Information System Issues Facing Canadian Small Business

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A national survey of small Canadian firms was conducted using the Delphi technique. Major information systems issues were identified including 1) using IS for competitive advantage; 2) improving IS project management practices and 3) improving the effectiveness of software development. It appears that small firms are lagging large firms where the technology is concerned, but are similar on conceptual issues. We believe that small firms will continue to desire more internal control over operations and consequently adopt more technology. Hardware and software quality and reliability will stay at the forefront of their worries. Furthermore, as communications become more mission critical, i.e. Electronic Data Interchange, small firms will embrace network technology. Managing networks may become a ***very*** *critical problem for small business.*

The literature is divided on how to define *small*. Some studies use annual sales figures of less than $10 million (Weinstein, 1994), however, it has been suggested that private companies are often reluctant to disclose their annual revenues (Montazemi, 1988). Those who discriminate based on numbers of employees have chosen different thresholds. For example, some chose less than 50 employees (Lai, 1994), 100 or less (Doukidis, Smithson and Lybereas, 1994), 250 (Kagan, Lau and Nusgart, 1990) and 500 or less (SBA, 1990). It has even been suggested that defining a small business has to be arbitrary because different standards are adopted for different purposes such as SBA loans, government grants, etc. (Delone, 1981; Weinstein 1994). This view was confirmed in a recent personal communication with the Director of the Canadian Federation of Independent Business (Wright 1995) who proposes that the definition of a small business is a "moving definition" in the current business environment. The definition held constant some ten years by the Canadian Small Business Guide (1984, less than 100 employees) is no longer applicable. The Canadian Organization of Small Business (1995) reported that they accept members up to and including 150 employees. For the purposes of the current study, we have chosen to use the 150 or less employees as the definition of a small business.

In recent studies on the use of IT, several researchers (Heikkila, Saarinen and Saaksjarvi, 1991; Clark, 1987; Poutsma and Walravens, 1989; Comford and Whitly, 1991) propose major differences between small and large firms. These include

- Small firms tend to use computers more as tools and less as a communications medium;
- Few stakeholders involved in small firms mean that there are likely to be fewer problems in terms of organizational politics;
- Small firms have diminished resources available to implement IT solutions;
- Small firms are able to complete the transition process much faster and possess greater flexibility to realize the full benefits of any new IT;
- Flexibility of new IT facilitates small batch or niche-focused production (the preserve of the small firm);
- IT allows small firms to increase their market scope and secure their position through improved communication with other large and small firms;
- Technology can lead to greater internal control of operations;
- New organizational forms;
- Ease of spawning new business.

While factors that influence the use of information technology by small firms and their satisfaction with IT have been the focus of a number of studies, little has been said about the kinds of MIS issues they face. With the exception of Alpar and Ein-Dor (1991), who polled U.S. companies with 500 or fewer employees, previous studies of MIS issues have focused on large organizations, or have not reported a distinction between large and small firms in their findings. Of those reporting on large organizations, the most notable studies include Ball and Harris

(1982), Dickson, Leitheiser, Wetherbe and Nechis (1984), Brancheau and Wetherbe (1987), Dickson and John (1989), Delone (1988) and Niederman, Brancheau and Wetherbe (1991). Table 1 presents the results from the most recent threeround Delphi survey of senior IS executives in the U.S. (Niederman, Brancheau and Wetherbe, 1991). This data is placed in the series of surveys beginning in 1980 that was captured by researchers by Ball and Harris (1982) and the those carried out at the SIM/MIS Research Center, University of Minnesota (see Figures 1 and 2). The most important issues are fairly conceptual and have broad scope.

On the other hand, Alpar and Ein-Dor (1991) polled small firms (using a free form survey) on their "concerns" with respect to information technology and then categorized them. Since this is a quite different methodology from the Delphi technique above, one would expect to see differences in the labeling, but perhaps not in the content of the issue or concern. As they point out, their top two items, Reliability and System Quality, do not appear in **any** of the previous issues studies. Further, five out of six of their lowest ranked categories parallel the top five issues in most of the previous studies. They suggest two hypotheses to explain the differences. First, the two populations are different. IS executives or senior managers are quite different than the owner/operators of small business. Generally speaking, owner/operators have quite a bit less experience with computers than do large business executives. Second, the needs of the two sizes of firms are quite different. There is less need for alignment and coordination because there is often direct communication between top management and the employees. On the other hand, resources are scarce and cost consciousness very high.

RESEARCH METHOD

Research methods were chosen to allow comparison of results with the key issues framework generated by the series of U.S. studies, and more specifically the most recent study, Niederman, Brancheau and Wetherbe (1991). Our study began with the list of 23 issues in IS management and their supporting rationale developed in the Niederman et al. (1991) study. A two-round Delphi Method was employed in order to move the respondents to a reasonable level of consensus about the critical issues they were facing in information systems management. Although previous studies have used three-rounds of questionnaires, negligible differences were shown between second and third round questionnaires in the Niederman, et al. (1991) study. This is consistent with the premise that the number of rounds is somewhat flexible and the Delphi process stops when a reasonable level of consensus is achieved (Delbecq, Van de Ven and Gustafson, 1975).

The Respondents

Although all companies were classified as small, 44.4% of the respondents reported that they were employed by companies that had less than 50 employees and the remaining 55.6% had between 51 and 150 employees. Classified by job level, respondents were evenly divided between senior management (33.3%), middle managers (33.3%) and consultants (33.3%). All regions of Canada were represented, Western provinces (Alberta and British Columbia) represented 33.4%, Central provinces (Saskatchewan and Manitoba) represented 16.7% and Eastern provinces (Nova Scotia, Ontario and Quebec) made up the remaining 49.9%.

FINDINGS

Table 2 shows the ten most critical issues that small firms expect to face in the 1995-2000 era. Each of these issues is discussed briefly in the context of the current findings and those previously reported.

1. Using Information Systems for Competitive Advantage - The rating of competitive advantage as the most critical issue may be indicative of the increased competitiveness in small business. It also reflects the realization that the strategic use of IT is far more important that the technology itself. Simply applying IT is no guarantee of success. A corporate strategy that leverages the IT must also exist. (Lin, Vassar and Clark, 1993). While large organizations have long recognized this as an issue, its rating as a critical issue has declined through the years. Until recently IT has been outside the grasp of many small firms because of their lack of resources. During the past two or three years, hardware prices have tumbled while speed and capacity have grown along with the availability of

affordable, easy-to-use, off-the-shelf software, thus enabling small business to take advantage of the strategic possibilities that IT offers.

2. Improving IS Project Management Practices - The second most important issue is a newcomer to any of the issues lists. Along with the recognition that IT can improve their status in the marketplace, comes the need to make sure that this increasingly important resource is managed well. Respondents agreed that project management of software development is more critical than the software effectiveness itself. Small business is just beginning to deal with this issue and the growing scale and complexity of their IT projects is a major concern. To improve IS project management, well-trained, highly specialized, multi-disciplinary teams must be developed to deliver on time and within budget.

2. Improving the Effectiveness of Software Development - Tied for second most important issue, improving the effectiveness of software development has slowly been gaining in importance for large organizations. Just as the project itself must be managed well, so must the quality of the end product. Large companies have long wrestled with the application development backlog, and small business might well learn from their mistakes. Traditional development methods and platforms are no longer satisfactory, and new methods have not yet proven themselves. This is consistent with findings reported by Raymond (1983) who found that small firms often cannot justify the expenses and time involved in a formal process to select and develop IT. Indeed, Senn and Gibson (1981) suggested that the poor resource state of small firms may place them in greater jeopardy than large firms undergoing a similar process. On the other hand, small firms must be careful to avoid investing too much time in developing complex systems that may only produce marginal benefits.

4. Building a Responsive IT Infrastructure - Fourth on the list is an important task that is frustrated by the continuing rapid changes in IT and the increasing breadth and depth of applications that need to be supported. Building a technology infrastructure to support existing applications while remaining responsive to change is key to long-term enterprise productivity. For small firms, in particular, an appropriate IT infrastructure is necessary to provide for resource flexibility and fast response to business needs.

5. Facilitating and Managing Business Process Redesign - The fifth issue is another newcomer to the issues list. To remain competitive, many organizations are radically changing the way they do business, and this is particularly true of small business. IT Plays an increasingly important role in this change process by enabling the innovative redesign of core business processes. IT should be viewed as more than an automating force; it can fundamentally reshape the way small business is done (Linn, Vassar and Clark, 1993).

6. Educating the User - Sixth on the list is yet another new issue. The majority of small firms have no formal IS department. Too often, home grown IS “experts” emerge, with no formal training to help them guide users. As a result, many users have no general understanding of what IS really is. Too many projects fail because users do not know (or at least do not adhere to) basic elements such as requirements analysis, data structures, etc. Training and development of fundamental systems analysis and design skills for user professionals must be put in place to help them become more effective users.

6. Planning and Managing Communications Networks - shares the sixth place. Recognition that stand-alone workstations are no longer feasible in today’s team-oriented workplace placed Planning and Managing Communications Networks seventh in importance. Using IT for competitive advantage depends heavily on access to appropriate internal and external communication networks. This task is complicated by rapid advances in underlying technology and major structural changes in the communications industry. The lack of trained IS personnel in small firms is particularly frustrating when dealing with the complexities of distribution processing and communication.

8. Coping with the Degree and Rate of Technology Change - in eighth place, this also is a new issue. Given the high degree of technology change in the next few years (e.g., new CPUs and Operating Systems) major purchases of the wrong hardware and operating system combination could be particularly disastrous to small firms that are heavily constrained by limited resources. It has been previously been suggested that many of the barriers to IT-enabled productivity enhancements involve the management of people’s responses to technological change rather

than the IT itself (Blackler and Brown, 1985). In this regard, Linn, Vassar and Clark (1993) suggest that this leads to a need on the part of small business executives to be aware of the IT which is shaping their future, but also the need to create changes in organizational culture to support the IT functions.

9. Aligning the IS Organization within the Enterprise - The IS organization's effectiveness in supporting the small business needs is dependent on its location within the business. Too often IS is not located and structured appropriately. Small firm managers must view IT as an integral part of their business strategy.

10. Measuring IS Effectiveness and Productivity - Understanding how IT use impacts the bottom-line is crucial for justifying new investment. In addition, measuring its performance is necessary for effective management. This is particularly difficult in small firms where IT has no central point of control. Large firms with centralized data processing shops have been unable to achieve this aim, and the decentralized nature of end user computing in small businesses makes this a vexing yet critical issue, given the strategic opportunities offered by the increasing need to develop and implement IT application to support business strategies.

IMPLICATION FOR SMALL BUSINESS MANAGERS

We suggest that a combination of three phenomenon are occurring: 1) owner/operators of small business have begun to see the power of IT and can find the resources to adopt it; 2) small firms still do not have the resources to make significant mistakes so they are very concerned about adopting technology that can directly impact their bottom line; 3) small business still has a low level of IT expertise.

Over the next few years, if small firms truly **are** lagging large firms, we expect them to continue to be concerned with managing networks and software development. The small firm may begin to use IT for Strategic Planning, so it's importance may increase. In a related issue to educating users (and as their IT expertise increases), small firms may find it difficult to locate and retain staff with the proper mix of business and information systems knowledge.

We believe that small firms will continue to desire more internal control over operations and consequently adopt more technology (see bulleted list above). Hardware and software quality and reliability will stay at the forefront of their worries. Furthermore, as communications become more mission critical, i.e. Electronic Data Interchange, small firms will embrace network technology. Managing networks may become a **very** critical problem for small business.

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Table 1: U.S. MIS Executives Information Systems Issue Ranking (1991)

Rank	**Rating**	**Issue**
1	8.32	Developing and Implementing an Information Architecture
2	8.31	Making Effective Use of the Data Resource
3	8.06	Improving IS Strategic Planning
4	7.74	Recruiting and Developing IS Human Resources
5	7.54	Facilitating Organizational Learning
7	7.39	Aligning the IS Organization within the Enterprise
8	7.34	Using Information Systems for Competitive Advantage
9	7.22	Improving the Effectiveness of Software Development
10	6.92	Planning and Managing Communications Networks
11	6.85	Increasing Understanding of IS Role and Contributions
12	6.63	Planning and Integrating Multi-Vendor Open Systems Technologies
12	6.63	Developing and Managing Electronic Data Interchange

15	6.37	Managing the Existing Portfolio of Legacy Applications
16	6.20	Measuring IS Effectiveness and Productivity
17	6.02	Facilitating and Managing Decision and Executive Support Systems
18	5.93	Facilitating and Managing End-User Computing

Table 2: Comparison of Top Ten Issues with Previous Findings

				Ranking	
Rating	**Std. Dev.**	**Issue**	**Current Study**	**N,B & W (1991)**	**A & E-D (1991)**
7.91	1.46	Using IS for competitive advantage	1	8	NEW
7.75	1.52	Improving IS project management practices	2	NEW	NEW
7.75	1.27	Improving Effectiveness of Software Development	2	9	5
7.61	1.44	Building a Responsive IT Infrastructure	4	6	NEW
7.19	1.74	Facilitating and Managing Business Process Redesign	5	NEW	NEW
7.16	1.76	Educating the User	6	NEW	8
7.16	1.50	Planning and Managing Communication Networks	6	10	6
7.11	1.86	Coping with Degree and Rate of Technology Change	8	NEW	3
7.08	2.21	Aligning the IS organization within the Enterprise	9	7	NEW
7.02	1.73	Measuring IS effectiveness and productivity	10	16	4

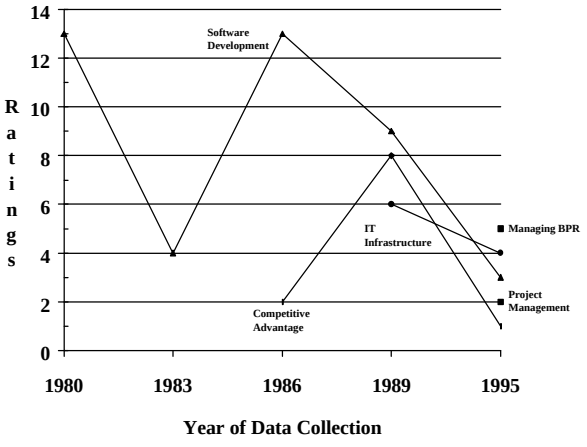

Figure 1: Top Five Issues Facing Small Firms (Trends)

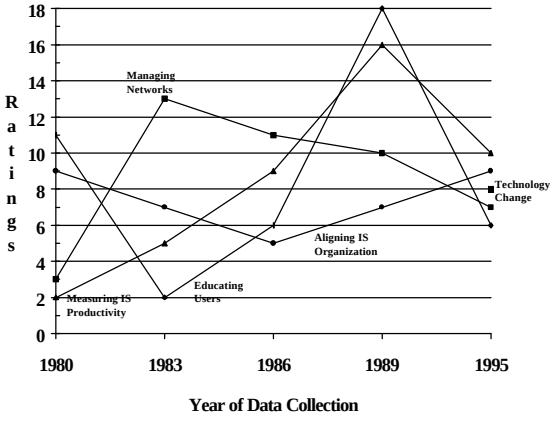

Figure 2: Next Five Issues Facing Small Firms (Trends)