

The Impact of Environmental Characteristics on Electronic Commerce Performance

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Abstract – Domestic enterprises are surveyed and analyzed to find the empirical relationship between environmental characteristics and electronic commerce (EC) performance. Dynamism, hostility and heterogeneity are selected as environmental characteristics. EC performance is articulated as EC utilization, EC satisfaction and EC usefulness. Empirical test presents that dynamism has a statistically significant relationship with EC performance except EC usefulness, but hostility and heterogeneity have no statistically significant relationship with EC performance. The impact of industry type on environmental characteristics and EC performance is also tested.

Keywords: Electronic commerce, Environmental characteristics, EC performance, Industry type

1 Introduction

Electronic commerce (EC) has caused many changes in the economic structure, and now begins to develop a new paradigm for business process [8]. Business firms are taking part in online business activities because they cannot survive without participating in e-commerce. Thus, e-commerce is now an essential part of business strategy for survival and growth [9], [10], [12] for both large enterprises and small to medium enterprises [1], [4], [7], [8], [13].

The research on e-commerce so far has some limitations. It lacks empirical study conducted with field data collected from business firms. Most of the past studies also focused on the issues of adoption and diffusion of e-commerce [3], [5], [11]. E-commerce nowadays, however, is considered a must rather than a matter of choice. Thus, we need to discuss the issue of how to use e-commerce more effectively.

This paper considers the impact of environmental characteristics on EC performance to extend the previous research on EC. Enterprises are using EC under different environmental conditions, but there has not been enough empirical study with field data to find out whether these differences impact on the e-commerce practices and performance. This paper is to study whether there are differences of environmental characteristics between manufacturing industry and service industry, and what are the differences and the impact of them on EC performance.

2 Research Methodology

2.1 Research Model and Hypotheses

The research model in Figure 1 shows the overall conceptual relationships among industry type, environmental characteristics and EC performance. Table 1 contains the explanations for the variables, and the hypotheses that will be tested are as follows:

Hypothesis 1: The firm's environmental characteristics are different among the types of industry in which the firm operates.

The characteristics of environment in which the firm operates would be different between manufacturing industry and service industry. For example, those firms in service industry are likely to operate in more heterogenous environment while manufacturing firms are likely to operate in less heterogenous environment.

Hypothesis 2: The firm's EC performance is affected by the type of industry in which the firm operates.

A firm's performance is generally improved by adoption and implementation of electronic commerce. The magnitude of improvement, however, would be different by the type of industry in which the firm operates

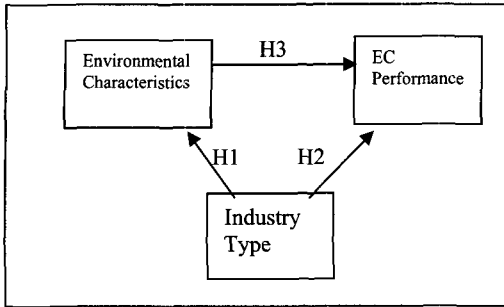


Figure 1. Research model for E-Commerce environment

Hypothesis 3: The firm's EC performance is affected by the characteristics of environment in which the firm operates.

A firm's performance is generally improved by adoption and implementation of electronic commerce. The magnitude of improvement, however, would be different by the characteristics of environment in which the firm operates

Table 1. Explanation of the variables

Variables	Contents
Industry Type	Manufacturing industry Service industry
Environmental Characteristics	Dynamism Hostility Heterogeneity
EC Performance	EC utilization EC satisfaction EC usefulness

2.2 Data Collection and Analysis

For a preliminary test, questionnaires were circulated to 150 enterprises in Korea and 51 firms have returned the questionnaires. The data collected from the sample of 51 firms are used for analyses. Statistical test such as alpha test, factor analysis, t-test and analysis of variance(ANOVA) are used to analyze the data and to find out the answers for the hypotheses presented in the above.

Table 2. Profile of respondent firms

Type of industry	No. of firms	Proportion
Manufacturing	25	49%
Service	26	51%
Total	51	100%

3 Analyses and Results

The reliabilities are tested for the measured variables, and the results show that all of them are well above the acceptance level(cronbach's $\alpha > 0.9$). Also, factor analysis is conducted to confirm the validity of the

environment and performance variables. The 13 items in the questionnaire used to measure environmental characteristics were analyzed using principal component analysis with varimax rotation. It used eigenvalue of one and the factor loading of 0.5 as the selection criteria. This yielded three factors with 2 items for each factor. The three factors are named as dynamism, hostility, and heterogeneity. The factor analysis conducted for the performance variables yielded also three factors with 3 items for each factor. The three factors are named as EC utilization, EC satisfaction, and EC usefulness.

Tables 3 through 5 show the results of the tests to find out the relationship among the variables and to determine the acceptance of the hypotheses presented in the above. Environmental characteristics are classified as low, middle and high level by the degree of dynamism, hostility, and heterogeneity. Industry type is classified as manufacturing industry and service industry.

3.1 Industry type and Environmental characteristics

The hypotheses about the relations between the firm's industry type and the firm's environmental characteristics are tested by t-test. The t-test results in Table 3 show that service industry is more heterogeneous than manufacturing industry. But, dynamism and hostility are not significantly different between manufacturing industry and service industry. In other words, the staff and employees of manufacturing and service firms feel the same degree of dynamism and hostility about their environment. But, there are noteworthy differences in buying habits of customers, nature of competition, and uncertainty of market between manufacturing firms and service firms.

Table 3. Impact of industry type on environmental characteristics (t-test)

Environment variable	Industry type	Means	Results
Dynamism	Manufacturing	6.4000	t = -0.568 p = 0.573
	Service	6.8077	
Hostility	Manufacturing	8.7500	t = -0.249 p = 0.804
	Service	8.6000	
Heterogeneity	Manufacturing	7.0477	t = -2.059 p = 0.045
	Service	8.1923	

3.2 Industry type and EC Performance

This paper tested the relations between industry type and the firm's E-commerce performance measured in utilization, satisfaction and usefulness. The t-test results in Table 4 show that industry type does not significantly

affect EC usefulness. But, EC utilization and EC satisfaction are significantly different between manufacturing industry and service industry. The descriptive analysis reveals that manufacturing firms utilize E-commerce more than service firms, but service firms are more satisfied than manufacturing firms.

Table 4. Impact of industry type on EC performance (t-test)

Performance variable	Industry type	Means	Results
EC Utilization	Manufacturing	22.2083	t = -2.357 p = 0.023
	Service	27.1923	
EC Satisfaction	Manufacturing	23.8800	t = -2.494 p = 0.016
	Service	27.0769	
EC Usefulness	Manufacturing	22.7500	t = -0.929 p = 0.359
	Service	24.4583	

3.3 Environmental characteristics and EC performance

This paper tested the relations between the three environmental variables discussed above (dynamism, hostility, and heterogeneity) and the EC performance experienced by the firm measured in utilization, satisfaction and usefulness. The results of analysis of variance (ANOVA) are presented in Table 5.

Some of the environmental characteristics have significant impact on the firm's E-commerce performance. ANOVA shows that dynamism of environment significantly affect EC utilization and EC satisfaction at the significance level of $p < 0.05$. Environmental characteristics does not affect EC usefulness at all. That is, firms do not feel any difference in usefulness of E-commerce based on the environmental characteristics.

Additional descriptive analysis reveals that the firms utilize E-commerce more in low dynamic and hostile environment than in high dynamic and hostile environment. The firms are more satisfied in low dynamic and high heterogeneous environment than in high dynamic and low heterogeneous environment. EC systems are appreciated as more useful in low dynamic and high heterogeneous environment than in high dynamic and low heterogeneous environment. Regression analysis indicates that EC utilization is not affected by all three environmental characteristics variables, EC satisfaction is significantly affected by dynamism and heterogeneity, and EC usefulness is significantly affected by only heterogeneity.

Table 5. Impact of environmental characteristics on EC performance (ANOVA)

Performance	Environmental	Means	Results
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variable	characteristics			
EC Utilization	Dynamism	Low	29.9524	F = 3.738 p = 0.029
		Middle	24.1923	
		High	24.8400	
	Hostility	Low	27.0435	F = 0.270 P = 0.764
		Middle	25.4000	
		High	25.6429	
	Heterogeneity	Low	25.6250	F = 0.185 P = 0.831
		Middle	25.6800	
		High	26.8750	
EC Satisfaction	Dynamism	Low	28.4545	F = 4.558 p = 0.014
		Middle	24.4615	
		High	25.4800	
	Hostility	Low	26.9130	F = 1.457 P = 0.240
		Middle	24.4500	
		High	26.3929	
	Heterogeneity	Low	25.4167	F = 0.793 P = 0.456
		Middle	25.4800	
		High	27.0000	
EC Usefulness	Dynamism	Low	27.3333	F = 1.580 p = 0.213
		Middle	24.2500	
		High	24.1200	
	Hostility	Low	25.9565	F = 0.279 P = 0.757
		Middle	25.0526	
		High	24.4815	
	Heterogeneity	Low	23.6818	F = 0.649 P = 0.526
		Middle	25.7083	
		High	25.7083	

4 Conclusion

This study have found that the impact of industry type and environmental characteristics is significant for some cases of E-commerce performance. Generally EC performance is higher in service industry than in manufacturing industry. Empirical test shows that the impact of environmental characteristics on EC performance is significant for only case of dynamism. But, additional test such as regression analysis reveals that heterogeneity significantly affect EC satisfaction and EC usefulness. These results indicates that the firms should consider environment variables such as industry type and environmental characteristics in using E-commerce for their management of business.

This study has been conducted with a relatively small sample size, especially, of only two industries (manufacturing and service). Further research is needed to continue to collect data from more firms in various

industries, and then the study will produce more reliable and meaningful results.

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