning limited on-line business using on-line media independent of internal systems ◦ Providing customized information such as news and events ◦ Using limited electronic documents of customers and suppliers ◦ Some procedures remain still manual 	<ul style="list-style-type: none"> ◦ DB and web-server ◦ Functional use of Information systems ◦ On-line businesses are independent of business strategy
integrated on-line business	<ul style="list-style-type: none"> ◦ On-line payment available ◦ Using on-line media dependent of internal systems ◦ Using on-line media to maintain relationship with customers/partners such as A/S ◦ System integration with customers and suppliers 	<ul style="list-style-type: none"> ◦ Beginning to integrate on-line media with core business strategically ◦ Using integrated Information system to support cross departments collaboration ◦ Data Warehouse ◦ ERP ◦ Partial adoption of CRM, SCM
Integration	<ul style="list-style-type: none"> ◦ Integration of value chain ◦ Fully integrated linkage with-customers/partners ◦ Creating new markets through EC ◦ Virtual organization 	<ul style="list-style-type: none"> ◦ Distributed DB and safe secure environment ◦ Development of new business processes ◦ Full adoption of CRM, SCM ◦ Expansion of business processes ◦ Outsourcing of non-core business processes

studies describing the stage or level of IS and EC in <Table 1>. This study, however, modified and supplemented previous models for research purpose. First, this study divides each level into two activities. A survey of EC research indicates that EC use can be divided according to the focus of activity, that is, customers and suppliers, competitors, and internal processes [Daniel and Wilson, 2002]. This study treats customers, suppliers, and competitors as external activity, and divides EC use into two activities; external processes and internal infra/processes. Secondly, this study adds "e-mail adoption" level considering small firm's context. Many small firms establish connectivity with customers and business partners using e-mail without independent domain names and Web sites. Lastly, measuring method of EC utilization is sophisticated. While the level of EC utilization was measured using single paragraph description in the study of DTI [2000], Teo and Pian [2003, 2004, 2007], and Park [2005], EC level in PwC's emm@ model [2000] was decided as the highest level selected among lists which describe EC related activities. The result of the pre-test indicated that the single paragraph description method seems to be somewhat simple for measuring the multidimensional EC activities while PwC's emm@ model has too many measures neglecting firm's internal processes. To make up the limitation of two methods mentioned above, this study provides detailed description of each level dividing into external processes and internal infra/processes and allows the firm to choose one level which is

suitable to the firm's situation.

Even though measuring indicators of this study are not meant to be exhaustive documentation of all the activities and functions that EC can provide due to the rapid changing nature of EC, it attempts to include substantial applications and activities of EC within the firms. The level of EC utilization is not necessary to be sequential. A firm may enter at any level.

3.2 Research model

Based on the TOE framework and the theory of innovation diffusion, many IS and EC researchers have successfully examined the key elements that determine Internet-related technology deployment [Iacovou et al., 1985; Chau and Tam, 1997; Teo et al., 1998; Zhu et al., 2003; Chung, 2001; Han et al., 2002]. As EC is enabled by technological development of the Internet, driven by organizational factors such as firm scope and size, and influenced by environmental factors related to consumers, business partners, as well as competitors, the TOE framework is appropriate for studying EC adoption. It is, however, necessary to examine the affecting factors of utilizing EC after its adoption, due to the fact that firms may use Internet technology and EC in different extent and level depending on their organizational characteristics and objectives.

The extent of new technology utilization is mainly determined by organizational characteristics rather than technical and environmental

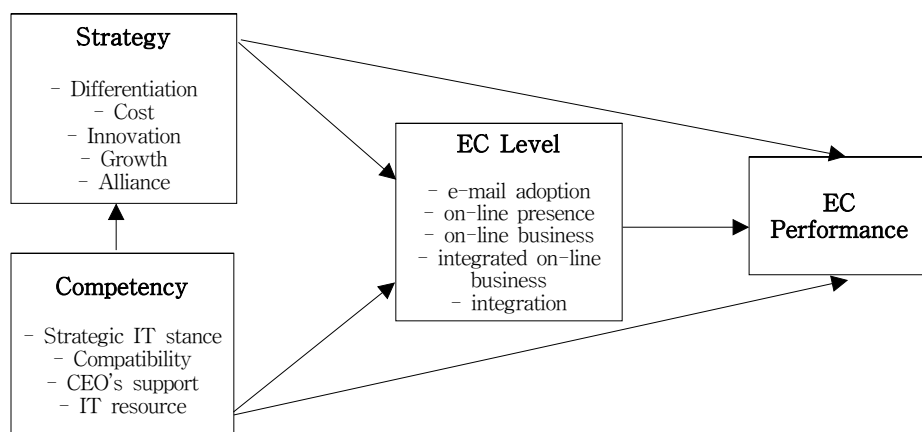
characteristics [Thong, 1999]. Karahanna et al. [1999] suggested that adoption and continued usage of IT are determined by different factors. Chung [2001] and Han et al. [2002] also argued that affecting factors are different between adoption and utilization of EC in SMEs. The level of EC utilization is mainly affected by an organization's internal factors such as the CEO's characteristics, EC attributes, and organizational competency. Zhu et al. [2003] demonstrated that environmental factors become less important as EC intensity increases and Yang et al. [2005] analyzed the affecting factors of Enterprise Information Portal (EIP) establishment in terms of only organizational characteristics.

Even though many organizations have embraced e-commerce given such unique characteristics of the Internet as connectivity, interactivity, and open-standard network integration [Shapiro and Varian 1999, Kauffman and Walden, 2001], the way that e-commerce is embedded in business processes differs [Zhu and Kraemer, 2003]. That is, firms use Inter-

net technologies and EC in different ways and extent depending on organizational characteristics and objectives [Teo and Pian, 2004].

The primary objective of this study, therefore, is to investigate the level of EC utilization and its affecting factors in the point of organizational factors as depicted <Figure 1>. As financial and economic evaluations don't adequately capture the value of EC investment [Tiwana and Ramesh, 1999], the impact of EC utilization on firm performance is analyzed by applying BSC.

In the study of IT utilization and value, Resource-Based View (RBV) has been used to explain how firms can create competitive value from IT assets. RBV refines the firm as a bundle of firm specific resources within an administrative framework [Penrose, 1959] and links firm performance to organizational resources and capabilities. Firms create IT value by assembling resources that work together to create organizational capabilities. Resources can be combined and integrated into unique clusters that enable distinctive abilities



<Figure 1> Research Model

within a firm [Teece et al., 1997]. Based on RBV, Zhu and Kraemer [2002] analyzed that EC capabilities combine with IT infrastructure and produce complementarities that contribute to firm performance. Melville et al. [2004] developed an integrated model of IT business value based on RBV and argued that IT and complementary resources lead to IT value creating processes and IT value creating processes to organizational performance.

IT value and performance, however, should be evaluated by complementarity between resource based perspective and competitive strategy framework. Spanos and Lioukas [2001] analyzed the impact of IT on firm performance by considering both organizational resources and competitive strategies. Rivard et al. [2006] adapted Spanos and Lioukas [2002]'s model and improved the understanding of the contribution of IT to firm performance in building upon the complementarity between two perspectives; competitive strategy framework and resource-based perspective. In reality both resources and strategies can co-exist and shape the actual firm behavior. Value creation stems from the fit of internal capabilities to the strategy pursued [Barney and Griffin, 1992; Barney, 1992]. Tarafdar and Vaidya [2006] also analyzed both organizational and strategic imperatives that have influenced IS assimilation and evolution of IS application portfolio.

From those points of view mentioned above, affecting factors of EC utilization level are specifically examined in terms of strategy perspective and competency respective.

3.3 Hypotheses

(1) Strategy

The level of EC utilization can be influenced by the firm's goals and strategies. Chatterjee et al. [2002] found that strategic rationale for web is more likely to enable firms to assimilate Web. Raymond [2001] also revealed that the assimilation of EC by SMEs is determined by firm's marketing strategy.

EC strategy is the means by which a firm seeks to achieve its EC objectives [Rowley, 2002]. It is about how the Internet and related technologies can reshape and provide competitive advantages [Cagliano et al., 2003]. Typically, a firm has a range of strategic options, which support the achievement of its objectives.

Organizations invest in information systems to fulfill different managerial objectives. The objectives support different bases for achieving strategies such as cost savings, differentiation, and combination of them. Weill [1992] identified three different managerial objectives for IT investment and utilization, which are informational objectives, transactional objectives, and strategic objectives. Albert et al. [1997] identified multiple variables for measuring IT objectives based on prior IS researches and validated informational-transactional-strategic IT objectives model. Three IT objectives were divided into six specific strategies; information, cost savings, competitiveness, productivity, planning and control, and new application.

A survey of EC strategy revealed that both

cooperative strategies based on strategic alliance and competitive strategies are important in e-commerce environment. This study, therefore, intends to use the types of strategy suggested by Wiseman [1985], because it includes alliance strategy as well as generic strategies.

EC strategy is measured by re-categorizing Albert et al.'s strategies into differentiation, cost reduction, innovation, growth and alliance strategy.

H1-1 : Firm's EC strategy is significantly related to the level of EC utilization.

H1-1a : Differentiation strategy is significantly related to the level of EC utilization.

H1-1b : Cost reduction strategy is significantly related to the level of EC utilization.

H1-1c : Innovation strategy is significantly related to the level of EC utilization.

H1-1d : Growth strategy is significantly related to the level of EC utilization.

H1-1e : Alliance strategy is significantly related to the level of EC utilization.

(2) Strategy -> performance

Firm performance is influenced by its strategy in the value creating process. Côté et al. [2005] developed strategic management process for EC and argued that EC strategy affects the EC performance. According to Koo et al. [2004] and Lai and Wong [2005], EC

strategy is different by business types and is important to firm performance. Park and Chung [2007], Moon [2003], and Cho [2004] also found that EC strategy is one of important affecting factors of firm performance.

H1-2 : Firm's EC strategy is significantly related to the firm performance.

(3) Competency

Competency refers to the ability to make effective use of knowledge and skills in a managerial context [Middleton and Long, 1990] and the underlying characteristic of a person that results in effective and/or superior job performance [Boyatzis, 1982]. Development of EC is reliant on the appropriate integration of core organizational competencies via a value chain [Fillis and Wagner, 2005]. Those competencies are organization's internal resources and are different by each firm accordingly. EC utilization, therefore, is different by each firm's competency.

Melville et al. [2004] argued that IT business value is generated by the development of organizational resources and categorized them into IT resource and complementary resource. IT resource refers to IT infrastructure, business applications, and human capital. Complementary resource refers to organizational resources complementary to IT such as culture and workplace practices. Spanos and Lioukas [2001] and Rivard et al. [2006] classified organizational resources into organizational/managerial capabilities (knowledge and skill, firm climate, strategic planning etc.),

marketing capabilities (market knowledge, customer relationship etc.), and technical capabilities (technical experience, technological equipment etc.).

Those organizational resources can be understood in terms of organizational readiness for EC. Several studies revealed that organizational readiness such as CEO's support, technical and financial slack, and attitude are significantly related to the adoption and utilization of EC [Grover and D., 1993; Chung, 2001; Jun and Kang 2003; Cho, 2004].

This study categorizes organizational resource into strategic IT stance, compatibility, CEO's support, and IT resource.

H2-1 : Firm's competency is significantly related to the level of EC utilization.

H2-1a : Firm's strategic IT stance is significantly related to the level of EC utilization.

H2-1b : The compatibility of EC with firm's business process and values is significantly related to the level of EC utilization.

H2-1c : CEO's support is significantly related to the level of EC utilization.

H2-1d : IT resources are significantly related to the level of EC utilization

(4) Competency -> performance

According to the RBV, a firm creates performance by assembling firm-specific resources that work together to create organizational capabilities. Based on RBV, several studies of IT and EC performance found that organiza-

tional competency like IT resource significantly influence the firm performance [Spanos and Lioukas, 2001; Zhu et al., 2003; Melville et al., 2004; Yoon, 2004; Rivard et al., 2006].

H2-2 : Competency is significantly related to the firm performance.

(5) Competency -> strategy

Organizational competency and strategy are complementary for creating the firm's value. Organizational resources support the planning and execution of competitive strategy to increase business performance [Rivard et al., 2006]. According to IS and EC utilization literature, organizational competency is an important preceding factor of competitive strategy execution [Johnson and Carrico, 1988; Desarbo et al., 2004; Nicholls and Watson, 2005].

H2-3 : Competency is significantly related to the EC strategy.

(6) Performance

A successful utilization of EC is ultimately determined by its ramifications of firm performance. If the level of EC utilization is higher, this implies that the firm has higher ability to implement new ways of doing business. It would, in turn, influence the firm performance to a greater extent.

EC specifically is predicted to result in lower coordination costs due to automation of transactions online, as well as productivity and efficiency gains. EC also is expected to facilitate entry into new markets or extension of

existing markets, and greater integration of systems with suppliers and customers [Kraemer et al., 2005]. In recent years, the rapid development of Internet technology has established a new competitive arena for firms [Teo, 2007]. The Internet technology and EC can create competitive advantage by giving firms new ways to outperform their rivals [Porter, 2001]. Brynjolfsson and Hitt [1996] revealed that greater usage and investment in IT could result in greater impact. Consequently, firms with a high level of EC utilization are more likely to derive greater performance

compared to firms with a low level of EC utilization.

BSC is used to measure the impact of EC utilization on the firm performance, because it has been regarded as a holistic approach that can help balanced performance measurement including traditional financial evaluation and non-financial evaluation. Since EC utilization is multidimensional, its impact on firm performance should be also broad as indicated by the improvement in management view, external view, operations-based view and organizational view.

<Table 3> Measurement

Construct		Items	References
Strategy	Differentiation	Use EC to : <ul style="list-style-type: none"> ◦ provide new products/services to customers ◦ provide better products/services to customers ◦ enhance brand distinguishability ◦ provide customized products/services ◦ speed up business transactions 	Wiseman [1985], Albert et al. [1997], Teo and Pian [2003, 2004], Park and Jung [2007]
	Cost reduction	Use EC to : <ul style="list-style-type: none"> ◦ reduce cost in information distribution ◦ reduce cost in advertisement/marketing ◦ reduce cost in communication ◦ save cost by reducing the workforce 	
	Innovation	Use EC to : <ul style="list-style-type: none"> ◦ innovate products/services ◦ improve and innovate processes ◦ R&D of products/services ◦ respond more quickly to change 	
	Growth	Use EC to : <ul style="list-style-type: none"> ◦ expand products/services ◦ expand new market ◦ increase market share ◦ increase annual sales revenue 	
	Alliance	Use EC to : <ul style="list-style-type: none"> ◦ enable to easier access to information by customers and business partners ◦ enable to faster retrieval or delivery of information or reports by customers and business partners ◦ keep close contact with customers and business partners ◦ help establish useful linkages with other organizations 	

Competency	Strategic IT stance	Firm : <ul style="list-style-type: none"> ◦ is favorite to try new methods and technologies ◦ spends more resources than competitors in developing new products/services ◦ recruits actively the best technical personnel ◦ keeps abreast of the latest technical development 	Teo and Pian [2003, 2004]
	CEO's support	<ul style="list-style-type: none"> ◦ CEO is interested in EC and have knowledge of EC ◦ CEO considers EC important to the firm ◦ CEO actively supports for EC utilization ◦ CEO willingly takes change and risks through EC 	Wu [2001], Jun and Kang [2003], Park [2005]
	Compatibility	<ul style="list-style-type: none"> ◦ EC is consistent with firm's belief and value ◦ EC is consistent with firm's business strategy ◦ EC is needed to maintain business relationship with customers and partners ◦ EC doesn't change organizational structure and policy ◦ EC provides efficiency of business processes ◦ Firm's member is favorite toward EC 	Rogers [1985], Kendall et al. [2001], Park [2005]
	IT resources	<ul style="list-style-type: none"> ◦ Firm has enough HW and network for EC ◦ Firm has enough SW and applications for EC ◦ IT employee is good at EC technologies ◦ IT employee has knowledge of recent EC-related technologies ◦ Firm has internal financial slack for EC ◦ Firm has ability to get outside funding for EC 	Jun and Kang [2003], Melville et al. [2004], Lee et al. [2001]
Performance	Finance	Through EC : <ul style="list-style-type: none"> ◦ sales revenue was increased ◦ earning rate was increased ◦ cash flow was improved ◦ cost of customer acquisition/maintenance was decreased 	Park and Jung [2007], Nam [2001]
	Business process	Through EC : <ul style="list-style-type: none"> ◦ rate of on time delivery was improved ◦ lead time from order to delivery was minimized ◦ inventory management was improved ◦ time of business transactions was shortened 	
	Innovation and learning	Through EC : <ul style="list-style-type: none"> ◦ employees' satisfaction was improved ◦ new knowledge assets was increased ◦ R&D of new technology was increased ◦ period of new products development was shortened 	
	Customer	Through EC : <ul style="list-style-type: none"> ◦ number of new customer was increased ◦ customer satisfaction was improved ◦ customer relationship was tightened ◦ quality of product/service was improved ◦ query/visit of potential customer was increased 	

H3 : The level of EC utilization is significantly related to the firm performance.

H3-1 : The level of EC utilization is significantly related to financial perfor-

mance.

H3-2 : The level of EC utilization is significantly related to business process performance.

H3-3 : The level of EC utilization is significantly related to innovation and learning performance.

H3-4 : The level of EC utilization is significantly related to customer performance.

3.4 Measurement

Based on various existing literature, measures are developed. It is modified and refined by in-depth interviews with knowledgeable academic experts. All items are measured on a five-point Likert scale ranging from "1 = strongly disagree" to "5 = strongly agree."

4. Data Analysis and Results

4.1 Samples and procedure

A questionnaire was used to collect data for this study. Before the formal survey, a pre-test was conducted to improve clarity and readability. This study employed both Web-based survey¹⁾ and personal contact survey to collect data targeting SMEs that had already used EC. Every effort was made to make initial contact with the personnel in a managerial position as they are the most knowl-

edgeable overall of their firm's EC utilization and strategy.

In this study, EC is defined broadly as "the buying and selling of information, products and services and supporting for any kind of business transactions over a computer network and digital infrastructure such as Internet, EDI, and VANS)" [Bloch et al., 1996; Jun et al., 2006].

As a result, 86 responses from personal contact and 100 responses from Web-based survey were received. Out of these, 15 questionnaires were deemed unusable and discarded because they were incomplete and insincere. Hence, the remaining 171 responses were used as a basis for the findings of this study.

Non-response bias was ascertained by comparing the means of all variables between Web-based survey and personal contact survey respondents. However, no significant differences were found.

4.2 Respondents characteristics

<Table 4> presents the demographic data of respondents. Over 60% of the respondents held managerial positions, which gives some assurance as to the validity of the sample since management level respondents are more likely to be knowledgeable about the firm's EC strategy and utilization. Nevertheless, this study did not eliminate responses from non-managers taking into consideration that some firms may not have managers responsible for leveraging EC.

Among the 171 respondents, the distribution of levels of EC utilization is as follows : 4 in

1) http://www.wsurvey.net/survey/issv5_ws/iss_answer_survey.php?id=bojun00&no=1&tc=1196498703.

<Table 4> Demographic profile

Demographic profile		Number	Percentage
Total		171	100%
Industry	Manufacturing related	82	48%
	Service related	89	52%
Number of employee	50 and less	96	56.1%
	Over 50	75	43.9%
Number of IT employee	10 and less	111	64.9%
	Over 10	60	35.1%
Annual sales (hundred million Won)	50 and less	107	63%
	Over 50	47	28%
	Missing	17	9%
Job position	General staff	68	39.8%
	Over managerial position	103	61.2%

<Table 5> Distribution of EC Levels

Levels of EC utilization	Number	Percentage
e-mail adoption	4	2.3%
On-line presence	32	18.7%
On-line business	45	26.3%
Integrated on-line business	45	26.3%
Integration	45	26.3%

e-mail adoption, 32 in on-line presence, 45 in on-line business, 45 in integrated on-line business, and 45 in integration as shown in <Table 5>. These results show that the level of EC utilization has been increasing. However, only 26% of respondents belonged to integration level and among 45 respondents of integration level, service related firms (75%) greatly outnumbered to manufacturing related firms (25%).

4.3 Analysis and results

(1) Measurement model

To assess the measurement model, a series

of empirical test were used by employing confirmatory factor analysis (CFA). Following CFA that corroborated the inter-correlation between individual strategy, competency, and performance dimensions, composite measures of each dimensions were developed by averaging the respective individual items.

Unidimensionality was assessed by examining the strength of loadings, using 0.5 as cut-off value. All item-to-construct loadings in this study are above 0.5 except two items (cost 2 and compatibility 4), thus demonstrating the unidimensionality of the scales used. Two items lower than 0.5 were deleted for further analysis.

<Table 6> Composite reliability and AVE

Construct	Indicators	First order		Second order	
		ICR	AVE	ICR	AVE
Strategy	Differentiation	.874	.582	.950	.791
	Cost	.816	.599		
	Innovation	.855	.596		
	Growth	.876	.639		
	Alliance	.851	.590		
Competency	Strategic IT stance	.856	.601	.928	.765
	Compatibility	.897	.645		
	CEO	.892	.674		
	ITR	.926	.642		
Performance	Finance	.901	.699	.956	.844
	Process	.877	.641		
	Learning	.906	.706		
	Customer	.912	.676		

Note) Internal Consistency Reliability (ICR) = $(\sum \text{Standardized loadings})^2 / (\sum \text{Standardized loadings})^2 + \sum \epsilon_j$
Average Variance Extracted (AVE) = $\sum (\text{Standardized loadings}^2) / \sum (\text{Standardized loadings}^2) + \sum \epsilon_j$.

<Table 7> Discriminant validity

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Differentiation (1)	1												
Cost (2)	.634***	1											
Innovation (3)	.788***	.682***	1										
Growth (4)	.794***	.582***	.728***	1									
Alliance (5)	.691***	.615***	.680***	.657***	1								
Strategic IT stance (6)	.600***	.449***	.559***	.527***	.563***	1							
Compatibility (7)	.694***	.616***	.620***	.623***	.672***	.596***	1						
CEO (8)	.677***	.484***	.608***	.570***	.576***	.665***	.647***	1					
ITR (9)	.483***	.458***	.476***	.399***	.491***	.480***	.402***	.448***	1				
Finance (10)	.644***	.595***	.605***	.607***	.528***	.512***	.638***	.576***	.496***	1			
Process (11)	.604***	.594***	.583***	.585***	.561***	.578***	.679***	.608***	.508***	.713***	1		
Learning (12)	.527***	.552***	.636***	.554***	.592***	.569***	.647***	.603***	.543***	.677***	.691***	1	
Customer (13)	.662***	.595***	.620***	.688***	.604***	.515***	.735***	.652***	.504***	.739***	.703***	.775***	1

Note) *** denotes $p < 0.01$.

Reliability was examined by composite reliability estimates, and convergent validity was examined by computing the indexes of average variance extracted (AVE) [Fornell and Larcker, 1981]. As shown in <Table 6>, all composite reliability estimates are greater than 0.70 and all AVE value are greater than 0.50 supporting their reliability and convergent validity. In addition, the correlation matrix in <Table 7> supports discriminant validity.

<Table 8> shows the fit indices for CFA. Even though all indices fully don't meet the threshold value, it indicates that measurement model meets the minimum recommended fit indices for an acceptable fit.

(2) Hypotheses testing

Structural equation modeling (SEM) techni-

que was used to test the hypothetical models of this study. The research model was analyzed in the following steps.

First, the overall model was tested by simultaneous estimation of the casual relationship among two perspectives affecting factors, EC utilization level, and performance. The second-order measures were used to test the overall model [Teo and Pian, 2003; Rivard et al., 2006; Spanos and Lioukas, 2002]. Second, the relationship between specific affecting factors of each perspective and EC utilization level was analyzed separately due to the complexity of the research model [Noh and Jung, 2001] (<Figure 2>).

Results show that competency is significantly related to the level of EC utilization ($\gamma = 1.747, P < 0.05$) while strategy has an in-

<Table 8> Fit indices for CFA

	RMR	GFI	AGFI	NFI	CFI
Strategy	.049	.830	.776	.845	.908
Competency	.035	.844	.800	.819	.895
Performance	.033	.863	.815	.885	.937
2nd_order	.017	.888	.835	.919	.950

Note) RMR = Root Mean Square Residual, GFI = Goodness-of-Fit-Index, AGFI = Adjusted Goodness-of-Fit-Index, NFI = Normal Fit Index, CFI = Comparative Fit Index.

<Table 9> Path analysis results (Overall model)

Hypothesis	Path	Estimate	S.E	C.R	P	Result
H1-1	Strategy → EC level	-.099	.530	-.186	.852	Reject
H2-1	Competency → EC level	1.747	.855	2.043	.041**	Accept
H1-2	Strategy → Performance	-.114	.222	-.516	.606	Reject
H2-2	Competency → Performance	1.736	.418	4.156	.000***	Accept
H2-3	Competency → Strategy	1.408	.180	7.821	.000***	Accept
H3	EC level → Performance	.095	.031	3.047	.002***	Accept
$\chi^2(72, N = 171) = 176.328, p = 0.000, CFI = 0.943, NFI = 0.908, GFI = 0.880, AGFI = 0.825, RMR = 0.021$						

Note) *** denotes $p < 0.01$; ** denotes $p < 0.05$; * denotes $p < 0.1$.

significant relationship with the level of EC utilization ($\gamma = -0.099, P > 0.1$). Competency was also found to significantly relate to strategy ($\gamma = 1.408, P < 0.01$) and performance ($\gamma = 1.736, P < 0.01$), while strategy was shown to have an insignificant relationship with performance ($\gamma = -0.114, P > 0.1$). In addition, path estimate from the level of EC utilization to performance was significant ($\gamma = 0.095, P < 0.01$). Thus, H2-1, H2-2, H2-3, and H3 were supported while H1-1 and H1-2 were not supported by the data. The fit indices of model indicated a good fit to the data. The relationship between EC level and performance was also detailed to estimate in terms of BSC. Path coefficient from the level of EC utilization to each perspective performance (finance, process, innovation and learning, customer) was 0.122, 0.113, 0.154, and 0.124 respectively ($P > 0.1$). Thus H3-1, H3-2, H3-3, and H3-4 were supported.

With regard to strategy, differentiation ($\gamma = 1.536, P < 0.1$) and cost reduction strategy ($\gamma = 1.026, P < 0.1$) were found to marginally significantly relate to the level of EC utilization.

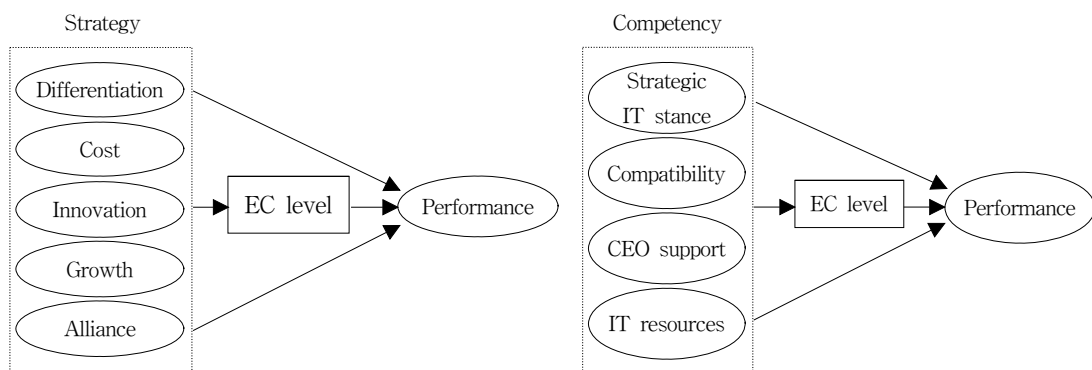
However, innovation ($\gamma = -1.379, P > 0.1$), growth ($\gamma = 0.149, P > 0.1$), and alliance ($\gamma = -0.397, P > 0.1$) were not shown to have a significant relationship with the level of EC utilization. Thus, H1-1a, H1-1b were supported while H1-1c, H1-1d, and H1-1e were not supported by the data.

Concerning competency effect, strategic IT stance ($\gamma = 0.783, P < 0.1$), compatibility ($\gamma = 0.771, P < 0.1$), and IT resources ($\gamma = 0.606, P < 0.05$) were found to significantly relate to the level of EC utilization. However CEO support ($\gamma = -0.454, P > 0.1$) was not shown to be important in influencing the level of EC utilization. Thus, H2-1a, H2-1b, and H2-1d were supported while H2-1c was not supported by the data.

5. Discussion and Conclusion

5.1 Discussion of results

This study sought to explore how SMEs are utilizing EC. Drawing on existing research on IT and EC related field, this study presented the framework of EC utilization le-



<Figure 2> Relationship between each affecting factors and EC level

vel and analyzed its affecting factors in the point of organizational perspectives; strategy and competency. The impact of EC utilization on firm performance was also examined by employing BSC. The following is the summary of the results.

With regard to the distribution of EC utilization level among respondents, the result showed that the rate of EC utilization in SMEs is growing quite rapidly. However, the result suggests that manufacturing related firms tend to adopt a "wait and see" attitude with regards to using EC to integrate and transform their business processes. Thus, appropriate measures would be needed in order to activate EC utilization in manufacturing related firms as well.

As for the two organizational affecting factors of EC utilization level, it was found that the level of EC utilization in SMEs appeared to be driven not by strategy but by competency. Similar result was found in the case of firm performance. Competency was shown to be critical in influencing firm performance while strategy was not. This result implicates that EC utilization in SMEs doesn't reach to strategic purpose yet, while it is dependent on firm's competency. Specifically, only such generic strategy as differentiation and cost reduction strategy were found to significantly relate to the level of EC utilization, while growth, innovation, and alliance strategy were not shown to be vitally important in affecting the EC utilization. It can be caused by the attribute of the relationship between SMEs and large firms which are their main partners.

Even though many SMEs seem to utilize EC at a higher level, it is subject to their counterparts, that is large firms. This inference can be supported by the fact that 78% of respondents utilize EC involuntarily by the force of large firms.

In the case of competency, among four competency perspective affecting factors that are associated with the level of EC utilization, IT resources were shown to be the most important factor ($P < 0.05$). This result is consistent with the previous IT related research, in particular RBV, which reported that a successful IS and EC implementation occurs when sufficient organization's internal resources are directed. Compared to large firms, SMEs are much restricted in their ability to evolve their EC provision because of the lack of resources. It implies that such IT resources as technical, human, and financial resources play a greater role in value creating processes via EC and firm performance in SMES than large firms. Therefore, SMEs-specific policy support for infrastructure, training program, and financial issues should be necessary. As organizational resources complementary to IT, strategic IT stance and compatibility were shown to be marginally significant to the level of EC utilization ($P < 0.1$). It may mean that it should always create a conducive organizational environment to make EC utilization seamlessly integrated with business activities and upgrade to a higher level of EC utilization. CEO's support was not found to significantly relate to the level of EC utilization level. This is in line with Thong [1999]'s research, which sug-

gested that although CEO's characteristics are important determinants of the decision to adopt information system, it does not affect the extent of adoption. However, owner-manager orientation links to the conservative/entrepreneurial continuum, from those who adopt a "wait and see" attitude or totally dismiss the notion of EC as a viable business option to the proactive risk taker. The exploratory research also supports that the ability to develop EC depends on the entrepreneurial/conservative orientation of firm's owner-manager [Covin, 1991; Poon and Swatman, 1999]. Thus, CEO's commitment should be necessary for strategic use of EC in SMEs. A successful firm of high-level EC utilization may be a firm advocating proactive business and technology strategies, and identifying the potential of Internet technology at earlier time than its competitors [Teo and Pian, 2003]. To maximize the benefits of EC utilization, CEO should carefully examine its business strategy and whether the EC can be used to aid in achieving those business objectives.

As far as the impact of EC utilization on firm performance, the study showed that the level of EC utilization has a significant relationship with all perspectives performance indicators of BSC. It suggests positive support for EC utilization. As the Internet has been increasingly used for commercial activities, more and more firms are connected to the Internet and EC. This study shows that utilizing EC can enable firms to enjoy finance, business process, innovation & learning, and customer performance. Therefore, firms hesi-

tating to adopt EC technologies need to examine their situations carefully as utilizing EC is likely to be a necessity for most, if not all, businesses.

5.2 Implications and future study

This study presented an integrated analysis of strategy and competency perspectives that have influenced the level of EC utilization. It was to improve the understanding of how different strategy and competency factors have influenced EC utilization in SMEs and the contribution of EC to firm performance.

This study can provide the managers with the current EC utilization pattern and the guidelines as to where to put the efforts in the EC utilization and how to get an effective EC utilization strategy in the future. It is necessary for managers to frame appropriate EC development strategies and to develop organizational competency necessary for implementing them.

However, the measures of EC utilization need to be refined more specifically. Even though this study provided detailed description of each level dividing into external processes and internal infra/processes, it still measured the EC utilization categorically. If EC utilization can be measured by business functions such as communication, internal administration, ordering/selling, and customer management etc., the effect of affecting factors on EC utilization and its impact on firm performance across different functional domains can be investigated.

This study targeted only SMEs and used general industry type. Comparative analysis with larger firms can give a more SMEs-specific insight. Considering the EC inherent characteristics, further study can involve in examining of the differences between pure players and click and mortar firms.

Reference

- [1] Albert, L. L., Dinesh, A. M. et al., "The link between information strategy and electronic commerce", *Journal of Organizational Computing and Electronic Commerce*, Vol. 7, No. 1, 1997, pp. 17-34.
- [2] Barney, "Integrating organizational behavior and strategy formulation research : a resource based analysis", *Strategic Management*, 1992, Vol. 8, pp. 39-62.
- [3] Barney and Griffin, "The management of organizations : Strategy, structure, and behavior", Houghton Mifflin, 1992.
- [4] Bergeron, F. and Raymond, L., "The advantages of electronic data interchange", *Database*, Vol. 23, No. 4, 1992, pp. 19-31.
- [5] Blili, S. and Raymond, L., "Information technology : Threats and opportunities for small and medium-sized enterprises", *International Journal of Information Management*, Vol. 13, No. 6, 1993, pp. 439-448.
- [6] Bloch, M. and Pigneur, Y. et al., "On the road of electronic commerce-a business value framework, gaining competitive advantage and some research issues", Fisher Center Research, University of California, 1996.
- [7] Boyatzis, "The Competent manager : A model for effective performance", New York, 1982.
- [8] Brynjolfsson, E. and Hitt, L. M. "Productivity, business profitability, and consumer surplus : Three different measures of information technology value", *MIS Quarterly*, Vol. 20, No. 2, 1996, pp. 121-142.
- [9] Cagliano, R. and Caniato, F. et al., "E-business strategy : How companies are shaping their supply chain through the Internet", *International Journal of Operations and Production Management*, Vol. 23, No. 10, 2003, pp. 1142-1162.
- [10] Chand, D. and Hachey, G. et al., "Balanced scorecard based framework for assessing the strategic impacts of ERP systems", *Computers in Industry* Vol. 56, No. 6, 2005, pp. 558-572.
- [11] Chatterjee, B. and Grewal, R. et al., "Shaping up for e-commerce : Institutional enablers of the organizational assimilation of web technologies", *MIS Quarterly*, Vol. 26, No. 2, 2002, pp. 65-89.
- [12] Chau, P. Y. K. and Tam, K. Y., "Factors affecting the adoption of open systems : an exploratory study", *MIS Quarterly*, Vol. 21, No. 1, 1997, pp. 1-21.
- [13] Cho, S. H., "Electronic commerce strategies for small and medium enterprises", *Korean Small Business Review*, Vol. 26, No. 2, 2004, pp. 23-48.
- [14] Chung, I. K., "Factors for electronic commerce in the small and medium enterprises", *Korean Small Business Review*, Vol. 23, No. 2, 2001, pp. 95-121.

- [15] Cote, L., Vezina, M. et al., "The strategic management process in e-business", *Ivey Business Journal*, Vol. 69, No. 5, 2005, pp. 1-7.
- [16] Covin, J. G., "Entrepreneurial versus conservative firms : A comparison of strategies and performance", *Journal of Management Studies*, Vol. 28, No. 5, pp. 439-461.
- [17] Cragg, P. B. and King, M., "Small-firm computing : motivation and inhibitors", *MIS Quarterly*, Vol. 17, No. 1, 1993, pp. 47-60.
- [18] Daniel, E. and Wilson, H., "Adoption intentions and benefits realised : A study of e-commerce in UK SMEs", *Journal of Small Business and Enterprise Development*, Vol. 9, No. 4, 2002, pp. 331-348.
- [19] Dearing, B., "The strategic benefits of EDI", *The Journal of Business Strategy*, Vol. 11, No. 1, 1990, pp. 4-6.
- [20] Desarbo, W. S., Benedetto, C. A. D. et al., "Revising the Miles and Snow strategic framework : uncovering interrelationships between strategic types, capabilities, environmental uncertainty, and firm performance", *Strategic Management Journal*, Vol. 26, No. 1, 2004, pp. 47-74.
- [21] Doukidis, G. I., Smithson, S. et al., "Approaches to computerization in small business in Greece", *Proceedings of ICIS*, 1992, pp. 139-148.
- [22] DTI, "International benchmarking study", 2000.
- [23] Emmerlhainz, "Electronic data interchange total management guide", VAN Nostrand Reinhold, 1990.
- [24] Ettlie J., "Organizational policy and innovation among suppliers to the food processing sector", *Academy of Management Journal*, Vol. 26, No. 1, 1983, pp. 2-10.
- [25] Fillis, I. and Wagner, B., "E-business development : An exploratory investigation of the small firm", *International Small Business Journal*, Vol. 23, No. 6, 2005, pp. 604-634.
- [26] Fornell, C. R. and Larcker, D. F., "Evaluating structural equation models with unobservable variables and measurement error", *Journal of Marketing Research*, Vol. 18, No. 1, 1981, pp. 39-50.
- [27] Grembergen, W. V. and Haes, S. D. "Measuring and improving IT governance through the balanced scorecard", *Information Systems Control Journal*, Vol. 2, 2005.
- [28] Grover, V. and G. M. D., "The initiation, adoption, and implementation of telecommunications technologies in U.S organizations", *Journal of Management Information Systems*, Vol. 10, No. 1, 1993, pp. 141-163.
- [29] Han, K. S., Lee, M. J. et al., "An integrated model of the adoption of e-Commerce and the extent of e-Commerce development : The case study of the small and medium-size firms in Korea", *Korean Small Business Review*, Vol. 24, No. 2, 2002, pp. 3-29.
- [30] Hasan and Tibbits, "Strategic management of electronic commerce : an adaptation of the balanced scorecard", *Internet*

- Research*, Vol. 10, 2000, pp. 439-450.
- [31] Hoffman, D. L., Novak, T. P. et al., "Commercial scenario for the web : Opportunities and challenges", *Journal of Computer-Mediated Communication*, Vol. 1, No. 3, 1995, pp. 29-53.
- [32] Iacovou, Benbasat, et al., "EDI and small organizations : Adoption and impact of technology", *MIS Quarterly*, Vol. 19, No. 4, 1985, pp. 465-486.
- [33] ITR, "2001 Report on the evaluation of IT deployment in Korean firms", 2002.
- [34] Johnson, H. R. and Carrico, S. R., "Developing capabilities to use Information strategically", *MIS Quarterly*, Vol. 12, No. 1, 1988, pp. 37-47.
- [35] Jones, C., Hecker, R. et al., "Small firm Internet adoption : Opportunities forgone, a journey not begun", *Journal of Small Business and Enterprise Development*, Vol. 10, No. 3, 2003, pp. 287-297.
- [36] Jun, B. H., Han, P. K. et al., "The effect of EC utilization on business performance in SMEs (in the point of BSC)", *Journal of Information Technology Applications and Management*, Vol. 13, No.2, 2006, pp. 99-113.
- [37] Jun, B. H. and Kang, B. G., "A study on factor affecting the utilization of EC in SMEs", *Korean Small Business Review*, Vol. 25, No. 3, 2003, pp. 25-52.
- [38] Kaplan, R. S. and Norton, D. P., "Using the balanced scorecard as a strategic management system", *Harvard Business Review*, Vol. 74, No. 1, 1996, pp. 75-85.
- [39] Karahanna, E., Straub, D. W. et al., "Information Technology adoption across time : A cross-sectional comparison of pre-adoption and post-adoption beliefs", *MIS Quarterly*, Vol. 23, No. 2, 1999, pp. 183-213.
- [40] Kauffman, R. J. and Walden, E. A. "Economics and electronic commerce : Survey and directions for research", *International Journal of Electronic Commerce*, Vol. 5, No. 4, 2001, pp. 5-116.
- [41] Kendall, J., Tung, L. L. et al., "Receptivity of Singapore's SMEs to electronic commerce adoption", *Journal of Strategic Information Systems*, Vol. 10, pp. 223-242.
- [42] Kettinger, W. J. and Hackbarth, G., "Selling in the era of the "Net" : Integration of electronic commerce in small business", *Proceedings of ICIS*, 1997, pp. 249-262.
- [43] Kim, E. H., Shu, C. W. et al., "An e-Business maturity model for small and medium-sized enterprises and case studies", *Journal of Information Technology Applications and Management*, Vol. 10, No. 3, 2003, pp. 109-119.
- [44] Kim, J. H., Lee, Y. S. et al., "Perceived IT performance and contextual factors of small firms in Korea : An exploratory study", *The Journal of MIS Research*, Vol. 14, No. 1, 2004, pp. 23-41.
- [45] Klein and Quelch, "Business-to-business market making on the Internet", *International Marketing Review*, Vol. 14, 1997, pp. 345-361.
- [46] Koo, C. M., Koh, C. E. et al., "An examination of Porter's competitive strategies in electronic virtual markets : A compar-

- ison of two on-line business models”, *International Journal Electronic Commerce*, Vol. 9, No. 1, 2004, pp. 163–180.
- [47] Kraemer, K. L., Gibbs, J. et al., “Impacts of globalization on e-Commerce use and firm performance : A cross-country investigation”, *The Information Society*, Vol. 21, 2005, pp. 323–340.
- [48] Kumar, U., Maheshwari, M. et al., “A framework for achieving e-business success”, *Industry and Higher Education*, Vol. 18, No. 1, 2004, pp. 47–51.
- [49] Lai, V. S. and Wong, B. K., “E-strategies and performance”, *Communications of the ACM*, Vol. 48, No. 5, 2005, pp. 80–85.
- [50] Lee, L. W., Runge, J. et al., “Adoption of internet technologies in small business”, *Proceedings of the KMIS International Conference*, pp. 1020–1033.
- [51] Levy, M., Powell, P. et al., “Assessing information systems strategy development framework in SMEs”, *Information and Management*, Vol. 36, No. 5, 1999, pp. 247–261.
- [52] Lewis, R. and Cockrill, A., “Going global-remaining local : the impact of e-commerce on small retails firms in Wales”, *International Journal of Information Management*, Vol. 22, 2002, pp. 195–209.
- [53] Martin, L., “Internet adoption and use in small firms : internal processes, organizational culture and the roles of the owner-manager and key staff”, *New Technology, Work and Employment*, Vol. 20, No. 30, 2005, pp. 190–204.
- [54] Martin, L. and Matlay, H., “‘Blanket’ approaches to promoting ICT in small firms : Some lessons from the DTI ladder adoption model in the UK”, *Internet Research : Electronic Networking Applications and Policy*, Vol. 11, No. 5, 2001, pp. 399–410.
- [55] Martinsons, M., Davison, R. et al., “The balanced scorecard : a foundation for the strategic management of information systems”, *Decision Support Systems*, Vol. 25, 1999, pp. 71–88.
- [56] McFarlan, F. W., McKenny, L. J. et al., “Information archipelago : Plotting a course”, *Harvard Business Review*, Vol. 61, No. 1, 1983, pp. 145–156.
- [57] MCGowan and Madey, “The influence of organization structure and organizational learning factors on the Extent of EDI implementation in U.S Firms”, *Information Resources Management Journal*, Vol. 11, 1998, pp. 17–27.
- [58] Mehrtens, J., Cragg, P. B. et al., “A model of Internet adoption by SMEs”, *Information and Management*, Vol. 36, No. 3, 2001, pp. 165–176.
- [59] Melville, N., Kraemer, K. et al., “Review : Information technology and organizational performance : An integrated model of IT business value”, *MIS Quarterly*, Vol. 28, No. 2, 2004, pp. 283–322.
- [60] Middleton and Long, “Marketing skills : Critical issues in marketing education and training”, *Journal of Marketing Management*, Vol. 5, No. 3, 1990, pp. 325–343.
- [61] MOCIE, “2005 e-Business White Paper”,

- 2005.
- [62] Moon, Y. J., "The research on moderator effect of IS maturity between e-business strategy and corporate performance", Cheju National University, Doctor, 2003.
- [63] Nam, J. G., "The Relationship between EC utilization and Business Performance", Kookmin University, Master, 2001.
- [64] Nicholls, A. and Watson, A., "Implementing e-value strategies in UK retailing", *International Journal of Retail and Distribution Management*, Vol. 33, No. 6, pp. 426-443.
- [65] Noh, Y. and Chung, Y., "A study on factors influencing the usage level and performance of EDI", *The Journal of MIS Research*, Vol. 11, No. 3, 2001, pp. 105-126.
- [66] Nolan, R. L., "Managing the crisis in data processing", *Harvard Business Review*, Vol. 57, No. 2, 1979, pp. 115-126.
- [67] Park, S. C., "The adoption and competitive advantage of e-Business in small and medium enterprises", *Korean Small Business Review*, Vol. 27, No. 4, 2005, pp. 55-85.
- [68] Park, Y. J. and Chung, K. S., "An empirical study on the relationship between competitive strategy and e-business performance by e-business development stages", *Information Systems Review*, Vol. 16, No. 2, 2007, pp. 1-33.
- [69] Penrose, E., "The theory of the growth of the firm", Basil Blackwell, 1959.
- [70] Poon, S., "Business environment and Internet commerce benefit-a small business perspective", *European Journal of Information Systems*, Vol. 9, No. 2, 2000, pp. 72-81.
- [71] Porter, M., "Strategy and Internet", *Harvard Business Review*, Vol. 79, No. 3, 2001, pp. 63-78.
- [72] Premkumar and Ramamurthy, "Determinants and outcomes of electronic data interchange diffusion", *IEEE Transactions on Engineering Management*, Vol. 42, No. 4, 1995, pp. 332-351.
- [73] PwC, "emm@, New e-business maturity model developed jointly by Pricewaterhousecoopers and Carnegie mellon university, Delivers first benchmarking standard for measuring e-business performance", 2000.
- [74] Rao, S. S., Metts, G. et al., "Electronic commerce development in small and medium sized enterprises", *Business Process Management Journal*, Vol. 9, No. 1, 2003, pp. 11-32.
- [75] Raymond, L., "Determinants of web site implementation in small business", *Internet Research*, Vol. 11, No. 5, 2001, pp. 411-422.
- [76] Rhu, H., "Evaluation of IT performance using BSC", *LG Weekly Economy*, Vol. 19, 2002, pp. 37-43.
- [77] Rivard, S., Raymond, L. et al., "Resource-based view and competitive strategy : An integrated model of the contribution of information technology to firm performance", *Journal of Strategic Information Systems*, Vol. 15, 2006, pp. 29-50.
- [78] Rowley, J., "Synergy and strategy in e-business", *Marketing Intelligence and*

- Planning*, Vol. 20, No. 4, 2002, pp. 215-222.
- [79] Shapiro, C. and Varian, H. R., "Information Rules : A strategic guide to the network economy", Harvard Business School Press, 1999.
- [80] Spanos, Y. E. and Lioukas, S., "An examination into the casual logic Of rent generation : Constrating Porter's competitive strategy framework and the resource-based perspective", *Strategic Management Journal*, Vol. 22, 2001, pp. 907-934.
- [81] Tarafdar, M. and Vaidya, S. D., "Information systems assimilation in India organizations : An examination of strategic and organizational imperatives", *Journal of Strategic Information Systems*, Vol. 15, 2006, pp. 293-326.
- [82] Teece, D. J., Pisano, G. et al., "Dynamic capabilities and strategic management", *Strategic Management Journal*, Vol. 18, No. 7, 1997, pp. 509-533.
- [83] Teo, T. S. H., "Organizational characteristics, modes of internet adoption and their impact : A Singapore perspective", *Journal of Global Information Management*, Vol. 15, No. 2, 2007, pp. 91-117.
- [84] Teo, T. S. H. and Pian, Y., "A contingency perspective in Internet adoption and competitive advantage", *European Journal of Information System*, Vol. 12, 2003, pp. 78-92.
- [85] Teo, T. S. H. and Pian, Y., "A model for web adoption", *Information and Management*, Vol. 41, 2004, pp. 457-468.
- [86] Teo, T. S. H., Tan, M. et al., "A contingency model of Internet adoption in Singapore", *International Journal Electronic Commerce*, Vol. 2, No. 2, 1998, pp. 95-118.
- [87] Teo, T. S. H. and Too, B. L., "Information systems orientation and business use of the Internet : An empirical study", *International Journal of Electronic Commerce*, Vol. 4, No. 4, 2000, pp. 105-130.
- [88] Thong, J. Y. L., "An integrated model of information systems adoption in small business", *Journal of Management Information Systems*, Vol. 15, No. 4, 1999, pp. 187-214.
- [89] Thong, J. Y. L., Yap, C. et al., "Top management support, external expertise and information systems implementation in small businesses", *Information Systems Research*, Vol. 7, No. 2, 1996, pp. 248-267.
- [90] Tiwana, A. and Ramesh, B., "Towards a composite metric for electronic commerce ROI : An extension of the balanced scorecard", *Proceedings of the Conference on Measurement of Electronic Commerce*, 1999.
- [91] TIPa, "Evaluation of IT deployment in small and medium-sized enterprises", Korea Technology and Information Promotion Agency for Small and Medium Enterprises, 2005.
- [92] Vadapalli, A. and Ramamurthy, K., "Business use of Internet : An analytical framework and exploratory case study", *International Journal of Electronic Commerce*, Vol. 2, No. 2, 1998, pp. 71-94.
- [93] Venkatraman, N., "IT-enabled business transformation : From automation to bu-

- siness scope redefinition”, *Sloan Management Review*, 1994, pp. 73-87.
- [94] Weil, P., “The relationship between investment in information technology and firm performance : A study of the valve manufacturing sector”, *Information Systems Research*, Vol. 3, No. 4, 1992, pp. 307-333.
- [95] Wiseman, C., “Information systems for competitive advantage : Implementation of planning process”, *MIS Quarterly*, Vol. 9, No. 4, 1985, pp. 285-294.
- [96] Wu, F., “Bringing “E” to corporate America : The drivers of e-business adoption and its impact on firm performance”, The University of Texas at Austin, Doctor, 2001.
- [97] Yang, S. M., Yang, M. H. et al., “The impacts of establishing enterprise information portals on e-business performance”, *Industrial Management and Data*, Vol. 105, No. 3, 2005, pp. 349-368.
- [98] Yoon, J. H., “An exploratory investigation of information systems resources and capabilities effect on e-business capabilities to firm performance”, *Industry Economy Review*, Vol. 17, No. 6, 2004, pp. 2453-2474.
- [99] Zhu, K., Kraemer, K. et al., “Electronic business adoption by European firms : A cross-country assessment of the facilitators and inhibitors”, *European Journal of Information Systems*, Vol. 12, No. 4, 2003, pp. 251-269.

■ Author Profile



Byoung-Ho Jun

Byoung Ho Jun is a full-time Instructor in the College of General Education at Seoul Women’s University.

He received his Ph.D degree in e-business from Korea University. His work has appeared in *Korean Small Business Review*, *Korean Venture Management Review*, *Journal of Information Technology Applications and Management*, *Journal of Korean IT Services*, and other journals. His research focuses on the adoption of new technology/service, the utilization of IT/EC in small firms, and standardization. He also involved in several government projects concerning standards and conformity assessment such as MRA (Mutual Recognition Agreement) and TBT (Technical Barriers to Trade).