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The Contribution of IT to the Bottom Line: A Contingency Perspective of Strategic Dimensions

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THE CONTRIBUTION OF IT TO THE BOTTOM LINE: A CONTINGENCY PERSPECTIVE OF STRATEGIC DIMENSIONS

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Abstract

The relationship between information technology and business performance has been a focus of IS research in recent years. However, few solid results have been found as of yet which empirically link them together. Some problems remain with the definition and measurement of IT, organizational performance and "fit" between technology and organizational strategy. Thus stronger empirical evidence is required before concluding with certainty that IT can lead to greater business performance. In view of this, an empirical study was conducted among 126 business firms to validate a research model linking strategic orientation and strategic IT management to performance. Using both a perceptual (growth and profitability) and an objective measure of performance (ROA), this study provides new and interesting empirical evidence for the strategic conditions under which information technology contributes to the bottom line. The main thrust of the findings is that peak performance is achieved by firms that combine a strong strategic orientation with a strategically oriented IT management.

1. INTRODUCTION

In the last decade, business organizations have invested huge sums in information technology, yet the profitability of these investments has not been fully demonstrated. While Roach (1987) was one of the first seriously to question the bottom line implications of IT, it was not until 1993 and following intensive research that a first study by Brynjolfsson and Hitt (1993) found computer ROI to average 54%. Unfortunately, this conclusion was limited to computer capital and could not be extended to information systems. A further study by the same researchers indicated that computers have not resulted in measurable improvements in business performance (Hitt and Brynjolfsson 1994).

However two other investigations, using a contingency framework, did find positive results. The first one by Raymond, Paré and Bergeron (1993) concluded that organizations having a sophisticated structure and sophisticated information technology performed better than others. The second study by Chan and Huff (1993) demonstrated that organizations with a strong strategic orientation and strategically oriented information systems were the ones that achieved peak performance. These were two important results in the pursuit of evidence that information technology is profitable for business, but the measures of performance were of a perceptual (subjective) nature. Although perceptual measures have been shown to be as valid as objective measures (Dess and Robinson 1984; Venkatraman and Ramanujam 1987), one is left with a doubt as to why, if such an impact on organizational performance exists, no relationship ever shows up in objective measures such as return on assets (ROA), as reported in financial statements.

This study intends to show that under specific conditions, namely the strategic orientation of the business and the strategic management of information technology, organizations perform better both in terms of perceived (subjective) growth and profitability, and in terms of return on assets, an objective financial ratio. These results will provide additional insight into the conditions under which information technology is profitable to organizations.

2. BACKGROUND

Research on the profitability of information technology has mainly produced mixed results, often non-generalizable, and sometimes contradictory (Weill and Olson 1989; Powell 1992). While the objective is quite simple and easily understandable (i.e., to show that information systems contribute to the bottom line), most IS studies have not yet been very successful in achieving it.

The profitability of information systems in organizations is a subject that has been tackled for several years, with inconsistent results. For instance, in the insurance industry, Bender (1986) found that low performing firms had either very high or very low information systems budgets. In the banking sector, Turner (1985) did not find any relation between information systems budgets and performance. In Cron and Sobol's study (1983), it was observed that firms making an intensive use of information technology showed either a very high or a very low level of profitability. Harris and Katz (1991) concluded that the most profitable firms are those that spend a higher proportion of their operating expenses on IT. Weill and Olson could not demonstrate the existence of a link between IT investment and organizational performance. Using chronological series on more than 700 banks over an eight year period, Alpar and Kim (1990) were unable to confirm a relationship between information processing expenses and return on equity, therefore bringing into question the results obtained by Bender, Cron and Sobol, and Harris and Katz.

The level of generalizability of such results is a concern for IS research. The previously cited studies sampled organizations in information-intensive industries such as insurance and banking. One is left to wonder if similar results could be obtained in industries where IT has a less fundamental role. Defining information technology is another problem. There is no common agreement on what is to be included in a conceptualization of IT (Weill and Olson 1989), nor is there any consensus on what factors should be included in a cost-benefit analysis. Indeed, financial models used to assess the profitability of IT have various limitations (Clemons and Weber 1990): the intangible benefits are ignored (e.g., strategic advantage, quality improvement, higher flexibility), benefits are summarized into savings on labor and material, and capital costs used in net present value calculations vary widely among enterprises.

There are also different points of view on the measurement of organizational performance (Foster 1986; Gagnon and Khoury 1988; Dawson, Neupert, and Stickney 1980). Although return on assets has often been used and recommended as an appropriate measure (Benbasat and Dexter 1979; Cron and Sobol 1983; Yap and Walshmam 1986; Keats 1988; Weill and Olson 1989; Weill 1990), perceptual (subjective) measures of organizational performance have also been frequently used (Venkatraman 1989; Chan and Huff 1993; Raymond, Paré and Bergeron 1993).

2.1 Contingency Models

Aside from methodological issues, many studies suffer from the lack of a general theoretical framework (Swanson 1987). Seemingly contradictory results might in fact be truly valid. The absence of control of contingency aspects might be a reason why dissimilar results are obtained from what seem to be similar studies. This possibility has been clearly indicated by Dennis, Nunamaker and Vogel (1990/1991) in their comparison of laboratory and field research on electronic systems, where they concluded that differences in findings were not inconsistent, but rather reflected different situations. Contingency theory, as a subset of organization theory, provides a valuable theoretical framework and helps build a cumulative research tradition in information systems (Iivari 1992). The importance of using a contingency model is well justified in the works of Venkatraman and Camillus, (1984). Using contingency theory, Raymond, Paré and Bergeron found that IT sophistication was positively related to organizational performance in small and medium-sized firms. Chan and Huff concluded that the fit between IS strategy and organizational strategy was associated with business performance. Again, both studies used only perceptual measures of business performance.

Overall, it can be concluded that a contingency approach is a promising path to follow in the attempt to demonstrate the profitability of information technology in organizations. This study pursues these latter efforts in attempting to establish a link between information technology and organizational performance. It seeks to answer the following research questions: What are the links between the strategic orientation of an organization, its strategic management of information technology, and its performance? Are effects on business performance observable in terms of both perceptual and objective measures?

3. RESEARCH MODEL AND HYPOTHESES

The research model, presented in Figure 1, hypothesizes relationships between the strategic orientation of the firm, its strategic management of information technology and its business performance.

3.1 Strategic Orientation

The strategic orientation of a firm is considered to be a crucial aspect in determining bottom line results (Steiner 1979). A firm that is more strongly oriented toward differentiation, cost leadership or focus, can achieve a competitive advantage. This translates into higher rates of sales, profits and returns.

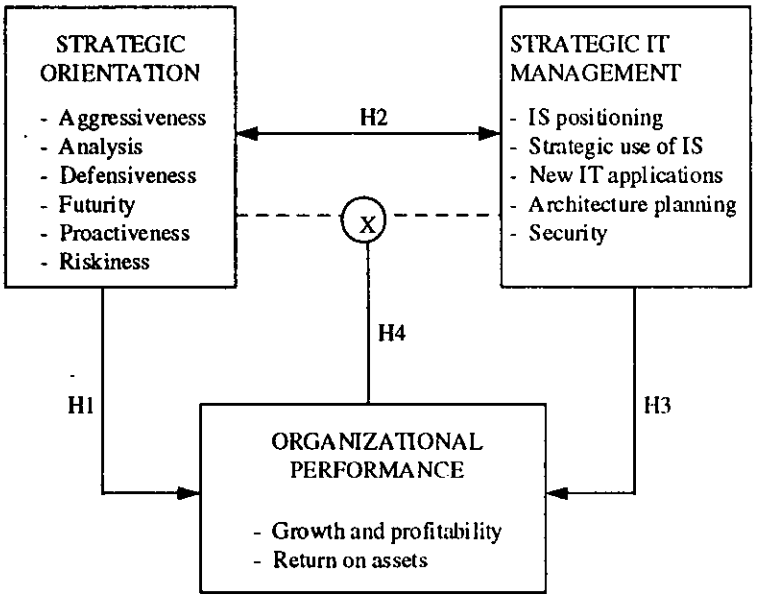

Figure 1. Research Model and Hypotheses

In strategic management research, Miller (1987) found a positive association between strategy and performance under various conditions. Venkatraman found various dimensions of strategy to be positively related to organizational performance, defined in terms of perceived growth and profitability. A study by Zahra and Covin (1993) also found similar results. Economic measures of business performance are preferred by strategy researchers over the more global concept of organizational effectiveness upon which organization theorists focus (Venkatraman and Ramanujam 1987). It is thus expected that a positive relationship between the strategic orientation of a firm and its performance will be observed. Given that the present study is in the information systems rather than strategic management domain, the purpose of the following hypothesis is to increase the validity of the research model and of the empirical data analysis.

Hypothesis 1: Strategic orientation is positively related to business performance.

Bergeron, Buteau and Raymond (1991) have ascertained that organizations basically use two approaches in managing IT. The alignment approach (e.g., BSP, CSF) is characterized by the adoption and implementation of information technologies intended to support the organization's goals and business strategy. In this case, the firm's strategic orientation directly influences the way in which the IS function will be planned and managed. The impact approach is one where IS planning and management drives the firm in the process of formulating a new vision and implementing corresponding strategic goals (e.g., Porter's value chain, Wiseman's strategic opportunities). In the latter case, the IS function influences the strategic orientation of the firm and leads to major changes in the way it does business.

Much has been written on the link that should exist between the IS function and organizational strategy (Henderson and Venkatraman 1992; Feeny, Edwards and Simpson 1992; Henderson and Sifonis 1988; Lederer and Mendelow 1990; Lederer and Sethi 1988; Weiss and Birnbaum 1989). However, there is still some uncertainty concerning the direction of the causal link between technology and strategy (Powell 1992). Strategic orientation can thus be viewed as playing a direct role in strategic IT management, and vice-versa. This leads us to the second hypothesis:

Hypothesis 2: Strategic orientation and strategic IT management are positively and mutually related.

3.2 Strategic Information Technology Management

There have been various perspectives used to measure the contribution of information technology to organizations. Delone and McLean's (1992) taxonomy identifies four antecedent factors (information quality, system quality, user satisfaction and use) that are seen to have individual and organizational impacts. The study by Raymond, Paré and Bergeron found IT usage to be significantly correlated to organizational performance, irrespective of organizational size, environmental uncertainty, human resources and formal structure.

As opposed to IT usage, IT management refers to the infrastructure put in place to organize the IS function (Olson and Chervany 1980) and to the managerial practices employed to plan and control the implementation and use of IT (Srinivasan and Kaiser 1987). Raymond, Paré and Bergeron concluded that IT management sophistication had a more contingential effect on performance. Given the amount of literature on the importance of strategic IT management from the research and practice point of view, its effect on organizational performance should be observable. This leads to the following hypothesis.

Hypothesis 3: Strategic IT management is positively related to business performance.

3.3 Strategy, IT and Business Performance

While strategy-technology contingencies are thought to have implications for performance (Vitale, Ives and Beath; 1986), there have been few empirical confirmations of this assumption. For strategic choices to make an impact on performance, they ought to be supported and facilitated by the appropriate information infrastructure. A firm that is more analytical, more proactive and more future-oriented in its outlook requires access to external networks, on-line databases and executive support systems (e.g., for strategic market analysis). Conversely, information technology choices shown to have the greatest bottom line impacts (famous cases in the airline, finance and distribution sectors) resulted in radical changes in the firm's strategic orientation.

Among the few IS researchers that have used the concept of fit, Chan and Huff showed that perceived business performance was higher when the IS strategy was aligned on the business strategy. The most fruitful approach to alignment seems to be one of moderation or interaction. Indeed, Raymond, Paré and Bergeron used such an approach to demonstrate that organizations whose IT sophistication was aligned on structural sophistication performed better than those that were misaligned. Hence, the following hypothesis:

Hypothesis 4: The relationship between strategic IT management and business performance indicated by Hypothesis 3 is stronger among organizations that have a stronger strategic orientation.

4. METHODOLOGY

4.1. Sample and Data Collection

The target population for this cross-sectional survey consists of several thousand business firms listed in Dun & Bradstreet's (1993) Canadian Key Business Directory. All these organizations have more than 249 employees and spend $50,000 or more on their annual IS budget. In order to obtain a precise and representative sample, 1,000 organizations were selected using a systematic sampling technique (an organization taken at random from the first k units and every k^{th} organization thereafter), following Cochran's recommendation (1963). The questionnaire used for data collection was pretested with five CEOs and CIOs through on-site interviews. A two-part questionnaire was addressed to the chief executive officer. He/she was asked to complete the first part concerning the organization's strategic orientation and performance. He/she was also asked to have the chief information officer complete the second part pertaining to the firm's strategic IT management. Both respondents mailed their questionnaire separately to secure confidentiality and independence. One week after the mailing, a follow-up card was sent out to all organizations reminding them of the importance of their participation in the study. There were 126 pairs (from both the CEO and CIO) of usable questionnaires returned for a response rate of 12.6%. Note that the somewhat low response rate was to be expected given the fact that the questionnaire was initially addressed to the CEO. The time constraints of these individuals are here a more plausible explanation for non-response than the nature of the question under study or a faulty questionnaire design or administration procedure (Assael and Keon 1982). The results, however, must be interpreted with this limitation in mind.

The firms came from a variety of sectors as follows: manufacturing (27.7%), finance/insurance/real estate (13.4%), services (11.8%), transport/communications (8.4%), retail (6.7%), agriculture/ forestry/fishing (4.2%), wholesale/distribution (3.4%), mining (1.7%), construction (1.7%) and others (21%). Their annual sales, $313 million on average, were distributed as follows: < or = 50M$ (28%); 51M$ to 100M$ (20%); 101M$ - 500M$ (40%); 501M$ to 1,000M$ (6%); > 1,000M$ (6%). They had 1774 employees on average and a mean IS budget of $4.2 million.

4.2 Definition, Measurement and Validity of Variables

Strategic Orientation. The firm's strategic orientation lies in the operationalization of the strategies tracing its course of action. This concept was measured with Venkatraman's instrument. It is based on the measurement of six underlying traits or dimensions: aggressiveness (allocation of resources for improving market positions at a faster rate than competitors), analysis (tendency to search deeper for the root causes of problems and to generate the best solution), defensiveness (preservation of one's own products, markets and technology through cost reduction and efficiency increase), futurity (emphasis on longer-term effectiveness), proactiveness (continuous search for new market opportunities and pre-emptive actions) and riskiness (organizational risk-taking in product, market and resource allocation choices).

The instrument is composed of 29 items rated by the respondents on seven-point scales (varying from 1= very weak to 7= very strong). The number of items forming each dimension along with

Cronbach alpha were as follows: aggressiveness (4, 0.81), analysis (6, 0.83), defensiveness (3, 0.77, one item eliminated), futurity (5, 0.67), proactiveness (5, 0.60) and riskiness (5, 0.45). This reveals acceptable levels of reliability for all dimensions, except for riskiness which was judged to be somewhat unreliable (Nunnally and Durham 1975).

Strategic Information Technology Management. The instrument developed to measure the strategic information technology management construct (SITM) was based on the list of most critical issues facing information systems executives as extracted by Niederman, Brancheau and Wetherbe (1992). The SITM construct was operationalized by evaluating to what extent these issues constitute a strength or a weakness for the organization, relative to its competitors. The measure is strategic in that it positions each organization on a series of important IT management traits, relative to the competition. A principal components factor analysis (Table 1) identified five underlying factors: information systems positioning (the role and contribution of IS to organizational objectives); strategic use of IS (applications to gain competitive advantage); new IT applications (adoption of new technologies such as EDI and CASE); architecture planning (the existence of data, technology and systems architectures); and data security (data security, integrity and recovery).

The instrument is composed of 20 items rated by the respondents on a seven-point scale (ranging from 1= major weakness to 7= major strength) (see the appendix). Out of the original 20 items, 19 items were elected to form the factors. One item (# 18) was eliminated because it did not load sufficiently on any one factor. The final number of items in each factor with the corresponding Cronbach alpha were as follows: information systems positioning (5, .79), strategic IS use (4, .77), new IT applications (4, .74); architecture planning (4, .78); security (2, .64). These levels of reliability were considered acceptable.

Business Performance. Business performance was measured along two dimensions: growth and profitability, and return on assets. The first dimension was measured with an instrument developed by Venkatraman. It consists of a subjective evaluation based on eight items rated by the respondents on a seven-point scale (1= very weak to 7= very strong). Its internal validity was found to be .89.

The second dimension, ROA, was assessed with an objective financial measure. There are various ways to calculate the ROA, most of which produce equivalent results when used for businesses comparison purposes (Dawson, Neupert and Stickney 1980). The exact measure used in this study is equal to: *net income plus income taxes plus interest expense, divided by total asset,* as used for instance by Yap and Walshman.

The ROA of each firm was first calculated with the above formula, and positioned on a 7 point equal interval scale (where 1= lower fractile, 4= median fractile and 7= upper fractile) following the recommended procedure (Gagnon and Khoury 1988; Deakin 1976; McDonald 1984). The position of each firm on the scale was determined by a careful analysis of its ROA relative to a group of organizations in the same industrial sector, as indicated by the four-digit SIC code. Financial data were extracted from the CanCorp database.

A subset of the sample of 126 firms was used to test the model relative to the return on assets measure of business performance. Out of the seventy-one business having their financial statements reported in the CanCorp database, twenty-three were eliminated for various reasons: fourteen with financial statements which were too old, three with too few comparable businesses in the same industrial sector, and three being too large or too small in terms of assets to suffer comparison. A study of statistical residuals eliminated three more organizations identified as outliers.

5. RESULTS AND DISCUSSION

The hypotheses were tested by computing zero-order and partial product-moment correlation coefficients for the global research constructs and for each of their dimensions (Figure 1). Additional analyses were made by forming sub-samples based on the median (high-low) strategic orientation (STRO) and strategic IT management (SITM), comparing correlations and means with Z and t tests. With methodological triangularization in mind, all tests were performed using both the perceptual (growth and profitability) and objective (ROA) measures of performance. The descriptive statistics of the research variables are presented in Table 2. Note that the correlation between these two dependent variables was 0.51 ($p<0.001$), in line with previous results linking both types of performance measures (Dess and Robinson 1984; Miller 1987)

5.1 Hypothesis 1

The results presented in Table 3 provide empirical support for the first hypothesis, linking strategy to performance. Looking at the first column from the left, the correlations confirm that the more an organizational posture or stance is strategically oriented overall, the better the performance in terms of profitability and ROA. In particular, the proactiveness, futurity and defensiveness dimensions are seen to contribute the most to both aspects of performance. Analysis has a positive effect on growth and profitability but not on ROA. Similarly to Venkatraman's study, the negative results pertaining to the riskiness dimension could be attributed to its lack of reliability (alpha = 0.45).

Added support for Hypothesis 1 lies in the fact that the strength of the strategy-performance relationships remains the same, when one takes IT management into account by calculating partial correlations as shown in the second column. This would indicate that SITM has no *mediating* effect (STRO →SITM →Performance) on strategic orientation. However, when one looks at the strategy-performance relationships within the two sub-samples consisting

Table 1. Rotated Factor Matrix of Strategic IT Management
(n = 126)

Scale*	Strategic IT Management Factors				
	IS Position	Strategic IS Use	New IT Application	Architecture Planning	Security
1	-	-	-	.77	-
2	-	-	-	.62	-
3	.55	-	-	-	-
4	-	-	.48	-	-
5	-	.47	-	-	-
6	-	-	-	.65	-
7	.72	-	-	-	-
8	-	.65	-	-	-
9	.59	-	-	-	-
10	.69	-	-	-	-
11	.69	-	-	-	-
12	-	-	.60	-	-
13	-	-	.77	-	-
14	-	-	.77	-	-
15	-	-	-	.52	-
16	-	.69	-	-	-
17	-	.71	-	-	-
18	-	-	-	-	-
19	-	-	-	-	.77
20	-	-	-	-	.79
% variance	37.7	7.9	6.4	6.0	5.1
eigenvalue	7.5	1.6	1.3	1.2	1.0

*The Strategic IT Management scales are presented in the Appendix.

Table 2. Descriptive Statistics of the Research Variables
(n = 126)

Variable (range)	mean	alpha	s.d.	min.	max.
Strategic Orientation (1-7)	4.88	.81	0.60	2.83	6.48
aggressiveness	3.44	.81	1.30	1.00	6.50
analysis	5.59	.83	0.90	2.67	7.00
defensiveness	5.16	.77	1.14	1.67	7.00
futurity	5.28	.67	0.89	2.60	7.00
proactiveness	4.59	.60	0.88	2.60	7.00
riskiness	4.55	.45	0.85	2.00	7.00
Strategic IT Management (1-7)	4.66	.90	.91	1.97	7.00
IS positioning	4.88	.79	1.06	1.00	7.00
strategic use of IS	4.31	.77	1.11	1.00	6.75
new IT applications	3.99	.74	1.09	1.00	6.75
architecture planning	4.60	.78	1.11	1.50	7.00
security	4.94	.64	1.25	2.00	7.00
Organizational Performance (1-7)					
growth and profitability	4.40	.89	1.17	1.63	6.63
return on assets*	4.94	-	1.34	2.00	7.00

*(n = 48)

Table 3. Correlations of Strategic Orientation with Organizational Performance

	with Growth and Profitability				
	All firms (n = 126)	part.[a]	High[b] SITM (n = 63)	Low SITM (n = 63)	Z[c]
Strategic Orientation	.29***	.31***	.43***	.14	1.75*
aggressiveness	-.05	-.05	-.04	-.07	0.16
analysis	.19*	.20*	.34**	.04	1.72*
defensiveness	.21**	.21*	.34**	.03	1.77*
futurity	.23**	.25**	.26*	.18	0.46
proactiveness	.35***	.35***	.38***	.29**	0.55
riskiness	-.08	-.08	-.08	-.06	-0.11
	with Return on Assets				
	All firms (n = 48)	part.[a]	High[b] SITM (n = 24)	Low SITM (n = 24)	Z[c]
Strategic Orientation	.35**	.31*	.60***	.12	1.85*
aggressiveness	.22	.23	.28	.17	0.38
analysis	.08	-.00	.47*	-.33	2.76**
defensiveness	.13	.11	.36*	.03	1.12
futurity	.20	.15	.22	.21	0.36
proactiveness	.34**	.33*	.31	.37*	-0.22
riskiness	-.10	-.10	-.12	.08	-0.13

[a]Partial correlation, controlling for Strategic IT Management (SITM).
[b]High/Low: based on median Strategic IT Management score.
[c]A positive Z score indicates that the correlation between Strategic Orientation and Organizational Performance is greater in the high-SITM firms than in the low-SITM firms (Guilford and Fruchter 1973, pp. 166-167).
*p < 0.05 **p < 0.01 ***p < 0.001

of organizations who do manage IT strategically (high SITM) and those who do not (low SITM), a significant *moderating* effect occurs, i.e., (SITM →[STRO → Performance]). The positive impact of strategy becomes much stronger overall in the former group, whereas it becomes non significant in the latter.

Differences between the two sets of correlations notably occur along the analysis and defensiveness dimensions, as demonstrated by significant Z values. The exception is the proactiveness dimension whose correlation with performance remains equally strong in both high and low-SITM groups. The strategic key to performance would thus lie in searching for new business opportunities, in introducing innovative new products or services to stay ahead of the competition, and in acting on rather than reacting to changing environmental trends. From a validity standpoint, these results are seen to be in line with Venkatraman's (1989) study that showed proactiveness to be dominant in regard to growth and profitability, and both aggressiveness and riskiness to have no positive effect.

5.2 Hypothesis 2

Shown in Table 4 are the correlation coefficients related to the second hypothesis, linking strategy and information technology. These results confirm that the more strategically oriented the organization, the more it tends to manage IT strategically. This is

Table 4. Correlations of Strategic Orientation with Strategic IT Management
(n = 126)

	Strategic IT Management					
	SITM	IS posit.	Strateg. IS use	New IT applic.	Arch. Plan.	Security
Strategic Orientation	.36***	.25**	.39***	.29***	.34***	.07
aggressiveness	.01	.08	.05	-.04	-.03	-.10
analysis	.42***	.30***	.40***	.32***	.40***	.20*
defensiveness	.14	.00	.15*	.13	.22**	.01
futurity	.35***	.23**	.34***	.31***	.29***	.16*
proactiveness	.14	.06	.21**	.16*	.14	-.07
riskiness	.00	-.03	-.03	-.05	.01	-.08

*p < 0.05 **p < 0.01 ***p < 0.001

true for all dimensions of SITM with the exception of security. Here, one could surmise that systems security has now become a primary concern for all organizations, irrespective of their strategic posture.

Also, the effect of strategic orientation on IT management originates mostly from the analysis and futurity dimensions. The former trait refers to the rationality and comprehensiveness of organizational decision-making, whereas the latter refers to the organizational time frame (short versus long term). A more analytic, future-oriented organization uses planning, coordinating, forecasting and tracking systems more extensively. This would require management to support these systems by aligning its IT planning, organizing and control activities more strategically, and by providing the needed data, applications and technological infrastructure. Correspondingly, a well articulated architecture planning and the support of strategic IS applications might be considered as conditions for a strategic orientation to take form.

5.3 Hypothesis 3

Directly linking IT management to performance, the third hypothesis cannot be confirmed. Looking at the first column from the left in Table 5, the only significant correlation is between the IS positioning dimension and ROA. Again, one can see why previous researchers have had difficulty in linking IT investment or sophistication by itself to organizational performance. These results lose even more significance when one controls for strategic orientation, by calculating partial correlations, as shown in the second column. This would indicate that STRO has no mediating effect (SITM → STRO → Performance).

The preceding results are in line with Raymond, Paré and Bergeron's finding that IT management sophistication does not by itself affect business performance, that is, irrespective of structure (or strategy in this case). These authors state that to better understand the effect of IT management, one should rather look to a joint effect ("alignment" or "fit") with strategy and structure. This is done in the following section.

5.4 Hypothesis 4

The last research hypothesis stated that the effect of strategic IT management on performance would be greater in organizations having a more strategic orientation. This is globally confirmed by the two sets of correlations presented in Table 5, using the median value to break down the sample into two groups (high and low STRO). Z tests indicate that the relationship between IT management and performance is stronger in the high STRO group, indicating strategy's moderating effect (STRO → [SITM → Performance]). This is also evidence of a possible reverse causality between IT and business strategy (Powell 1992), given their mutually moderating effect in relation to performance.

In regard to growth and profitability, managing IT strategically would in fact have a dysfunctional effect in firms that are not strategically oriented, as shown by significant but negative correlations. Conversely, IT management has a positive effect on ROA only in firms that show a strong strategic orientation. These results are also in line with the general argument that IT management does not by itself impact performance, but only to the extent that it is aligned with the organization's strategy or structure (Ilivari 1992).

5.5 Further Analyses

Given the need for a more encompassing perspective on strategic fit (Van de Ven and Drazin 1985), other types of joint effects can

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*p < 0.05 **p < 0.01 ***p < 0.001

of organizations who do manage IT strategically (high SITM) and those who do not (low SITM), a significant *moderating* effect occurs, i.e., (SITM →[STRO → Performance]). The positive impact of strategy becomes much stronger overall in the former group, whereas it becomes non significant in the latter.

Differences between the two sets of correlations notably occur along the analysis and defensiveness dimensions, as demonstrated by significant Z values. The exception is the proactiveness dimension whose correlation with performance remains equally strong in both high and low-SITM groups. The strategic key to performance would thus lie in searching for new business opportunities, in introducing innovative new products or services to stay ahead of the competition, and in acting on rather than reacting to changing environmental trends. From a validity standpoint, these results are seen to be in line with Venkatraman's (1989) study that showed proactiveness to be dominant in regard to growth and profitability, and both aggressiveness and riskiness to have no positive effect.

5.2 Hypothesis 2

Shown in Table 4 are the correlation coefficients related to the second hypothesis, linking strategy and information technology. These results confirm that the more strategically oriented the organization, the more it tends to manage IT strategically. This is

Table 4. Correlations of Strategic Orientation with Strategic IT Management
(n = 126)

	Strategic IT Management					
	SITM	IS posit.	Strateg. IS use	New IT applic.	Arch. Plan.	Security
Strategic Orientation	.36***	.25**	.39***	.29***	.34***	.07
aggressiveness	.01	.08	.05	-.04	-.03	-.10
analysis	.42***	.30***	.40***	.32***	.40***	.20*
defensiveness	.14	.00	.15*	.13	.22**	.01
futurity	.35***	.23**	.34***	.31***	.29***	.16*
proactiveness	.14	.06	.21**	.16*	.14	-.07
riskiness	.00	-.03	-.03	-.05	.01	-.08

*p < 0.05 **p < 0.01 ***p < 0.001

true for all dimensions of SITM with the exception of security. Here, one could surmise that systems security has now become a primary concern for all organizations, irrespective of their strategic posture.

Also, the effect of strategic orientation on IT management originates mostly from the analysis and futurity dimensions. The former trait refers to the rationality and comprehensiveness of organizational decision-making, whereas the latter refers to the organizational time frame (short versus long term). A more analytic, future-oriented organization uses planning, coordinating, forecasting and tracking systems more extensively. This would require management to support these systems by aligning its IT planning, organizing and control activities more strategically, and by providing the needed data, applications and technological infrastructure. Correspondingly, a well articulated architecture planning and the support of strategic IS applications might be considered as conditions for a strategic orientation to take form.

5.3 Hypothesis 3

Directly linking IT management to performance, the third hypothesis cannot be confirmed. Looking at the first column from the left in Table 5, the only significant correlation is between the IS positioning dimension and ROA. Again, one can see why previous researchers have had difficulty in linking IT investment or sophistication by itself to organizational performance. These results lose even more significance when one controls for strategic orientation, by calculating partial correlations, as shown in the second column. This would indicate that STRO has no mediating effect (SITM → STRO → Performance).

The preceding results are in line with Raymond, Paré and Bergeron's finding that IT management sophistication does not by itself affect business performance, that is, irrespective of structure (or strategy in this case). These authors state that to better understand the effect of IT management, one should rather look to a joint effect ("alignment" or "fit") with strategy and structure. This is done in the following section.

5.4 Hypothesis 4

The last research hypothesis stated that the effect of strategic IT management on performance would be greater in organizations having a more strategic orientation. This is globally confirmed by the two sets of correlations presented in Table 5, using the median value to break down the sample into two groups (high and low STRO). Z tests indicate that the relationship between IT management and performance is stronger in the high STRO group, indicating strategy's moderating effect (STRO → [SITM → Performance]). This is also evidence of a possible reverse causality between IT and business strategy (Powell 1992), given their mutually moderating effect in relation to performance.

In regard to growth and profitability, managing IT strategically would in fact have a dysfunctional effect in firms that are not strategically oriented, as shown by significant but negative correlations. Conversely, IT management has a positive effect on ROA only in firms that show a strong strategic orientation. These results are also in line with the general argument that IT management does not by itself impact performance, but only to the extent that it is aligned with the organization's strategy or structure (Ilivari 1992).

5.5 Further Analyses

Given the need for a more encompassing perspective on strategic fit (Van de Ven and Drazin 1985), other types of joint effects can

Table 5. Correlations of Strategic IT Management with Organizational Performance

	with Growth and Profitability				
	All firms (n = 126)	part.[a]	High[b] SITM (n = 62)	Low SITM (n = 64)	Z[c]
Strategic IT Management	.01	-.11	.11	-.25*	1.99*
IS positioning	-.02	-.10	.13	-.27*	2.23*
strategic use of IS	.04	-.08	.17	-.22*	2.16*
new IT applications	-.03	-.13	-.11	-.11	0.00
architecture planning	.06	-.05	.15	-.20*	1.93*
security	-.03	-.05	.02	-.16	0.99
	with Return on Assets				
	All firms (n = 48)	part.[a]	High[b] SITM (n = 25)	Low SITM (n = 23)	Z[c]
Strategic IT Management	.18	.06	.36*	-.07	1.45
IS positioning	.24*	.16	.25	.16	1.35
strategic use of IS	.19	.06	.44*	-.09	1.82*
new IT applications	.07	-.04	.29	-.18	1.56
architecture planning	.15	.03	.33*	-.10	1.43
security	-.05	-.08	-.13	-.03	-0.32

[a]Partial correlation, controlling for Strategic Orientation (STRO)
[b]High/Low: based on median Strategic Orientation score
[c]A positive Z score indicates that the correlation between Strategic IT Management and Organizational Performance is greater in the high-STRO firms than in the low-STRO firms (Guilford and Fruchter 1973, pp. 166-167).
*$p < 0.05$

be analyzed. In line with the last hypothesis, one can also test for an *interaction* effect between strategic orientation and IT management ([STRO x SITM] → Performance). The correlations presented in Table 6, linking the product of the two independent variables and their respective dimensions to performance, confirm the presence of such an effect on profitability, and especially on ROA. The dominant dimensions in this regard are proactiveness and defensiveness for STRO, joined with strategic IS use and IS positioning for SITM. The strongest combination would thus be a firm that seeks new product and market opportunities, and more efficiency to preserve its existing markets. This strategy should be aligned with an IT management that has an equally strong strategic vision and promotes the use of information systems in supporting strategic decision-making (e.g., DSS, EIS) and in attaining a competitive advantage (e.g. through operations support applications) (Bergeron, Buteau and Raymond 1991).

To better visualize this effect, a breakdown of the sample into four groups was performed, based on the median value for strategic orientation and IT management (low/low, low/high, high/low and high/high). Comparing the performance means for each group, t-test results shown in Table 7 indicate, as expected, that the high STRO/high SITM group had a significantly better performance than the three other groups, concurring with Chan and Huff's findings. There was however no significant difference in performance among the latter, even though the low/high and high/low groups should have had better performances than the low/low group. However, strategic orientation had more of an effect on

Table 6. Correlations of Strategy-IT Management Interaction with Organizational Performance

Interaction*	correlation with Growth and Profitability (n = 126)					
	SITM	IS posit.	Strateg. IS use	New IT applic.	Arch. Plan.	Security
Strategic Orientation	.15*	.13	.15*	.08	.17*	.10
aggressiveness	-.04	-.05	-.02	-.05	-.01	-.06
analysis	.12	.10	.13	.05	.14	.08
defensiveness	.16*	.16*	.18*	.10	.17*	.13
futurity	.14	.12	.15*	.07	.15*	.11
proactiveness	.24**	.22**	.23**	.18*	.25**	.19*
riskiness	-.06	-.07	-.02	-.09	-.01	-.05
Interaction*	correlation with Return on Assets (n = 48)					
	SITM	IS posit.	Strateg. IS use	New IT a-pplic.	Arch. Plan.	Security
Strategic Orientation	.34**	.37**	.34**	.22	.28*	.11
aggressiveness	.30*	.33**	.33**	.24*	.27*	.18
analysis	.20	.24*	.22	.12	.17	.04
defensiveness	.25*	.32*	.27*	.15	.22	.05
futurity	.26*	.29*	.27*	.16	.23	.07
proactiveness	.35**	.38**	.35**	.28*	.31*	.18
riskiness	.06	.13	.09	-.00	.05	-.05

*Interaction = Strategic Orientation x Strategic IT Management
*$p < 0.05$ **$p < 0.01$

growth and profitability (low versus high STRO groups), whereas strategic IT management had more of an effect on ROA (low versus high SITM). A tentative interpretation of this last result could take into account the time-frame difference between the two performance measures (Kaplan 1982). Strategic IT management would show its effects sooner, in the form of greater returns on assets, whereas strategic orientation would pay off later, (i.e., in long-term increases in sales and profitability).

A final analysis involves a difference or *matching* approach to alignment ([STRO-SITM]^2 → Performance). Given the preceding justification for the research model, and for Hypothesis 4 in particular, this last approach seems to be a priori less plausible. For instance, contrary to the preceding interaction approach, it would entail that a low STRO/low SITM combination would be as effective as a high/high combination. Nonetheless, it was tested for comparison purposes. In contrast to the interaction approach (Table 6), the matching approach was much less successful in explaining performance.

6. FUTURE RESEARCH

While providing new and interesting empirical results on the contribution of information technology to organizational performance, this study should be followed by others. A "systems" rather than a bivariate approach to alignment (Van de Ven and Drazin 1985) could be used to analyze the joint effects of strategic orientation and IT management, given the multidimensional nature of these constructs. Further data analyses that are to be carried out by the researchers will thus include multivariate techniques such as cluster analysis and structural equation modeling, in order to more fully understand the internal coherence, patterns and covariations among the various strategic dimensions. In the same vein, while a fair amount of knowledge has now been gained by IS researchers and organization theorists on the strategy-IT, structure-IT and strategy-structure alignments, one should now look at combined strategy-IT-structure effects on business performance for greater explanatory power.

Table 7. Breakdown of Organizational Performance by Strategic Orientation (STRO) and Strategic IT Management (SITM)

	Group 1	Group 2	Group 3	Group 4
	low STRO low SITM	low STRO high SITM	high STRO low SITM	high STRO high SITM
Growth and profitability (F = 6.0***)	(n = 37)	(n = 27)	(n = 26)	(n = 36)
mean (1-7)	4.3	3.9	4.3	5.1
s.d.	1.1	1.1	1.2	1.0
Contrasts (t value)[a]				
Group 1	-	-1.2	0.0	3.0**
Group 2		-	1.2	4.0***
Group 3			-	2.7**
Group 4				-
Return on assets (F = 3.1*)	(n = 14)	(n = 9)	(n = 10	(n = 15)
mean (1-7)	4.5	5.1	4.3	5.7
s.d.	1.2	1.4	1.5	1.0
Contrasts (t value)[a]				
Group 1	-	1.1	-0.4	2.5*
Group 2		-	-1.4	1.0
Group 3			-	2.7**
Group 4				-

[a]Comparing means for each pair of groups

*p < 0.05 **p < 0.01 ***p < 0.001

7. CONCLUSION

This study has important implications for IS research and management practice. It has provided empirical evidence for the strategic conditions under which information technology contributes to the bottom line. Peak performance, both in perceptual (growth and profitability) and objective (ROA) terms, was achieved by organizations that combine a strong strategic orientation to a strategically oriented IT management. In this regard, a moderation or interaction conceptualization of fit was seen to be most appropriate, as was the use of two different types of performance measure. Another contribution of this study is the instrument developed to measure IT management, designed to reflect the inherent nature of this construct as perceived by IS executives, rather than to parallel the business strategy measure.

IT investment by itself, be it transactional, managerial or strategic in nature, provides no assurance of bottom line improvements. In an increasingly complex, uncertain and global business environment, firms needing to maintain or increase performance levels must adopt a stronger strategic posture (i.e., must be more aggressive, proactive, analytical and future-oriented), and must insure that IT management follows suit. This means aligning the strategic position and use of IS on organizational objectives and providing the required support in terms of data, applications and technology. In this regard, the SITM instrument can be used by management to pinpoint the organization's strengths and weaknesses and to size the extent to which the IS function may help the organization define its own strategic orientation. Hence, IT management will be more focused, leading to improved business performance.

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9. REFERENCES

Alpar, P., and Kim M. "A Microeconomic Approach to the Measurement of Information Technology Value." *Journal of Management Information Systems*, Volume 7, Number 2, Fall, 1990, pp. 29-54.

Assael , I., and Keon, J. "Non Sampling vs. Sampling Errors in Survey Research." *Journal of Marketing*, Volume 46, Number 2, Spring, 1982, pp. 114-123.

Benbasat, I., and Dexter, A. S. "Value and Events Approaches to Accounting: An Experimental Evaluation." *The Accounting Review*, October 1979, pp. 735-749.

Bender, D. "Financial Impact of Information Processing." *Journal of Management Information Systems*, Volume 3, Number 2, Summer 1986, pp. 232-238.

Bergeron, F.; Buteau, C.,; and Raymond, L. "Identification of Strategic Information Systems Opportunities: Applying and Comparing Two Methodologies." *MIS Quarterly*, Volume 15, Number 1, March 1991, pp. 89-103.

Brynjolfsson E., and Hitt, L. "IS Information Systems Spending Productive? New Evidence and New Results." In J. I. DeGross, R. P. Bostrom, and D. Robey (Editors), *Proceedings of the Fourteenth International Conference on Information Systems*, Orlando, Florida, December 5-8, 1993, pp. 47-64.

Chan, Y. E., and Huff, S. L. "Investigating Information Systems Strategic Alignment." In J. I. DeGross, R. P. Bostrom, and D. Robey (Editors), *Proceedings of the Fourteenth International Conference on Information Systems*, Orlando, Florida, December 5-8, 1993, pp. 345-363.

Clemons, E. K., and Weber B. W. "Strategic Information Technology Investments: Guidelines for Decision Making." *Journal of Management Information Systems*, Volume 7, Number 2, Fall 1990, pp. 9-28.

Cochran W. G. *Sampling Techniques*, Second Edition. New York: Wiley, 1963.

Cron, W., and Sobol M. "The Relationship Between Computerization and Performance: A Strategy for Maximizing Economic Benefits of Computerization." *Information & Management*, Volume 6, 1983, pp. 171-181.

Dawson, P.; Neupert, P. M.; and Stickney, C. P. "Restating Financial Statements for Alternatives GAAPs: Is It Worth the Efforts ?" *Financial Analyst Journal*, November-December 1980, pp. 38-46.

Deakin, E. B. "Distributions of Financial Accounting Rations: Some Empirical Evidence." *The Accounting Review*, January 1976, pp. 90-96.

Dennis, A. R.; Nunamaker, J. R.; and Vogel, D. R. "A Comparison of Laboratory and Field Research in the Study of Electronic Meeting Systems." *Journal of Management Information Systems*, Volume 7, Number 3, Winter 1990-91, pp. 107-135.

Delone E. H., and McLean, E. R. "Information Systems Success: The Quest for the Dependent Variable." *Information Systems Research*, Volume 3, Number 1, 1992, pp. 60-95.

Dess, G. G., and Robinson R. B. "Measuring Organizational Performance in the Absence of Objective Measures: The Case of the Privately-held Firm and Conglomerate Business Unit." *Strategic Management Journal*, Volume 4, 1984, pp. 265-273.

Dun and Bradstreet. "Canadian Key Business Directory." Dun and Bradstreet Canada, Toronto, 1993.

Feeny, D. F.; Edwards B. R.; and Simpson K. M. "Understanding the CEO/CIO Relationship." *MIS Quarterly*, Volume 16, Number 4, December 1992, pp. 435-448.

Foster, G. *Financial Statement Analysis*, Second Edition. Englewood Cliffs, New-Jersey: Prentice-Hall, 1986.

Gagnon, J. M., and Khoury, N. *Traité de gestion financière*. Gaëtan Morin éditeur, 1988.

Harris, S. E., and Katz J. L. "Firm Size and the Information Technology Investment Intensity of Life Insurers." *MIS Quarterly*, Volume 15, Number 3, September 1991, pp. 333-352.

Henderson, J. C., and Sifonis J. G. "The Value of Strategic IS Planning: Understanding Consistency, Validity and IS Markets." *MIS Quarterly*, Volume 12, Number 2, June 1988, pp. 187-199.

Henderson, J. C., and Venkatraman, N. "Strategic Alignment: A Model for Organizational Through Information Technology." In T. A. Kochan and M. Useem (Editors), *Transforming Organizations*. Oxford: Oxford University Press, 1992.

Hitt, L., and Brynjolfson, E. "The Three Faces of IT Value: Theory and Evidence." In J. I. DeGross, S. L. Huff, and M. C. Munro (Editors), *Proceedings of the Fifteenth International Conference on Information Systems*, Vancouver, British Columbia, Canada, December 14-17, 1994, pp. 263-289

Kaplan, R. S. *Advanced Management Accounting*. Englewood Cliffs, New Jersey: Prentice-Hall, 1982.

Keats, B. W. "The Vertical Construct Validity of Business Economic Performance Measure." *The Journal of Applied Behavioral Science*, Volume 24, Number 2, 1988, pp. 151-160.

Lederer, A. L., and Mendelow A. L. "The Impact of the Environment on the Management of Information Systems." *Information Systems Research*, Volume 1, Number 3, September 1990, pp. 205-226.

Lederer, A. L., and Sethi V. "The Implementation of Strategic Information Systems Planning Methodologies." *MIS Quarterly*, Volume 12, Number 3, September 1988, pp. 445-461.

Iivari, J. "The Organizational Fit of Information Systems." *Journal of Information Systems*, Volume 2, 1992, pp. 3-29.

McDonald, M. H. "The Statistical Validity of the Ratio Method in Financial Analysis: An Empirical Examination." *Journal of Business Finance & Accounting*, Spring 1984, pp. 89-97.

Miller, D. "Strategy Making and Structure: Analysis and Implications for Performance." *Academy of Management Journal*, Volume 30, Number 1, 1987, pp. 7-32.

Niederman, F.; Brancheau J. C.; and Wetherbe J. C. "Information Systems Management Issues for the 1990s." *MIS Quarterly*, Volume 16, Number 4, December 1992, pp. 475-500.

Nunnally, J. C., and Durham R. L. "Validity, Reliability and Special Problems of Measurement in Evaluative Research." In E. L. Struening and M. Guttentag (Editors), *Handbook of Evaluation Research*. Beverly Hills, California: Sage Publications, 1975, pp. 289-354.

Olson, M. H., and Chervany N. L. "The Relationship Between Organizational Characteristics and the Structure of the Information Services Function." *MIS Quarterly*, Volume 4, Number 2, June 1980, pp. 57-68.

Powell, P. "Information Technology and Business Strategy: A Synthesis of the Case for Reverse Causality." In J. I. DeGross, J. D. Becker, and J. J. Elam (Editors), *Proceedings of the Thirteenth International Conference on Information Systems*, Dallas, Texas, December 13-16, 1992, pp. 71-80.

Raymond, L.; Paré, G.; and Bergeron, F. "Information Technology and Organizational Structure Revisited: Implications for Performance." In J. I. DeGross, R. P. Bostrom, and D. Robe (Editors), *Proceedings of the Fourteenth International Conference on Information Systems*, Orlando, Florida, December 1993, pp. 129-143.

Roach, S. S. "The Technology Slump: Dim Prospects from the Bottom." *Economics Perspective Memorandum*. New York: Morgan Stanley Economics Department, March 11, 1987.

Srinivasan, A., and Kaiser, K. M. "Relationship between Selected Organizational Factors and Systems Development." *Communications of the ACM*, Volume 30, Number 6, June 1987, pp. 556-562.

Steiner, G. A. *Strategic Planning: What Every Manager Must Know*. New York: The Free Press, 1979.

Swanson, E. B. "Information Systems in Organization Theory: A Review." In R. J. Boland and R. A. Hirschheim (Editors), *Critical Issues in Information Systems Research*. Chichester: John Wiley and Sons, 1987, pp. 181-204.

Turner, L. "Organizational Performance, Size, and the Use of Data Processing Resources." Center for Research in Information Systems, New York University, Working Paper Number 58, 1985.

Van de Ven, A. H., and Drazin, R. "The Concept of Fit in Contingency Theory." *Research in Organizational Behavior*, Volume 7, 1985, pp. 333-365.

Venkatraman, N. "Strategic Orientation Of Business Enterprises: The Construct, Dimensionality, and Measurement." *Management Science*, Volume 35, Number 8, August 1989, pp. 942-962.

Venkatraman, N., and Camillus, J. C. "Exploring the Concept of 'Fit' in Strategic Management." *Academy of Management Review*, Volume 9, Number 3, 1984, pp. 513-525.

Venkatraman, N., and Ramanujam, V. "Measurement of Business Economic Performance: An Examination of Method Convergence." *Journal of Management*, Volume 13, Number 1, 1987, pp. 109-122.

Vitale, M. R.; Ives, B.; and Beath, C. M. "Linking Information Technology and Corporate Strategy: An Organizational View." In L. Maggi, R. Zmud and J. Wetherbe (Editors), *Proceedings of the Seventh International Conference on Information Systems*, San Diego, California, December 1986, pp. 265-276.

Weill, P. *Do Computers Pay Off?* Washington: ICIT Press, 1990.

Weill, P., and Olson, M. H. "Managing Investment in Information Technology: Mini Case Examples and Implications." *MIS Quarterly*, Volume 13, Number 1, March 1989, pp. 3-18.

Weiss, A. R., and Birnbaum P. H. "Technological Infrastructure and the Implementation of Technological Strategies." *Management Science*, Volume 35, Number 8, August 1989, pp. 1014-1027.

Yap C. S., and Walshman, G. " A Survey of Information Technology in the U.K. Service Sector." *Information & Management*, Volume 10, 1986, pp. 267-274.

Zahra, S. A., and Covin, J. G. "Business Strategy, Technology Policy and Firm Performance." *Strategic Management Journal*, Volume 14, 1993, pp. 451-478.

Appendix

STRENGTHS AND WEAKNESSES OF INFORMATION SYSTEMS

*In comparing your organization with competition, indicate whether these aspects of your information systems constitute a **strong or weak point** of your organization. Refer to this scale to answer:*

very weak	*moderately weak*	*slightly weak*	*neither strong nor weak*	*slightly strong*	*moderately strong*	*very strong*	***Not Applicable***
1	*2*	*3*	*4*	*5*	*6*	*7*	***N/A***

You must circle "N/A" for every question that is not applicable to your situation.

1.	Implementation of an information architecture to guide applications development and facilitate the integration and sharing of data	1	2	3	4	5	6	7	N/A
2.	Effective use of data resource (the Information Systems Department develops a climate in which data is considered a corporate asset)	1	2	3	4	5	6	7	N/A
3.	Strategic planning of information systems in relation with the business objectives of the organization	1	2	3	4	5	6	7	N/A
4.	Recruitment and development of human resources for information systems	1	2	3	4	5	6	7	N/A
5.	Continuous learning in the organization about ways to better use and integrate new information technologies	1	2	3	4	5	6	7	N/A
6.	Implementation of a responsive information technologies infrastructure	1	2	3	4	5	6	7	N/A
7.	Appropriate position of the Information Systems Department according to the structure and needs of the organization (centralization/decentralization)	1	2	3	4	5	6	7	N/A
8.	Development and use of information systems for competitive advantage	1	2	3	4	5	6	7	N/A
9.	Quality and effectiveness of software development	1	2	3	4	5	6	7	N/A
10.	Planning and implementation of a telecommunications infrastructure that is flexible and effective	1	2	3	4	5	6	7	N/A
11.	Understanding the role and contribution of information systems	1	2	3	4	5	6	7	N/A
12.	Use of electronic data interchange systems (EDI) with your customers, retailers and/or business partners	1	2	3	4	5	6	7	N/A
13.	Development and management of distributed systems	1	2	3	4	5	6	7	N/A
14.	Use of CASE technologies for software development	1	2	3	4	5	6	7	N/A
15.	Planning and management of the applications portfolio	1	2	3	4	5	6	7	N/A
16.	Measure of information systems effectiveness and productivity	1	2	3	4	5	6	7	N/A

Keats, B. W. "The Vertical Construct Validity of Business Economic Performance Measure." *The Journal of Applied Behavioral Science*, Volume 24, Number 2, 1988, pp. 151-160.

Lederer, A. L., and Mendelow A. L. "The Impact of the Environment on the Management of Information Systems." *Information Systems Research*, Volume 1, Number 3, September 1990, pp. 205-226.

Lederer, A. L., and Sethi V. "The Implementation of Strategic Information Systems Planning Methodologies." *MIS Quarterly*, Volume 12, Number 3, September 1988, pp. 445-461.

Iivari, J. "The Organizational Fit of Information Systems." *Journal of Information Systems*, Volume 2, 1992, pp. 3-29.

McDonald, M. H. "The Statistical Validity of the Ratio Method in Financial Analysis: An Empirical Examination." *Journal of Business Finance & Accounting*, Spring 1984, pp. 89-97.

Miller, D. "Strategy Making and Structure: Analysis and Implications for Performance." *Academy of Management Journal*, Volume 30, Number 1, 1987, pp. 7-32.

Niederman, F.; Brancheau J. C.; and Wetherbe J. C. "Information Systems Management Issues for the 1990s." *MIS Quarterly*, Volume 16, Number 4, December 1992, pp. 475-500.

Nunnally, J. C., and Durham R. L. "Validity, Reliability and Special Problems of Measurement in Evaluative Research." In E. L. Struening and M. Guttentag (Editors), *Handbook of Evaluation Research*. Beverly Hills, California: Sage Publications, 1975, pp. 289-354.

Olson, M. H., and Chervany N. L. "The Relationship Between Organizational Characteristics and the Structure of the Information Services Function." *MIS Quarterly*, Volume 4, Number 2, June 1980, pp. 57-68.

Powell, P. "Information Technology and Business Strategy: A Synthesis of the Case for Reverse Causality." In J. I. DeGross, J. D. Becker, and J. J. Elam (Editors), *Proceedings of the Thirteenth International Conference on Information Systems*, Dallas, Texas, December 13-16, 1992, pp. 71-80.

Raymond, L.; Paré, G.; and Bergeron, F. "Information Technology and Organizational Structure Revisited: Implications for Performance." In J. I. DeGross, R. P. Bostrom, and D. Robe (Editors), *Proceedings of the Fourteenth International Conference on Information Systems*, Orlando, Florida, December 1993, pp. 129-143.

Roach, S. S. "The Technology Slump: Dim Prospects from the Bottom." *Economics Perspective Memorandum*. New York: Morgan Stanley Economics Department, March 11, 1987.

Srinivasan, A., and Kaiser, K. M. "Relationship between Selected Organizational Factors and Systems Development." *Communications of the ACM*, Volume 30, Number 6, June 1987, pp. 556-562.

Steiner, G. A. *Strategic Planning: What Every Manager Must Know*. New York: The Free Press, 1979.

Swanson, E. B. "Information Systems in Organization Theory: A Review." In R. J. Boland and R. A. Hirschheim (Editors), *Critical Issues in Information Systems Research*. Chichester: John Wiley and Sons, 1987, pp. 181-204.

Turner, L. "Organizational Performance, Size, and the Use of Data Processing Resources." Center for Research in Information Systems, New York University, Working Paper Number 58, 1985.

Van de Ven, A. H., and Drazin, R. "The Concept of Fit in Contingency Theory." *Research in Organizational Behavior*, Volume 7, 1985, pp. 333-365.

Venkatraman, N. "Strategic Orientation Of Business Enterprises: The Construct, Dimensionality, and Measurement." *Management Science*, Volume 35, Number 8, August 1989, pp. 942-962.

Venkatraman, N., and Camillus, J. C. "Exploring the Concept of 'Fit' in Strategic Management." *Academy of Management Review*, Volume 9, Number 3, 1984, pp. 513-525.

Venkatraman, N., and Ramanujam, V. "Measurement of Business Economic Performance: An Examination of Method Convergence." *Journal of Management*, Volume 13, Number 1, 1987, pp. 109-122.

Vitale, M. R.; Ives, B.; and Beath, C. M. "Linking Information Technology and Corporate Strategy: An Organizational View." In L. Maggi, R. Zmud and J. Wetherbe (Editors), *Proceedings of the Seventh International Conference on Information Systems*, San Diego, California, December 1986, pp. 265-276.

Weill, P. *Do Computers Pay Off?* Washington: ICIT Press, 1990.

Weill, P., and Olson, M. H. "Managing Investment in Information Technology: Mini Case Examples and Implications." *MIS Quarterly*, Volume 13, Number 1, March 1989, pp. 3-18.

Weiss, A. R., and Birnbaum P. H. "Technological Infrastructure and the Implementation of Technological Strategies." *Management Science*, Volume 35, Number 8, August 1989, pp. 1014-1027.

Yap C. S., and Walshman, G. " A Survey of Information Technology in the U.K. Service Sector." *Information & Management*, Volume 10, 1986, pp. 267-274.

Zahra, S. A., and Covin, J. G. "Business Strategy, Technology Policy and Firm Performance." *Strategic Management Journal*, Volume 14, 1993, pp. 451-478.

Appendix

STRENGTHS AND WEAKNESSES OF INFORMATION SYSTEMS

*In comparing your organization with competition, indicate whether these aspects of your information systems constitute a **strong or weak point** of your organization. Refer to this scale to answer:*

very weak 1	*moderately weak* 2	*slightly weak* 3	*neither strong nor weak* 4	*slightly strong* 5	*moderately strong* 6	*very strong* 7	***Not Applicable N/A***

You must circle "N/A" for every question that is not applicable to your situation.

1.	Implementation of an information architecture to guide applications development and facilitate the integration and sharing of data	1	2	3	4	5	6	7	N/A
2.	Effective use of data resource (the Information Systems Department develops a climate in which data is considered a corporate asset)	1	2	3	4	5	6	7	N/A
3.	Strategic planning of information systems in relation with the business objectives of the organization	1	2	3	4	5	6	7	N/A
4.	Recruitment and development of human resources for information systems	1	2	3	4	5	6	7	N/A
5.	Continuous learning in the organization about ways to better use and integrate new information technologies	1	2	3	4	5	6	7	N/A
6.	Implementation of a responsive information technologies infrastructure	1	2	3	4	5	6	7	N/A
7.	Appropriate position of the Information Systems Department according to the structure and needs of the organization (centralization/decentralization)	1	2	3	4	5	6	7	N/A
8.	Development and use of information systems for competitive advantage	1	2	3	4	5	6	7	N/A
9.	Quality and effectiveness of software development	1	2	3	4	5	6	7	N/A
10.	Planning and implementation of a telecommunications infrastructure that is flexible and effective	1	2	3	4	5	6	7	N/A
11.	Understanding the role and contribution of information systems	1	2	3	4	5	6	7	N/A
12.	Use of electronic data interchange systems (EDI) with your customers, retailers and/or business partners	1	2	3	4	5	6	7	N/A
13.	Development and management of distributed systems	1	2	3	4	5	6	7	N/A
14.	Use of CASE technologies for software development	1	2	3	4	5	6	7	N/A
15.	Planning and management of the applications portfolio	1	2	3	4	5	6	7	N/A
16.	Measure of information systems effectiveness and productivity	1	2	3	4	5	6	7	N/A

17.	Development and management of decision support systems and executive support systems	1	2	3	4	5	6	7	N/A
18.	Management and use of end-user computing	1	2	3	4	5	6	7	N/A
19.	Information security and control	1	2	3	4	5	6	7	N/A
20.	Establishment of effective disaster recovery capabilities	1	2	3	4	5	6	7	N/A

Questionnaire adapted from F. Niederman, J. C. Brancheau and J. C. Wetherbe, "Information Systems Management Issues for the 1990s," *MIS Quarterly*, Volume 15, Number 4, December 1992, pp. 475-500.