

# Use and Business Impacts of Internet Technologies and e-Business Solutions among Small and Medium-sized Enterprises (SMEs) in Atlantic Canada

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## Abstract

*This paper describes patterns of use of Internet technologies and e-business solutions among over 700 SMEs in Atlantic Canada in 2005. It also describes patterns of facilitators and outcomes of e-business use. Atlantic SMEs have found the most value in e-business in customer-facing performance improvements in the regional market, and the least value in e-business as a facilitator of external market expansion. The smallest firms are the most dependent on Internet sales. Between one quarter and one third of SMEs express interest in externally provided support services, especially illustrative examples, recommendations, and personalized advice.*

**Keywords:** *SMEs; Atlantic Canada; Internet technologies; e-business solutions; use and business impacts*

## 1. Introduction

Atlantic Canada, one of the poorest regions of the country, faces major growth and development challenges in the knowledge-based economy. The region lacks large urban centers and financial centers; its economy is largely specialized in resource industries with low value-added; its transportation system is inadequate; and the region is located far from major markets (Ruggieri, 2003; Desjardins, 2005). Although Atlantic Canada has a variety of institutions of higher education, they are small and dispersed. On most indicators of science, technology, and innovation Atlantic Canada is well behind the rest of the country (Bourgeois & LeBlanc, 2003; Locke et al., 2004). The region suffers from relatively slow growth, relatively low levels of income, and demographic stagnation due to outmigration and inability to attract immigrants. Among its strengths are its educated labour pool, energy resources, a growing capability in health sciences, marine, and bioresource innovation, and an emerging generation of export-oriented entrepreneurs (Mac-Millan, 2001).

Of the approximately 88,000 businesses in Atlantic Canada, 95% employ fewer than 500 people and are therefore considered small or medium-sized enterprises (SMEs). The Atlantic Canadian regional market of around 2 million people imposes limits to the growth of firms. Growth-oriented Atlantic SMEs need to seize opportunities to reach new markets. Harnessing e-commerce in order to catch up and overcome the disadvantages of their peripheral location may be more

important to SMEs in Atlantic Canada than in other parts of the country. However, lack of awareness, lack of qualified staff, and cost of implementing e-commerce solutions are known to have been obstacles that prevent many Atlantic Canadian SMEs from establishing an e-commerce presence (InnovaQuest, 2000).<sup>1</sup>

This paper describes the use and impacts of Internet technologies and e-business solutions among more than 700 small and medium-sized enterprises (SMEs) in the four provinces of Atlantic Canada, based on an online survey carried out in June and July 2005. We describe the socio-demographic characteristics of the respondents, perceived facilitators of adoption and barriers to adoption, and the perceived outcomes of adoption of Internet technologies and e-business solutions among Atlantic SMEs.<sup>2</sup> Our deliberately broad definition of e-business encompasses all Internet-based business-to-business and business-to-consumer transactions, as well as non-transactional electronic interactions throughout the customer transaction cycle. In this definition, a firm can be engaged in e-business without necessarily conducting online transactions, as long as some of the steps in the transaction cycle such as marketing or post-sale service delivery take place online. We also consider the internal use of information and communication technologies to be a feature of e-business. However, here we focus on the business use of relatively advanced, complex, or emerging applications for purposes of internal process integration, coordination, or decision support.

Our regional survey extends a benchmarking study supported as part of the *e-Business Awareness Program* currently being funded by the Atlantic Canada Opportunities Agency (ACOA) and executed by the Electronic Commerce Centre of the University of New Brunswick – Saint John. In 2004, under the auspices of this program, we surveyed SMEs in New Brunswick regarding their use of Internet technologies and e-business solutions (see Davis and Vladica, 2004). The present survey of Atlantic Canadian SMEs uses a modified version of the 2004 New Brunswick survey instrument.

Conventions have not yet been established for the measurement of e-Business use and impacts (cf. Ven der Veen, 2004). Our survey included questions about the responding firm and its market behavior, its use of Internet technologies and e-business solutions, enablers of Internet business, outcomes or effects of technology use, and training and support needs.

## **2. Characteristics of respondents**

Invitations were e-mailed to 8,520 Atlantic SMEs that were identified from a variety of mailing lists and business directories. The survey questionnaire was available online, on a secure password controlled website, linked from the e-mail sent to participants. The response rate was about 9.11% (776 usable responses). Respondents could complete the questionnaire in English or in French. The questionnaire was completed in French by 6.57% of the respondents and in English by 93.42%. Although we made every attempt to ensure geographical representativeness in our mailing list, firms from Prince Edward Island are over-represented in proportion to the population of the province, firms from New Brunswick and Nova Scotia are more or less proportionately represented, and firms from Newfoundland and Labrador are under-represented among

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<sup>1</sup> In this report we use the terms electronic commerce, e-commerce, or e-business as shorthand for Internet technologies and e-business solutions.

<sup>2</sup> For complete results of the survey see our longer technical report (Davis, Lin & Vladica, 2006).

respondents (Table A). It is not possible to determine how closely our sample of firms replicates the sectoral distribution of Atlantic SMEs. Around two-thirds of the respondents are in the following sectors: professional & business services, tourism, IT & telecommunications, and commerce (see Table B).

We distinguish five size classes of firms: micro-enterprises, which have fewer than 5 employees (including owners), very small firms (with 5 to 19 employees), small firms (with 20 to 49 employees), medium firms (50 to 499 employees), and large firms (500 or more employees). This classification of firm size follows convention in Canada, except that we have split the category “small firms” into two separate categories: very small firms and small firms.

62% of respondents are micro-enterprises (<5 employees), 25% are very small firms (5-19 employees), 7% are small firms (20-49 employees), and 5.7% are medium firms (50 to 499 employees) (Table C). The size distribution of firms in the population of respondents is a fairly close approximation of the size distribution of firms in Canada (Table C), although micro-enterprises are under-represented in our population of respondents. 78% of Canada’s SMEs are micro-enterprises, and only 3.5% of Canadian SMEs employ more than 50 people.

Table D provides information about the characteristics of the respondent firms. The SMEs that participated in this survey have an estimated 16,410 employees and conduct an estimated \$1.27 billion in sales. Although micro-enterprises represent nearly 62% of the firms in the survey, they have only 7.4% of all employees and account for only 2.4% of all revenue. Firms from all size categories report 16% to 19% average annual sales growth over the past three years. These reported rates of growth are undoubtedly higher than those of SMEs in general, especially micro-enterprises. The average age of firms in the survey is greater than eleven years, rising to around 27 years in medium-sized firms. Smaller firms tend to be younger.

According to Industry Canada’s definition, rural and small town (RST) areas are those communities with fewer than 20,000 residents. Using this definition of rural and small town, 49% of participating businesses in our survey are in urban locations, while 51% are in rural and small town areas. Compared to the percentage (36%) of all firms in rural and small town areas in Canada provided by Industry Canada, our survey included more respondents located in rural and small town areas (Table E).

### **3. Business climate and business behavior of Atlantic SMEs**

Atlantic SMEs earn nearly 60% of their revenue in their province, and almost 75% in Canada (see Table F). About 73% of the SMEs in our survey have no international sales. The United States is the most important international market, providing almost 11% of revenue. The U.S. market is a particularly important source of growth for small and medium firms (i.e. firms with 20 to 499 employees). Larger firms tend to earn a greater proportion of their revenue from international markets. Firms in the commerce, design and publishing, and construction sectors are the least export-oriented of the sectors in Atlantic Canada.

Competition is generally less intense in local (provincial or regional) markets than in national or international markets. Small firms (20-49 employees) are exposed to the most intense competition. Medium size firms are in comparatively stable competitive situations, especially in international markets, and report lower levels of competition than firms of other sizes (Figure A).

Younger companies experience intense competition in national and international markets; however, older companies experience higher competition in local markets (Figure B). Firms in Arts and Handicraft report the least intense competition, while firms in Commerce, Finance, IT & Telecommunications, and Manufacturing report the least intense local competition. Firms in design & publishing and IT & telecommunications report the most intense international competition (data not shown).

SMEs invest in technology, including Internet technologies and e-business solutions, in order to solve a problem or to pursue a business opportunity. We asked respondents to evaluate potential barriers to growth and to identify capabilities that they would like to develop. E-business solutions that help to solve these problems or develop these capabilities are of interest to SMEs in the region (Davis and Vladica, 2005). In general, Atlantic SMEs believe that they would improve their business performance if they could:

- Improve the quality of their products or services;
- Deliver these products and services more effectively and efficiently to customers;
- Attract new domestic customers;
- Formulate and communicate their marketing messages more effectively; and
- Develop specialized niches in the domestic market (see Figure C).

As we can see from Figure C, when firms have more than 5 employees, they consider staff recruitment, retention, managing and communicating with staff, and productivity to be more significant than other barriers to growth. Once firms grow to more than 50 employees, they face a different set of growth challenges that reflect the transition to a larger organization with more formal management and business routines. Older companies consider equipment costs, attracting and retaining key staff, increasing staff productivity, and managing and reporting financial and tax information as the most important barriers to growth. They report an increased interest in HR management and controlling business costs. However, younger firms are more concerned about business development; they consider that getting marketing messages out and finding customers abroad are the biggest barriers to success.

Firms acquire capabilities in order to compete more effectively. They often adopt e-business solutions and internet technologies in order to support the development of new capabilities (Davis & Vladica, 2004). Figure D provides a rank-ordered list of capabilities that Atlantic SMEs would like to acquire. Marketing, interactivity with customers, and strategic planning are the most highly desired capabilities. The profile of small firms (20-49 employees) differs from the others. They share the interests of other SMEs but also express particular interest in capabilities related to technology, purchasing, supply management, and change management. Medium size firms are also interested in purchasing, supply management, and change management but place less emphasis on new product development and interactivity with customers.

Figure E shows that the most important factors that might facilitate adoption and use of IT and e-business are firms' views about accessing new markets, the nature of the goods or services they buy or sell, their capability to manage technological change, demands that customers or suppliers make on them, and access to specialized suppliers. The emphasis seems to be on new market acquisition, management capability, and relationships with customers or suppliers.

Although the benefits of e-commerce are often believed to be available to adopting firms regardless of firm size, size is an important factor in e-business adoption and use. SMEs adopt e-business technologies and Internet solutions less quickly than larger firms, and larger SMEs adopt these technologies more quickly than smaller SMEs. On the other hand, some smaller SMEs may have an advantage in identifying and adopting business models that are tailored to exploit the possibilities offered by online commerce (Davis and Vladica, 2006).

SMEs of different sizes face a somewhat different set of adoption facilitators. Larger firms believe skillful and resourceful employees, established business processes to facilitate learning, management commitment, leadership, and internal business culture are important factors that facilitate adoption of e-business. Combinations of market access, demanding customers and suppliers, capability to manage technological change, and access to specialized suppliers appear to induce very small and small SMEs to adopt Internet and e-business solutions and technologies.

To summarize this section, Atlantic SMEs are generally embedded in local markets where competition is less intense than in national or international markets. Although patterns of “pain points” (barriers to growth), desired capabilities, and facilitators of technology adoption vary by firm size and industry sector, in general Atlantic SMEs are concerned about the quality of their products, services, and delivery processes in the domestic market. They consider that improved capabilities in marketing, planning and interactivity would improve their performance.

It is widely believed that competition, attitude toward risk, and business culture are factors that largely influence Atlantic SMEs’ behavior with respect to e-business. Our research shows that demanding customers, management capabilities, and suitability of products or services for e-business are much more important facilitators of adoption.

#### **4. Patterns of use of Internet technologies and e-business solutions among Atlantic SMEs**

The simplest IT and e-business solutions (such as e-mail, PCs, and use of the Internet for information searches) are in widespread use among respondents (more than 90%) (see Figure F).<sup>3</sup> Stand-alone solutions (such as websites) are widely used; however, integrated solutions (such as conducting secure business transactions with other businesses, government, or consumers; intranet; remote data storage) are much less common - fewer than half of the firms use the integrated technologies or solutions. More than three-fourths of all firms use network/information security technology and functional (application) software.

Larger SMEs adopt more complex IT and e-commerce solutions faster than their smaller counterparts. For example, larger firms use shared file folders much more than smaller sized firms. Figure G shows patterns of use by size of firm. The data suggest that when firms reach the range of 20 employees, they become concerned about using IT for efficient communication among employees or with customers. Therefore, larger firms are either currently using or planning to use meetings over the Internet, remote data storage, extranets, and remote help desk assistance for their customers.

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<sup>3</sup> Because our survey was conducted online, firms without basic online capabilities are excluded from our sample. However, in 2005 very few firms lacked basic online capabilities such as e-mail.

Almost 71% of Atlantic SMEs have their own web site, and 45.6% sell their products online (See Table G and Figure H). Use of the Internet for purchasing is widespread among Atlantic SMEs. 86% of these firms report using the internet for purchasing.

Sector affiliation is an important factor in owning a website. Over 80% of Atlantic SMEs in the tourism, IT and design & publishing industries have websites, whereas only 40% of SMEs in the food production & distribution categories have websites (see Figure H).

Most Atlantic SME's websites offer information about products and services and information about the business. Fewer than one-third of Atlantic SMEs' websites offer asynchronous two-way communication, or transaction security. Fewer than one in five offers a privacy policy statement, online payment facilities, or other features (see Figure I). Facilities for online payment, digital products or services, wireless access through their websites, and synchronous two-way communication are minor functions; fewer than 11% of SMEs offer such services. Although websites of micro-enterprises provide less information, security, and two way communications than the sites of larger firms, they provide more functions, such as access via wireless mobile devices, interactivity, on-line payment, digital products or services, and privacy policy statements (although fewer than 20% actually do so).

Table H presents a high level summary of the degree of use of IT and e-business solutions by Atlantic SMEs. We used four indexes to measure overall use of Internet technologies and e-business solutions:

1. The Connectivity Index (C);
2. The e-Business Use Index (EBU);
3. The Website Functionality Index (WFI);
4. The Transaction Index (T).

The Connectivity Index measures the speed of the firm's connection to the Internet. If a firm connects with dial-up, it scores one point; if it connects with cable modem, ISDN, or wireless, 2 points; if it connects with a T1 line, 3 points. Because firms can connect to the Internet using multiple methods, the highest possible score on the Connectivity Index is 10.<sup>4</sup>

In the survey, the highest Connectivity Index score received was 10, the average score was 2.73, and the median and mode were 2 (more than a half of the respondents scored 2 points). Micro firms have the highest Connectivity Index scores (Table I). We know that dial-up connections are still in use among Atlantic SMEs (about 30% of respondents). The persistence of dial-up connections shows that slow speed access to the Internet is still a fact of life for many firms. However, 60% of all firms have adopted high speed connections. Furthermore, faster and more flexible methods of connecting to the Internet, such as wireless connections, are increasingly utilized by SMEs. About 60% of respondents indicate they are using wireless.

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<sup>4</sup> That is,  $1 + 2 + 2 + 2 + 3 = 10$ . Please note that the Connectivity Index is calculated differently in the 2004 survey. However the other Indexes are comparable.

The e-Business Use Index measures use of 18 Internet and e-business technologies and solutions as well as ownership of a website (see Figure F for the list of technologies). If the firm possesses a website it scores three points; if not, it scores zero. If the firm uses a particular technology or solution it scores 2 points; if it plans to use a technology or solution it scores 1 point; otherwise it scores zero. The maximum possible score for the e-Business Use Index is 39 points. In our survey, the maximum score received was 34 points. The average score on this Index is 17.3 points, the median is 17 and mode is 18 points. Micro (<5) SMEs have the lowest average e-Business Use Index score (16.4) and medium SMEs have the highest average score (21.5). In general, the smaller the firm, the lower the average e-Business Use score (Table H).

The Index of Website Functionality measures the extent of available functional features on a firm's website. Only firms with websites can score on this index. For each of nine features utilized, a firm scores one point (see the list of features in Figure I). The maximum possible score is therefore nine points. Only two firms in our survey scored nine on the Index of Website Functionality. The average score is 2.18, the median is 2, and mode is 0 points (248 responses scored zero). Small SMEs have the highest average Website Functionality Index score: 2.48 (Table H). The Transaction Index measures the firm's use of the Internet for buying and selling. If the firm uses the Internet for purchasing products or services it receives a score of three, if not, zero. If the firm uses the Internet for selling it receives a score of three, otherwise zero. The maximum Transaction Index score is therefore six. In our service the Transaction Index scores ranged from six to zero and the average was 3.9. Most SMEs use the Internet for purchasing: the average rate of use is 86.3% (see Table H). However, fewer than half of SMEs use the Internet for selling. 49% of micro-enterprises, 39.9% of very small firms, 45.3% of small firms, and 34.1% of medium firms sell via the Internet.

A composite Index of e-Business Enablement combines the four indexes described above. The highest possible score is 64. In our survey, the highest score obtained by a firm is 49. The average score is 26.11, the median is 26 and mode is 24 points (51 respondents). Smaller firms tend to have lower e-Business Enablement scores (Table H).

## **5. Impacts of use of Internet technologies and e-business solutions**

We asked respondents to assess the extent of fifteen possible impacts of using Internet technologies and e-business solutions. The results are shown in Figure J. On the vertical axis are shown the average scores of fifteen possible impacts. On the horizontal axis are shown the percentage of respondents reporting high or very high impacts (i.e. scores of 4 or higher).

Clearly, Atlantic SMEs have primarily used e-business to improve relationships with existing customers. They have used e-business for purposes of business development or economic expansion much less frequently. Figure J shows that over 40% of respondents reported High or Very High impacts of the following kinds:

- Improvement of the brand or image of the business and its products or service;
- Permit the business to keep up with competitors;
- Building and enhancing relationships with existing customers;
- Increasing the level of customer service and satisfaction;
- Increasing the speed of supplying products or services; and

- Increasing the ability to adapt to different customer demands.

On the other hand, fewer than one-third of respondents reported High or Very High impacts of the following kinds:

- Increasing the domestic market share;
- Increasing the international market share;
- Decreasing the cost of producing goods or services;
- Developing distinctiveness, improvement of rate of product or service innovation;
- Improvement of the quality of products or services; or
- Improvement of business profitability.

Around thirty percent of Atlantic SMEs' gross sales are generated over the Internet. However, most of these are domestic sales (see Figure K). The Internet has not led to significant internationalization of Atlantic SMEs. Although micro-enterprises have the highest percentage of sales conducted over the Internet (about 34%), medium sized firms have the highest percentage of international Internet sales (about 29%).

Atlantic SMEs are planning to increase their involvement in e-business. Two-thirds of respondents report having plans for further investments in IT and e-business solutions. The coming wave of investment will focus on website content development and design, conducting secure transactions with business or government customers, and on marketing on the Internet (Figure L).

## **6. External services and support needs**

Most Atlantic SMEs have purchased externally supplied business services within the past three years. More than half of the surveyed microenterprises report having purchased such services, while over 75% of small and medium SMEs report having done the same. Technical services are the most frequently purchased business services, followed by marketing services, although demand for services varies among size classes of firms. Smaller firms tend to purchase technical services, including information and communication technology, more so than their larger counterparts.

Figure M provides a rank-ordered list of preferences for support tools or services related to IT or e-business solutions which Atlantic SMEs are most likely to use. More than one-third of respondents would be likely to use examples (cases) of successful e-business use, recommendations about e-commerce solutions, personalized advice, sector-specific online seminars, and directories of organizations that can offer help in using e-commerce.



## **7. Issues regarding SMEs' use of Internet technologies and e-business solutions in Atlantic Canada**

In this section we ask five questions of the survey data.

### **7.1 Is e-business enablement associated with firm growth?**

The answer is a qualified Yes. We measured the correlation between reported average annual three-year growth rates on the one hand, and the Connectivity Index, the e-Business Use Index, the Transaction Index, and the Website Functionality Index on the other. Connectivity and Website Functionality are *not* significantly correlated with business growth. But greater degrees of e-Business Use and electronic Transactions (as measured by their respective indexes) *are* significantly correlated with higher business growth rates. This means that faster growing firms are using more e-business technology, especially for purchasing and selling.

### **7.2 How does size affect a firm's ability to adopt and take advantage of Internet technologies and e-business solutions?**

We saw earlier that on the average, the smaller the firm, the lower the Index of e-Business Enablement. We measured the correlation between the size of the firm (measured by revenue and by number of employees) and fifteen possible impacts of technology. We found that size is significantly positively correlated only with improvement in coordination with partners or suppliers. It is significantly negatively correlated with reported increase in business profitability and reported increase in speed of delivering products or services. This may be evidence that some larger firms in Atlantic Canada have had unsatisfactory experiences with e-business systems.

Larger firms have more complex technological systems. High scores on the e-Business Use Index and on the Transaction Index are significantly correlated with higher technology impacts. High scores on the Website Functionality score are significantly correlated with international market expansion and improvement of brand and image. This suggests that depth of e-business capabilities influences business outcomes more than firm size per se.

### **7.3 Does rural or small town location inhibit e-business enablement?**

We compared Atlantic urban SMEs with Atlantic rural or small town SMEs for the four technology Indexes.<sup>5</sup> Urban SMEs have a significantly lower Connectivity Index and significantly higher e-Business Use Index. The Website Functionality Index and Transaction Index are not significantly different. As we saw earlier, the e-Business Use Index and the Transaction Index are more closely linked to revenue growth and positive business outcomes than the other two indexes. We do not know at this point why rural and small town SMEs have significantly lower Index of e-Business Use. However, urban SMEs report significantly higher impacts of using Internet technologies and e-business solutions in the areas of productivity, business speed enhancement, and product innovation. Furthermore, urban SMEs report significantly higher annual rates of growth than rural or small town SMEs. However, industries are distributed differently between urban and rural or small town settings. The differences between urban and small town or rural firms that we noted above may be a reflection of different degrees of sectoral engagement in e-business. When we compare sector by sector, we find that in some cases adoption of Internet technologies and e-business solutions has provided strong support to firms in rural or small town settings.

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<sup>5</sup> Urban SMEs are those located in population centres of 20,000 persons or more.

#### **7.4 Does e-business enablement support export development?**

Yes. The e-Business Use Index, the Website Functionality Index, and the Transaction Index are significantly correlated with export intensity to the United States. The Connectivity Index is not correlated with export intensity. The Website Functionality Index and the Transaction Index are significantly correlated with exports to international destinations other than the U.S.<sup>6</sup>

#### **7.5 Does competition drive e-business enablement?**

Atlantic SMEs consider that “keeping up with competition” is one of the major benefits of using Internet technologies and e-business solutions. Is intensity of competition related to e-business enablement? We measured the correlation between reported intensity of competition at the local, national, and international levels and the four Indexes of technology use. We found no significant correlation between intensity of competition at the local level and any of the technology use indexes. However, intensity of competition at the *national* and international levels is significantly correlated with the e-Business Use Index. In other words, use of e-Business technologies is greater in competitive business environments, which tend to be export environments.

### **8. Implications for theory and practice**

Research reported here was undertaken to better understand the demand side of the Atlantic IT innovation system. Local and regional demand from SMEs is the major source of income for most small IT service providers (Davis and Schaefer, 2003). The the learning and value creation processes of SMEs e-business users are not well described in the scientific literature. We show that connectivity per se, and website functionality per se, are not highly associated with perceived value creation by adopters. These capabilities in themselves do not have substantial positive business impacts on users. Demand for e-business capability is driven primarily by customer requirements in the regional economy, and that perceived benefits frequently have to do with improved relationships with domestic customers. However, firms also invest in e-business capability for strategic reasons. Service providers and policymakers need to take these demand drivers and processes of value creation into account when strategic interventions to improve regional uptake of e-business are under consideration.

Relatively few Atlantic SMEs have found ways to create value with e-business in export markets. E-business enablement in itself does not necessarily lead to export development. In Atlantic Canada, a peripheral region distant from major markets, complementary policies and programs for e-business enablement and export promotion need to be developed.

Based on the results of our 2004 survey of e-business technologies and Internet solutions among New Brunswick SMEs, we developed support services including case studies and a package of online e-business awareness and training modules. These are currently being delivered under the auspices of the Electronic Commerce Centre in Saint John.

### **9. Conclusions**

Use of the least complex Internet technologies and e-business solutions has become widespread among Atlantic Canadian SMEs. These firms are experiencing a range of significant business benefits from using e-business technologies and Internet solutions, and two-thirds of our respon-

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<sup>6</sup> We use the 5% level of significance.

dents have plans for further investments in areas such as website content development and design, and marketing on the Internet.

While adoption of Internet technologies and e-business solutions is facilitated by many factors, the most important ones are the possibility to access new markets, the nature of products or services that the firm buys or sells, the firm's capability to manage technological change, and the presence of demanding customers or suppliers. These four facilitators portray an e-business innovation process in which market learning, technological learning, and interaction with customers and suppliers are the key drivers. The highest impacts of e-business adoption have to do with improvement of image, keeping up with competition, improvement of relationships with existing customers, and improvement of customer satisfaction.

Atlantic Canadian SMEs are not noticeably harnessing e-commerce in order to overcome the disadvantages of their peripheral location. Atlantic SMEs are primarily using Internet technologies and e-business solutions to improve relationships with existing customers in the regional market, where Atlantic SMEs gain the majority of their revenues and where competition is less intense than in national or international markets. In general, faster-growing Atlantic SMEs use e-business technologies more extensively, and have a stronger export orientation, than more slowly-growing firms.

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## **Biographical Notes**

Charles Davis has worked as an educator and researcher in the area of innovation policy and management for over twenty-five years. His general area of interest is business innovation in the ICT and media industries. He holds the Edward S. Rogers Sr. Research Chair in Media Management and Entrepreneurship at Ryerson University in Toronto, where he teaches courses in entrepreneurship, business strategy, political economy, and the sociology of work and occupations. Previously he taught in the Faculty of Business at the University of New Brunswick in Saint John. He also worked for the International Development Research Centre and the former Science Council of Canada. Charles completed his doctoral studies at the Université de Montréal.

Yi- Jing (Carinna) Lin currently works as a Business Systems Analyst at TFG Consulting Inc. in Toronto. Her major work consists of analyzing and translating business needs into specifications using requirement methodologies. Before immigrating to Canada, Carinna had 5 years of Internet technology field work experience in system integration and marketing environment plus one year of Computer Networking System Engineer training by the Taiwan government. Carinna holds SAS programmer certificate and is a Microsoft Certificated System Engineer. She received her M.B.A. in e-business from University of New Brunswick and a B.Sc. in economics from the National Taipei University.

Florin Vladica holds an engineering degree in radio navigation, an M.B.A in e-business from University of New Brunswick, and an Executive M.B.A from ASEBUSS Bucharest & Washington University in Seattle. Florin also teaches business courses for the University of New Brunswick in Saint John. He recently joined the joint Ryerson-York graduate program in Communication and Culture in Toronto. His research focuses on the use of the Internet by small firms. Florin managed a series of development projects that required comprehensive investigation about needs and challenges of moving business online. Results of this work include a comprehensive e-learning package for small business owners in Atlantic Canada, a business plan for a Customer Intelligence Center of Excellence using data mining and neural networks, and a sales reporting system using the corporate intranet.

Table A: Geographic distribution of respondents

Atlantic Province	Count and % of total respondents (our 2005 survey)		Count and % of total population (2001 census)	
	New Brunswick	294	37.89%	729,498
Nova Scotia	276	35.57%	908,007	39.73%
Newfoundland & Labrador	72	9.28%	512,930	22.44%
Prince Edward Island	132	17.01%	135,294	5.92%
Other	2	0.26%		
Totals	776		2,285,729	

Table B: Sectoral affiliation of respondents by size of firm

		Micro (<5)		Very small (5-19)		Small (20-49)		Medium (50-499)		Total
		Count	Row %	Count	Row %	Count	Row %	Count	Row %	Count
* sector	arts, handicrafts, decoration	38	95.0%	1	2.5%	1	2.5%	0	.0%	40
	food production & distribution	23	50.0%	11	23.9%	5	10.9%	7	15.2%	46
	natural resource	10	47.6%	6	28.6%	2	9.5%	3	14.3%	21
	services, general	47	68.1%	12	17.4%	6	8.7%	4	5.8%	69
	commerce	38	45.2%	32	38.1%	6	7.1%	8	9.5%	84
	construction	13	25.5%	21	41.2%	9	17.6%	8	15.7%	51
	tourism & recreation	84	84.0%	12	12.0%	3	3.0%	1	1.0%	100
	manufacturing	21	29.2%	37	51.4%	8	11.1%	6	8.3%	72
	IT & telecommunications	48	59.3%	26	32.1%	6	7.4%	1	1.2%	81
	design & publishing	40	76.9%	11	21.2%	1	1.9%	0	.0%	52
	professional and business services	121	76.1%	25	15.7%	7	4.4%	6	3.8%	159
	Total	483	62.3%	194	25.0%	54	7.0%	44	5.7%	775

Table C: Size distribution of firms in survey

# of Employees	Firms/Respondents (our 2005 survey)		Firms (Statistics Canada)	
	Count	% of total	Count	% of total
1 – 4 (micro)	483	62.24%	114,656	88.65%
5 – 19 (very small)	195	25.13%		
20 – 49 (small)	54	6.96%	10,170	7.86%
50 – 500 (me- dium)	44	5.67%	4,516	3.49%
Totals	776	100.00%	129,332	100.00%

Source: Statistics Canada database. Canadian Business Patterns, 2000



Table D: Main characteristics of firms in survey

	Micro (<5)	Very small (5-19)	Small (20-49)	Medium (50-499)	Total
# of firms in survey	483	195	54	44	776
% of total respondents	62.24%	25.12%	6.95%	5.67%	100.0%
Average # of employees	2.5	12	34.5	250	21.15
# of total employees	1,207.5	2,340	1,863	11,000	16,410.5
% of total employees	7.4%	14.3%	11.4%	67.0%	100.0%
Average estimated gross sales last year (\$000)	\$468	\$2,044	\$5,505	\$11,822	\$1,948.4
Total estimated gross sales last year (\$000)	\$181,925	\$357,625	\$269,725	\$461,050	\$1,270,325
% of all estimated gross sales last year for all respondents	2.4%	10.3%	27.7%	59.6%	100.0%
Estimated annual growth rate past 3 yrs	18.9%	15.8%	18.5%	17.6%	18.0%
Average age (years)	11.1	19.0	24.3	27.2	14.9

Table E: Atlantic SMEs in survey by location (density of population)

Population levels		Respondents (our 2005 survey)		All Canada
		Count	% of total	
5	>100,000	123	19.16%	
4	50,000-99,999	111	17.29%	
3	20,000-49,999	81	12.62%	
Total urban		315	49.07%	64%
2	10,000-19,999	44	6.85%	
1	<10,000	283	44.08%	
Total small town and rural		327	50.93%	36%
Grand Totals		642	100%	

Table F: Geographic orientation of business activities by size of firm

	Firm's size category				
	Micro ( $<5$ )	Very small (5-19)	Small (20-49)	Medium (50-499)	Total
	<i>mean</i>				
% revenue of last year only in province	60.1	62.4	53.4	49.4	59.6
% revenue of last year in all Atlantic Canada	60.9	69.0	56.6	62.4	62.7
% revenue of last year gross sales in all Canada	73.3	80.3	72.2	71.5	74.9
% revenue of last year gross sales only in US	10.8	8.5	16.2	15.4	10.8
% revenue of last in other international markets	4.1	2.2	2.5	5.3	3.6

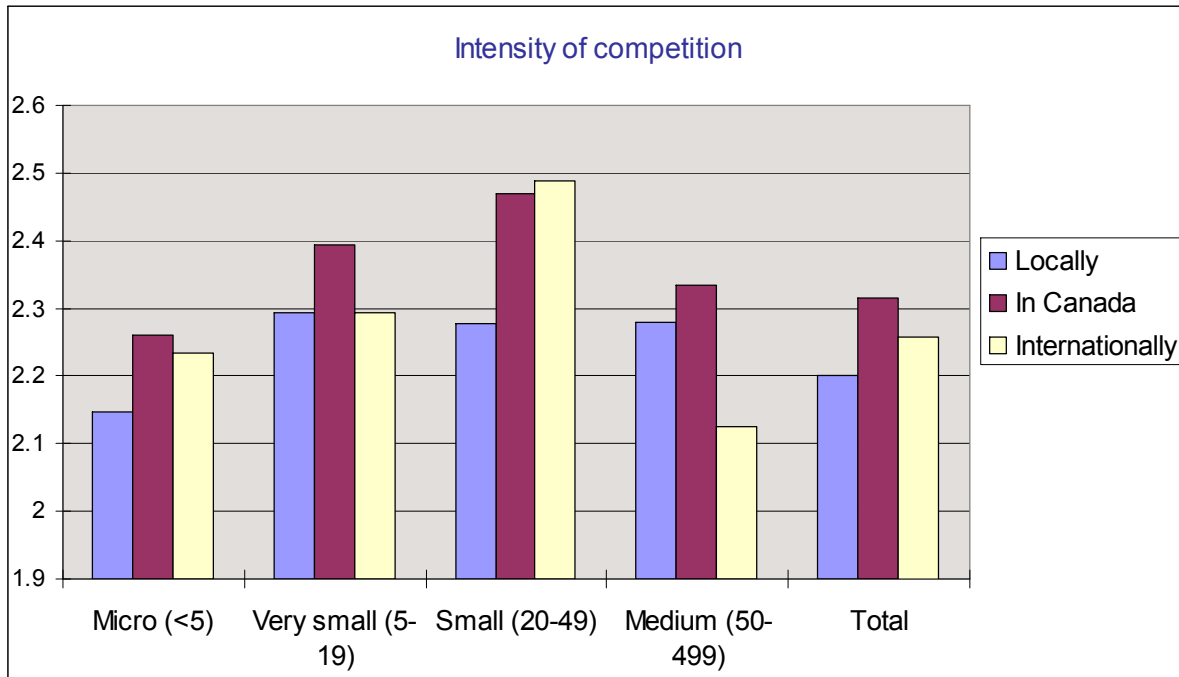
Table G: Online purchase and sales

		Firm's size category									
		Micro (<5)		Very small (5-19)		Small (20-49)		Medium (50-499)		Total	
		Count	% in size ctg.	Count	% in size ctg.	Count	% in size ctg.	Count	% in size ctg.	Count	%
Does your organization use the Internet to purchase goods or services?	Yes	404	84.90%	169	88.50%	49	92.50%	37	84%	659	86.3%
	Total	476	100.00%	191	100.00%	53	100.00%	44	100.00%	764	100%
Does your organization use the Internet for selling goods or services?	Yes	234	49.00%	75	39.90%	24	45.30%	15	34.10%	348	45.6%
	Total	478	100.00%	188	100.00%	53	100.00%	44	100.00%	763	100%

Table H: Indexes of Connectivity, e-Business Use, Transactions, Website Functionality, and e-Business Enablement by firm size

	Micro (<5)	Very small (5-19)	Small (20-49)	Medium (50-499)
Index of Connectivity (C)	2.77	2.66	2.57	2.75
Index of e-Business Use (EBU)	16.36	17.67	21.02	21.50
Index of Transaction (T)	3.96	3.75	4.06	3.55
Index of Website Functionality (WFI)	2.04	2.46	2.48	2.16
Index of e-Business Enablement (C+EBU+T+WFI=EBE)	25.13	26.54	30.13	29.95

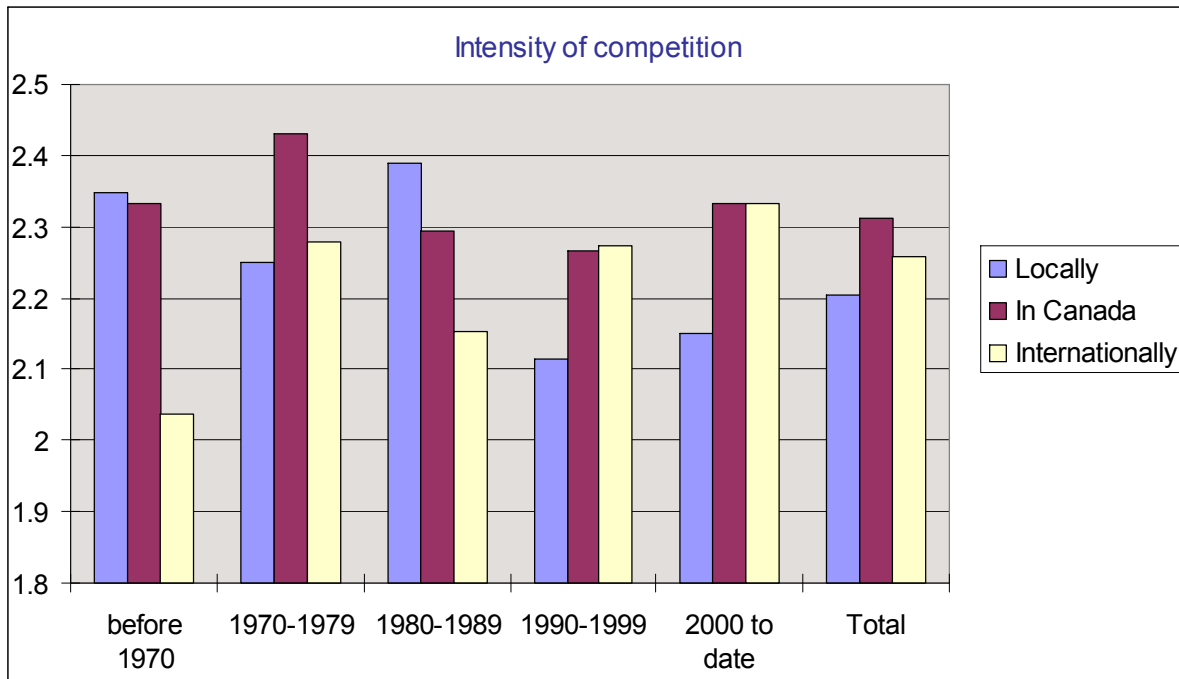
**Figure A: Perceived intensity of competition by size of firm**



Scale:

- 1 = low
- 2 = medium
- 3 = high

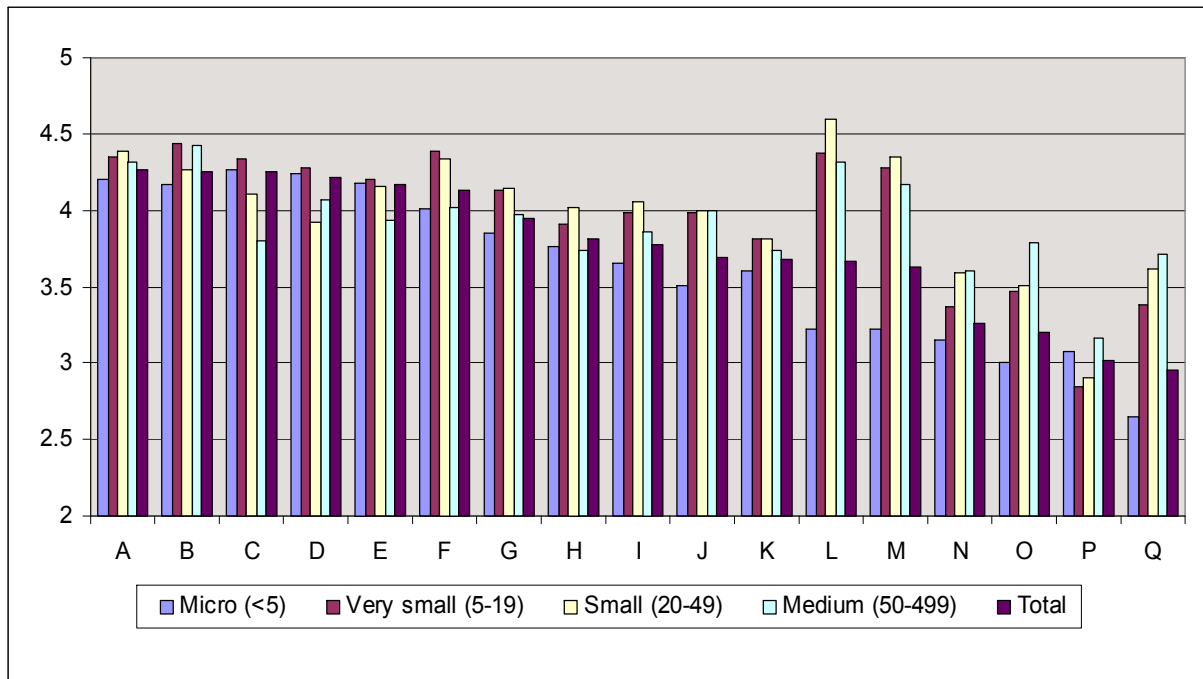
Figure B: Perceived intensity of competition by age of firm



Scale:

- 1 = low
- 2 = medium
- 3 = high

Figure C: Perceived barriers to success among Atlantic SMEs (by size of firm)



Scale

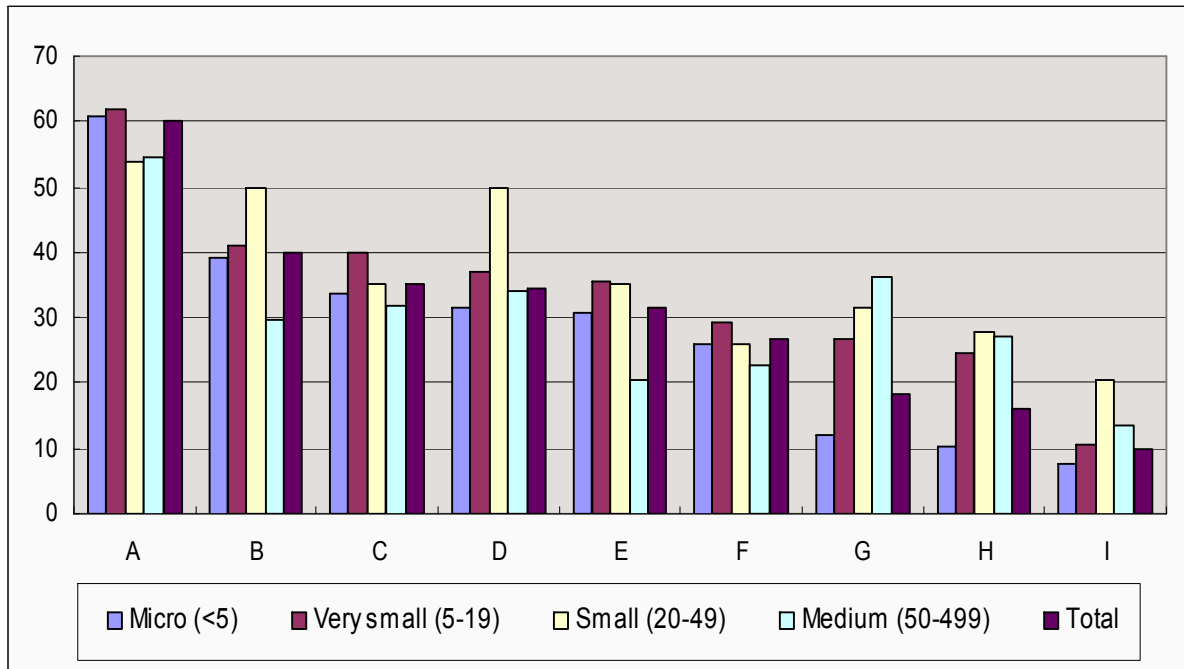
1. No Impact
2. Low
3. Medium
4. High
5. Very High Impact

Legend

- A Improving the quality of the products/services
- B Delivery of products/services to customers
- C Attracting new domestic customers
- D Getting marketing message out
- E Developing niche, specialized markets
- F Keeping overhead costs down (i.e. office space, consumable)
- G Managing customer information
- H Implementing new information and communication technologies
- I Managing office information technology
- J Equipment costs
- K Managing and reporting financial and tax information
- L Attracting and retaining key staff
- M Increase staff productivity
- N Geographical distance from clients and suppliers
- O Purchasing supplies and raw materials
- P Finding customers abroad
- Q Managing and communicating with mobile staff



Figure D Desired capabilities to develop (by size of firm)

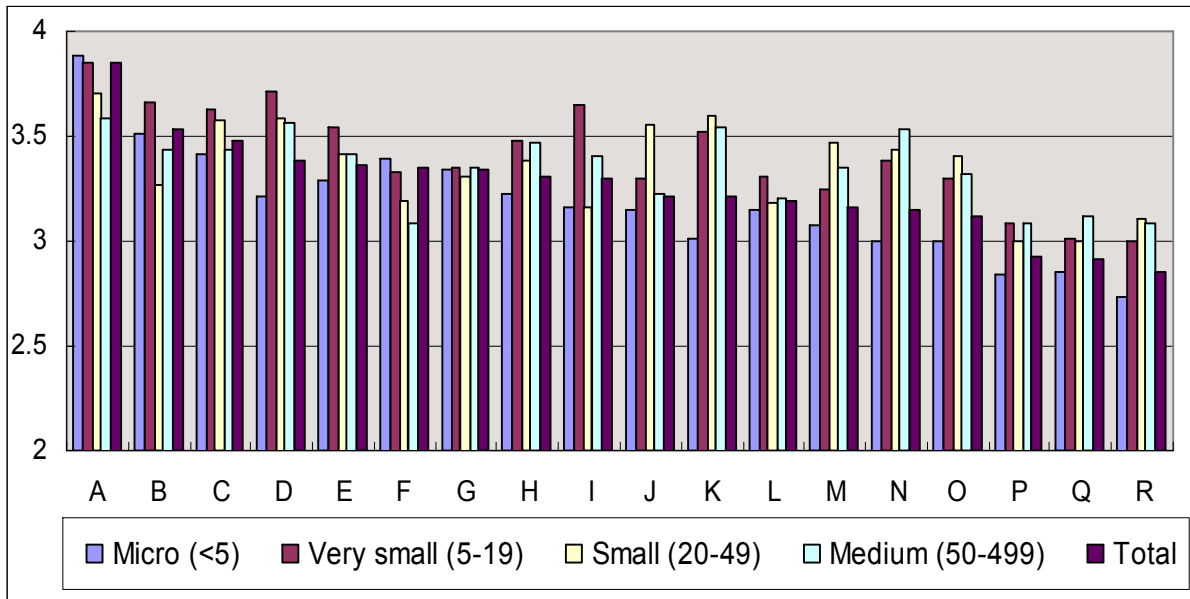


Vertical axis: percent of firms desiring to develop the capability in question

Legend:

- A Marketing
- B Interactivity with customers
- C Strategic planning
- D Technology
- E New product development
- F Entrepreneurship and leadership
- G Purchasing
- H Supply management
- I Change management

Figure E: The importance of the factors that might facilitate adoption and use of the Internet (by size of firm)



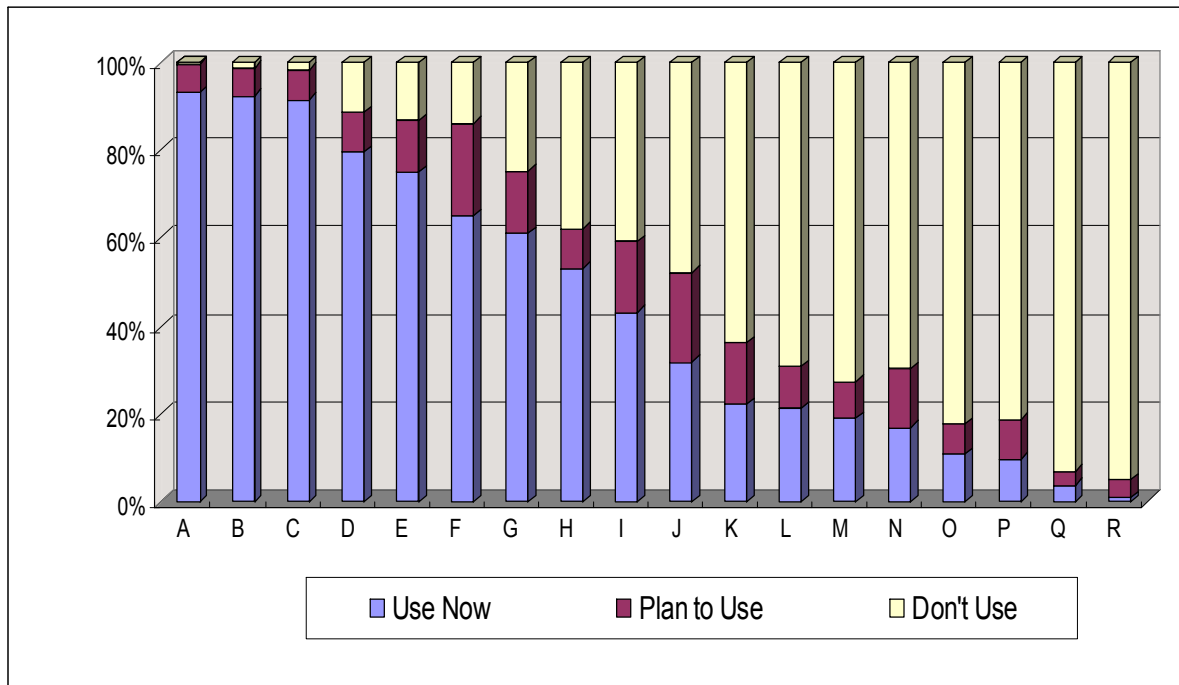
Scale

1. No Importance
2. Little Importance
3. Neutral
4. Important
5. Very Important

Legend

- A Possibility to access new markets
- B Nature of the goods or services you buy or sell
- C Capability to manage technological change
- D Demanding customers or suppliers
- E Access to specialized suppliers
- F Entrepreneurship
- G Strategic objectives
- H Management effectiveness
- I Competitive threats
- J Access to financial resources
- K Skilful and resourceful employees
- L Focus
- M Business processes in place that facilitate learning
- N Management commitment
- O Leadership quality
- P Attitude towards risk
- Q Favourable regulatory environment
- R Internal business culture

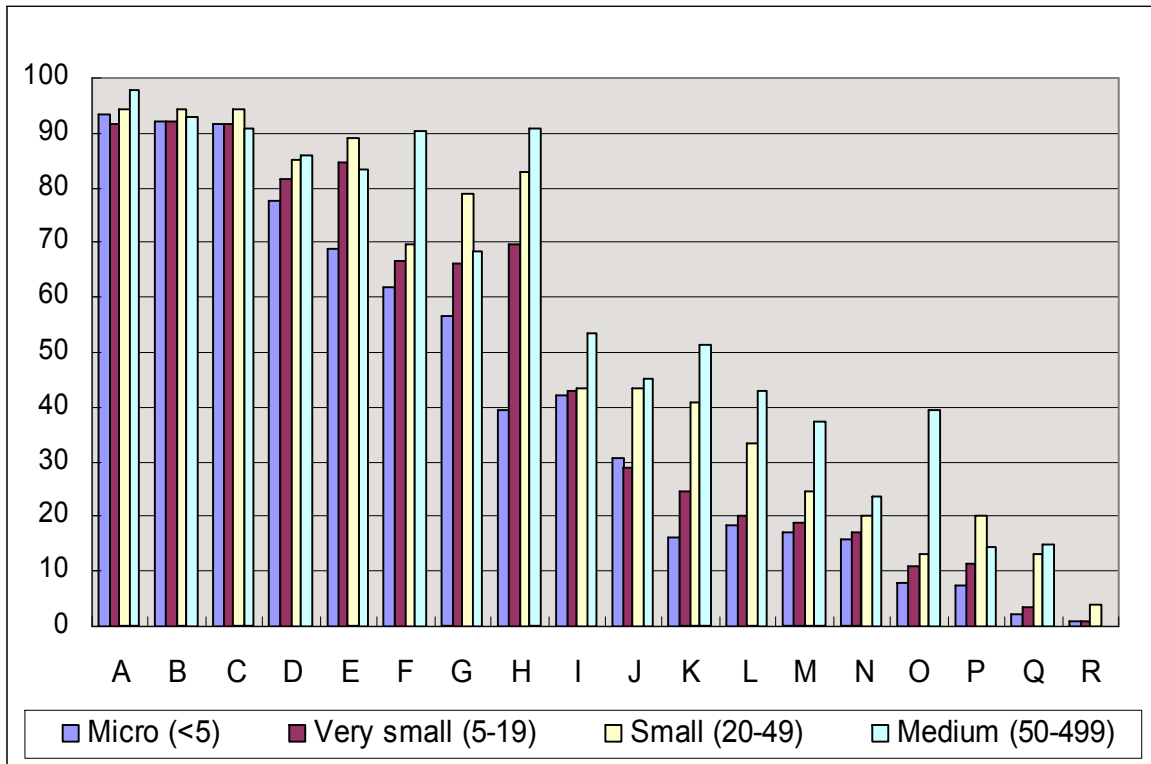
Figure F: Use of IT and e-business solutions by Atlantic SMEs



Legend

- A E-mail (electronic mail)
- B Personal computer, workstation or terminals
- C Internet; surfing the Internet, visiting websites, etc.
- D Network/information security technology (e.g. firewall, anti-virus software, access control)
- E Functional software packages (e.g. accounting, HR, marketing)
- F Presenting own website (on the Internet)
- G Wireless communications
- H Shared file folders
- I Conducting secure business transactions with other businesses or government
- J Conducting secure transactions with consumers
- K Internal company website and communications (intranet)
- L Remote data storage
- M Hosted software solutions
- N Meeting over the network (e.g. videoconferencing)
- O Remote help desk assistance for your employees
- P Extranet
- Q Radio Frequency Identification (RFID)
- R Biometrics

Figure G: Use of IT and e-business solutions (by size of firm)

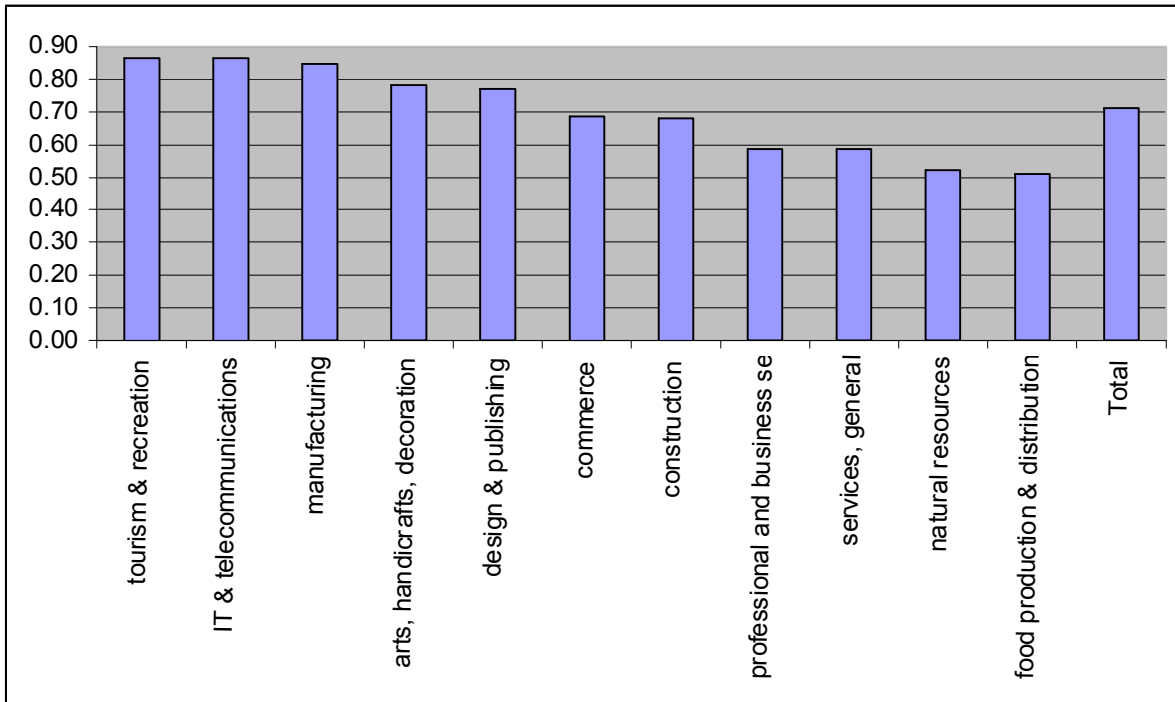


Vertical axis: percent of respondents using the technology or solution

Legend

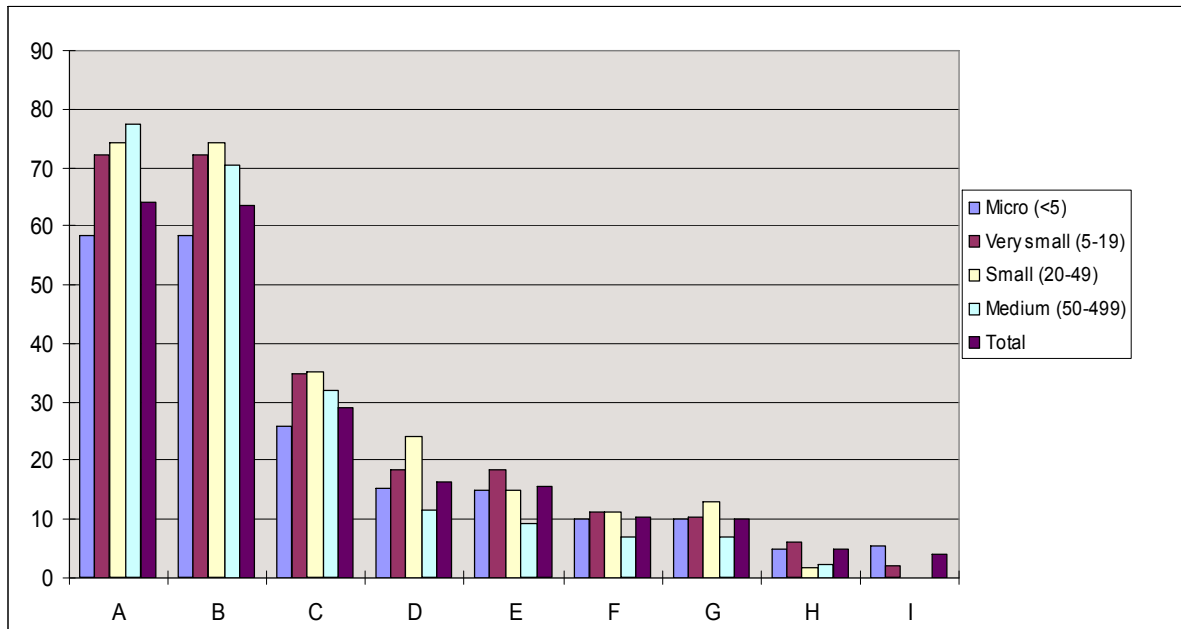
- A E-mail (electronic mail)
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- O Remote help desk assistance for your employees
- P Extranet
- Q Radio Frequency Identification (RFID)
- R Biometrics

Figure H: Website ownership by sector



Vertical axis: percent of firms having a website

Figure I: Features of respondent's websites (by size of firm)

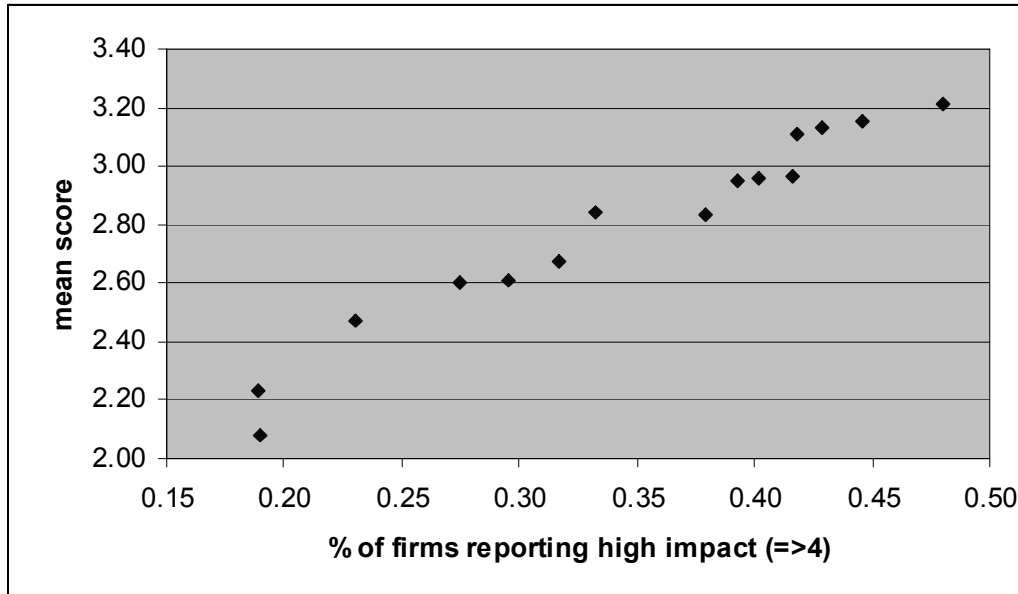


Vertical axis: percent of firms with websites having various functions or features

Legend

- A Information about product or services
- B Information about the business
- C Two way communication
- D Secure web site
- E Privacy policy statement
- F On-line payment
- G Digital products or services
- H Access via wireless mobile devices
- I Real-time interactivity

Figure J: Impacts of Internet technologies and e-business solutions among Atlantic Canadian SMEs



The vertical axis represents the mean reported impact on a five-point Likert scale:  
 1 = No Impact; 2 = Low Impact; 3 = Medium Impact; 4 = High Impact; 5 = Very High Impact

The horizontal axis represents the percentage of firms reporting a High or Very High Impact (>= 4)

- 0.48 Improved the brand and image of the business and its product/service
- 0.45 Allowed business to keep up with its competitors
- 0.43 Building and enhancing relationships with existing customers
- 0.42 Increased the speed of supplying and/or delivering services or goods
- 0.42 Increased level of customer service and satisfaction
- 0.4 Increased the ability to adapt to different client demands
- 0.39 Increased the business productivity
- 0.38 Improved co-ordination with partners or suppliers
- 0.33 Increased the business profitability
- 0.32 Improved the quality of goods or services
- 0.3 Improved rate of development and introduction of new products/services
- 0.27 Developing unique expertise or a unique market
- 0.23 Increased the business domestic market share
- 0.19 Decreased the cost of producing goods or services
- 0.19 Increased the business international market share

Figure K: Atlantic SMEs' portion of sales conducted over the Internet and portion of Internet-based sales to international customers (by firm's size)

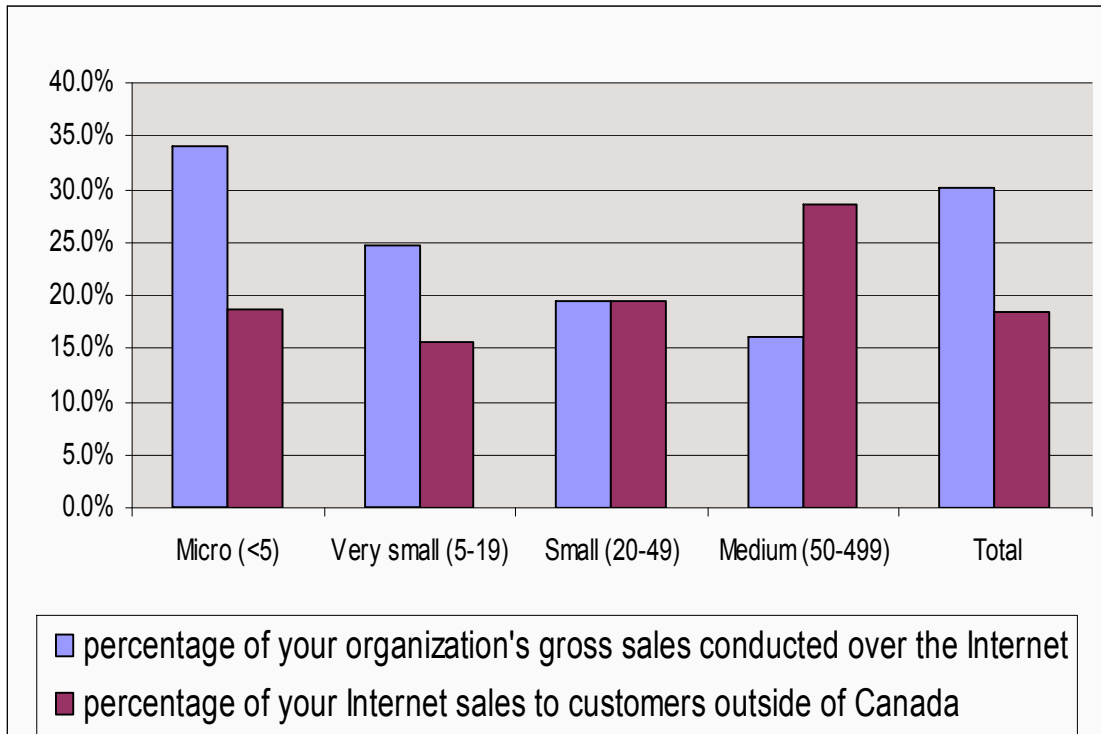
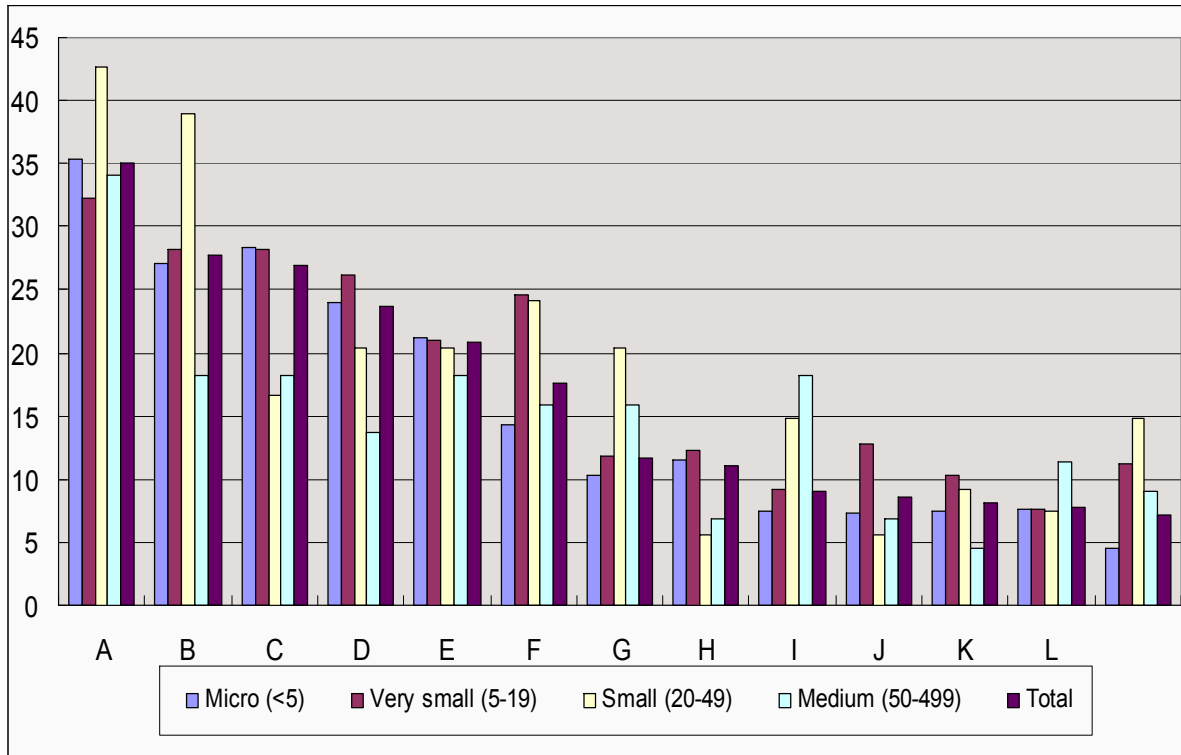




Figure L: Plans to use Internet technologies and related business solutions (by size of firm)

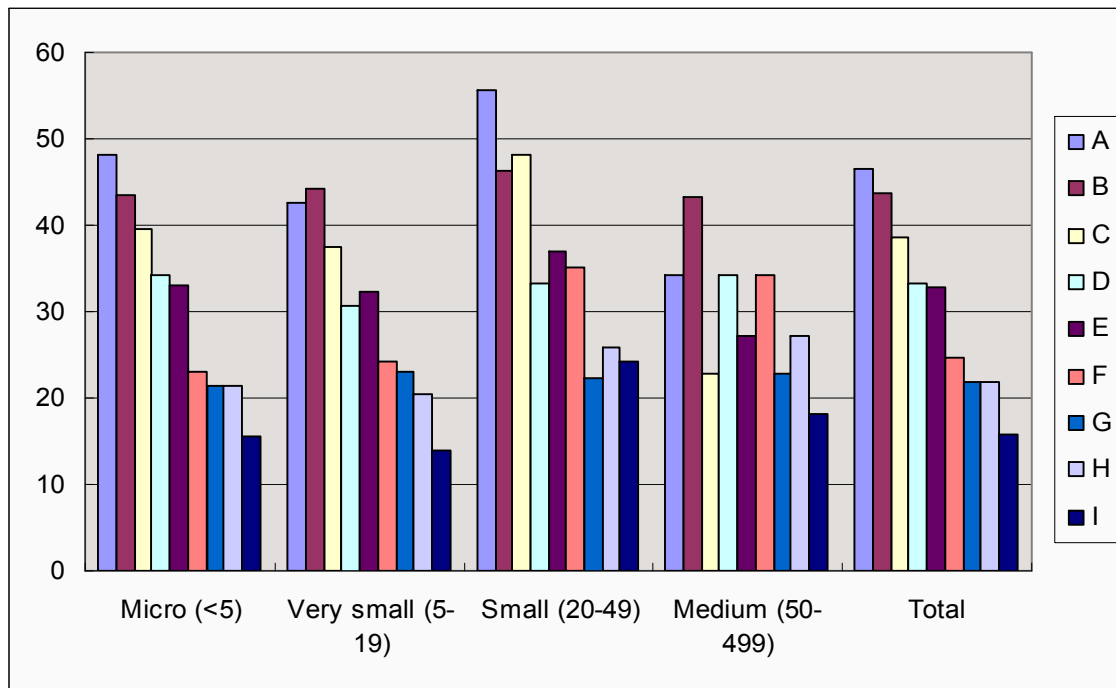


Vertical axis: percent of firms reporting plans to use a technology or solution

Legend

- A I have no plans in this regard
- B Website content development
- C Website design
- D Promotional/Internet marketing services
- E Payment services
- F Customer support
- G Delivery, fulfillment and order tracking
- H Shopping cart
- I Security/Access management
- J Catalogue management
- K Hosting
- L Technical consulting
- M Business process integration

Figure M: Atlantic SMEs' likely use of tools or services designed to assist with e-commerce (by respondent firm's size)



Vertical axis: percent of firms reporting likely use of tools or services

### Legend

- A - Examples (case studies) of businesses similar to yours, currently using e-commerce successfully;
- B - Recommendations about e-commerce solutions relevant to your type of sector or business;
- C - Personalized, expert advice on e-commerce for your business;
- D - Online seminars on e-commerce in your sector (i.e. tourism, fisheries, manufacturing, etc.);
- E - Directory of organizations that can offer help in using e-commerce;
- F - Visits to successful companies;
- G - Interactive questionnaire to help you define an e-commerce strategy;
- H - Classroom-based seminars about e-commerce in your sector (i.e. tourism, fisheries, manufacturing, etc.);
- I - Statistics and graphics about e-commerce adoption and use among different sizes or types of companies in Atlantic Canada.