Factors Influencing Strategic Use of Information Technology and Its Impact on Business Performance of SMEs

Moon-Koo Kim and Kyoung-yong Jee

In this paper, we study the relationship between factors influencing the strategic use of IT and business performance by conducting a survey of small and medium-size enterprises (SMEs). From the results of our survey we came to several conclusions which are presented here. First, IT investment has a significant impact on the strategic use of IT, and the strategic use of IT has a significant impact on business performance. Second, SME investment in IT and strategic use of IT are influenced by both the intensity of competition in the market environment and partnership with other organizations. Third, the support from the management group in SMEs is a core factor for IT investment and strategic use of IT. Finally, for SMEs to use IT strategically and successfully, it is necessary to combine members' participation with a flexible organizational structure and culture.

Keywords: Strategic use of IT, business performance, small and medium enterprise (SME).

I. Introduction

Strategic use of IT can be especially beneficial to small and medium-size enterprises (SMEs), which are more vulnerable to external environmental factors than large corporations, and are disadvantaged in terms of operation resources. IT can help these firms improve efficiency, effectiveness, and innovativeness, so that they can rise above their limitations to compete viably with their larger counterparts [1].

While the importance of strategic use of IT has been pointed out in numerous studies, there are only a few studies which have empirically investigated the relationship between determinants of strategic use of IT and performance [2]-[4]. Most previous works on the subject are concerned with understanding the effect of individual variables such as human and organizational resources on the use of IT. Little or no attempt has been made to analyze determinants of strategic IT use, based on a global assessment of relevant variables. The literature is just as meager concerning the strategic use of IT among SMEs and the effects of IT on performance indicators.

The purpose of this study is to empirically investigate factors influencing IT investment and the strategic use of IT among SMEs. We use an extended research model, which considers environmental characteristics and the characteristics of human resources and organization, as well as the characteristics of external relationships, to shed light on how IT investment and use of IT affect the business performance of these firms. The study is organized as follows: First, we review the theoretical background to the concept of strategic use of IT and its

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importance. Second, we examine the relationship between SME investment in IT and the strategic use of IT, assessing how the latter is influenced by the environment, human resources and organization, and the characteristics of external relationships. Third, we establish the practical relevance of the strategic use of IT by demonstrating its impact on the performance of SMEs.

II. Theoretical Background and Hypotheses

1. Theoretical Background

The use of IT is a strategic necessity, enabling companies to reposition themselves in the competitive configuration within a market or to overcome their competitive disadvantages [5], [6]. Using IT, companies can improve the efficiency of their operations and their performance in resource procurement and management, and can enable them to enhance their competitive advantages in certain areas, by making moves against competitors or consolidating resources and capabilities [5].

However, the question of whether the use of IT as such can create lasting competitive advantages is a controversial one, and the empirical answers are far from uniform [3]. The importance of strategic use of IT, especially when used in line with the specific environment of a given firm, its competitive strategy, its organizational and management characteristics, and its external network has been well recognized since the late 1990s [7].

Fewer studies are available on the strategic use of IT among SMEs than among large corporations [8]. Due to their limited size of operation, SMEs frequently lack the capability to implement a comprehensive IT strategy, and do not often hire IT specialists [9]. Insufficient knowledge of IT and meager technical competencies are impediments to technology acceptance among SMEs [10]. Moreover, SMEs have a tendency to undertake short-term strategies and can seldom afford the time and effort necessary to thoroughly integrate IT in their operations, which increases the odds against successful technology acceptance [10]. Due to these limitations, SMEs tend to use IT as a simple operational and technical tool, and fail to draw significant performance benefits from it.

More recently, however, SMEs have been more actively investing in informatization, demonstrating a heightened awareness of the importance of IT. Studies also report that SMEs that make extensive use of IT perform better. Even with small investments, SMEs, provided they make active use of IT, are able to improve their market shares or profitability or make progress in other performance areas [11], [12]. Accordingly, a strategic use of IT is essential for the SMEs to overcome limitations in resources and competitive capabilities to enhance their performance. Just as with their larger counterparts, it is crucial for SMEs to ensure that their IT strategies fit their business operations.

2. Research Model

Although there is a shared view that a firm's IT investment and its strategic use of IT are influenced by factors related to its external environment and internal organization as well as external networking, attempts to investigate the determinants of IT investment and the strategic use of IT by comprehensively considering all of these relevant factors (as in [3], [6], [7]) have been rare. Even rarer are studies dealing with the relationship of an SME's IT investment and strategic use of IT with its business performance. In this study, we empirically investigate the determinants of IT investment and the strategic use of IT among SMEs, using an extended research model which considers a broad range of influence factors, including environmental characteristics, the characteristics of human resources and organization, as well as the characteristics of external relations. We also try to determine whether and how IT investment and the strategic use of IT affect the business performance of SMEs.

3. Research Hypotheses

The role of IT in today's corporate world is no longer limited to that of a business support tool. Perceived as indispensable for overcoming competitive disadvantages and effectively compensating for a paucity of resources, IT has become an integral part of business strategy for many companies. Meanwhile, no real consensus exists among researchers as to the direct relationship between IT investment and competitive advantages, and empirical studies report mutually contradictory results on the subject [12]. Findings of past studies range from those confirming a positive influence of IT investment on business performance and asserting the performance benefits of stepping up IT investment [13] to those attesting only to a partial influence on certain performance areas [2], [12] to an absence of relationship [3]. In this study, we assume that IT investment positively affects business performance among SMEs.

- H1: IT investment has a positive effect on the business performance of SMEs.

The importance of strategic use of IT, in other words, closely linking IT resources with a company's external environment, internal capabilities and external networks, has long been noted. Several empirical studies, from the 1990s onwards, corroborated this idea at least partially [6]. IT has been a strategic tool for companies to achieve continued growth and

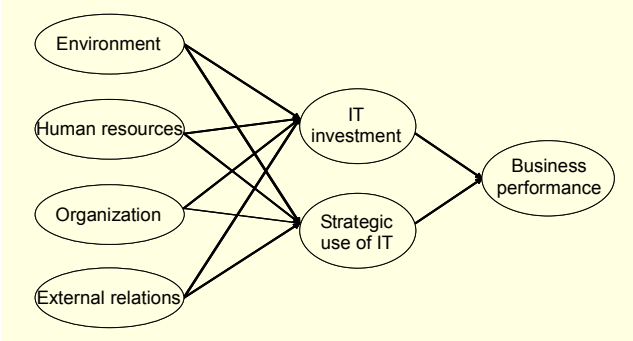

Fig. 1. Research model.

acquire or maintain competitive advantages in times of high external uncertainties [14]. The idea that IT can contribute to the optimization of enterprise resources and the strengthening of its capabilities, ultimately enhancing business performance, has received empirical support from several studies [4], [15], [16]. Harmonization of IT with competitive strategy has been proven to exert a beneficial influence on a firm's competitive position and performance [3], [17]. Strengthening external networking is an important driving factor for strategic use of IT and beneficially affects business performance [7]. Based on these views, we set up the following hypothesis on the relationship of strategic use of IT with business performance in SMEs:

- H2: The strategic use of IT has a positive effect on the business performance of SMEs.

In order for a firm to strategically exploit IT, it must invest in IT resources to acquire a certain requisite level of infrastructure. One cannot hope to make strategic use of IT in an environment where IT resources are scarce due to insufficient investment. The resource-based approach of competitive advantage argues that resources are the very basis of a company's management or business strategy with profound effects on its competitive position and performance. Hence, for a firm to strategically use IT, it must first invest in related resources to attain an adequate accumulation. Therefore, we propose the following hypothesis on the relationship of IT investment in SMEs and the strategic use of IT:

- H3: IT investment in SMEs has a positive effect on the strategic use of IT.

The more dynamic or hostile a firm's relationship to its external environment, the more inclined it is to overcome external variables through organizational innovation initiatives such as informatization [18]. Studies have found that external factors such as market uncertainties and intensity of competition have a positive effect on IT investment [1]. Human resource-related characteristics such as the degree of support from company leadership and involvement of staff also influence IT investment. Companies in which the management has a favorable attitude toward IT and a good understanding of it generally invest more in related resources than others [19]. The characteristics of a firm's organizational resources have intimate linkage with its level of investment in IT. Organizational culture is another factor influencing the introduction of IT and investment in related resources [1]. Finally, the characteristics of a firm's external relations are significant variables in how it invests in IT [20]. Firms actively partnering with other organizations or extensively relying on outsourcing tend to step up their investment in IT to enhance the efficiency of their external linkage. Taking these views into consideration, we establish the following hypotheses:

- H4-1(2): Environmental uncertainty (competition intensity) has a positive effect on IT investment in SMEs.
- H5-1(2): Support from management (members' participation) has a positive effect on IT investment in SMEs.
- H6-1(2): Organizational openness (organizational flexibility) has a positive effect on IT investment in SMEs.
- H7-1(2): Partnership with other organization (outsourcing) has a positive effect on IT investment in SMEs.

External environmental variables such as uncertainties and competition have been driving factors for strategic use of IT in companies [21], [22]. Companies respond to environmental uncertainties and fierce competition by expanding IT capabilities to more effectively manage suppliers and customers. Support from company leadership and a high degree of involvement of staff are important antecedents of a strategic use of IT. A supportive leadership ensures a close integration of IT with the company's business strategy and internal processes, producing a beneficial impact on the strategic use of IT [23]. Meanwhile, involvement of staff in the informatization process, through training, for instance, helps make them favorably disposed toward IT. This also facilitates the integration of IT into business processes, so that technology investment yields concrete performance benefits [24]. The fit between IT implementation and deployment, and the characteristics of organizational resources impacts the business performance of a company [7]. Organizational flexibility and openness, entertaining a relationship of complementarities with IT, influences business performance [3]. External connectivity is one of the principal capabilities provided by the use of IT, having correlation with business performance [7]. Taking these views into consideration, we establish the following hypotheses:

- H8-1(2): Environmental uncertainty (competition intensity) has a positive effect on the strategic use of IT in SMEs.
- H9-1(2): Support from management (members' participation) has a positive effect on the strategic use of IT in

Table 1. Operational definition of research variables and measures.

Variables		Definition	Measurement items	Related Studies
Environment	Environmental uncertainty	External environmental changes and hardship in control	• Changes in consumers' preferences • Changes of technology • Hardship in control of external environment	[1], [14], [18], [22]
	Competition intensity	Competition level within same industry	• Number of similar companies within same industry • Competition of products in the market • Change of market share resulting from competition	
Human resources	Support from management	Supports from leadership group on IT implementation	• Valuation on IT • Support of resources in IT implementation and operation • Acceptance level of risk from IT implementation	[19], [23], [24]
	Members' participation	Positive attitude to IT	• In favor of introducing new IT system • Willingness to use IT in their own tasks • Enthusiasm to learn IT usage	
Organization	Organizational openness	Trust among members and communicative openness	• Trust among members • Openness in communication within the organization • Informality of the organization	[1], [3], [17]
	Organizational flexibility	Flexibility to deal with change	• Members' attitude to accepting change • Attitude to accepting new IT technology • Willingness to combine IT with organizational culture	
External relations	Partnership with other organizations	Level of partnership with other organizations	• Partnership with conglomerates • Partnership with competitive companies • Partnership with supporting companies	[7], [20]
	Outsourcing	Level of outsourcing to external companies	• Ability to mobilize external resources through outsourcing • Scope of outsourcing to external companies • Size of outsourcing to external companies	
IT investment		Level of investment in IT	• Investment in hardware within a company • Investment in software within a company • Investment in network within a company	[2], [13], [15], [16], [17], [25]
Strategic use of IT		Level of strategic use of IT	• Level of IT use to confront the external environment • Level of IT use to strengthen internal competence • Level of IT use to coordinate competition strategy • Level of IT use to strengthen external networking	
Business performance		Competitive advantage over competitors and enhancement in performance	• Enhancement of competitive advantage over competitors for 3 years • Enhancement of financial performance over competitors for 3 years • Enhancement of profitability over competitors for 3 years • Enhancement of market share over competitors for 3 years	

SMEs.

• H10-1(2): Organizational openness (organizational flexibility) has a positive effect on the strategic use of IT in SMEs.

• H11-1(2): Partnership with other organization (outsourcing) has a positive effect on the strategic use of IT in SMEs.

III. Research Methodology

1. Research Variables and Sample

Operational definitions for testing the hypotheses of this study were established by drawing on the theoretical background provided by prior research and measures created along with related questionnaire items. Measures and questionnaire items were either borrowed from existing studies, or modified or newly conducted to fit the purposes of this study. Operational definitions and measures for the research variables are given in Table 1. A 7-point Likert scale was used for all of the questionnaire items (1: not at all, 7: extremely so).

Regarding company size, which has potential impact on investment in and use of IT and business performance, we tried to keep its influence on the results to a minimum by using the number of employees as a control variable.

Samples for this study were selected among those SMEs with marketable securities listed on the Korea Exchange and Korea Securities Dealers Automated Quotation (KOSDAQ)

Table 2. Results of factor analysis on independent variables.

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Factor 8
Environmental uncertainty 2	-0.026	0.051	0.125	-0.003	0.068	0.140	0.079	0.860
Environmental uncertainty 1	0.000	-0.021	0.116	0.045	-0.010	0.132	0.139	0.835
Environmental uncertainty 3	-0.059	0.157	0.011	0.197	0.255	0.001	-0.125	0.712
Competition intensity 2	-0.032	0.136	0.021	0.121	-0.027	0.848	0.154	0.024
Competition intensity 3	0.008	0.014	0.052	0.002	0.096	0.803	0.163	0.103
Competition intensity 1	-0.009	0.147	-0.007	0.148	0.119	0.772	-0.025	0.149
Supports from management 3	-0.028	0.886	0.108	0.071	0.095	0.067	0.246	0.053
Supports from management 2	0.055	0.826	0.080	0.081	0.103	0.146	0.291	0.043
Supports from management 1	-0.006	0.811	0.068	0.073	0.231	0.128	0.163	0.085
Members' participation 2	0.007	0.119	0.916	0.088	0.000	0.041	-0.017	0.037
Members' participation 1	0.027	0.054	0.900	0.099	-0.014	0.051	-0.075	0.116
Members' participation 3	0.052	0.040	0.795	0.040	0.016	-0.020	0.066	0.088
Organizational openness 2	0.055	0.033	0.092	0.904	0.110	0.084	0.101	0.080
Organizational openness 1	0.000	0.032	0.164	0.836	0.044	0.135	0.139	0.017
Organizational openness 3	0.090	0.141	-0.011	0.810	0.191	0.054	-0.060	0.111
Organizational flexibility 2	0.060	0.071	-0.003	0.144	0.823	0.090	0.094	0.080
Organizational flexibility 3	-0.071	0.094	0.019	0.114	0.805	0.085	0.195	0.017
Organizational flexibility 1	-0.020	0.221	-0.012	0.067	0.733	0.015	0.126	0.162
Partnership with other organizations 1	0.017	0.176	-0.004	0.142	0.154	0.089	0.799	0.073
Partnership with other organizations 3	0.013	0.287	0.023	0.044	0.157	0.033	0.749	-0.040
Partnership with other organizations 2	0.072	0.186	-0.039	-0.005	0.115	0.189	0.727	0.087
Outsourcing 1	0.985	0.003	0.042	0.057	-0.010	-0.001	0.040	-0.021
Outsourcing 3	0.981	-0.024	0.044	0.043	-0.006	-0.007	0.028	-0.034
Outsourcing 2	0.975	0.039	0.010	0.039	-0.012	-0.022	0.031	-0.022
Eigen value	2.922	2.447	2.378	2.353	2.141	2.134	2.101	2.080
% of variables	12.173	10.196	9.907	9.805	8.922	8.891	8.754	8.665
Cumulative % of variables	12.173	22.369	32.276	42.081	51.003	59.894	68.648	77.313
Cronbach's α of relevant factor	0.983	0.890	0.860	0.851	0.771	0.783	0.761	0.770

Notes: 1. The shaded cells mark detailed variables related to the same factors. These results were used as statistical data for the regression analysis.
2. The details of the questionnaire are shown in the appendix.

market.[1)]

Three hundred firms were selected through random stratification sampling by taking into consideration both the size of the companies and their sectors. The survey was conducted in 2006 by a leading Korean market research firm, using a structured questionnaire. Company officials, surveyed through face-to-face interviews, were board directors or higher in rank. After discarding grossly incomplete or unacceptable responses, we obtained 293 valid responses.

The characteristics of companies which responded to this survey are as follows. Of the SMEs surveyed, 38.9% were listed on the security market, and 61.1% of them on the KOSDAQ market. Of these, 34.1% employed 50 or less

1) For the definition of SMEs, we followed the criteria provided in Article 2 of the Framework Act on Small and Medium Enterprises and Article 3 of the Enforcement Decree to the same Act in Korea. The following is the full quote of Article 3, excluding related Appendix Tables:

Article 3 (Definition of Small and Medium Enterprise) Small and Medium Enterprises pursuant to Article 2, Paragraph 1 of the Framework Act on Small and Medium Enterprises refer to businesses satisfying all of the conditions described below:

1. Companies meeting the criteria set forth in Appendix Table 1, concerning the principal line of business, number of full-time employees and the capital or annual sales. Notwithstanding, companies falling into either of the following categories shall not be considered small and medium enterprises:

A. Employs 1,000 or more workers; or

B. Owns KRW 500 billion or more in total assets

2. Companies meeting the criteria set forth in Appendix Table 2, in terms of actual independence of ownership and management.

Table 3. Results of factor analysis on intermediary and dependent variables.

	Factor 1	Factor 2	Factor 3
IT investment 1	0.083	0.245	0.909
IT investment 2	0.033	0.196	0.895
IT investment 3	0.097	0.230	0.871
Strategic use of IT 4	0.137	0.873	0.189
Strategic use of IT 3	0.120	0.862	0.256
Strategic use of IT 2	0.221	0.850	0.173
Strategic use of IT 1	0.224	0.806	0.206
Business performance 2	0.918	0.154	0.048
Business performance 3	0.916	0.139	0.104
Business performance 1	0.876	0.178	-0.005
Business performance 4	0.835	0.183	0.114
Eigen value	3.295	3.139	2.585
% of variables	29.957	28.534	23.496
Cumulative % of variables	29.957	58.491	81.987
Cronbach's α of relevant factor	0.925	0.912	0.912

Notes: 1. The shaded cells mark detailed variables related to the same factors. These results were used as statistical data for the regression analysis.
2. The details of the questionnaire are shown in the appendix.

workers, and 31.7% had a staff size between 100 and 150.

2. Validity and Reliability of Variables

Before testing the model, we performed a validity and reliability analysis to verify how closely the measurement results met the objectives of this study. To test the validity of the measurement, we conducted a factor analysis on items of each variable. To extract factors, we undertook a principal component analysis, followed by VARIMAX rotation. We extracted factors whose eigen value is greater than 1. The factor loading cutoff was set to 0.5. To assess the reliability of the measurement, we used Cronbach's alpha coefficient.

The results of the factor analysis on the eight research variables, for testing the validity of items of independent variables, are as given in Table 2. Eight total factors were extracted, as we had expected. We did not find any items that needed to be discarded. Under the reliability analysis, all factors earned a Cronbach's alpha value of 0.6 or greater with regard to all of the questionnaire items, suggesting there were no reliability issues with the instrument. Next, the results of the factor analysis on two intermediary variables, IT investment and strategic use of IT, and a dependent variable, business performance, are given in Table 3. We extracted three total factors. No reliability issues were found with regard to any questionnaire items.

Table 4. Results of regression analysis on relationship between IT investment, strategic use of IT and business performance[3].

	Business performance		
	Beta	T-value	Sig. level
Number of employees (LN)	0.065	1.196	0.233
IT investment	0.014	0.220	0.826
Strategic use of IT	0.375***	6.101	0.000
F-value	16.876***		
R^2 / adjusted R^2	0.149 / 0.140		

* Significant at p <0.1, ** Significant at p <0.05, *** Significant at p <0.01

Table 5. Results of regression analysis on relationship between IT investment and strategic use of IT.

	Strategic use of IT		
	Beta	T-value	Sig. level
Number of employees (LN)	-0.007	-0.126	0.900
IT investment	0.470***	9.062	0.000
F-value	41.102***		
R^2 / adjusted R^2	0.221/ 0.215		

* Significant at p <0.1, ** Significant at p <0.05, *** Significant at p <0.01

3) The value of R^2 we obtained in this study is rather low. This result suggests that the strategic use of IT is not the only factor influencing the business performance of Korean SMEs, and that there are others. Corporate innovation, alliances with large corporations, cost-cutting, and competition strategies matching with the corporate culture may be some of the other influencing factors.

Table 6. Results of regression analysis on factors influencing IT investment and strategic use of IT.

	IT investment			Strategic use of IT		
	Beta	T-value	Sig. level	Beta	T-value	Sig. level
No. of employees (LN)	0.092	1.597	0.111	0.149***	3.221	0.001
Environmental uncertainty	0.071	1.302	0.194	0.021	0.477	0.634
Competition intensity	0.175***	3.200	0.002	0.160***	3.638	0.000
Support from management	0.306***	5.577	0.000	0.464***	10.472	0.000
Members' participation	0.049	0.912	0.363	0.105**	2.405	0.017
Organizational openness	0.082	1.521	0.129	0.163***	3.734	0.000
Organizational flexibility	-0.001	-0.015	0.988	0.127***	2.878	0.004
Partnership with other organization	0.203***	3.670	0.000	0.439***	9.839	0.000
Outsourcing	0.054	0.999	0.319	-0.004	-0.086	0.931
F-value	6.486***			26.891***		
R^2 / adjusted R^2	0.171/ 0.145[4)]			0.461/ 0.444		

* Significant at p <0.1, ** Significant at p <0.05, *** Significant at p <0.01

IV. Results

1. Relationship between IT Investment, Strategic Use of IT, and Business Performance

A multiple regression analysis was performed to determine the effects of IT investment and the strategic use of IT on business performance. As the results in Table 4 indicate, only the strategic use of IT had a positive influence on business performance (H1 rejected/ H2 accepted). With regard to the relationship between IT investment and business performance, past studies report rather contradictory results. Meanwhile, most studies found that the strategic use of IT positively affected business performance. The results in this study corroborate those positive findings of earlier studies, concerning the effect of the strategic use of IT. Investment in IT indirectly influenced business performance by the intermediary of the strategic use of IT. The implication of this for SMEs is that, rather than just using IT as a simple business support tool, they must try to integrate it with their key capabilities, including those concerning response to external environments and internal capabilities, and align it with their competitive strategies.

The regression analysis to estimate the relationship between IT investment and the strategic use of IT found that the former had a positive effect on the latter, as shown in Table 5 (H3 accepted). This finding, in line with the main argument in the resource-based approach, suggests that a certain level of accumulation of IT resources through prior investment is a precondition for the strategic use of IT. Hence, stepping up investment to increase IT resources and making strategic use of it is crucial for SMEs to gain competitive advantage and enhance performance indicators.

2. Factors Influencing IT Investment and Strategic Use of IT

The regression analysis of the influence of environment, human resources, organizational resources, and external relations on IT investment (see Table 6) indicated that competition intensity, support from management, and partnership with other organizations were the only factors having a statistically significant positive influence (H4-2, H5-1, H7-1 accepted / H4-1, H5-2, H6-1, H6-2, H7-2 rejected). In other words, the more intense the competition faced by a small and medium-size firm, the more supportive the management, and the more extensive the partnership with other organizations, the larger its investment was in IT. Meanwhile, we found that organizational openness and flexibility did not influence IT investment in SMEs. Therefore, for SMEs, the characteristics of the external environment and their external relations, and the stance of their leadership toward IT appeared to be more important influencing factors for investment than internal attributes such as organizational structure or culture.

The results of regression analysis to determine the influence of the characteristics of environment, human resources,

4) The regression analysis to assess the impact of IT investment influencing factors performed in this study yielded a comparatively low R^2 value. This signifies the existence of influencing factors other than those considered in this study. For example, company characteristics (such as size, profits, sales, and R&D investment), market factors (such as market sharing, credit rating, economic prosperity, and market growth) can all influence a firm's investment in IT.

organizational resources, and external relations on the strategic use of IT are given also in Table 6. We found that all variables except environmental uncertainty and outsourcing had a statistically significant positive effect on the strategic use of IT (H8-2, H9-1, H9-2, H10-1, H10-2, H11-1 accepted / H8-1, H11-2 rejected). The implication of this finding is that for SMEs to make strategic use of IT, conditions including support from management and partnership with other organizations, two influencing factors for investment, as well as staff involvement and characteristics of organizational resources, must be met.

V. Conclusion

In this study, we assessed the relationship between the strategic use of IT and business performance, and analyzed factors influencing the strategic use, including the characteristics of environment, human and organizational resources, and external relations.

The empirical testing of our research hypotheses yielded the following findings. First, the strategic use of IT is a key performance enhancement factor for SMEs, enabling them to attain competitive advantage and improve performance indicators. Second, of the external environmental characteristics, competition intensity and characteristics of external relations were found to have influence on both IT investment and the strategic use of IT in SMEs. Third, support from management is a key driving factor for IT investment and the strategic use of it in SMEs. Finally, the strategic use of IT in SMEs requires an active participation on behalf of the staff, open and flexible organizational structure, and as importantly, a certain level of harmony with the organizational culture.

The primary contribution of this study is that it theoretically examines the subject of strategic use of IT in SMEs, in relation to business performance and antecedent factors that influence it, and empirically verifies such influence factors and correlations. Strategic use of IT concerning SMEs was an area virtually unexplored prior to this study. Most research in related subjects has been either exclusively devoted to large corporations or partial investigations concerned with a few influence factors. By verifying a model on the relationship of the characteristics of external environment, human and organizational resources, and external relations with the strategic use of IT in SMEs, we sketched out basic directions for future research in this subject area. Our empirical analysis of the interaction and correlation between IT investment, strategic use of IT, and business performance contributed to the theoretical framework for understanding the factors that may help SMEs acquire or maintain competitive advantage and enhance performance indicators.

This study has the following limitations that should be addressed in future research. First, although this study establishes the effect of the characteristics of environment, human and organizational resources, and external relations on the strategic use of IT, it does not examine any indirect effects these characteristics may produce, in concert with the strategic use of IT, on business performance. Future research should attempt to assess the adjustment effect of these characteristics and the influence of their harmonization with the strategic use of IT on business performance. Second, in this study, we limited our consideration to SMEs. In future research, it may be useful to compare them with large corporations or compare different industry sectors. Third, this study investigated the influence of IT investment on the strategic use of IT. The strategic use of IT by SMEs, if it turns out to positively affect their business performance, is bound to increase the latter's investment in IT. Therefore, assessing the impact of strategic use of IT on IT investment can be an important area of investigation for future research. Finally, to examine whether the IT paradox is at work among SMEs, we focused on the impact of IT investment and the strategic use of IT on the business performance of these companies [25]. If IT investment and the strategic use of IT do have a positive effect on business performance, this will create a feedback loop. Future research should investigate such a feedback loop between business performance and IT investment and the strategic use of IT.

Appendix. Survey Questionnaire Items

(Environmental uncertainty)

1. The changing preferences of your company's customers are difficult to predict.
2. Technologies involved in the products of your company are changing too rapidly to allow any long-term predictions.
3. The rapidly changing external environment of your company is difficult to control.

(Competition intensity)

1. There are many firms engaged in similar business as your company.
2. There is intense competition in your company's principal product category.
3. The market share composition in your company's principal product category is constantly changing due to high competition.

(Supports from management)

1. Your company's management gives higher priority to the introduction of IT than other business activities.
2. Your company's management provides resources necessary

for implementing and operating IT systems.
3. Your company's management is ready to take on the investment risks associated with implementing an IT system.

(Members' participation)

1. Your company's employees favorably view the introduction of IT.
2. Your company's employees are willing to use IT in their respective tasks.
3. Your company's employees are willing to take part in IT training programs.

(Organizational openness)

1. There is mutual trust among members of your organization.
2. There is open communication between members of your organization.
3. Your company's employees cooperate with each other through informal channels.

(Organizational flexibility)

1. You company's employees easily cope with organizational changes.
2. Your company's employees tend to conjugate new IT with organizational changes.
3. Your company's employees tend to use IT to bring about changes in organizational culture.

(Partnership with other organizations)

1. Your company cooperates with large corporations across the full spectrum of business processes.
2. Your company cooperates with other small and medium-size firms across the full spectrum of business processes.
3. Your company cooperates with external support organizations across the full spectrum of business processes.

(Outsourcing)

1. Your company compensates for lacking internal resources through outsourcing.
2. Your company outsources to external organizations for most tasks and processes.
3. The extent of outsourcing in your company is greater than that of other small and medium-size companies.

(IT investment)

1. Your company invests more in hardware than other small and medium-size companies in the same sector.
2. Your company invests more in software than other small and medium-size companies in the same sector.
3. Your company invests more in network implementation than other small and medium-size companies in the same sector.

(Strategic use of IT)

1. Your company makes strategic use of IT to respond to the external environment.
2. Your company makes strategic use of IT to strengthening internal competences.
3. Your company makes use of IT in implementing competition strategies.
4. Your company makes strategic use of IT to strengthen external networking.

(Business performance)

1. Your company has improved its competitive advantage over other competitor firms over the past three years.
2. Your company has improved its financial performance more than other competitor firms did over the past three years.
3. Your company has improved its profitability more than other competitor firms did over the past three years.
4. Your company has improved its market share more than other competitor firms did over the past three years.

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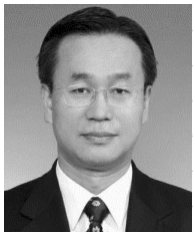

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