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December 2001

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### Recommended Citation

Sung, Tae-Kyung and Lee, Sang-Jun, "Electronic Commerce in Korea: Critical Success Factors" (2001). *PACIS 2001 Proceedings*. 44.  
<http://aisel.aisnet.org/pacis2001/44>

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# Electronic Commerce in Korea: Critical Success Factors

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## Abstract

The purposes of the paper are to (1) determine critical success factors (CSF's) for electronic commerce (EC) and (2) investigate the explanatory power of these CSF's on firm performance in Korea. Through a literature review and interviews with managers in Korean EC firms, a list of 16 CSF's consisting of 111 items was compiled. In the second stage, questionnaires were administered to top EC managers of EC companies in Seoul, Korea. Survey results show that CSF's have very significant explanatory power for firm performance (above 51% for both Tobin's  $q$  and ROA). Security, privacy, technical expertise, information about goods/services, and variety of goods/services is the most explanatory CSF's. This analysis confirms the fact that customers use EC if they feel comfortable about navigating EC for plenty of information about and variety of goods/services without any technical difficulty in a secure and private way. Regression analyses on high and low performance firms show that explanatory power indicated by  $R^2$  is higher for high performance firms than lower performance firms for both Tobin's  $q$  and ROA. High performance firms tend to have already accommodated customer service requirements while low performance firms are working to accomplish these services.

**Key Words:** Critical Success Factors, Electronic Commerce

## 1. Introduction

The enormous growth of electronic commerce (EC) along with the rapid development of information technology (IT) is having a profound impact on the world economy. EC makes regional businesses and economies less local and more global in keeping with long-term trends toward market liberalization and reduced trade barriers (Brynjolfsson and Kahin, 2000). Accordingly, EC is considered to be an unavoidable alternative for companies of the 21<sup>st</sup> century (Adam, et. al, 1999; Westland and Clark, 1999).

According to U.S. Department of Commerce, almost half of the U.S. workforce will be employed by industries that are either major producers or intensive users of information technology products and services by 2006. Internet-related jobs grew 29% between the first quarter of 1999 and the first quarter of 2000 compared to 6.9% growth of non-Internet related jobs during the same period. The Internet economy generated an estimated \$830 billion in revenue in 2000, a 58 % increase over 1999 (Cisco Systems and the University of Texas at Austin, 2001).

There is a critical question emerging under this explosive EC growth. What is management “best practices” of successful EC firms? The primary purpose of this paper is to explore what are the critical success factors (CSF’s) for EC companies. Another related question is the validity of these CSF’s. Do CSF’s actually impact firm performance? Thus, the secondary purpose is to investigate explanatory power of select CSF’s on firm performance.

The structure of the remainder of the paper is as follows. The next section reviews the literature on CSF’s and performance measures. Then research design where operational measures and data collection processes are described. Next, survey results are presented and important research findings and implications are discussed. Finally, section 5 summarizes findings, draws the conclusions, and provides future research directions.

## **2. Literature Review**

The number of U.S. firms engaging in EC has increase from just under 8% in 1999 to over 35% by the end of 2000 (eMarketer, 2000). But, a key question is how many of these firms grow and prosper? The rapid rise and fall of many dot.com companies indicates that we should look at what factors should be seriously considered to measure to achieve EC success.

### ***2.1 Critical Success Factors for Electronic Commerce***

There have not been many studies explicitly examining CSF’s for EC. Rather, most studies implicitly suggest a number of important factors or issues, which may be considered to be CSF’s.

Huff et al. (2000) emphasize nine CSF’s for EC firms. First, add value in terms of convenience, information value, disintermediation, reintermediation, price, and choice. Second, focus on a niche market and then expand. Third, maintain flexibility. Fourth, segment geographically. Fifth, get the technology right. Sixth, manage critical perceptions. Seventh, provide exceptional customer services. Eighth, create effective connectedness. Ninth, understand Internet culture. Through case studies, Tabor (1998) reveals that a synergistic relationship between business strategy and strategic fit is critical factor for EC success. Plant (1999) studied the success factors associated with over 40 organizations in the US and Europe and identified the following seven CSF’s: financial impact, competitive leadership, brand, service, market, technology, and site metrics.

Instead of CSF’s, Hahn and Noh (2000) used CFF’s (Critical Failure Factors) to explore the factors that discourage the growth of EC. They listed 44 variables and through empirical study categorized into the following 6 CFF’s: lower level of data security, inconvenient use, unstable system, lack of information mind, dissatisfied purchasing, and social disturbance. Regression analysis on performance variables further indicated that unstable system, unsatisfied purchasing, and lower level of data security affect satisfaction while only unstable system and lower level of data security affect usage. CFF’s that affect expectation of EC usefulness are unsatisfied purchasing, social disturbance, and inconvenient use.

Hagel and Rayport (1997a and 1997b) discuss extensively about the implications of consumers taking control of their own information as EC strategy. Their work suggests the importance of security and privacy of customer information as key EC success factors. E

(electronic) - Loyalty was targeted by Reichheld and Scheffer (2000) to emphasize the trust of customers to a specific EC company, which leads to successful e-business. Manchala (2000) confirms the importance of trust as a critical factor.

To explore web-based electronic commerce opportunities, Riggins (1999) presents a framework that identifies 15 key ways to add value to an organization's e-commerce strategy. The extent to which each of these is utilized represents critical success factors. Similarly, Barua et al. (2000c) suggest eight key drivers for EC operational success: system integration, customer orientation of IT, supply orientation of IT, international operation of IT, customer-related processes, supplier-related processes, customer e-business readiness, and supplier e-business readiness.

A number of studies emphasize the importance EC strategy (Aldridge, Forcht, and Pierson, 1997; Bennett and Eustis, 1999; Klose and Lechner, 1999; Lincke, 1998; Timmers, 1998; Gebauer and Scharl, 1995; Porra, 2000; Jarvenpaa and Tiller, 1999). Athey (2000) stresses that EC requires leadership as challenges for the future.

Customer-orientation is another critical factor discussed by researchers (Elofson and Robinson, 1998; Fulkerson, 1997; Gonsalves, et al., 1999). In this respect, Hoffman and Novak (1997) suggest a new marketing paradigm for EC and a number of researches explore the importance of marketing including pricing mechanisms (Jahng, Jain, and Ramamurthy, 1999; Lee, Westland, and Hong; 1999-2000; Burn and Barnett, 2000; Manchala, 2000; Roberts, 2000).

Another stream of research is on the issue of evaluation and assessment of EC operations and web sites (Selz and Schuert, 1997 and 1998; Strader and Hendrickson, 1998; Burn and Barnett, 2000; Day, 1997; Gebauer and Scharl, 1995). These researches suggest that effectiveness of EC operations and web sites should be evaluated even though EC is considered to a strategic necessity.

In summary, literature review on CSF's for EC indicates a broad range of issues including security of information and systems, privacy of customer information, stable systems, low cost of operation, metrics for EC operations and web sites, ease of use, proper presentation of information about goods and services, customer orientation, EC strategy, EC expertise in both technical and managerial perspectives, payment, delivery, competitive price, speed, services, variety of goods and services, proper web design, marketing, trust and loyalty of customers. In total list of 125 specific items was compiled from literature review.

## ***2.2 Performance of EC Firms***

How to measure the success of EC firms? For example, the most successful online seller, Amazon.com, which had less than \$1 billion in revenue, is worth more than long-established corporations including Delta Airlines, Kmart, Apple Computer, and Barnes & Noble (Choi and Whinston, 2000). As of 2001, Amazon.com has never produced a profit. Even though Andy Grove, Chairman of Intel, once mentioned "What's my ROI on e-commerce? Are you crazy? This is Columbus in the New World. What was his ROI?" it is about time for researchers to develop some kind of valid and reliable measures to evaluate EC firms.

Most studies on EC success have been centered on levels of national economy, industry, and web site (Haltiwanger and Jarmin, 1999; Barua, Whinston, and Yin, 2000a and 2000b; Shaw, 1999; Shaw, et al., 2000; Jutla, Bodorik, and Wang, 1999). There have been few studies that measure the organizational performance of EC companies as does this research.

Organizational performance is a multi-faced construct that defies measurement by a single item and it is the area that much research work is needed (Delone and McLean, 1992). Two widely used measures of firm performance are Tobin's  $q$  ratio, and ROA (Bharadwaj, Sambamurthy, and Zmud, 2000). IS researchers have utilized a variety of dependent variables to represent firm performance, including perceptual measures, such as IT assimilation (Armstrong and Sambamurthy, 1999; Boynton, Zmud, and Jacobs, 1994), and objective measures, such as ROA, and Tobin's  $q$  (Bharadwaj et al. 1999; Hitt and Brynjolfsson 1994). In this study, objective measures of firm performance will be used. Since measures of CSF's will be gathered through questionnaires from managers' perceptions, an objective measure of firm performance eliminates potential concerns about methods bias and provides the basis for a robust test of CSF's on firm performance.

Tobin's  $q$  ratio (or simply, the  $q$  ratio), which is defined as the capital market value of the firm divided by the replacement value of its assets, represents a market-based measure of firm value that is forward looking, risk adjusted, and less susceptible to changes in accounting practices (Montgomery and Wernerfelt 1988). The  $q$  ratio has been widely used in the business, economics, and finance literature as a measure of business performance (c.f. Chen and Lee 1995; Hall 1993; Megna and Clock 1993; Simon and Sullivan 1993). More recently, the  $q$ -ratio has also been used in the IS literature to examine the association between IT and firm performance (c.f. Bharadwaj et al. 1999; Hitt and Brynjolfsson 1994). Thus, the use of Tobin's  $q$  as a performance measure is applicable in this study.

In addition to using a market-based measure, EC CSF's and firm performance will be also assessed through return on assets (ROA), a widely used accounting measure in the IT-business value literature (Attewell, 1993; Brynjolfsson, 1993). Using both marketing and accounting measures of firm performance, we can expect more valid research findings. Also this will allow us to examine comparability of two measures.

### **3. Research Methodology**

#### ***3.1 Two-Staged Data Collection***

A two-staged data collection methodology was adopted. In the first stage, in-depth interviews were conducted to verify CSF's extracted from literature review. Twenty high-level EC managers from 20 EC companies participated. Using a 7-point Likert scale, the list of 125 items was presented to interviewees to evaluate the importance of each item to EC success. Items that scored lower than 4 were removed from the list. After the evaluation, interviewees were asked to eliminate duplicate or similar items and to integrate them if possible. This process removed 14 items from the original list. Then each of twenty participants was asked to categorize 111 items into a number of groups in terms of commonality of items. After the grouping, all twenty participants made group discussion on the categorization for further refinement and generalization. Finally, 16 groups were identified as critical success factors for EC success.

In the second stage, uniform questionnaires were administered to EC companies in Korea. A preliminary version of the questionnaire was pilot-tested for accuracy and reliability with three target respondents. Each respondent reviewed the questionnaire in the presence of one of researchers and provided feedback regarding wording, understandability, and applicability

of the instrument. The original questionnaire utilized a 7-point Likert type scale, but respondents at the pilot-test indicated that a 5-point scale was more comfortable to answer than the 7-point scale since respondents tend to avoid the extreme scales. Thus, the 5-point Likert type scale was adopted for the study.

### **3.2 Sample**

This study concerns CSF's on firm performance and the organization is the level of analysis. Therefore, top managers who are in charge of EC business of corporations were the target respondents. About 400 EC companies were listed at Chamber of Commerce in Korea by December 2000. For the sake of convenience, only EC firms in the metropolitan area of Seoul were targeted. This pre-screen sampling process resulted in the sample of about 320 firms. To avoid contaminating the sample, recently established companies (that could not provide Tobin's  $q$  and ROA) were eliminated. Two hundred and thirty five EC firms were left after the elimination process and were designated as the target sample.

The questionnaire was administered to top EC managers at 235 EC companies from January 15, 2001 to January 19, 2001 by one nationwide Korean newspaper agency. To secure high response rate, newspaper agency reporters visited each EC firm and solicited participation. Out of 203 questionnaires returned, 7 were unusable. Therefore, the final response rate was 83.40% (196 questionnaires). Demographic analysis (comparison of size and sales between respondent and non-respondent companies) does not reveal any significance to suspect sample bias.

### **3.3 Measures**

From the first stage of data collection, 16 factors that consist of 111 items were identified. Table 1 shows 16 CSF's as well as a number of items and sample items for each CSF. There were between 4 and 8 items for a factor.

As discussed in literature section, two performance measures were employed: Tobin's  $q$  as a market-based measures and ROA as an accounting measure of firm performance. The mean firm  $q$  ratio of about 1.12 is comparable to the average  $q$ -values reported in other studies (c.f. Bharadwaj et al. 1999). Summary statistics for all research variables are displayed in Table 2.

### **3.4 Reliability and Validity**

Reliability refers to the stability of measures over a variety of conditions (Nunally, 1978). The amount of error made by any measure is determined by Cronbach's alpha test applied to interitem scores and to the overall measures. The results of reliability test on corporate strategy and CAIT measures are shown in Table 2. There is no absolute standard for interpreting Cronbach's alpha. But there are some guidelines suggest by several theorists. Brown (1983) recommends the minimum value of 0.80 for tests measuring attitudes or values. More generally, Nunally (1978) argues that the satisfactory level of exploratory study is 0.7 or above. Cronbach's alphas ( $\alpha$ ) are on the diagonals of Table 3 and all variables suffice the Nunally's standard and close to Brown's recommendation. Therefore, reliability of measures is concluded to be satisfactory.

**Table 1: CSF's and Sample Items**

<b>CSF's</b>	<b>No. of Items</b>	<b>Sample Items</b>
Customer Relationship (CUSTOMER)	6	Web page is customized for each customer? How much sensitive to needs of customers?
Privacy of Information (PRIVACY)	7	Is there any illegal use of customer information? Do you honor privacy rights?
Low cost Operation (LOWCOST)	7	What is cost/revenue ratio? What is overhead cost ratio?
Ease of use (EASY)	8	How easy to recognize menu? Is web page sequence logical?
EC strategy (STRATEGY)	6	Is there EC strategy? Is strategy integrated with IT strategy?
Technical EC Expertise (EXPERTISE)	6	Do you have EC expert(s) in company? Do you have necessary EC technology?
Stable Systems (STABLE)	8	How often system is disconnected? How constant system is working?
Security of Systems (SECURITY)	8	Do you have enough protection from hacking? How secure customer information?
Plenty of Information (PLENTY)	8	Is there enough Information about goods/services? Is information relevant?
Variety of Goods/Services (VARIETY)	7	Is there variety of goods/services? Do you carry top-brand goods/services?
Speed of Systems (SPEED)	8	How fast is retrieval time? Is speed fluctuates at peak and off times?
Payment Process (PAYMENT)	6	Is customer payment is safe? Do you accept variety of payment?
Services (SERVICES)	8	Do you provide A/S? Do you have technical service hot lines?
Delivery of goods/services (DELIVERY)	8	How accurate your delivery to customers? Are Goods delivered are the same as on the screen?
Low Price of Goods/Services (LOWPRICE)	4	Are your prices of goods/services are competitive? Are Shipping and handling charges are reasonable?
Evaluation of EC Operations (EVALUATION)	6	Do you have metrics for EC? Do you have metrics for web sites?

To verify the validity of measures, factor analysis was performed. As Table 3 shows, all 16 CSF's has high loadings (above 0.5000) on one of 4 components. Thus, validity of CSF's measures is generally supported.

**Table 2: Descriptive Statistics of Research Variables**

CSF's	No. of Items	Mean	Std. Dev.	Cronbach's $\alpha$
CUSTOMER	6	3.5459	1.0874	0.8543
PRIVACY	7	3.1046	0.7346	0.7872
LOWCOST	7	3.1565	0.5256	0.8320
EASY	8	3.5595	0.8299	0.8122
STRATEGY	6	2.8699	0.7677	0.7145
EXPERTISE	6	3.1837	0.8394	0.7630
STABLE	8	2.9311	0.9096	0.8088
SECURITY	8	2.7577	0.7783	0.7753
PLENTY	8	2.9473	0.7867	0.8289
VARIETY	7	3.2449	0.8667	0.8091
SPEED	8	3.6173	0.8132	0.8345
PAYMENT	6	3.1888	0.7746	0.7360
SERVICES	8	2.4362	0.7389	0.7874
DELIVERY	8	4.0663	0.7076	0.7582
LOWPRICE	4	3.3810	0.6572	0.8481
EVALUATION	6	2.8087	0.7564	0.7230
Tobin's $q$	N/A	1.1227	0.2546	N/A
ROA		20.0125	4.2467	

**Table 3: Factor Analysis on Research Variables**

CSF's	Components			
	1	2	3	4
PLENTY	<b>0.6857</b>	0.3798	0.1872	0.0646
PAYMENT	<b>0.7058</b>	0.2626	0.0467	0.1747
VARIETY	<b>0.7005</b>	0.2498	-0.1982	0.3077
LOWPRICE	<b>0.5543</b>	-0.1791	0.2529	0.3154
SERVICES	<b>0.6178</b>	-0.1779	0.3045	-0.0273
DELIVERY	<b>0.5066</b>	0.0687	0.3061	0.1837
SECURITY	-0.0211	<b>0.5545</b>	0.0170	0.2278
STABLE	0.3710	<b>0.6911</b>	0.1271	0.0056
EVALUATION	0.3799	<b>0.5281</b>	0.3873	0.0195
EXPERTISE	0.1595	<b>0.6491</b>	0.1617	-0.0301
SPEED	0.1029	<b>0.6628</b>	0.0978	0.1614
CUSTOMER	0.1756	0.0364	<b>0.7062</b>	-0.1190
STRATEGY	0.3679	0.2450	<b>0.6336</b>	0.0802
PRIVACY	0.0162	0.1733	0.1345	<b>0.8091</b>
LOWCOST	0.0306	0.2237	0.3863	<b>0.6904</b>
EASY	0.2254	0.2686	-0.0023	<b>0.6523</b>
<b>Variance Explained</b>	<b>2.9009</b>	<b>2.3109</b>	<b>1.8274</b>	<b>1.7618</b>



To further examine the validity of CSF's measures, correlation analysis of CSF's on two performance measures was performed (refer to Table 4). In case of Tobin's q, correlation coefficients of 14 CSF's are statistically significant at alpha level of 0.01. The remaining two CSF's are statistically significant at alpha level of 0.05. In terms of ROA, correlation coefficients of 15 CSF's are statistically significant at alpha level of 0.01. The remaining CSF is statistically significant at alpha level of 0.10. Correlation analysis indicates that CSF's have considerable association with performance measures. Therefore, CSF's measures are proved to be valid.

**Table 4: Correlation Analysis on Critical Success Factors**

CSF's	Tobin's q		ROA	
	Coefficient	P > Ho: Rho=0	Coefficient	P > Ho: Rho=0
PLENTY	0.5010***	0.0001	0.5231***	0.0001
PAYMENT	0.4223***	0.0001	0.3922***	0.0001
VARIETY	0.3998***	0.0001	0.3979***	0.0001
LOWPRICE	0.2182***	0.0021	0.1842***	0.0097
SERVICES	0.1800***	0.0116	0.2009***	0.0047
DELIVERY	0.1549**	0.0302	0.1361*	0.0572
SECURITY	0.3826***	0.0001	0.4340***	0.0001
STABLE	0.4719***	0.0001	0.4889***	0.0001
EVALUATION	0.4035***	0.0001	0.3640***	0.0001
EXPERTISE	0.4785***	0.0001	0.4569***	0.0001
SPEED	0.4192***	0.0001	0.4156***	0.0001
PRIVACY	0.3261***	0.0001	0.3034***	0.0001
LOWCOST	0.2861***	0.0001	0.3372***	0.0001
EASY	0.3142***	0.0001	0.3265***	0.0001
CUSTOMER	0.1741**	0.0146	0.2511***	0.0004
STRATEGY	0.3218***	0.0001	0.3986***	0.0001

\*, \*\*, and \*\*\* denote coefficients are statistically significant at  $\alpha$  level of 0.10, 0.05, and 0.01, respectively

#### 4. Results and Discussions

Respondents rated DELIVERY (of goods/services)<sup>1</sup> as the most critical factor, followed by SPEED (of systems), EASY (of use), CUSTOMER (orientation), LOWCOST (operation). On the other hand, SERVICES was rated as the least critical factor, followed by SECURITY (of systems), EVALUATION (of EC operations), (EC) STRATEGY, and STABLE (system) (refer to Table 2). These ratings of CSF's are perceptual and relative since EC managers evaluate each CSF based on their prior experience and educated guess. Thus it may not accurately reflect objective contribution of CSF on firm performance.

To investigate importance of each individual CSF's on firm performance, regression analysis was performed (refer to Table 5). CSF's have very significant explanatory power for firm performance (above 51% for both Tobin's q and ROA). In case of Tobin's q,

<sup>1</sup> For the detailed discussion of each CSF, please refer to Table 1.

SECURITY (of systems), PRIVACY (of information), (technical EC) EXPERTISE, PLENTY (of information on goods/services), VARIETY (of goods/services), EVALUATION (of EC operations) were statistically significant in explaining firm performance. In terms of ROA, PLENTY (of information and goods/services), SECURITY (of systems), VARIETY (of goods/services), PRIVACY (of information), (technical EC) EXPERTISE, and STABLE (systems) were CSF's that contribute to firm performance. Whether Tobin's  $q$  or ROA is used, SECURITY (of systems), PRIVACY (of information), (technical EC) EXPERTISE, PLENTY (of information about goods/services), and VARIETY (of goods/services) are the most explanatory CSF's on firm performance. This analysis can be interpreted as customers would use EC if they feel comfortable about navigating EC for plenty of information about and variety of goods/services without any technical difficulty in a secure and private way. Negative coefficients such as PAYMENT (process) and (EC) STRATEGY seem to be the results of multi-collinearity among independent variables (CSF's).

**Table 5: Regression Analysis of CSF's on Performance**

CSF'S	Performance			
	Tobin's $q$		ROA	
	Estimate	t-statistics	Estimate	t-statistics
PLENTY	0.0574	2.26**	1.0640	2.55**
PAYMENT	-0.0249	1.04	-0.1750	0.45
VARIETY	0.0427	1.93*	0.6769	1.87*
LOWPRICE	0.0044	0.18	-0.2123	-0.54
SERVICES	0.0016	0.08	0.1164	0.34
DELIVERY	0.0083	0.41	0.0864	0.26
SECURITY	0.0725	3.70***	1.4129	4.41***
STABLE	0.0240	1.21	0.5448	1.68*
EVALUATION	0.0389	1.77*	0.1486	0.41
EXPERTISE	0.0712	3.87***	0.9979	3.31***
SPEED	0.0285	1.46	0.4279	1.34
PRIVACY	0.0522	2.35**	0.7042	1.94*
LOWCOST	0.0161	0.52	0.6594	1.31
EASY	0.0355	1.51	0.5141	1.33
CUSTOMER	0.0061	0.44	0.3495	1.55
STRATEGY	-0.0258	-1.07	-0.0062	-0.02
R-Square	51.0102		52.7487	
F-Statistics	11.65		12.49	
Pr < F	0.0001		0.0001	

\*, \*\*, and \*\*\* denote coefficients are statistically significant at  $\alpha$  level of 0.10, 0.05, and 0.01, respectively

Khandwalla (1971) reports interesting results from his extensive studies on U.S. and Canadian firms. He found that high performers show stronger relationships among research variables while low performers have weaker relationships. This result sheds additional logic

to this study. High performance firms may have better chance to show more explanatory power of CSF's on firm performance than low performance firms

To examine this proposition, the sample was divided into high performance and low performance groups. If firm records higher than 1.20 (median value) on Tobin's  $q$ , then it belongs to high performance group in terms of Tobin's  $q$  (N= 98). If not, it belongs to low performance firms (N = 98). In terms of ROA, if firm records higher than 20.08 (median value), then it belongs to high performance group (N= 98). If not, it belongs to low performance firms (N = 98). Then regression analysis was performed on high and low performance groups, respectively (refer to Table 6). Agreeing with Khandwalla's analysis, explanatory power indicated by  $R^2$  is higher for high performance firms than lower performance firms in both Tobin's  $q$  and ROA cases. Thus, the proposition that high performance firms have better understanding of CSF's and their effects on performance are confirmed.

**Table 6: Regression Analysis of CSF's on Performance by High and Low Performance Firms**

CSF's	Performance							
	Tobin's $q$ <sup>a</sup>				ROA <sup>b</sup>			
	High (N=98)		Low (N=98)		High (N=98)		Low (N=98)	
PLENTY	0.022	1.08	0.093	2.96***	0.266	0.62	1.346	2.83***
PAYMENT	-0.045	-1.84*	-0.008	-0.30	-0.234	-0.57	0.366	0.83
VARIETY	0.032	1.43	0.023	0.97	-0.067	-0.18	0.977	2.36**
LOWPRICE	0.039	2.07**	-0.018	-0.59	0.204	0.55	-0.367	-0.74
SERVICES	0.030	1.72*	-0.030	-1.21	-0.050	-0.15	0.273	0.68
DELIVERY	-0.001	-0.08	0.007	0.26	0.304	1.01	0.515	1.27
SECURITY	-0.002	-0.13	0.085	3.12***	0.430	1.51	1.249	2.78***
STABLE	0.010	0.74	-0.061	-1.98*	0.421	1.50	0.200	0.43
EVALUATION	0.010	0.63	0.066	2.29**	-0.204	-0.63	-0.064	-0.14
EXPERTISE	0.051	3.34***	0.031	1.27	0.998	3.45***	0.411	1.05
SPEED	0.032	1.94**	-0.011	-0.49	0.261	0.87	0.277	0.75
PRIVACY	0.026	1.38	0.050	1.97*	-0.008	-0.02	0.367	0.87
LOWCOST	-0.019	-0.74	-0.019	-0.51	1.085	2.11**	0.276	0.46
EASY	0.015	0.74	0.006	0.22	0.191	0.52	0.973	2.06**
CUSTOMER	0.022	1.76*	0.003	0.21	0.072	0.34	0.221	0.83
STRATEGY	-0.015	-0.79	-0.016	-0.50	0.219	0.62	-0.660	-1.30
R-Square (%)	43.7342		36.9317		44.7480		39.1888	
F-Statistics	3.93		2.96		4.10		3.26	
Pr < F	0.0001		0.0007		0.0001		0.0002	

a High performance and low performance group were divided by the median of Tobin's  $q$  (1.20)

b High performance and low performance group were divided by the median of ROA (20.08)

\*, \*\*, and \*\*\* denote coefficients are statistically significant at  $\alpha$  level of 0.10, 0.05, and 0.01, respectively

Further observation shows that effects of CSF's on performance are different for high and low performance firms. In case of low performance firms, services related CSF's are more contributing to firm performance. This difference may be a plausible distinction between

high and low performance firms. High performance firms may have already accommodated customer service requirements while low performance firms are working hard to accomplish these services.

## 5. Summary and Conclusions

The purposes of the paper were to (1) determine critical success factors (CSF's) for EC companies and (2) investigate explanatory power of these CSF's on firm performance in Korea. Through literature review and first stage intense interviews, a list of 16 CSF's that consist of 111 items was compiled. Questionnaires were administered to top EC managers at 235 Korean EC companies from January 15, 2001 to January 19, 2001 and the final response rate was 83.40% (196 questionnaires).

The survey results show that CSF's have significant explanatory power on firm performance (above 51% for both Tobin's  $q$  and ROA). Whether Tobin's  $q$  or ROA is used, SECURITY (of systems), PRIVACY (of information), (technical EC) EXPERTISE, PLENTY (of information about goods/services), and VARIETY (of goods/services) are the most explanatory CSF's on firm performance. This analysis can be interpreted as customers would use EC if they feel comfortable about navigating EC for plenty of information about and variety of goods/services without any technical difficulty in a secure and private way.

Further regression analysis on high and low performance firms show that explanatory power indicated by  $R^2$  is higher for high performance firms than lower performance firms in both Tobin's  $q$  and ROA cases. Thus, confirming the belief high performance firms have better understanding of CSF's and their effects on performance. Further observation shows that effects of CSF's on performance are different for high and low performance firms. In case of low performance firms, service related CSF's are considered to be more critical to firm performance. This difference may be a plausible distinction between high and low performance firms. High performance firms may have already accommodated customer service requirements while low performance firms are working hard to accomplish these services.

This research has several limitations. First, the research setting is limited to metropolitan area of Seoul. Also the sample size ( $N = 196$ ) may not be large enough to carefully examine all CSF's and their relationships with firm performance. Second, this study may not include all CSF's for EC success. There may be other CSF's that this study missed. Third, two firm performance measures (objective, marketing measure and traditional, accounting measure) may not adequately represent corporate performance. As Delone and McLean (1992) point out, organizational level performance measures need to be refined.

There are several directions in which this research can be extended. One suggestion for future effort is to replicate this research with a larger population setting including EC companies in U.S. and other countries. The second future research direction is to comprehensively include CSF's and validate CSF's. The third direction concerns the dependent variable. More reliable and valid organizational level performance measures should be devised and empirical tested.

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