

Information Technology And The Performance Of Financial Companies In South Korea

Thomas G. Calderon, (Email: tcalderon@uakron.edu), University of Akron
Sooduk Seo, Kyung-Sung University, South Korea
Il-Woon Kim, University of Akron

Abstract

An underlying premise of investments in information technology (IT) for internal business processes is that these investments add value to the enterprise. This study examines the relationship between the effectiveness of IT and financial growth of publicly traded financial companies in South Korea. IT effectiveness is measured through a survey administered to middle managers that focused on user satisfaction, support for internal business processes, and system reliability. The study provides insight into the degree of effectiveness of IT employed in Korean banks as perceived by bank managers, and also demonstrates the link between IT effectiveness and economic performance. Univariate analysis of the data shows a statistically significant association between IT effectiveness and financial growth. The paper offers limited insight into the thesis that enterprises with high business information intensity will show a positive association between effective IT and economic performance.

Introduction

Recently there has been an explosion in the use of information technology (IT) to support internal and external operations of businesses. Globally, companies invest billions of dollars to support IT activities. It has been reported that up to 50% of annual capital expenditures are budgeted for IT (Mooney, Gurbaxani, and Kraemer, 1996). The capital budgeting literature suggests that firms will invest in capital projects that enhance the value of the firm. Oliva (1991) suggests that a firm investigating a new IT project starts out with some expectation of the contribution of the project to firm profitability. According to Oliva,

one of three conditions exists: (1) the impact on firm value is very high, and the firm adopts; (2) the impact on firm value is low, and the firm does not adopt; (3) the impact of the technology is in between, causing the firm to search for more information and make a rational decision based on the new information. Thus, it must be presumed that investments in IT are predicated on the expectation that these expenditures will ultimately add value to business enterprises. Otherwise, rational managers would not approve such investments.

Although one would expect that investments in IT, if effective, would produce significant payoffs and consequently enhance firm value, the empirical literature does not indicate a con-

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sistent positive impact on firm performance (Brown, Gatian and Hicks, 1995; Mooney et al., 1996). Results have ranged from “instances of insignificant or negative relationships between IT and various performance ratios . . . to bimodal distribution of impacts for firms operating in the same industry . . . to conclusions of significant returns on investment . . .” (Mooney et al., 1996; p. 70). In addition, most empirical studies on IT effectiveness and firm performance have focused on the U.S. environment. While the US is a good laboratory for studying the impact of IT on firm performance, studies that focus exclusively on the US ignore the global thrust toward the use of information technology in business.

This study examines the association between IT effectiveness and the profitability and growth of banks in South Korea. Though several studies have examined the impact of IT on the performance of banks and financial institutions (Bender, 1986; Harris and Katz, 1991; Floyd and Woodridge, 1990), none has specifically examined this issue from the perspective of the Korean environment. An examination of the relationship between IT and financial performance in the context of a Southeast Asian country allows one to extend the prior research and explore the generalizability of existing research findings. In addition, this study differs from prior research in that it focuses on exploring the relationship between IT effectiveness and financial performance. Prior research has considered IT investments (Mahmood and Mann, 1993; Brown et al., 1995), IT expenses (Bender, 1986; Harris and Katz, 1991), use of IT to support bank products and processes (Miller and Doyle, 1987), and corporate strategy and IT adoption (Floyd and Woodridge, 1990).

Failure to focus on IT effectiveness in exploring the relationship between IT and financial performance ignores the important underlying characteristics that lead to a sustained organizational impact such as system quality, support for key activities in the value chain, access and control, and system downtime. As Brown et al.

(1995; p. 218) observed, “large IT expenditures may reflect an inefficient IT operation or poor planning” instead of reflecting underlying characteristics that lead to profitability. Similarly, IT expenditures and other similar input measures do not capture the real extent of computer usage and the processes with which IT interact to create business value (Mooney et al., 1996). Use of IT to support products and processes (Miller and Doyle, 1987) does not necessarily capture the dynamics of an effective system.

Background

Porter and Millar (1985) observed that IT involves “more than just computers.” They defined IT to include “the information that businesses create and use as well as the wide spectrum of increasingly convergent and linked technologies that produce the information.” These authors assert that IT is a strategic factor in competitive economies because it can alter the rules of competition, give companies new ways to outperform competitors, and often form the basis for whole new businesses. Porter and Millar note that business activities have a physical and information-processing component. The physical component may be simple or very complex, and could itself involve an information processing component. The information processing component, on the other hand, includes the data and data processing activities needed to perform and sustain the activity.

Both the processes used to create business value and the products produced by a business enterprise incorporate varying degrees of information (Porter and Millar, 1985). The products offered by a bank, for example, contain a high level of information. The information content of the processes used to develop, market and deliver those products to customers is also very high. In contrast, both the products produced by a farming company and the physical processes used to make and deliver those products contain less information than products offered by a bank. Using the phrase “business information inten-

sity” to describe the interaction of the level of information in the product and in the value chain, it is posited that the degree to which IT impacts firm performance will depend on the company’s business information intensity.

It is expected that firms with high business information intensity, or firms that can create competitive advantage by transforming their enterprises into high business information intensity establishments, will experience significant pay-offs from investments in IT. Competitive advantage generally translates into tangible benefits such as lower costs, higher throughput, product or service differentiation, and enhanced quality (Porter, 1985). These benefits set the foundation for enhanced profitability and growth. Because banks and other financial institutions can be expected to have a high degree of information intensity, one should expect a positive relationship between the effectiveness of IT and the profitability and growth of those enterprises.

Though there is consensus in the literature that IT should have a significant positive impact on firm performance, there are divergent views on two fundamental issues related to empirical investigations on the impact of IT on firm performance. First, it is acknowledged that IT will have a significant positive impact on organizations only if the dominant IT activities and processes are themselves effective. This begs the question as to what constitutes IT effectiveness and how IT effectiveness should be operationalized. This has implications for the choice of independent variables that must be used in assessing the financial impact of IT. The second issue has to do with the choice of dependent variable or, more precisely, what financial impacts should be observed when IT is effective. Both issues are discussed below.

Choice of Dependent Variables

Several indicators of financial performance have been studied in exploring the relationship between IT and economic performance. Table 1

presents a list of the types of indicators that have been used in prior studies. Return on assets represents one of the more frequently used indicators. Many of the earlier studies focused on the relationship between IT investments and cost reduction (Edelman, 1981; Rivard and Huff, 1984; Bender, 1986; Miller and Doyle, 1987; Harris and Katz, 1991). More recent studies such as Mahmood and Mann (1993) and Brown et al. (1995) have examined sales growth as an indicator of financial performance that is impacted by IT.

Though many studies have found sales growth and total operating costs to be correlated with IT investments, none has examined the impact of IT on net income growth. Yet, if IT effectively supports processes that help to create and sustain competitive advantage, one should expect simultaneous enhancements in sales growth and cost management when multiple companies are examined in a cross-sectional study. Sustained sales growth and enhancements in cost management should lead to growth in operating income and other related financial growth measures. In general, if IT interacts effectively with the processes that create value and competitive advantage, a firm that invests in IT should experience sustained financial performance and growth. When considered within the context of a bank, effective IT should lead to growth in key outputs (Alpar and Kim, 1990) such as operating income, total income, return on total assets, total loans to customers, and total bank assets. Thus, the following indicators of financial performance, adapted for the banking industry, are used in this study: growth in return on total assets (ROA), measured as net income / total assets; growth in profit margin, measured as net income / total income; growth in total income; growth in total loans to customers; growth in total assets; and growth in operating income.

Choice of Independent Variables

Although several studies have used IT expenditures as the independent variable in assess-

Table 1
Indicators of Financial Performance Used in Prior Studies

<u>Author(s)</u>	<u>Description of Study</u> (Independent variable(s) studied and Sample)	<u>Indicators of Financial Performance</u>
Edelman (1981)	IT support for HR and Industrial relations; one firm, 14 operating units	Cost of information per employee
Turner (1982)	Overall investments in IT; 38 mutual savings banks	Net income relative to total operating expenses
Cron and Sobol (1983)	Level of computer usage; 138 small to medium-sized wholesalers	Pretax return on assets Return on net worth Return on sales (Pretax profits / sales) Average 5-year sales growth
Rivard and Huff (1984)	User developed applications; 10 large companies	Cost reductions Profit contribution
Lincoln (1986)	Specific IT applications; 20 organizations, 167 applications	Internal rate of return Cost-benefit ratio
Bender (1986)	Overall information processing expenses; 132 life insurance companies	Ratio of total general expense to total premium income Return on net assets
Yap and Walsham (1986)	Overall IT; Managing directors in 695 organizations	Overall cost-effectiveness of I/S
Miller and Doyle (1987)	Overall IT; 21 financial firms, 276 user managers	Return on assets
Floyd and Woodridge (1990)	Adoption of Product IT and Process IT; 127 banks, 68 bank CEOs	Return on equity capital
Alpar and Kim (1990)	Total IT expenses, level of computer usage, number of ATMs and number of computerized functions; 624 to 759 US banks	Cost of operations
Harris and Katz (1991)	Overall IT expenditures; 40 insurance companies	Return on investment Return on sales Asset turnover (sales / total assets) Sales per employee Sales growth Market value to book value
Mahmood and Mann (1993)	Overall investments in IT; Computer World Premier 100 list for 1989.	Sales growth Accounts receivable turnover Inventory turnover Asset turnover Return on assets Return on sales Stock market returns
Brown, Gatian and Hicks (1995)	Investments in strategic information systems; 35 companies with successful strategic information systems	

ing the impact of IT on performance, this study focuses on the underlying characteristics of IT that impact organizational performance. The basic premise is that only successful IT implementations will have a sustained positive impact on firm performance. In essence, both the processes

supported by IT and the financial outcomes that result from the IT/process interaction are examined. This approach responds to the call by Mooney et al. (1996) to incorporate processes affected by IT in examining the impact of IT on financial performance.

DeLone and McLean (1992) provide a comprehensive review of underlying characteristics that have been used in evaluating the impact of IT. Noting that there are as many measures of IT impact as there are studies, DeLone and McLean (DM) used Shannon and Weaver's (1949) mathematical theory of communication to posit that the impact of IT can be observed at different levels, including the technical level, the semantic level, and the effectiveness level. The technical level refers to the accuracy and efficiency of the system that produce the information; the semantic level refers to the success of information in conveying the intended meaning; and the effectiveness level has to do with the effect of the information on the receiver. Citing Mason (1978), DM concluded that effectiveness might be relabeled as "influence" on the recipient and on the system or organization. DM proposed six categories of IT success variables, including system quality, information quality, use of the system, user satisfaction, impact on individual, and impact on the organization.

Pitt, Watson and Kavan (1995) criticized DM's six category model of IT success as being too product oriented. Pitt et al. contend that the quality of service provided by the information system department as perceived by its users is a key indicator of IT success. IT departments, they argue, offer a service to users and factors such as installation assistance, product knowledge, software training and support, and online help will impact the relationship between specialized IT personnel and users. Pitt et al., therefore, proposed service quality of IT departments as a further dimension of IT success. Service quality relates to the extent of conformance between what user expect to be offered and what the IT service actually delivers (Parasuraman, Zeithaml and Berry, 1985). Though IT service quality exists at both the IT department level and at the level of specific IT services offered by an enterprise, high service quality implies a significant degree of conformance between user expectations and actual service results for substantially all IT services. Low levels of conformance be-

tween user expectations and actual IT services could lead to cynicism about the business information system, low usage of information technology to support value chain activities, and ultimately productivity problems.

This paper examines the link between IT effectiveness and firm financial performance through an adaptation of the framework proposed by DeLone and McLean (1992), as modified by Pitt et al. (1995). The framework posits that IT effectiveness is tied to several fundamental factors, including: information quality; quality of MIS support (or service); support for end user applications; support for accounting, budgeting and planning; support for operating and strategic decisions; access to hardware; control and security; and system downtime. These factors make up the technical and semantic characteristics of the system (DeLone and McLean, 1992; Pitt et al., 1995), which influence IT effectiveness.

Effectiveness is also influenced by the extent of use of the system and user satisfaction with the system's technical and semantic characteristics. Firm financial performance is impacted if the system is effective and managers can leverage the characteristics of the system to create or sustain competitive advantage. The model suggests that an information system may have strong technical and semantic characteristics, but may still not produce positive financial performance. This would occur if the system is not extensively used to support value chain activities and/or managers are unable to leverage the power of the business information system to support processes that lead to competitive advantage.

Research Issues

Three issues are examined in this study. First, the strength of the semantic and technical characteristics of IT systems employed by South Korean banks is examined. This is a fundamental issue that seeks clarity on the extant state of the semantic and technical characteristics of IT used

Table 2
Factors Used in Measuring Technical and Semantic Characteristics of IT

Factor 1: Quality of Information (average correlation: 0.629; Cronbach's alpha: 0.949)

- Does the system provide information in the exact format that you need?
- Are the reports and output generated by the system complete?
- Are the reports and output generated by the system accurate?

- Is the information generated by the information system clear?
- Does the system provide the precise information that you need?
- Does the system provide you with reports that are timely?

- Does the system provide you with reports that are relevant for the intended purposes?
- Are the reports and output generated by the system easy to understand?
- Are reports generated by the system sufficiently detailed?

- Is the information system dependable?
- Are you satisfied with the reports and output generated by the information system?

Factor 2: Quality of MIS Support (average correlation: 0.681; Cronbach's alpha: 0.937)

- Are requests for changes in the information system processed promptly?
- Is the lead time for developing new systems very short?
- Is the system responsive to the changing demands of your job?

- Are computer personnel sensitive to your needs as a user of the information system?
- Do computer personnel display a high level of competence in dealing with you as a user?
- Do computer personnel display a positive attitude in dealing with you as a user?
- Are you satisfied with the systems development process?

Factor 3: End-user applications (average correlation: 0.502; Cronbach's alpha: 0.876)

- Does the system support your data analysis needs (e.g., modeling, simulation, optimization and statistical routines)?
- Does the system allow you to query the database to obtain answers to non-routine questions?
- Does the system allow you to prepare ad hoc reports easily?
- Are you properly trained to use the applications needed to do your job?

- Are you ever involved in the design & development of the information system?
- Do you have control over the type of information systems services offered to system users?
- Are you satisfied with your level of involvement in decisions relating to the information system?

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by Korean banks. Characteristics examined include: quality of information generated by the business information system; quality of MIS support; quality of end-user applications; degree of support for accounting; planning and budgeting; control and security; access to hardware;

support for operating and strategic decisions; and system downtime. The primary question examined is: how do South Korean bank managers rate the strength of the semantic and technical characteristics of their IT systems?

Table 2 (continued)
Factors Used in Measuring Technical and Semantic Characteristics of IT

Factor 4: Support for accounting planning and budgeting (average correlation: 0.720; Cronbach's alpha: 0.885)

- Does the system provide support for planning and budgeting?
- Does the system provide adequate support for accounting and financial reporting?
- Are you satisfied with the adequacy of the system for planning and decision making?

Factor 5: Control and security (average correlation: 0.847; Cronbach's alpha: 0.917)

- Are data and information secure?
- Are you satisfied with the security and privacy of the information system?

Factor 6: Access to hardware

- Do you have easy access to computer terminals or PCs?

Factor 7: Support for operating and strategic decisions (average correlation: 0.671; Cronbach's alpha: 0.891)

- Are reports generated by the system available when you need them?
- Does the system provide adequate support for making operating decisions?
- Does the system provide adequate support for making strategic decisions?
- Does the system provide adequate support for making product development decisions?

Factor 8: System downtime

- How frequently is the computer system down?

The second issue examined is the association between the technical and semantic characteristics of IT used in South Korean banks and the financial performance of those banks. It is assumed that managers seek to use IT to support processes that help to create or sustain competitive advantage. Thus, it is expected that a positive relationship exists between the technical and semantic characteristics of IT and financial performance. This would be particularly true in entities with high business information intensity such as commercial banks. In such entities, both the product and the processes that support the value chain make extensive use of information and information technology.

The third issue examined is managers' overall satisfaction and overall effectiveness rating of their business information system, and the relationship with financial performance. It is posited

that systems that are rated high in terms of overall satisfaction and effectiveness are most likely to be successfully leveraged to support the value chain and create competitive advantage. Such systems should contribute positively to financial performance. Therefore, a positive relationship is expected between the level of overall satisfaction with the business information system and financial performance. A similar relationship is expected between overall effectiveness rating and financial performance.

Indicators of financial performance used in this study are growth in return on total assets, growth in profit margin, growth in total income, growth in total loans to customers, growth in total assets, and growth in operating income. The fundamental premise is that banks with the most effective business information systems will generate the highest levels of financial growth. This

Table 3
Average Bank Size for years 1991 - 1994
(in US\$ millions)

	<u>Average</u>	<u>Standard Deviation</u>
Total assets	\$8,439	\$8,885
Total loans	2,903	2,950
Total deposits	1,925	2,675
Total income	643	593
Operating income	49	56
Net income	38	38

is consistent with the findings of Brown et al., (1995) who report a positive relationship between sales growth and investments in strategic information systems. Although Brown et al. (1995) did not examine commercial banks, it seems reasonable to use their findings to support the expected direction of the association between IT effectiveness and financial growth in this context.

Method

Sample and Data Collection

The data for this study were collected at a bank training seminar for middle managers held in Seoul, South Korea. A total of 72 managers, representing 24 banks, was surveyed. Most of them used information technology extensively in their jobs. On average, forty to sixty percent of their jobs entailed the use of computers. Average job tenure was nine years and they used computers for an average of 4.5 years. Thus, IT is used extensively by the managers surveyed.

The survey instrument used contained 36 items (see Table 2) related to the technical and semantic characteristics of IT. Responses were solicited using a seven-point scale ranging from never (1) to always (7). A factor analysis of the responses confirmed the eight categories into which the 36 items are organized in Table 2. These eight factors explained approximately 90% of the variance in the data set. A reliability analysis (Nunnally 1978), documented in Table

2, shows Cronbach alpha (a widely used measure of reliability) for each of the multi-item factors exceeds 80 percent. Eighty percent is an acceptable alpha for this type of study (Carmines and Zeller, 1979) and provides support for aggregating the items that make up each factor. Thus, responses to all items within each factor were summed to determine a single factor score for each respondent. These factor scores were used to explore the relationship between the semantic and technical characteristics of IT and bank financial performance.

Two other questions were used besides those listed in Table 2: one to assess each manager's overall satisfaction with the information system, and the other to assess the effectiveness of the overall computer-based information system employed by the bank. System overall effectiveness was rated on a seven-point scale ranging from very poor (1) to excellent (7). Overall satisfaction with the information system was rated on a similar seven-point scale that ranged from very dissatisfied (1) to very satisfied (7). The correlation between the overall satisfaction and overall effectiveness was .75. The univariate correlations between each of the eight semantic and technical characteristics and effectiveness were all significant at the 5% level or lower. Together, the eight characteristics explained 82% of the variance in the overall IT effectiveness rating assigned by managers.

Four years (1991 - 1994) of financial data were obtained from the published financial state-

statements of each of the participating banks. The banks included in this study are among the largest in Korea. Average size statistics for the 24 banks are shown in Table 3.

Results

Status of Semantic and Technical Characteristics

Results showing bank managers' ratings of the semantic and technical characteristics of their business information systems are presented in Table 4. Most managers (over 50%, on average) indicate that their information systems seldom or only sometimes possess the types of characteristics that contribute toward high information quality. There are individual exceptions, however; a majority of managers (slightly over 50%) suggest that reports are clear, easy to understand, and dependable. Nonetheless, a high proportion of managers indicate that reports produced by their systems seldom possess those characteristics.

Almost 50% of managers reported that their systems seldom, almost never, or never have desirable MIS support. The results suggest that it takes a long time to process IT service requests and that IT personnel are not very responsive to user needs and requests. Over 50% of bank managers report that they are seldom, almost never or never satisfied with the quality of MIS support received from their systems personnel.

There appears to be very little support for end-user applications. For example, only 10% of managers indicate that the system at least sometimes satisfies their data analysis needs. Overall, only an average of 30% of respondents indicate that their systems at least sometimes support desirable end-user application needs.

Support for accounting, planning and budgeting as well as control and security are rated relatively high. Support for operating and strategic decision making is also relatively high. Most managers report that their systems, at least

sometimes, support these characteristics. In contrast, 35% of managers indicate that they seldom or never have access to computer terminals or PCs. As many as 22% indicate a problem with system downtime.

Overall, the results indicate that the technical and semantic characteristics of IT in Korean banks are marginally to moderately strong. The group of managers surveyed considered their systems to be only marginally effective, and they are, in general, somewhat dissatisfied with their systems.

Financial Performance and System Characteristics

Results from a univariate correlation analysis are presented in Table 6. In general, the univariate results show that the technical and semantic characteristics of IT in the banks surveyed are positively associated with financial performance. Twenty-seven of the forty-eight coefficients in Panel A are significant at the 10% level or lower. Quality of information and support for accounting, planning and budgeting are positively correlated with all six indicators of financial performance (p-value < .10). Except for system downtime, the technical and semantic characteristics are all positively correlated with growth in operating income (p-value < .05). Similarly, the univariate correlations between growth in profit margin and all but three (access to hardware, support for operating and strategic decisions, and system downtime) of the semantic and technical characteristics are statistically significant. Quality of MIS support is associated with only growth in profit margin and operating income. End user applications and control and security are both positively associated with growth in ROA, growth in profit margin, and operating income. Access to hardware is positively associated with growth in total income, loans to customers, total assets, and operating income. Support for strategic decisions is positively associated with growth in total income, total assets, and operating income. System down-

Table 4
Evaluation of System Semantic and Technical Characteristics
Percentage of Respondents

Factors	Never	Almost Never	Seldom	Some-times	Most of the time	Almost Always	Always
Factor 1: Quality of Information							
Does the system provide information in the exact format that you need?		2	43	15	38	1	1
Are the reports and output generated by the system complete?		3	41	22	29	5	
Are the reports and output generated by the system accurate?		1	18	32	31	17	1
Is the information generated by the information system clear?		1	24	15	32	28	
Does the system provide the precise information that you need?		12	25	26	28	8	1
Does the system provide you with reports that are timely?		10	27	33	24	6	1
Does the system provide you with reports that are relevant for the intended purposes?		1	30	37	13	18	1
Are the reports and output generated by the system easy to understand?			10	29	35	22	4
Are reports generated by the system sufficiently detailed?		2	35	22	35	6	
Is the information system dependable?		1	21	21	37	19	1
Are you satisfied with the reports and output generated by the information system?		8	36	17	34	5	
Factor 2: Quality of MIS Support							
Are requests for changes in the information system processed promptly?	1	14	44	14	20	7	
Is the lead time for developing new systems very short?	1	19	35	25	15	4	
Is the system responsive to the changing demands of your job?		15	40	20	17	7	
Are computer personnel sensitive to your needs as a user of the information system?		10	38	28	11	12	1
Do computer personnel display a high level of competence in dealing with you as a user?		6	29	37	21	7	
Do computer personnel display a positive attitude in dealing with you as a user?		8	27	33	21	11	
Are you satisfied with the systems development process?	1	12	38	24	13	12	

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time is not significantly related to any of the financial indicators.

Financial Performance and Overall Ratings

As shown in Table 6, Panel B, overall satisfaction and effectiveness are positively correlated with growth in total income, loans, and total assets. Growth in operating income is significantly related to only overall effectiveness. Although

multivariate analysis would shed much more light on the nature of this relationship, the sample size is insufficient for meaningful multivariate analysis.

Discussion And Conclusion

This study explored the relationship between IT effectiveness and the financial growth of fi-

Table 4 (continued)

<u>Factors</u>	<u>Never</u>	<u>Almost Never</u>	<u>Seldom</u>	<u>Some- times</u>	<u>Most of the time</u>	<u>Almost Always</u>	<u>Always</u>
Factor 3: End-user applications							
Does the system support your data analysis needs?	31	34	24	8	1	1	1
Does the system allow you to query the database to obtain answers to non-routine questions?		44	38	15	1	1	1
Does the system allow you to prepare ad hoc reports easily?		19	32	28	11	9	1
Are you properly trained to use the applications needed to do your job?	6	30	37	6	16	5	
Are you ever involved in the design & development of the information system?	13	40	24	5	13	4	
Do you have control over the type of information systems services offered to system users?	11	20	40	9	15	4	
Are you satisfied with your level of involvement in decisions relating to the information system?	6	25	24	17	22	3	3
Factor 4: Support for accounting planning and budgeting							
Does the system provide support for planning and budgeting?		11	34	23	27	4	1
Does the system provide adequate support for accounting and financial reporting?		6	27	15	31	20	1
Are you satisfied with the adequacy of the system for planning and decision making?	1	10	37	25	20	6	
Factor 5: Control and security							
Are you satisfied with the security and privacy of the information system?	1	2	12	17	25	23	21
Factor 6: Access to hardware							
Do you have easy access to computer terminals or PCs?	1	10	24	21	31	10	2
Factor 7: Support for operating and strategic decisions							
Are reports generated by the system available when you need them?		1	31	16	30	21	1
Does the system provide adequate support for making operating decisions?		3	28	26	30	12	
Does the system provide adequate support for making strategic decisions?		9	32	37	16	6	
Does the system provide adequate support for making product development decisions	1	11	39	30	15	3	1
Factor 8: System downtime							
How frequently is the computer system down?	2	36	40	11	5	3	3

financial institutions in South Korea. Consistent with Mooney et al. (1996), effectiveness is measured using a multidimensional measure that incorporates the technical and semantic characteristics of an information system as well as support for internal business processes. The results indicate that the technical and semantic charac-

teristics of IT in Korean banks are marginally to moderately strong. IT systems are viewed as only marginally effective and the group of managers surveyed are, in general, somewhat dissatisfied with their systems. The study supports the hypothesis that IT effectiveness is positively associated with growth in financial fundamentals

Table 5
Overall Level of Effectiveness and Satisfaction
Percentage of Respondents

	<u>Very Poor</u>	<u>Poor</u>	<u>Good</u>	<u>Excellent</u>			
How would you rate your company's overall computer-based information system. Circle the item that best describes your assessment of the effectiveness of your system?	5	11	7	18	59	0	0
	<u>Very Dissatisfied</u>				<u>Very Satisfied</u>		
Overall, how satisfied are you with your company's information system?	0	1	27	39	21	12	0

such as growth in total income, growth in loans to customers, growth in total assets, and growth in operating income. The results also support the hypothesis that both overall satisfaction and overall perceived effectiveness are positively associated with growth in financial fundamentals.

The results reported in this study are consistent with findings reported by Brown et al. (1995), which indicate a positive association between the implementation of strategic information systems and sales growth and other financial performance indicators. However, Brown et al. (1995) restricted their study to US companies that had implemented a strategic information system. This study extends those findings in two ways. First, the study shows that the hypothesized association between IT and financial performance holds in a non-US environment. Second, the study suggests that an association between IT and financial performance might exist in a company which deliberately sets out to create a strategic information system (SIS) as well as in an enterprise that uses IT effectively without a specific agenda to create an SIS. This observation alludes to the assertion that the degree of "business information intensity" is the operational factor in determining the association between IT and financial performance (Porter and Millar, 1985). Businesses such as commercial banks with high business information intensity will demonstrate a strong association between IT effectiveness and financial performance.

The findings of this study are also consistent with those of Floyd and Wooldridge (1990). However, Floyd and Wooldridge confined their study to US commercial banks and used only return on assets as a measure of financial performance. In addition, Floyd and Wooldridge examined two classifications of IT--process IT and product IT--and reported a significant positive association between only product IT and bank financial performance. The current study suggests that the absence of a measure of effectiveness in the Floyd and Wooldridge study could have contributed to their failure to find an association between process IT and bank financial performance. Such a failure may have also resulted in an underestimated, albeit statistically significant, association between product IT and financial performance.

Limitations and Suggestions for Future Research

This study provides insight into the degree of effectiveness of IT employed in Korean banks as perceived by bank managers, and also demonstrates the link between performance and IT effectiveness. It is not clear, however, whether IT effectiveness promotes growth or that enterprise growth promotes the need for and the capacity to invest in IT. Additional research is needed to explore this issue.

The paper provides limited insight into the normative proposition that enterprises with high

Table 6
Relationship Between IT Effectiveness Factors and Financial Growth Fundamentals

Panel A: Correlations between technical and semantic characteristics and financial performance

Technical and semantic characteristics	Growth in ROA	Growth in profit margin	Growth in total income	Growth in loans to customers	Growth in total assets	Growth in operating income
1. Quality of Information	0.18*	0.23*	0.34**	0.29**	0.36**	0.23*
2. Quality of MIS Support	0.14	0.21*	0.10	0.09	0.14	0.32**
3. End-user applications	0.26**	0.28**	0.04	0.02	0.06	0.34**
4. Support for accounting, planning, and budgeting	0.21*	0.24*	0.28**	0.21*	0.25*	0.33**
5. Control and security	0.36**	0.40**	0.03	0.05	0.10	0.29**
6. Access to hardware	0.10	0.10	0.27**	0.17*	0.28**	0.23*
7. Support for operating and strategic decisions	0.08	0.14	0.20**	0.13	0.23*	0.26**
8. System downtime	-0.01	-0.01	-0.07	-0.02	-0.08	-0.01

Panel B: Correlations between overall satisfaction, overall effectiveness and financial performance

Technical and semantic characteristics	Growth in ROA	Growth in profit margin	Growth in total income	Growth in loans to customers	Growth in total assets	Growth in operating income
Overall satisfaction	-.03	-.06	.37**	.29**	.40**	.05
Overall effectiveness	-.01	.03	.27**	.20*	.28**	.20*

Notes: ** p < .05; * p < .10

business information intensity will show a positive association between IT and economic performance. However, only one industry with high information intensity is studied. Additional research is needed to assess whether the association observed in this study extends to other types of enterprises with high business information intensity. Similar research is needed to determine whether an association exists between IT effectiveness and economic performance among enterprises with low business information intensity. Indeed, greater insight into the relationship between business information intensity and IT effectiveness would be provided by an alternative research design that included industries with both high and low business information intensity. This line of research could help resolve the conflicting findings that currently exist in the literature concerning the association between IT and firm economic performance.

The relatively small sample size used in the study limited the opportunity for detailed insight

into the multivariate relationships that might exist in the data. Additional research that expands the sample size, increases the countries and industries represented in the study, and explores the multivariate relationships between financial performance and the IT effectiveness would make a valuable contribution to the literature. □

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