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Technology Management and Information Technology Strategy: Preliminary Results of an Empirical Study of Canadian Organizations

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The strategic use of information technology (IT) has received considerable attention in academic circles from the 1980s on and researchers have put forward several prescriptive models which businesses could adopt in order to identify the strategic potential of IT in business. Most of them tried to rationalize their theories using a limited number of success stories originating largely from American multinational corporations. Unfortunately, so far, very little empirical research has been conducted to examine the general validity of the ivory tower theories. Our project which was conducted in Montreal using a large number of Canadian companies has been an attempt to discover if we can find any evidence of the impact of academic theories on the real world of business. This paper addresses three main themes: Do Canadian organizations have a corporate IT strategy? Are organizations in Canada using IT in a strategic fashion? Can we identify any difference between the service and manufacturing sectors concerning the use of IT? In order to achieve these objectives we used two methods. Since there is overwhelming evidence in the management literature that the Chief Executive Officer's annual report to shareholders can serve as a convenient keyhole through which one can observe the evolution of corporate strategy, our first approach involved an examination of a random sample of such reports of 39 companies to see if IT matters figured prominently in them. Secondly we used a questionnaire survey of a fairly large number of companies, which formed the major part of our investigation, to ascertain top management commitment to IT as well as the external orientation of IT systems in order to address the competitive forces faced by companies.

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Introduction

Information is now widely regarded as an important organizational resource[1] and, like all other resources, it has to be managed effectively in order to achieve organizational goals and objectives. Perhaps the most important vehicle available for the management of information is information technology (IT) and, since the 1960s, organizations have been using computers successfully as an information resource management tool. Most of the early use of IT, however, had a heavy internal focus (eg accounting, payroll etc). During the 1980s onwards its strategic use (external focus, eg automatic teller machines (ATMs) machines in banks) has received considerable attention probably as a direct result of the deregulation of the financial and communications sectors. Indeed the past decade has witnessed a plethora of publications championing the potential of IT in achieving competitive advantage.[2] Unfortunately most authors have made repeated use of a limited

[1] BURCH, J G (1986) 'In a competitive world, the strongest weapon is information' *Data Management'* **24** (2) 22–28

[2] BEAUMONT, J AND SPARKS, L (1990) 'Information technology is a source of competitive advantage' *International Journal of Information Resource Management* **1** (1) 28–36; EARL, M J *ET AL* (1988) 'Competitive advantage through information technology: eight maxims for senior managers'

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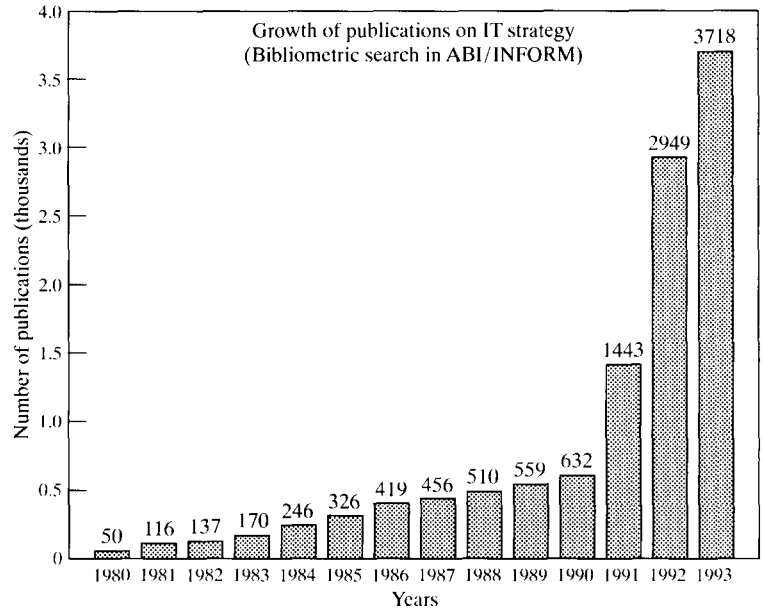

Figure 1

number of well-known success stories emanating from such large corporate giants as the American Airlines, Federal Express, American Hospital Supply etc so much so that it has become almost impossible to separate facts from fiction. In fact some of them went completely overboard and seemed to prescribe IT as the cure for all business ills. If life were that simple virtually every organization would have moved their IT systems from the backroom to the firing line. Indeed many did, and paid a heavy price.

IT and the management/IS literature

Since the subject of IT has received considerable academic and commercial interest recently, we began our project first by quantifying the number of papers that have been published in this area during the past decade. A bibliometric analysis of the literature was conducted using the terms 'information technology' or 'IT' or 'information systems' and 'strategy' in the ABI/Inform database. The number of papers for each year from 1980 to 1993 was then calculated and a graph was plotted to produce the results shown in *Figure 1*.

As can be seen, the total number of papers was shown to be 14 452 and that the number of publications have grown from 60 in 1980 to 3718 in 1993 which obviously represents more than a 61-fold increase over the past 13 years or so. Whilst the number of papers has grown steadily from 1980 to 1990 (reaching a 10-fold increase in as many years), there has been an upsurge from 1990 onwards demonstrating the tremendous interest the subject is generating currently among the academic and research community. [A word of caution, however. It is likely that at least part of the increase in papers over the years could be attributed to the addition of more and more management journals to the ABI/INFORM database so that citations are growing in number.] In view of the significant growth in papers, most of them theoretical, we wanted to

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Multinational Business (2) 15–21; PARSONS, G L (1983) 'Information technology, a new competitive weapon' *Sloan Management Review* **25** (1) 3–14

study if there is any relationship between what academic pundits have been prophesying about the competitive benefits which can be derived from IT systems and what has been happening in the real world of business. More specifically, using a large number of organizations in Montreal as a test bed, we wanted to examine empirically (i) if they have any clearly defined strategy with regard to the use of IT and, if so, (ii) whether there is any evidence to conclude that IT is being used to address the external competitive threat faced by firms.

IT and competitive strategy

The origin of most of the current work in IT strategy lies with Michael Porter's classical framework[3] concerning competitive forces. According to him, the five possible threats a firm has to face are: rivalry within the industry, bargaining power of customers, bargaining power of suppliers, threat of new entrants and substitute products/services. His descriptive competitive framework also identified three generic strategies which a firm could choose from in order to counteract the influence of the external forces. These are cost leadership, differentiation of its products and/or services, and innovation to focus its business in a market niche. Porter argued that organizations could deal with the competitive forces effectively by following any one of the above strategies. There are proponents and opponents of this view. For instance, Miller questions the wisdom of following a single generic strategy at the exclusion of others and he argues that a mixed strategy, in many instances, will have less pitfalls.[4] That is, the synergy which can be generated from the hybrid approach is more difficult for competitors to copy. Indeed Miller and Friesen[5] tested the strategy employed by a large number of consumer durable industries in the USA using cluster analysis technique and it was shown that none of the companies fell into Porter's 'pure' generic type. The majority followed a mixed strategy [cost leadership and differentiation or cost leadership and innovation (focus) etc] and Porter's model did not apply to the rest. The issue of competitive strategy has also been studied widely by other authors such as Quinn.[6]

Many other researchers such as McFarlan,[7] Cash and Konsynski[8] and Earl[9] have, more recently, expanded and built upon the work of Porter with a view to study the opportunities which his model provides for top executives to investigate the strategic potential of IT systems in business. Some of them have argued[10] passionately that IT can be used in a defensive or offensive fashion in order to address the five competitive forces. If there is any substance in this proposition, we should be able to demonstrate that it is being practiced by the real world of business. In other words we need to examine whether corporate practice matches with academic theory. For instance, if IT plays a central role in an organization's performance then it is likely that this will be reflected in the annual Chief Executive Officer's (CEO's) report to shareholders. Similarly other evidences we could look for include the use of IT for managing customer and supplier relationships. In a recent paper Segars and Grover[11] point out the lack of empirical studies (models) in assessing the impact of IT on organizational performance and competitiveness. This indeed has been the major impetus for our investigation.

In a recent conference presentation entitled 'Information technology and new emergent forms of organization', Land[12] makes an interesting comparison between the work of John Kay[13] and Scott Morton[14] in the

[3] PORTER, M E (1979) 'How competitive forces shape strategy' *Harvard Business Review* **57** (2) 137–145; PORTER, M E (1989) *Competitive Strategy* Free Press, New York; PORTER, M E AND MILLAR, V (1985) 'How information gives you competitive advantage' *Harvard Business Review* **63** (4) 149–160

[4] MILLER, D (1992) 'The generic strategy trap' *The Journal of Business Strategy* **13** (1) 37–41

[5] MILLER, D AND FRIESEN, P H (1986) 'Porter's (1980) generic strategies and performance: an empirical examination with American data Part 1: testing porter' *Organisation Studies* **7** (1) 37–55; MILLER, D AND FRIESEN, P H (1986) 'Porter's (1980) generic strategies and performance: an empirical examination with American data Part II: performance implications' *Organisation Studies* **7** (3) 255–261

[6] QUINN, J B AND PAQUETTE, P C (1990) 'Technology in services: creating organizational revolutions' *Sloan Management Review* **31** (2) 67–78; QUINN, J B *ET AL* (1990) 'Technology in services: rethinking strategic focus' *Sloan Management Review* **31** (2) 79–87; QUINN, J B *ET AL* (1990) 'Beyond products: services-based strategy' *Harvard Business Review* **68** (2) 58–68; QUINN, J B (1992) 'The intelligent enterprise a new paradigm' *Academy of Management Executive* **6** (4) 48–63

[7] MCFARLAN, F W (1984) 'Information technology changes the way you compete' *Harvard Business Review* **62** (3) 98–103

[8] CASH, J I AND KONSYNSKI, B R (1985) 'IS redraws competitive boundaries' *Harvard Business Review* **63** (2) 134–142

[9] EARL, M J (1989) *Management Strategies for Information Technology* Prentice Hall, London; EARL *ET AL*, *op cit*, Ref 2

[10] *Op cit*, Ref 9

[11] SEGARS, A H AND GROVER, V (1994) 'Strategic group analysis: a methodological approach for exploring the industry level impact of information technology' *Omega* **22** (1) 13–34

[12] LAND, F (1994) 'The emergent organization: does information technology matter?' in *Information Technology and New Emergent Forms of Organizations IFIP WG 8.2 working conference* University of Michigan

[13] KAY, J (1993) *Foundations of Corporate Success* Oxford University Press, Oxford

[14] SCOTT MORTON, M (1991) *The Corporation of the 1990s* Oxford University Press, Oxford

area of corporate success. According to Kay '. . . there are no recipes, and generic strategy for corporate success' and that success will depend on a range of factors such as the architecture, innovation, reputation and strategic assets of the company. Unlike the MIT researchers led by Scott Morton which has investigated the centrality of information technology in the emerging organizations of the 1990s, Kay emphasizes the point that the '. . . match between the capabilities of the organization and the challenges it faces . . . was the most important issue in understanding corporate success and corporate failures.' Obviously an interesting dichotomy has arisen between those who consider IT to be the driving force for success and those who take a more cautious approach. This has indeed been the background in which our current project was carried out. More specifically, we wanted to investigate if it is possible to find any evidence for the centrality of information technology in the corporate success of a large number of Canadian companies.

Research methodology

The initial impetus for the current project came from the research of Jarvenpaa and Ives,[15] who proposed that the annual report to shareholders can serve as a rough surrogate for CEO's views and the status of IT in organizations. Their work was based on the suggestions by other researchers[16] that such reports can serve as a convenient keyhole through which we can observe the evolution of corporate strategy. Since, this method on its own could not address the research propositions of our study, a two stage approach was adopted. Thus, in the first stage, we attempted to replicate the results of the other researchers by examining the annual reports to shareholders of Montreal-based organizations. More specifically we were trying to establish if any evidence can be found concerning top management commitment towards the use of IT in business. Annual reports of 39 companies operating in a wide range of sectors were obtained for 1989, 1990, 1991 and 1992. In some cases we were unable to get the complete set of reports for all the four years. A total of 128 reports were analysed for their contents which represents an average of 3.3 reports for each company. The examination of each set of reports took on average, three hours. All companies had sales turnover in excess of $100m per annum with public listings for their stock.

Our analysis was not as extensive as that of Jarvenpaa and Ives.[17] Nevertheless the analysis included the number of times any IT related matters were discussed and the manner in which IT was used.

In the second stage, which formed the major part of our investigation, a questionnaire was designed to examine if there is a strategic alignment between IT systems and the external competitive forces faced by organizations. The survey instrument also included questions to assess overall management commitment towards developing and using IT. The questionnaire used a methodology somewhat similar to the research instrument developed by Chan and Huff[18] for their working paper on assessing information systems strategy. However, the aim of their research was different from ours, as they attempted to find out what relationships exist between realized information systems strategy and information system effectiveness.

The listings of companies for the survey was obtained from the

[15] JARVENPAA, A I AND IVES, B (1990) 'Information technology and corporate strategy: a view from the top' *Information Systems Research* **1** (4) 351–370

[16] BOWMAN, E H (1984) 'Content analysis of annual reports for corporate strategy and risk' *Interfaces* **14** (1) 61–71

[17] *Op cit*, Ref 15

[18] CHAN, Y AND HUFF, S (1993) 'Assessing information systems strategy' Working Paper Queen's University, Kingston, Ontario, Canada

Financial Post's Top 500 Canadian company listings for 1992. The list contains companies ranked according to their annual sales turnover which ranged from Cd$144m to Cd$19.8b. The companies were contacted over the telephone to seek their consent for participation in the study. Once the consent was obtained, introductory letters (to the study) and questionnaire were sent to 78 companies. Companies in Montreal were chosen in order to ease the administration of the survey. However, these companies are representative of similar companies spread throughout Canada (ie similarity in size, sales volume, industry sector variations etc).

Discussion of results

Analysis of annual reports

Jarvenpaa and Ives' study[19] included analysis of annual reports (1982–87) of 88 US companies in the banking, publishing, retailing and petroleum sectors. According to their research more than 90 per cent of companies in the banking, publishing and retailing sector had some mention of IT matters in their reports. Our study, by contrast, indicated that only 43.5 per cent of the 39 companies surveyed had some IT related phrases appear in their annual reports. While the other researchers attempted to monitor the progression of IT related phrases from 1982 to 1987 and the sector differences based on information intensity of the four specific sectors, our study used this approach primarily to assess if IT was an important enough issue to top management for presentation to shareholders of the company, and in turn, indicate a degree of top management commitment to IT. The analysis involved an examination of the number of times IT related matters are mentioned and the manner in which IT has been used. Unlike the previous study, we did not engage in a detailed analysis since it constituted only a minor part of our investigation. The major instrument of our research, as indicated earlier, was a questionnaire survey which contained several questions to study company policies in relation to IT including a direct question: 'Do IT matters figure prominently in your CEO's annual reports?'.

Content analysis of annual reports of companies that did mention IT-related phrases indicated a strong positive role IT plays in relatively smaller Montreal companies. These were companies such as Guillevin International, United Westborne (both Electrical parts distributors), Quebecor Inc (publishing), and Unigesco (Food Beverage, retail). For example, the letter from the CEO of United Westborne to its shareholders in 1990 had IT phrases used over 11 times and included statements such as IT 'is a key element in developing opportunities for greater market penetration . . . reduction in operating costs . . . (and) to maintain optimum inventory levels'. In 1991 one of the highlights of the year has been the appointment of a general MIS manager and the 'installation of a new MIS system . . . (which) . . . features a decentralised distributed architecture . . . linked through high speed WAN'. The CEO went on to say IT is playing an 'increasingly important role in gaining . . . competitive advantage' through reduction in operating costs and improved customer service.

Similarly the CEO of Guillevin International is quoted below in five consecutive years beginning 1988:

[19] *Op cit*, Ref 15

> We foresee a rapid increase in this type of service (EDI) and are prepared to satisfy all our customer's requirements in this area of EDI. [1988]
>
> The internal development of the company parallels the evolution within our industry. The Just-in-Time, EDI, and bar coding are concepts which have arrived. [1989]
>
> A major element in partnering (close co-operation between distributor and customer to lower transaction costs) is the use of EDI which is a vehicle by which transactions are completed accurately, quickly and at low cost. [1990]
>
> Through improved computerised management systems and special program for handling slow moving merchandise, Guillevin succeeds in reducing inventory investment by $10.7 million. [1991]
>
> EDI is an essential tool in raising the efficiency and productivity of modern companies. It enables customers and suppliers to complete many transactions without exchanging documents. [1992]

Based on these statements and analysis of the reports of other companies we can cautiously state that IT systems enjoy the strong support of the CEOs of at least 45 per cent of companies and therefore it is not unreasonable to assume that IT has become an integral part of the corporate strategy in a significant number of Canadian companies. Unfortunately, because of a shortage of resources (ie research assistant), we were unable to carry out an extensive analysis of the content of all the annual reports. In any case, analysis of reports was not a major part of our study and it was performed largely to 'test the water'.

Questionnaire survey

The questionnaire design attempted to limit the time needed for responses from the respondents, and at the same time enable them to answer questions without much cross referencing in their organization. It was divided into three sections. In the first section, respondents were asked to provide demographic details. These included the principal activity of the company, age and status of the company, the position of the respondent and the number of employees employed locally and the company as a whole. The second section was used to gather data concerning indicators of strategic alignment of IT systems. Companies were first asked to rate the five competitive forces identified by Michael Porter in the order of their significance. Secondly they were given a list of 13 different strategic uses of IT (see *Table 1*) and were asked to relate their own experiences with IT systems based on their strength of agreement to the options provided. These options identify the specific strategies which companies could adopt in order to meet or challenge the external competitive forces. Companies were also asked if their IT systems were unique to the industry sector they operated in. This along with the strength of agreement with the 13 IT options (to challenge competitive forces) can suggest if companies perceive IT systems as a source of competitive advantage.

Since organizational culture and structure[20] are important in creating an environment conducive to the innovative use of IT, section three of the questionnaire was devoted to the collection of data pertaining to this point. It is now widely recognized that the leadership should come from

[20]EARL, *op cit*, Ref 9; ROCKHART, J F AND SCOTT MORTON, M S (1984) 'Implications of changes in information technology for corporate strategy' *Interfaces* **14** (1) 84–95; LAND, F (1992) 'The management of change: guidelines for the successful implementation of information systems' in BROWN, A (ED) *Creating a Business-based IT Strategy* Chapman & Hall, London, pp 144–173; QUINN, J B AND BAILEY, M N (1994) 'Information technology' *Brookings Review* **12** (3) 36–41

Table 1 *Potential of IT in the competitive arena*

Experience of companies with their IT systems	Competitive force
IT systems used by us are capital intensive and contribute significantly to our economies of scale.	Threat of new entrants
IT systems used by us are unique to our industry and are a source of major competitive advantage to our business.	
IT systems used by us link up our distribution channel extensively through online computer systems.	
IT systems enable us to develop strong ties with our major suppliers	Bargaining power of suppliers
IT systems enable online scanning or periodic analysis of supplier products, prices and performance.	
Interorganizational IT systems enable us to differentiate our service from other vendors within the industry and provide preferential service to our customers.	Rivalry within the industry
IT systems help us in maintaining leadership position in our industry.	
Our IT systems are updated to keep ahead of technological systems of other competing firms in our industry.	
For strategic reason, we share our IT systems with other competitors within our industry.	
IT systems help us better manage our dealer, distribution networks for our products and services.	Bargaining power of customers
IT systems help our customers custom design, specify, and query product specifications, prices, service support etc.	
IT based customer information systems are used to gather information on customer behaviour, tastes, needs, and help us target new segments.	Threat of substitute products or services
IT systems help us design innovative products/services within and in related industry we operate in.	

the top[21] and IT requires the continued support of senior executives who have the vision and political will to make things happen. The theme of top management commitment and organizational culture, particularly in the implementation stage, has been well argued by other researchers such as Land[22] and Mintzberg.[23] As Mintzberg puts it: 'The notion that strategy is something that should happen way up there, far removed from the details of running the organisation on a daily basis, is one of the great fallacies of conventional strategic management. And it explains a good many of the dramatic failures in business and public today'. The IT manager ideally should be a self assured hybrid—a person who combines business skills with technical competence[24]—who enjoys the support of top management and has the persuasive power to knock down walls in way that is acceptable to the organization. Above all he should have the ability to identify the strategic potential of IT in business without falling in love with the technology. Our survey instrument included several questions to examine some of the above

[21] DAVENPORT, T H (1989) 'How executives can shape their company's information systems' *Harvard Business Review* **67** (2) 130–134; EARL *ET AL*, *op cit*, Ref 2
[22] LAND, *op cit*, Ref 20
[23] MINTZBERG, H (1987) 'Crafting strategy' *Harvard Business Review* **65** (4) 66–75
[24] MEIKLEJOHN, I (1989) 'CIOs search for a role' *Management Today* September, 137–138

Table 2 *Profile of respondents by line of business and organizational position*

Line of business	Number	%
Manufacturing	17	51.5
Services (eg banking, transportation . . .)	10	30.3
Distribution/Wholesale/Retail business	6	18.2
Total	33	100.0
Position of respondent	**Number**	**%**
Director/President	2	6.1
Vice President/Manager	27	81.8
System Analyst/Programmer	4	12.1
Total	33	100.0

issues including top management commitment to IT matters. Frequency of IT discussion at Board level, the position of the IT manager in the company (is he a member of the Executive Board?) and his background (hybrid?), existence of an internal IT team, strength and budget of the IT department, end-user involvement in IS development, and training policy of the company can all provide some insight into the organizational culture and top management commitment to IT. The questionnaire also contained a direct question on whether IT matters figure prominently in their annual reports to shareholders.

The response to the questionnaire was encouraging, with 42 per cent (33 companies) returning the completed questionnaires. *Table 2* provides a profile of the companies and the position of the respondent within the company.

As *Table 2* shows 51.5 per cent of the companies who participated in the survey were in the manufacturing sector. Since distribution/wholesale and retail business are also service oriented companies, for the purpose of our study, they were combined with others in the service sector. Thus the service sector represented 48.5 per cent of the sample. Mean age of the companies was 45 years, indicating that these are mature organizations. The companies had, on average, 865 staff employed locally, and a mean of 4944 employees in the company as a whole. Eighty-eight per cent of the respondents were at manager or higher level in the company's hierarchy.

External competitive force(s) faced by respondent companies

Companies were first asked to rank (on a scale of 1 to 5) the five competitive forces proposed by Porter and Millar[25] in the order of their significance. This question was put to them without any reference to IT. Not surprisingly, 'Intensive competition/rivalry within the industry' emerged as the single most important competitive force faced by the companies (mean 1.467, mode 1). For 66.6 per cent of the companies, this was the most important force, and for 20 per cent of the companies the second most important force.

The responses to 'Emerging substitute products/services' force (mean 3.000, mode 3) were normally distributed suggesting average significance of third most significant force faced by the companies. Companies were dispersed in their opinion on the 'Few large customers/fast

[25]PORTER AND MILLAR, *op cit*, Ref 3

changing consumer taste' force (mean 3.040, mode 5). None of the respondent companies felt that 'Threat of new entrants' (mean 3.296, mode 2/3), was the most important external force faced by them. Similarly, 'Monopoly of suppliers' was ranked as the most important external force by only one company and, in general, was ranked as a factor of low importance by the companies (mean 4.125, mode 5). Two other external forces namely, 'Government control' and 'Distributor power' were also referred to as additional complexities in the external environment of two companies.

The alignment of IT systems with firm's competitive forces

Having ranked the competitive forces, companies were given a list of 13 potential applications of IT (*Table 1*) in addressing the external threats. They were asked to rate these applications on a scale from 0 to 5 depending on the strength of agreement of their current IT systems (5 = strongly agree, 1 = strongly disagree, 0 = not applicable). Analysing the results, for 12 IT applications, the responses were slightly above the neutral response of 3.000 (mean scores between 3.000 and 3.667). Only one application namely, the strategy of sharing IT resources with other competitors in the industry (for cost reductions and sharing information) stood out, with 12 (36.4 per cent) of the companies finding this as not applicable to their IT systems, and the rest strongly disagreeing (mean 1.333) with the strategy.

Rank correlation tests (non-parametric) were performed using MINITAB to test if any correlation exists between various IT strategies and the corresponding external competitive force. Contrary to the suggestions made in academia for different IT strategies companies could adapt to challenge their external competitive forces, empirical results of Montreal based corporations indicate very low rank correlation scores. Very little association was found between the current uses of IT and the external competitive force(s) faced by the companies. *Table 3* provides the result of these tests.

This is also in line with other responses, for instance, 63.6 per cent of the respondent companies felt that their IT systems were in no way unique to the industry sector they operate in, suggesting a lack of evidence of competitive advantage obtained through IT.

Several reasons can be attributed to these findings. One could be that little attention is being paid by companies to their external business environment as far as the use of IT systems is concerned. Another reason could be that companies are concentrating their efforts on automating housekeeping functions and production to achieve internal efficiency and they do not regard external orientation of IT systems as critical to their operations. However, before any conclusive statements can be made (about Canadian companies in general), the researchers of this paper propose a further survey to increase the sample base and additional methods of measuring the strategic alignment of IT systems in companies.

The notion of information intensity put forth by Porter and Millar[26] received limited empirical support. Each of the 13 IT applications, when tested for differences between the manufacturing and the service oriented companies, no significant differences were observed in how strongly either sectors feel their IT systems correspond to the strategies mentioned in the questionnaire. For example, with respect to creating entry barriers to new entrants using capital intensive IT systems (and

[26]PORTER AND MILLAR, *op cit*, Ref 3

Table 3 *Rank correlation tests between IT strategies and competitive forces*

Experience of companies with their IT systems	Competitive force	Rank correlation coefficients
IT systems used by us are capital intensive and contribute significantly to our economies of scale.		−0.144
IT systems used by us are unique to our industry and are a source of major competitive advantage to our business.	Threat of new entrants	−0.010
IT systems used by us link up our distribution channel extensively through online computer systems.		−0.177
IT systems enable us to develop strong ties with our major suppliers.		−0.041
IT systems enable online scanning or periodic analysis of supplier products, prices and performance.	Bargaining power of suppliers	−0.022
Interorganizational IT systems enable us to differentiate our service from other vendors within the industry and provide preferential service to our customers.		−0.267
IT systems help us in maintaining leadership position in our industry.		−0.201
Our IT systems are updated to keep ahead of technological systems of other competing firms in our industry.	Rivalry within the industry	−0.119
For strategic reasons, we share our IT systems with other competitors within our industry.		−0.048
IT systems help us better manage our dealer, distribution networks for our products and services		0.312
IT systems help our customers custom design, specify and query product specifications, prices, service support etc.	Bargaining power of customers	0.537
IT-based customer information systems are used to gather information on consumer behaviour, tasks, needs, and help us target new segments.		0.069
IT systems help us design innovative products/services within and in related industry we operate in.	Threat of substitute products or services	−0.106

Level of significance 5 per cent. Reject null hypothesis for Rank correlations < -0.305, $n = 30$.

thus increasing overall economies of scale), no association in strength of agreement between service or manufacturing companies was found (chi-squared 6.558, df 4). Similarly, with respect to developing IT systems that are unique in some way to a particular industry sector (and thus offer a source of competitive advantage), there was once again no association (chi-squared 6.401, df 4) between the industry sector and IT applications.

Deployment in internal operations

Based on the above findings of a lack of clear external orientation of organizational IT systems, one would assume that organizations con-

tinue to use IT in areas that were traditionally in-house or internal to their operations. As *Table 4* shows almost all the companies are making extensive use of IT in their internal operations.

It is likely that some of these internal systems may have interaction with the outside. For example, Benjamin *et al*[27] suggests the use of EDI for online order placement to develop strong ties with major suppliers. This may be a component of material procurement support systems that organizations may already have, and a part of the overall production/ manufacturing systems that already exists in most companies. Since the use of EDI has matured, perhaps, companies do not perceive such technology as providing any special advantage vis-à-vis their competitors.

While the internal areas where IT is used in common to both the service and manufacturing oriented companies (with the exception of production), no significant associations were found when companies were tested for differences in reasons for using IT systems to support internal operation. On a scale of 1st to 3rd most important reason for using IT, companies ranked improvement in productivity as the most important reason (mean 1.40, mode 1) supporting decision making as second (mean 1.90, mode 2) and reduction in labour cost as the third most important reason (mean 2.34, mode 3). Tests for difference between service and manufacturing were inconclusive in proving the hypothesis that service companies use IT more for reduction of labour costs than manufacturing companies (chi-squared 1.333, df 3). Similar results were obtained for improvement in productivity (chi-squared 0.622, df 1), and in support of decision making (chi-squared 2.051, df 2).

Organizational structure and top management commitment to IT

Since organizational culture and structure[28] are important in creating an environment conducive to the effective harnessing of IT systems, our study has looked at this issue using a number of relevant questions. Despite the best efforts it is virtually impossible to obtain a clear picture of this point using a questionnaire survey. Nevertheless we did try to assess organizational culture in relation to the commitment of top executives to IT issues. More specifically, we wanted to find out: Do IT matters matter to senior managers?

Our survey has produced some positive results. For instance, it was found that at least a quarter of the companies surveyed had an IT manager who is a member of the Executive Board (IT budget over Cd$1m) and almost half of the IT managers have both business and technical expertise (IT budget in excess of Cd$500 000). More than 50 per cent of companies do discuss IT matters at Board level either on a monthly or quarterly basis. Around 15 per cent of companies said IT matters figure very prominently in their CEO's annual report to shareholders. Surprisingly this figure is much lower than that we found ourselves by analysing the reports. This is primarily due to the fact that a number of companies whose reports contained IT related matters did not return the completed questionnaire. Another reason could be that the person who completed the questionnaire was perhaps not aware of the fact that his/her Chairman had included the subject in the letters to shareholders. Over 75 per cent of the respondents said their companies have a formal policy to train staff in IT skills and almost 70 per cent have IT budgets in excess of Cd$500 000 per annum. All the above points including those other ones shown in *Table 5* seem to indicate that a

[27]BENJAMIN, R I, *ET AL* (1990) 'Electronic data interchange—how much competitive advantage?' *Long Range Planning* **23** (1) 29–40

[28]EARL *ET AL*, *op cit*, Ref 2

Table 4 *Internal areas where it is used*

Internal operations	Percentage
Production (MRP, Scheduling, Inventory control . . .)	85%
Marketing (Billing, Sales, Distribution . . .)	94%
Finance (Accounting systems, Capital budgeting . . .)	100%
Personnel (Payroll, HRD, Time Management . . .)	94%

significant number of Canadian companies do recognize the potential of IT in business, although, at the moment, it is used primarily to improve internal efficiency rather than to address the external competitive forces.

Conclusions

'Competitive advantage through IT' used to be the slogan by which some academics sought to respond to all of the business ills of the 1980s. Although this phrase has captured our imagination it has not yet captured the hearts and minds of a large number of corporate executives. As our study shows, whilst there are encouraging signs that IT has become an integral part of the corporate strategy of a significant number of Canadian companies, the majority are still lagging far behind. Our study could find little empirical evidence to support the view that IT is currently being used either in a reactive or proactive fashion to address Porter's five competitive forces. Thus, for seven of the 13 IT options,

Table 5 *Measurement of commitment to IT*

Measures of commitment to IT	Percentage of companies responding favourably
IT Manager, a member of the Executive Board	23.0% Total 26 respondents
IT Manager, a Business Executive with IT expertise	46.1% Total 26 respondents
Prominent mention of IT matters in CEO's statements in Annual Reports	15.1%
Frequency of IT discussions at senior management level:	
Monthly	9 companies 27.3%
Quarterly	8 companies 24.2%
Annually	1 company 3.0%
Depending on need	13 companies 39.4%
Rarely	2 companies 6.0%
Policy for analysing organizational needs before implementing IT	63.6%
End-user involvement in design of IT systems	100.0% Total 32 respondents
Policy to train staff, update IT skills	75.8%
IT budgets in excess of $500 000 per annum	69.7%
Advice on IT matters—both internal staff and external available	87.8%
Whether a separate IT department exists for IT planning and implementation	81.8%

more than 30 per cent of the companies found that they were not applicable to their current IT systems, indicating a lack of external orientation of organizational IT systems. Analysis of individual companies that ranked a particular external force as the most important influencing factor in their business environment did not provide also any conclusive evidence to suggest that the IT systems of the companies are aligned to meet or challenge that external force. The survey findings thus indicate that there is a mismatch between IT systems and the overall external concerns (forces) of the company. Also, contrary to the notion of information intensity put forward by Porter and Millar, our results suggest that there is no difference in deployment of IT systems for any one of the strategic reasons between the manufacturing and the service oriented companies.

Despite the lack of alignment of IT systems with the external environment in a large number of companies, there is strong evidence to suggest that organizations are firmly committed to the use of IT particularly in their internal operations. However, we could find no evidence to support the proposition that service sectors would employ IT any more than manufacturing companies for reduction of labour costs. Also, in at least 25 to 45 per cent of companies, top management commitment to IT was clearly evident. In further research we propose to probe more deeply to identify the reasons for the lack of external orientation and strategic alignment of IT systems in Canadian companies.