INNOVATION BUSINESS SURVEY

A Survey of Innovation and Research and Development Activity in Newfoundland and Labrador's Private Sector

Final Report

Prepared for

Atlantic Canada Opportunities Agency
and Industry Canada

June 2002

Prepared by

Barry Sheppard Consulting
Wade Locke Consulting
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EXECUTIVE SUMMARY

What will it take to survive and grow in business in the future? *"Ongoing advances in technology and business methods make innovation an essential element in individual companies, and our economy as a whole."*[1]

Innovation is not only about invention. It is about a business culture where new ideas about products, services, technologies and processes are embedded as core values. Where will companies get innovative ideas? They will get their innovative ideas from their staff, customers and suppliers and through collaboration with other firms, universities, colleges and research institutions.

In an attempt to better understand the factors that contribute to innovation and influence research and development (R&D) activities within the private sector in Newfoundland and Labrador, the Atlantic Canada Opportunities Agency and Industry Canada, in cooperation with the Government of Newfoundland and Labrador, the Newfoundland and Labrador Association of Technology Industries, the Canadian Manufacturers and Exporters, Newfoundland and Labrador Division, the Newfoundland and Labrador Environmental Industry Association and the Newfoundland Ocean Industries Association commissioned this study to better understand the challenges to innovation in the province.

As part of this research Barry Sheppard Management Consulting was engaged to conduct a survey of the private sector and Wade Locke Economic Consulting was engaged to conduct a simultaneous survey of the academic community at Memorial University.

The private sector research attempted to survey 932 firms through a mail-out questionnaire. A total of 241 (25.8%) questionnaires were returned. Only 215 were used in the data analysis because 26 arrived after the March 15, 2002 cut-off date.

The survey sought to identify the characteristics of firms that innovate and undertake research and development. Table E-1 summarizes the survey responses.

A second objective of this study was to identify the barriers to innovation perceived by the private sector. Obviously, the identification of these barriers is an important step for the development of strategies that encourage and facilitate innovation activities in businesses in Newfoundland and Labrador.

The third focus of this research was to determine the forces that drive innovation in small and medium-sized enterprises in Newfoundland and Labrador. The most common drivers of innovation were market related. Participants considered the following to be the four most important drivers of innovation activity:

[1] Price Waterhouse Coopers. Fast-Growth Companies Boast a Competitive Edge in Innovation, March 28 2000 <http:// www.pricewaterhousecoopers.co.uk>

- to open new markets;
- to maintain market share;
- to increase market share; and
- to respond to changing market demands.

While reducing production time and labor costs, increasing delivery speed, increasing production capacity and improving production flexibility were all important, they ranked below the market factors in terms of their importance in driving innovation.

In addition, cost-related barriers were the most significant challenges to innovation activity in Newfoundland and Labrador. In order of importance, the top five barriers identified were:

- overall costs relative to expected payback;
- cost of marketing and commercialization;
- cost of production investment;
- cost of research and development; and
- cost of design and engineering.

While cost-related barriers were most important, there were other important barriers to innovation. Specifically, Newfoundland and Labrador businesses noted that the difficulty in obtaining government funding; the difficulty in obtaining private sector funding; the lack of time to generate ideas and take them forward; a lack of non-financial government supports; and government policy or regulatory environment also ranked high.

The role of partnerships and alliances with education, government and other research institutions in facilitating innovation was also investigated in the survey. Even though not many firms had attempted to collaborate with these potential partners, those that did were very successful.

The importance that human resources play in the innovation process is demonstrated by the survey responses. To tap into innovation, businesses must have both access to creative people and information technology and foster a culture that brings out the creative ideas of their employees. The survey responses confirm that employees and customers are the most important sources of innovation information. Customers continue to expect high levels of service and innovative firms respond through customer relationship management, enabled through information technology.

Table E-1 illustrates the statistically significant relationships that have been established between innovation variables and firm characteristics. For example, a statistically significant relationship exists between firms that applied for government funding and R&D activities. Specifically, firms that applied for government funding were eight times more likely to engage in R&D than firms that had not applied for government funding.

Similarly, the odds ratios[2] for firms that benefited from innovative solutions offered by employees were: 2.86 for introducing new or improved goods or services to the market; 4.31 for introducing new or improved production or other internal processes; 4.39 for engaging R&D; 2.90 for introducing new or improved production processes; 7.59 for introducing new or improved internal processes; 4.69 for acquiring machinery, equipment or technology; 3.44 for adapting existing technologies to provide a new good or service; 5.04 for adapting existing technologies to improve internal processes; and 4.95 for obtaining external R&D funding. No statistically significant relationship could be established for applying for the Scientific Research and Experimental Development (SR&ED) tax credit.

Table E-1 provides a summary of the statistically significant relationships that have been confirmed by this analysis. No statistically significant relation could be established between a number of factors and innovation activity. This surprisingly included location of business or years in operation. Furthermore, no statistically significant relationship could be established between firms that engaged in joint ventures with local companies and whether they introduced new goods or services to the market.

In summary, the evidence presented in this report confirms that government policy focused on innovation in Newfoundland and Labrador is essential. A Brazilian entrepreneur is quoted "A turtle may live for hundreds of years because it is well protected by its shell, but it only moves forward when it sticks out its head". Innovation activities are risky and firms in Newfoundland and Labrador have to be encouraged to move forward and innovate. Likewise government has an important role to play in creating an environment that facilitates this innovation.

[2] The odds ratio is the probability of a firm with a particular characteristic undertaking some activity relative to the probability of performing that activity by those firms that do not possess that characteristic.

Table E-1
Summary of Regression Results

Factors Contributing to Innovation and R&D Activity	Innovation and R&D Activity									
	Introduced New Goods or Services to the Market	Introduced Significantly Improved Goods or Services to the Market	Introduced New or Improved Production Processes	Introduced New or Improved Internal Processes	Engaged in R&D	Adapted Existing Technologies to Provide a New Good or Service	Adapted Existing Technologies to Improve Internal Processes	Acquired Machinery, Equipment or Technology	Obtained External R&D Funding	Applied for the SR&ED Tax Credit
	Odds Ratios									
Applied for government funding	3.02	1.89	1.89	1.98	**7.96**	2.77	-	-	-	-
Benchmarked performance	-	-	2.19	2.76	-	-	3.06	-	-	-
Benefited from innovative solutions offered by employees	2.86	**4.31**	2.90	**7.59**	4.39	3.44	**5.04**	**4.69**	**4.95**	-
Commenced exporting	2.76	2.01	2.01	2.15	2.71	-	-	-	-	-
Commercialization of research	-	-	-	-	4.89	-	-	-	-	-
Do market research on-line	-	-	-	2.50	3.68	2.22	-	-	-	-
Employment levels	-	-	-	-	-	-	-	-	-	-
Engaged in joint ventures with international companies	2.95	3.99	**3.99**	-	2.18	2.96	-	-	-	-
Engaged in joint ventures with local companies	-	**4.54**	**4.54**	2.29	-	2.16	-	-	-	-
Government research institutions in other provinces	-	-	-	-	-	-	-	-	-	-
Have a web page	2.83	-	-	-	-	2.17	2.41	-	-	-
Have access to the Internet	**3.58**	3.27	-	2.78	-	3.19	3.97	-	-	-
Have high-speed Internet access	2.21	1.85	1.85	2.24	-	2.15	2.23	-	-	-
Improved competitive position	2.11	3.89	3.89	**4.06**	3.18	2.27	1.93	-	-	-
Increased exporting	2.28	2.06	2.06	2.54	2.24	3.72	-	-	-	-
Location of business	-	-	-	-	-	-	-	-	-	-
Monitored customer satisfaction levels	-	2.30	-	2.65	-	-	2.43	-	-	-
Number of employees	-	-	-	-	-	-	-	-	-	-
Obtained external R&D funding	2.77	2.73	2.73	-	-	**4.23**	-	-	-	-
Participated in industry association activities	-	2.53	2.03	2.72	2.81	2.08	-	-	-	-
Partnered with local colleges	3.20	-	-	-	-	-	-	-	-	-
Partnered with local government research institutions	-	3.57	3.57	-	3.56	**5.36**	**8.50**	-	-	-
Partnered with Memorial University	-	-	-	2.25	4.52	-	-	-	-	-
Provided employee skills training	2.78	2.43	2.32	2.45	-	2.95	3.67	**4.66**	**3.78**	-
Provided management skills training	-	-	-	2.75	-	2.61	3.04	2.35	-	-
Purchase on-line	-	2.06	-	2.01	2.06	2.60	2.63	-	-	-
Research facilities outside Canada	-	-	-	-	-	-	-	-	-	-
Sell on-line	**5.08**	3.65	3.09	-	-	-	-	-	-	-
University research institutions in other provinces	-	-	-	-	-	-	-	-	-	-
Use e-mail	3.06	3.26	-	-	-	-	2.81	-	-	-
Used continuous improvement or other QA programs	-	1.86	2.58	3.02	-	-	2.49	-	-	**2.36**
Used incentives to encourage employee innovation	-	2.11	2.37	3.73	-	2.03	3.68	2.48	-	-
Years in operation	-	-	-	-	-	-	-	-	-	-
Your highest level of formal education	-	-	-	-	**10.67**	-	-	-	-	**6.29**

Bold = the two most statistically significant relationships for each innovation activity

1. INTRODUCTION

1.1 Background to This Study

"To survive and prosper, that is, to achieve and maintain a high standard of living for its members, a society must do (many) things well. First, it must build and sustain social, legal and economic structures and processes that support innovation, that are competitive while sustaining the natural environment, and that lead to well-being for the greatest number of people. Second, it must ensure that its members develop and continually update the knowledge, competencies, abilities and skills that are required to produce innovative products and services." [3]

There is global consensus about the importance of innovation in fostering the economic well-being of nations. Innovation is expected to be the driving force behind business prosperity and economic growth in the next century. The Organization for Economic Cooperation and Development (OECD) defines innovation as the creation and adoption of new products or processes, or the adaptation and fusion of existing technologies. It is the process by which improved products or processes are developed and introduced into the marketplace. In this context, goals of national prosperity and sustainable economic growth can only be achieved by understanding what innovation can do.

Canada currently lags other OECD nations in its investment in research and development, in innovation and productivity gains and in competitiveness. With Gross Expenditures on R&D (GERD) of 1.5% GDP, Canada ranks 15th in the OECD and sixth (with only Italy lower at 1%) in the G7 nations. Further, Canada's standard of living (GDP per capita) and productivity (real GDP per hour worked) have been falling relative to the United States for the last two decades. In the fall of 2000 Finance Minister Paul Martin posed a challenge for Canada to become one of the top five OECD nations in R&D investment by the year 2010.

While the innovation gap between Canada and other industrialized nations is widening, so too is the gap between Atlantic Canada and the other regions of Canada. The Atlantic region, and Newfoundland and Labrador in particular, trails the rest of Canada in the following areas: high knowledge activity, productivity, per capita R&D expenditures, business sector R&D, federal R&D spending, the adoption of advanced technology, patent applications and accessing national innovation programs.

Given the high priority of innovation for the Atlantic Canada Opportunities Agency (ACOA) and Industry Canada, the two have entered into a partnership to identify appropriate strategies and actions to strengthen this province's innovation system and improve innovation performance.

It is in this context that ACOA and Industry Canada determined that a systematic analysis of the state of the province's innovation activity and the barriers to innovation was required. Together, they determined that a statistically relevant survey of the province's

[3] 1994 Report of the Auditor General of Canada – Chapter 5 – An Innovative Society and the Role of Government.

private sector stakeholders and university researchers would provide information necessary for effective strategic policy planning on innovation. In cooperation with the Government of Newfoundland and Labrador, the Newfoundland and Labrador Association of Technology Industries, the Canadian Manufacturers and Exporters, Newfoundland and Labrador Division, the Newfoundland and Labrador Environmental Industry Association and the Newfoundland Ocean Industries Association, ACOA and Industry Canada have commissioned this research.

As part of this research, Barry Sheppard Management Consulting was engaged to conduct a survey of the private sector in the province. Wade Locke Economic Consulting was also engaged to conduct a simultaneous survey of the academic community at Memorial University.

This study aims to identify both key factors that drive innovation at the firm level and important barriers to innovation for firms. It maps out a series of driving forces and barriers that may potentially influence the implementation or adoption of innovation by firms in Newfoundland and Labrador. Results of the academic research are described in a separate report.

1.2 Structure of the Report

The methodology used in conducting the survey is outlined in Section Two. The remainder of the report presents the findings of the research. Section Three provides the general characteristics of the survey respondents, followed by the survey results and statistical analysis of the results. The report concludes with Section Four that highlights the observations of the research.

2. RESEARCH METHODOLOGY

2.1 Objectives of the Survey

Survey respondents were informed that in answering the questions innovation was to be interpreted as the process by which new or improved goods or services are developed and introduced into the marketplace, or new or improved processes are utilized by the firm. This encompasses research and development, engineering and industrial design, market investigation, organizational restructuring and skills development.

The objective of this private sector survey is to identify the factors that contribute, either positively or negatively, to the ability of small and medium-sized enterprises to develop, adopt and market leading-edge innovations. The survey results contribute to the ability of ACOA and Industry Canada to develop and implement strategies to address the challenges faced by firms in Newfoundland and Labrador in the pursuit of innovation activities.

2.2 Survey Instrument

The survey questionnaire (attached in Appendix A) was designed to address two issues. The first was to examine how the characteristics of firms affect their innovative activities. The second was to examine the barriers and drivers of innovation within private sector firms.

The questionnaire contained four sections. The first section was designed to obtain background and general information on the firms, including the location of business, its years in operation and employment levels. The second section assessed the innovative activities of firms over the past three years. This focused on whether firms had:

- introduced new goods or services;
- introduced significantly improved goods or services;
- introduced new or improved production processes;
- introduced new or improved internal processes;
- adopted existing technologies to provide a new good or service;
- adopted existing technologies to introduce or improve an internal process; and
- engaged in research and development activities.

The third section questioned firms on the challenges they faced with respect to innovation and which factors constituted important barriers to innovation. This included questions on the costs of innovation activities, information required for innovation and issues pertaining to partnering with other companies and research institutions. Common drivers of innovation activity, such as market, quality and capacity issues, were also considered in this section.

The final section focused on the future expectations of the firms regarding their intentions to introduce new products or processes; to adapt new technology; or to engage in research and development.

2.3 Conduct of the Survey

The survey sample was selected from the membership lists provided by the following industry associations who were participants in this study.

- Newfoundland and Labrador Association of Technology Industries (NATI)
- Newfoundland and Labrador Environmental Industry Association (NEIA)
- Newfoundland Ocean Industries Association (NOIA)
- Canadian Manufacturers and Exporters, Newfoundland and Labrador Division (CME)

It also included a mailing list of non-members provided by the Canadian Manufacturers and Exporters, Newfoundland and Labrador Division.

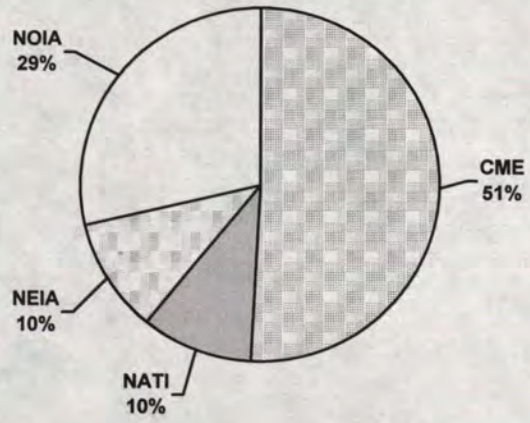
The total sample population was made up as follows:

Industry Association	Population Before Filtering	Population After Filtering	% of Total Filtered Population
CME	624	475	51%
NATI	116 (*)	93	10%
NEIA	118	97	10%
NOIA	450	267	29%
Totals	**1308**	**932**	**100%**

(*) NATI had already pre-filtered its list from 189 to 116

The combined unfiltered population from all four associations totaled 1,308 firms. Each association list was filtered to remove duplication of firms that were members of more than one industry association. Firms with out-of-province addresses were also removed, as were firms that were considered inappropriate for this survey. This latter group included banking institutions, legal and accounting firms and student members. After filtering there were 932 firms left in the sample. Figure 2.1 illustrates the distribution of the survey population by industry association membership or affiliation.

Figure 2.1: Survey Sample Population



The survey was conducted between March 1 and 15, 2002. The initial mailing was followed up by telephone contact to all firms in the mail-out with the exception of a small number that had incorrect telephone numbers on the contact lists provided by the industry associations. Firms were asked to return the completed questionnaire by March 15.

A total of 241 responses were received and an additional 28 were returned undelivered due to incorrect mailing information. Two hundred and fifteen questionnaires were entered for analysis, because 26 were received after the cut-off date.

This 26% response rate is considered very good and is explained by three key factors: (1) firms were encouraged to participate in the survey by the Vice-President of ACOA Newfoundland and Labrador and the Senior Trade Commissioner and Provincial Director of Industry Canada through cover letters that accompanied each survey; (2) firms were encouraged to participate by their respective industry associations; and (3) the extensive telephone follow-up met with a very favorable response.

2.4 Statistical Analysis

The methodology for the statistical analysis involved a two-step process. Using cross tabulations, Chi square tests were used to identify statistically significant relationships between variables. If a relationship was established then logic regression was used to identify the nature of the relationship. The likelihood of innovating was modeled as classification problem, where the characteristics of those that innovated were distinguished from those that did not. A detailed discussion of the procedure is provided in Appendix B.

3. RESEARCH FINDINGS

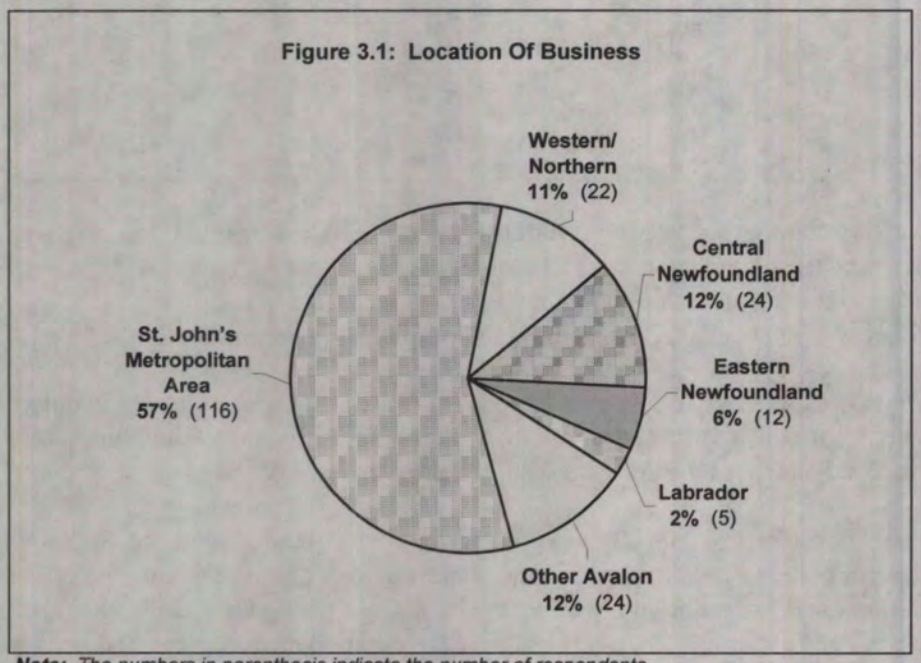
3.1 Characteristics of Survey Respondents

The following section provides an overview of the characteristics of the survey participants.

3.1.1 Location of businesses

A total of 203 survey respondents reported the location of their business. Figure 3.1 shows the breakdown of the respondent firms by location within the province.

Figure 3.1: Location Of Business



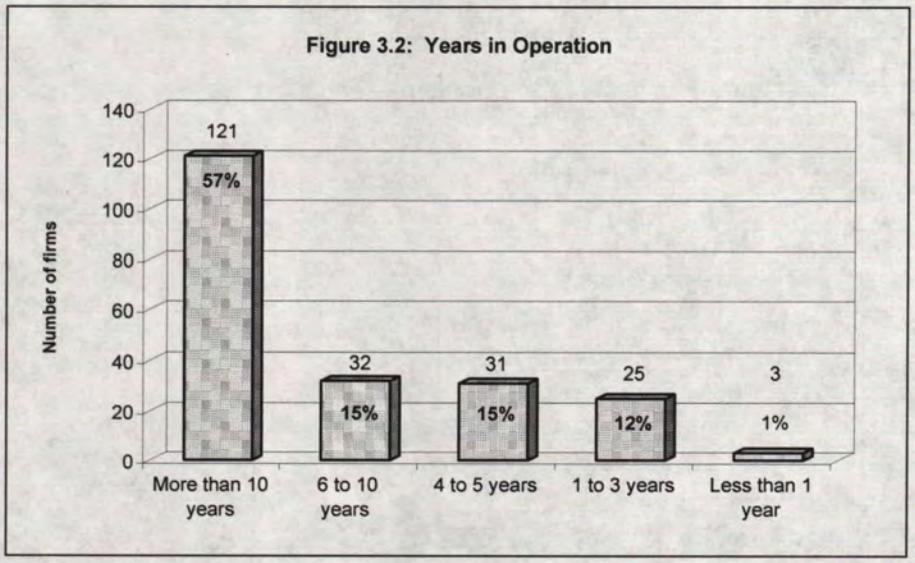
Note: *The numbers in parenthesis indicate the number of respondents.*
Missing = 12

It is not surprising that 69% of the respondents were from the Avalon Peninsula since this is where 70% of the population reside and the greatest concentration of businesses exist.

3.1.2 Years in operation

As illustrated in Figure 3.2 below, 212 respondents reported the length of time that they have been in business.

Figure 3.2: Years in Operation



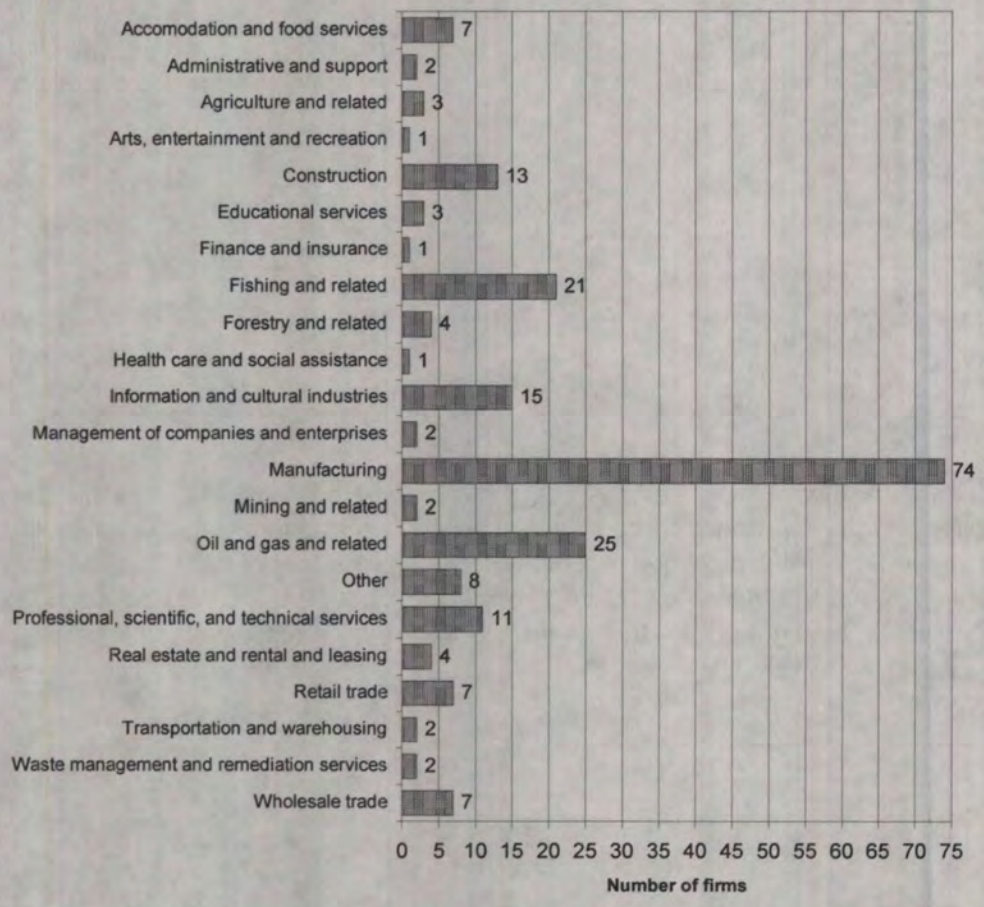
Missing = 3

One hundred and twenty-one respondents (57%) have been in business more than 10 years and 43% have operated for less than 10 years. It is also interesting to note that 28% of businesses (59 firms) have been operating for five years or less and 13% (28 firms) were in operation less than three years. The majority of businesses that responded to the survey were more mature firms, though there is a reasonable representation of firms from each stage of the development process.

3.1.3 Industry sectors

From a list of North American Industry Classification System (NAICS) codes provided, participants were asked to select the industry sector in which they operated. Figure 3.3 presents a breakdown of sectors from which the 215 respondents came.

Figure 3.3: Industry Sectors Represented in the Survey



Seventy-four (34%) of the responding firms were from the manufacturing sector. This is not surprising given that 51% of the total (filtered) sample population was drawn from the CME's mailing list. The second most frequent group of respondents was in the oil and gas related sectors (12%), which was followed closely by the fishing and related sectors with 10% of the respondents.

A number of respondents reported multiple entries for the industry in which they operated. In these cases, firms were assigned to one classification, by examining the

responses they gave to the other survey questions. The following is a further breakdown of the 74 manufacturing industries; 15 information and cultural industries; 11 professional, scientific and technical service industries; and 7 other service industries.

Manufacturing – Specified	#	Other Manufacturing	#
Food, beverage or tobacco production	9	Fibre reinforced products	1
Textiles & textile mill production	1	Pressure sensitive labels	1
Clothing manufacturing	4	Composting	1
Leather & allied products	-	Import / export concepts	1
Wood & paper products	7	Packaging materials	1
Printing services	9	PVC vinyl windows	1
Petroleum & coal products	-	Florite jewelry & souvenir items	1
Chemical manufacturing	-	Kitchen cabinets	2
Plastics & rubber products	5	Fish processing equipment	1
Non-metallic mineral products	-	Light fixtures for marine & offshore	1
Primary metal manufacturing	1	Caskets	1
Fabricated metal products	8	Geo-information products	1
Machinery manufacturing	2	Candles & wax products	1
Computer & electronic products mfg.	4		
Electrical equipment & appliances	-		
Transport equipment manufacturing (including boat building	4		
Furniture & retail products	6		
Total	**60**	**Total**	**14**

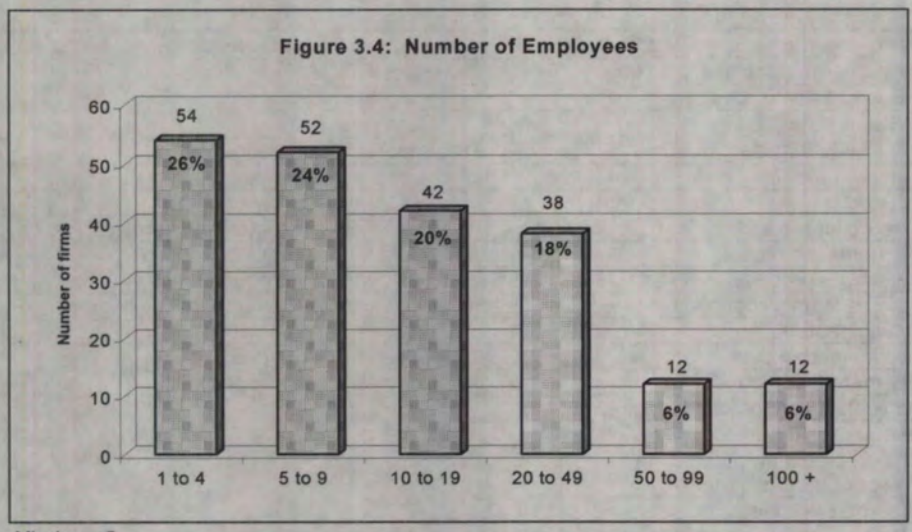
Information & Cultural Industries	#	Other Information Services	#
Book & software publishing	3	E-solutions & multimedia	1
Motion picture & sound recording	1	Safety consulting	1
Radio/TV/Internet publishing & broadcasting	1	Graphic design	1
Telecommunications – satellite, wireless	1	Maintenance management software	1
Internet service providers, data processing	-	Software products for general industry use	1
		IT professional services	1
		Internet reporting systems	1
		Quality control systems	1
		Marine software & integration	1
Total	**6**	**Total**	**9**

Professional, Scientific & Tech Services	#	Other Service Industries	#
Legal, accounting, architectural	1	Marketing & communications	1
Engineering, geophysical survey & mapping	1	Hydraulic sales, service & design	1
Industrial & computer systems design	1	Funeral industry	1
Management, scientific & technical consulting	8	Biotech & aquaculture	1
Scientific research and development	-	Service	1
		Electrical material handling	1
		Crane rental & transportation	1
Total	**11**	**Total**	**7**

3.1.4 Number of employees

Figure 3.4 profiles the distribution of the 210 respondent firms by the number of their employees.

Figure 3.4: Number of Employees



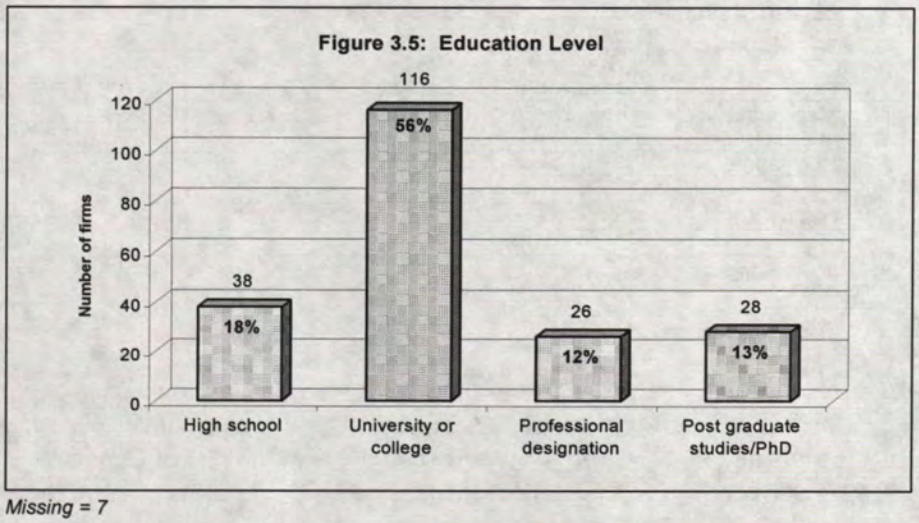
Missing = 5

Fifty percent of the respondent firms have less than ten employees and only 12% of respondents have more than 50 employees. The majority of firms (70%) have less than 20 employees. In other words, the firms surveyed represent small and medium-sized businesses.

3.1.5 Education of owners or managers

Innovative firms generally have a higher proportion of highly-educated personnel compared with their non-innovative counterparts. Figure 3.5 displays the distribution of the 208 respondents that indicated their highest level of formal education.

Figure 3.5: Education Level

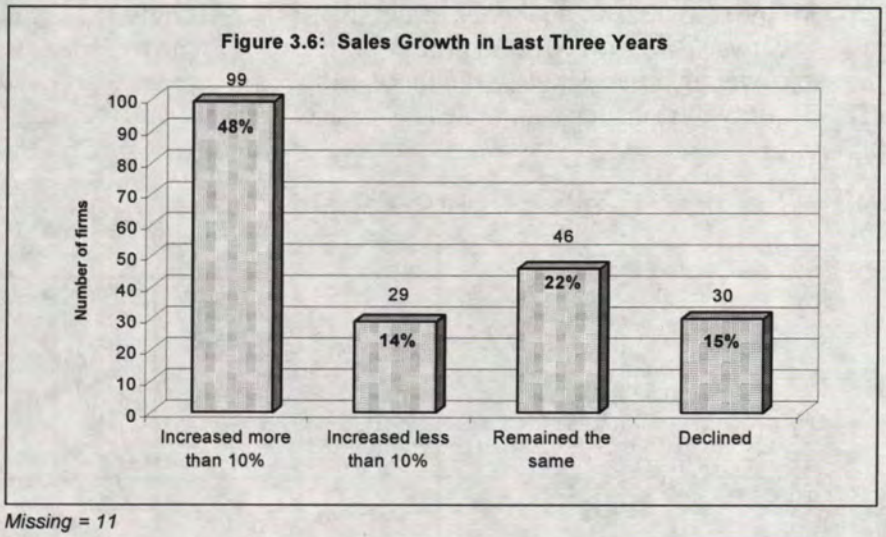


Missing = 7

3.1.6 Sales growth

Figure 3.6 presents the distribution of firms by their sales growth in the last three years. One hundred and twenty-eight (62%) reported growth during that time period, with 99 (48%) respondents experiencing sales growth of more than 10%.

Figure 3.6: Sales Growth in Last Three Years



Missing = 11

3.1.7 Export sales

Firms were asked what percentage of their annual sales were accounted for by local markets, national markets, US markets and other markets. Their responses are summarized in Table 3.1.

Table 3.1: Average (Normal) Annual Sales by Territory – Number of Firms

	Newfoundland and Labrador	Rest of Canada	United States	Other Countries
Number of firms with sales in	197	138	115	116
Firms with >90% sales in	121	3	3	7
Firms with 100% sales in	75	0	1	3
Missing responses	18	77	100	99

This table demonstrates that:

- 121 firms reported that over 90% of their sales were in Newfoundland and Labrador and 75 firms reported 100% of sales within the province;
- 3 firms indicated that over 90% of their sales were in the rest of Canada;
- 3 firms had over 90% of their sales and 1 firm had 100% of its sales in the United States; and
- 7 firms reported over 90% of sales in countries outside Canada and the United States and 3 had 100% of their sales in these countries.

3.1.8 Sales and profit

Respondents were asked how their sales and profits had changed over the last three years. Table 3.2 presents the responses to this series of questions. Interestingly, there was a direct correlation between sales growth and profit. In firms where the majority of sales remained the same over the three years, so did their profit and where sales declined, so did profit. The majority of firms reporting sales increase of more than 10% also reported an increase in profit.

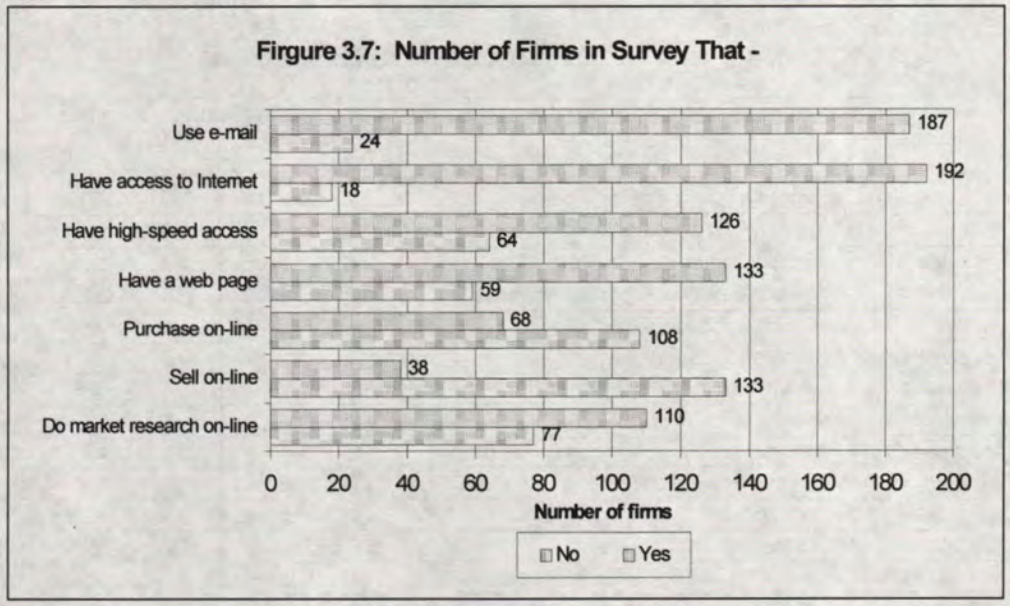
Table 3.2: Sales and Profit Over Last Three Years

	Profit			
Sales	Remained the same	Declined	Increased less than 10%	Increased more than 10%
	Number of Responses			
Remained the same	38	8	1	-
Declined	2	28	-	-
Increased less than 10%	12	3	13	-
Increased more than 10%	15	8	22	50
Total	67	47	36	50

Missing = 15

3.1.9 Access to information technology

Figure 3.7 and Table 3.3 is a summary of firms' use of e-mail, Internet and e-commerce applications.



About 90% of firms surveyed had access to the Internet (192 firms) and used e-mail (187 firms). Over half of the respondents had high-speed Internet access (126 firms) and owned a web page (133 firms).

Table 3.3: Firms' Access to Information Technology (Number of Firms)

		Access to Internet		High - speed access		Web page		Purchase on-line		Sell on-line		Market research on-line	
		No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Use e-mail	No	10	0	10	0	8	2	9	1	9	1	9	1
	Yes	54	125	54	125	51	130	99	67	124	37	68	109
Access to Internet	No	-	-	6	0	6	0	5	1	5	1	6	0
	Yes	-	-	58	125	53	132	103	67	128	37	71	110
High-speed access	No	-	-	-	-	36	28	48	16	54	9	34	30
	Yes	-	-	-	-	23	98	60	49	79	29	43	76
Web page	No	-	-	-	-	-	-	46	13	54	4	27	32
	Yes	-	-	-	-	-	-	61	55	78	34	49	77
Purchases on-line	No	-	-	-	-	-	-	-	-	100	8	52	56
	Yes	-	-	-	-	-	-	-	-	33	27	25	41
Sell on-line	No	-	-	-	-	-	-	-	-	-	-	61	72
	Yes	-	-	-	-	-	-	-	-	-	-	14	24

Table 3.3 illustrates that while there was widespread use of the Internet, only a few firms used the Internet for e-commerce. For instance, only 37 firms reported selling on-line and 67 firms had purchased on-line.

3.2 Recent Innovation Activities (Last Three Years)

Questions 11 through 34 in the survey questionnaire asked firms to identify the innovation activities they were involved in over the last three years. A summary of their replies, listed in order of most frequent responses, is provided in Table 3.4.

Table 3.4: Recent Innovation Activities (Last Three Years)

Innovation Activities	Distribution of Responses				
	Yes		No		Missing
	Number	Percent	Number	Percent	
Acquired machinery, equipment or technologies	163	80%	40	20%	12
Provided employee skills training	158	77%	48	23%	9
Monitored customer satisfaction levels	153	76%	48	24%	14
Adapted existing technologies to improve internal processes	144	73%	53	27%	18
Participated in industry association activities	148	73%	56	27%	11
Introduced new goods or services to the market	132	63%	76	37%	7
Introduced new or improved internal processes	124	61%	80	39%	11
Improved competitive position	118	61%	74	39%	23
Introduced significantly improved goods or services to the market	112	57%	83	43%	20
Adapted existing technologies to provide a new good or service	115	57%	86	43%	14
Used continuous improvement or QA programs	116	57%	86	43%	13
Provided management skills training	113	55%	92	45%	10
Benefited from innovative solutions offered by employees	110	54%	94	46%	11
Introduced new or improved production processes	104	53%	94	47%	17
Engaged in R&D	87	46%	104	54%	24
Used incentives to encourage employee innovation	90	44%	113	56%	12
Benchmarked performance	78	39%	120	61%	17
Obtained external R&D funding	39	35%	72	65%	104
Increased exporting	61	31%	139	70%	15
Engaged in joint ventures with local companies	61	30%	142	70%	12
Engaged in joint ventures with international companies	59	29%	145	71%	11
Commenced exporting	52	26%	147	74%	16
Discontinued selling goods or services	48	24%	152	76%	14
Acted to protect intellectual property	39	22%	135	78%	41
Applied for SR&ED tax credit	39	20%	157	80%	19
Applied for a patent	9	5%	188	95%	18

Missing = number of respondents that chose not to answer a specific question

Respondents were engaged in several types of innovation activities. The most frequent activities were the acquisition of machinery, equipment or technology (80%); the provision of employee training (77%); the monitoring of customer satisfaction levels (76%); the adaptation of existing technologies to improve internal processes (73%); and the participation in industry association activities (73%). Alternatively, respondents were less involved in joint ventures with local or international companies (30%, 29%) and did not apply for patents (5%) or other intellectual property protection (22%). Likewise, while 87 respondents engaged in R&D, only 39 suggested that they applied for the Scientific Research and Experimental Development (SR&ED) tax credit.

In Question 23, respondents that reported having obtained external R&D funding were asked to identify the source of this funding. The funding sources identified were:

External R&D Funding Sources	No.
Venture capital	6
Financial institution	7
Research institution	9
Government program	31
Other	7
Total	**60**

Details of 'Other' R&D Funding Source	No.
National Research Council	2
Industry	1
Company	1
Buy-out	1
Contract R&D	1
Unknown	1
Total	**7**

In response to Question 24, 157 firms reported they did not apply for the *Scientific Research and Experimental Development* tax credit. These firms were asked why they did not apply and 43 firms gave reasons. Eighteen firms (42%) replied that they were unaware of the SR&ED tax credit and another 6 firms (14%) felt that they were not eligible to apply for the tax credit. All of the responses are contained in Appendix C-1.

Question 34 asked firms if they had improved their competitive position over the past three years. One hundred and eighteen firms (61%) reported they had, and 91 went on to indicate factors that contributed to this. The most common factor identified by nine firms was the acquisition of equipment and the second most frequent factor, identified by four firms involved cost reduction. The remaining 78 factors covered a wide range of issues, from training to improved quality systems. All of the factors are listed verbatim in Appendix C-2.

3.3 Results of Statistical Regression Analysis

Bivariate logistic regressions were used to determine the statistical significance and nature of the relationship between the innovation activities and characteristics of firms in the sample. Results from the statistical analysis are presented in Tables 3.5 to 3.13.

A list of the dependent variables (innovation activities) is given in Table 3.5. It also presents the frequency of responses for each innovation activity. The reference to *'missing'* means the number of respondents that did not answer the question as to whether they were involved in the specific innovation activity.

Table 3.5: Innovation Activities Tested in Regression Analysis

Dependent Variables - Innovation Activities	Frequency of Responses				
	Yes		No		Missing
	No.	Valid Percent	No.	Valid Percent	No.
Firms that introduced new goods or services to the market *(re: Question 11)*	132	63%	76	37%	7
Firms that introduced significantly improved goods or services to the market *(re: Question 12)*	112	57%	83	43%	20
Firms that introduced new or improved production processes *(re: Question 14)*	104	53%	94	47%	17
Firms that introduced other new or improved internal processes *(re: Question 15)*	124	61%	80	39%	11
Firms that adapted existing technologies to provide a new good or service *(re: Question 21-a)*	115	57%	86	43%	14
Firms that adapted existing technologies to improve internal processes *(re: Question 21-b)*	144	73%	53	27%	18
Firms engaged in research and development *(re: Question 22)*	87	46%	104	54%	24

3.3.1 Firms that introduced new goods or services to the market

When firms were asked whether they had introduced new goods or services to the market in the last three years, 208 firms responded and 132 firms (63%) had introduced new goods or services and 76 firms (37%) had not. Seven respondents did not include an answer to this question.

Table 3.6 provides the results of the regression analysis of which variables were statistically significant in explaining whether firms introduced new goods or services to the market. It also presents those for which no statistical relationship was established.

Table 3.6: Dependent Variable - Firms that Introduced New Goods or Services to the Market

Independent Variable	Odds Ratio[3]
Sell on-line	5.08
Have access to the Internet	3.58
Partnered with local colleges	3.20
Use e-mail	3.06
Applied for government funding	3.02
Engaged in joint ventures with international companies	2.95
Firms that benefited from innovative solutions offered by employees	2.86
Have a web page	2.83
Firms that provided employee skills training	2.78
Obtained external R&D funding	2.77
Commenced exporting	2.76
Increased exporting	2.28
Have high-speed Internet access	2.21
Improved competitive position	2.11
Engaged in joint ventures with local companies	No statistical relationship established
Partnered with Memorial University	No statistical relationship established
Partnered with local government research institutions	No statistical relationship established
University research institutions in other provinces	No statistical relationship established
Government research institutions in other provinces	No statistical relationship established
Research facilities outside Canada	No statistical relationship established
Commercialization of research	No statistical relationship established
Location of business	No statistical relationship established
Years in operation	No statistical relationship established
Number of employees	No statistical relationship established
Employment levels	No statistical relationship established
Your highest level of formal education	No statistical relationship established
Firms that used incentives to encourage employee innovation	No statistical relationship established
Firms that provided management skills training	No statistical relationship established
Firms that used continuous improvement or other QA programs	No statistical relationship established
Firms that benchmarked performance	No statistical relationship established
Firms that monitored customer satisfaction levels	No statistical relationship established
Purchase on-line	No statistical relationship established
Do market research on-line	No statistical relationship established

Table 3.6 illustrates that selling on-line was a statistically significant factor in determining the likelihood of firms introducing new goods or services to the market. Firms that sold on-line were 5.08 times more likely to introduce new goods or services than firms that did not sell on-line. As well, a statistically significant relationship was established for firms with access to the Internet, used e-mail, and had a web page. Specifically, the likelihood of introducing new goods or services to the market was 3.58 times higher for firms that had access to the Internet; 3.06 times higher for those that used e-mail; and 2.83 times higher for firms with a web page.

Another statistically significant finding was firms that partnered with local colleges were 3.20 times more likely to introduce new goods or services to the marketplace. Similarly, firms that engaged in joint ventures with international companies were 2.95 times more likely to introduce new goods or services. However, no statistically significant relationship could be established for firms that partnered with Memorial University or for firms engaged in joint ventures with local companies. An explanation of this difference cannot be ascertained from the information contained in the survey.

Firms that applied for government funding are 3.02 times more likely to introduce new goods or services into the market and firms that obtained external R&D funding are 2.77 times more likely than firms that did not.

Further, a statistically significant relationship was established between firms that introduced new goods or services to the market and those that benefited from innovative solutions offered by employees and provided employee skills training. The estimated odds ratios were 2.86 and 2.78, respectively.

Statistical relationships were also established between firms that introduced new goods or services to the market and those that:

- obtained external R&D funding;
- commenced exporting;
- increased exporting; and
- improved competitive position.

A statistical relationship could not be established between a firm introducing new goods or services to the market and the location of the business, its years in operation, the number of employees or employment levels, and a number of other factors illustrated in Table 3.6 above.

[3]The odds ratio is the probability of a firm with a particular characteristic undertaking some activity relative to the probability of performing that activity by those firms that do not possess that characteristic.

3.3.2 Firms that introduced significantly improved goods or services to the market

Question 12 asked firms whether they had introduced significantly improved goods or services to the market in the last three years. One hundred and twelve respondents (57%) answered that they had and 83 firms (43%) reported they had not. Twenty respondents omitted this question.

Table 3.7: Dependent Variable - Firms that Introduced Significantly Improved Goods or Services to the Market

Independent Variables	Odds Ratio
Engaged in joint ventures with local companies	4.54
Firms that benefited from innovative solutions offered by employees	4.31
Engaged in joint ventures with international companies	3.99
Improved competitive position	3.89
Sell on-line	3.65
Partnered with local government research institutions	3.57
Have access to the Internet	3.27
Use e-mail	3.26
Obtained external R&D funding	2.73
Participated in industry association activities	2.53
Firms that provided employee skills training	2.43
Firms that monitored customer satisfaction levels	2.30
Firms that used incentives to encourage employee innovation	2.11
Increased exporting	2.06
Purchase on-line	2.06
Commenced exporting	2.01
Applied for government funding	1.89
Firms that used continuous improvement or other QA programs	1.86
Have high-speed Internet access	1.85
Partnered with Memorial University	No statistical relationship established
Partnered with local colleges	No statistical relationship established
University research institutions in other provinces	No statistical relationship established
Government research institutions in other provinces	No statistical relationship established
Research facilities outside Canada	No statistical relationship established
Location of business	No statistical relationship established
Years in operation	No statistical relationship established
Number of employees	No statistical relationship established
Employment levels	No statistical relationship established
Your highest level of formal education	No statistical relationship established
Firms that provided management skills training	No statistical relationship established
Firms that benchmarked performance	No statistical relationship established
Have a web page	No statistical relationship established
Do market research on-line	No statistical relationship established

Table 3.7 confirms that a statistical relationship existed between firms that introduced improved goods or services to the market and those that engaged in joint ventures (with either local or international companies) or that partnered with local government research institutions. Firms that partnered in joint ventures with other local companies were 4.54 times more likely to introduce significantly improved goods or services, and those that

formed alliances with international companies were 3.99 times more likely than firms that had not. Likewise, firms that collaborated with local government research institutions had a 3.57 higher probability of introducing improved goods or services. However, no statistical relationship could be established for firms that partnered with Memorial University or local colleges.

Firms that benefited from innovative solutions offered by employees, that provided employee skills training or that used incentives to encourage employee innovation were also more likely to introduce significantly improved goods or services. Those that benefited from solutions offered by employees were 4.31 times more likely to introduce significantly improved goods or services while those that provided employee skills training and used incentives to encourage employee innovation were, respectively, 2.43 and 2.11 times more likely to introduce improved goods or services.

A statistically significant relationship was also established between firms that introduced significantly improved goods or services to the market and firms that improved their competitive position. These firms had an odds ratio of 3.89.

Firms engaged in on-line activities were also more likely to introduce significantly improved goods or services. Those that sold on-line were 3.65 times more likely to introduce improved goods or services than those that did not. Moreover, firms that had access to the Internet were 3.27 times more likely, and those that used e-mail were 3.26 times more likely.

Statistically significant relationships were also established between firms that introduced significantly improved goods or services to the market and:

- obtained external R&D funding;
- that participated in industry association activities;
- monitored customer satisfaction levels;
- increased exporting;
- purchase on-line;
- commenced exporting;
- applied for government funding;
- used continuous improvement or other quality assurance programs; and
- have high speed Internet access.

3.3.3 Firms that introduced new or improved production processes

When asked whether they had introduced new or improved production processes a total of 104 respondents (48%) reported they had introduced new or improved production processes to the market in the last three years. Ninety-four firms (44%) stated they had not and 17 did not answer this question.

Table 3.8: Dependent Variable - Firms that Introduced New or Improved Production Processes

Independent Variables	Odds Ratio
Engaged in joint ventures with local companies	4.54
Engaged in joint ventures with international companies	3.99
Improved competitive position	3.89
Partnered with local government research institutions	3.57
Sell on-line	3.09
Firms that benefited from innovative solutions offered by employees	2.90
Obtained external R&D funding	2.73
Firms that used continuous improvement or other QA programs	2.58
Firms that used incentives to encourage employee innovation	2.37
Firms that provided employee skills training	2.32
Firms that benchmarked performance	2.19
Increased exporting	2.06
Participated in industry association activities	2.03
Commenced exporting	2.01
Applied for government funding	1.89
Have high-speed Internet access	1.85
Partnered with Memorial University	No statistical relationship established
Partnered with local colleges	No statistical relationship established
University research institutions	No statistical relationship established
Government research institutions in other provinces	No statistical relationship established
Research facilities outside Canada	No statistical relationship established
Location of business	No statistical relationship established
Years in operation	No statistical relationship established
Number of employees	No statistical relationship established
Employment levels	No statistical relationship established
Your highest level of formal education	No statistical relationship established
Firms that provided management skills training	No statistical relationship established
Firms that monitored customer satisfaction levels	No statistical relationship established
Use e-mail	No statistical relationship established
Have access to the Internet	No statistical relationship established
Have a web page	No statistical relationship established
Purchase on-line	No statistical relationship established
Do market research on-line	No statistical relationship established

The factors affecting firms introducing new or improved production processes were similar to those discussed previously for firms introducing significantly improved goods or services. Firms that have engaged in joint ventures (with local or international companies) were more likely to introduce new or improved production processes. Their odds ratios were 4.54 and 3.99, respectively. The odds ratio for firms that had partnered with local government research institutions was 3.57. This implies these firms were over

three and a half times more likely to introduce new or improved production processes than firms that did not partner. No statistical relationships could be established, however, for firms that partnered with Memorial University or local colleges, or other research institutions.

A statistical relationship was also established between firms that introduced new or improved production processes and firms that improved their competitive position. These firms had a 3.89 times higher probability of introducing new or improved production processes.

Firms that benefited from innovative solutions offered by employees, that used incentives to encourage employee innovation and that provided employee skills training were, respectively, 2.90, 2.37 and 2.32 times more likely to introduce new or improved production processes.

The relationships for firms selling on-line, obtaining external R&D, and utilizing continuous improvements or other quality assurance programs were also shown to be statistically significant. Firms selling on-line were 3.09 times more likely, firms obtaining external R&D were 2.73 times more likely and firms that used continuous improvement or other quality assurance programs were 2.58 times more likely to introduce new or improved production processes than those not involved in these activities.

Other activities determined to be statistically significant include:

- firms that benchmark performance;
- increased exporting;
- participated in industry association activities;
- commenced exporting;
- applied for government funding; and
- have high-speed Internet access.

3.3.4 Firms engaged in research and development

Question 22 asked firms if they had been involved in research and development. Eighty-seven respondents (46%) answered that they had engaged in R&D in the last three years and 104 (54%) reported they had not been involved in R&D activity. Twenty-four respondents did not provide an answer to this question.

Table 3.9: Dependent Variable - Firms Engaged in Research and Development

Independent Variables	Odds Ratio
Your highest level of formal education (PhD)	10.67
Applied for government funding	7.96
Commercialization of Research	4.89
Partnered with Memorial University	4.52
Firms that benefited from innovative solutions offered by employees	4.39
Do market research on-line	3.68
Partnered with local government research institutions	3.56
Improved competitive position	3.18
Participated in industry association activities	2.81
Commenced exporting	2.71
Increased exporting	2.24
Engaged in joint ventures with international companies	2.18
Purchase on-line	2.06
Have high-speed access	No statistical relationship established
Obtained external R&D funding	No statistical relationship established
Engaged in joint ventures with local companies	No statistical relationship established
Partnered with local colleges	No statistical relationship established
University research institutions in other provinces	No statistical relationship established
Government research institutions in other provinces	No statistical relationship established
Research facilities outside Canada	No statistical relationship established
Location of business	No statistical relationship established
Years in operation	No statistical relationship established
Number of employees	No statistical relationship established
Employment levels	No statistical relationship established
Firms that used incentives to encourage employee innovation	No statistical relationship established
Firms that provided employee skills training	No statistical relationship established
Firms that provided management skills training	No statistical relationship established
Firms that used continuous improvement or other QA programs	No statistical relationship established
Firms that benchmarked performance	No statistical relationship established
Firms that monitored customer satisfaction levels	No statistical relationship established
Use e-mail	No statistical relationship established
Have access to the Internet	No statistical relationship established
Have a web page	No statistical relationship established
Sell on-line	No statistical relationship established

Table 3.9 demonstrates that firms which had highly-educated personnel were more likely to engage in R&D activities than firms whose personnel had lower levels of formal education. Specifically, firms with personnel that had PhD's were 10.67 times more likely to engage in R&D activities.

Firms that applied for government funding were 7.96 times more likely to engage in R&D than firms that did not apply. It is surprising to find, however, that while applying for government funding was significantly related to engaging in R&D, no significant relationship was established between firms that obtained external R&D funding and engaging in R&D. The conclusion can be made that government funding is very important to a firm's R&D activities.

The relationship between firms that were involved in the commercialization of research and engaging in R&D activities was also shown to be statistically significant. Those involved were 4.89 times more likely to engage in R&D than those not involved in the commercialization of research.

The relationships between firms partnering with Memorial University, local government research institutions and international companies was statistically linked to involvement in R&D. Firms that partnered with Memorial University were 4.52 times more likely to engage in R&D activities. As well, those respondents that partnered with local government research institutions were 3.56 times more likely, and those engaged in joint ventures with international companies were 2.18 times more likely.

Benefiting from innovative solutions offered by employees and conducting marketing research on-line are also indicators of a firm's level of R&D activity. Those firms that benefited from employee solutions were 4.39 times more likely to engage in R&D, while those that did market research on-line were 3.68 times more likely.

Statistically significant relationships were also established for firms that:

- improved their competitive position;
- participated in industry association activities;
- commenced exporting;
- increased exporting; and
- purchase on-line.

3.3.5 Firms that introduced new or improved internal processes

Two hundred and four respondents reported whether they had introduced new or improved internal processes in the last three years. One hundred and twenty-four (61%) suggested that they had introduced new or improved internal processes, such as planning, logistics or marketing and 80 (39%) had not. Eleven respondents did not answer this question.

Table 3.10: Dependent Variable - Firms that Introduced New or Improved Internal Processes

Independent Variables	Odds Ratio
Firms that benefited from innovative solutions offered by employees	7.59
Improved competitive position	4.06
Firms that used incentives to encourage employee innovation	3.73
Firms that used continuous improvement or other QA programs	3.02
Have access to the Internet	2.78
Firms that benchmarked performance	2.76
Firms that provided management skills training	2.75
Participated in industry association activities	2.72
Firms that monitored customer satisfaction levels	2.65
Increased exporting	2.54
Do market research on-line	2.50
Firms that provided employee skills training	2.45
Engaged in joint ventures with local companies	2.29
Partnered with Memorial University	2.25
Have high-speed access	2.24
Commenced exporting	2.15
Purchase on-line	2.01
Applied for government funding	1.98
Obtained external R&D funding	No statistical relationship established
Engaged in joint ventures with international companies	No statistical relationship established
Partnered with local government research institutions	No statistical relationship established
University research institutions in other provinces	No statistical relationship established
Government Research Institutions in other provinces	No statistical relationship established
Research Facilities outside Canada	No statistical relationship established
Commercialization of Research	No statistical relationship established
Location of business	No statistical relationship established
Years in operation	No statistical relationship established
Number of employees	No statistical relationship established
Employment levels	No statistical relationship established
Your highest level of formal education	No statistical relationship established
Use e-mail	No statistical relationship established
Have a web page	No statistical relationship established
Sell on-line	No statistical relationship established

Table 3.10 demonstrates the statistical relationship between firms that introduce new or improved internal processes and employee involvement in firm activities. Specifically, firms that benefited from innovative solutions offered by employees were 7.59 times more likely to introduce new or improved internal processes. Similarly, firms that used

incentives to encourage employee innovation were 3.73 times more likely than those that did not use employee incentives. Firms that provided employee and management skills training were, respectively, 2.45 and 2.75 times more likely to introduce new or improved internal processes.

Improving the firm's competitive position and using continuous improvement or other quality assurance programs were statistically significant as well. Those firms had, respectively, 4.06 and 3.02 higher probabilities of introducing new or improved internal processes than firms that did not improve their competitive position.

Firms engaged in on-line activities were also more likely to introduce new or improved internal processes. Those that had access to the Internet were 2.78 times more likely to introduce new or improved internal processes than those that did not. In addition, firms that did market research on-line were 2.50 times more likely, and those that purchased on-line were 2.01 times more likely.

Other factors determined to be statistically significant to introducing new or improved internal processes include firms that:

- benchmark performance;
- participate in industry association activities;
- monitor customer satisfaction levels;
- engaged in joint ventures with local companies;
- partnered with Memorial University;
- increased exporting;
- commenced exporting; and
- applied for government funding.

3.3.6 Firms that adapted existing technologies to provide a new good or service

One hundred and fifteen firms (57%) indicated they adapted existing technologies to provide a new good or service in the last three years and 86 (43%) reported they had not. Fourteen respondents chose not to answer this question.

Table 3.11: Dependent Variable - Firms that Adapted Existing Technologies to Provide a New Good or Service

Independent Variables	Odds Ratio
Partnered with local government research institutions	5.36
Obtained external R&D funding	4.23
Increased exporting	3.72
Firms that benefited from innovative solutions offered by employees	3.44
Have access to the Internet	3.19
Engaged in joint ventures with international companies	2.96
Firms that provided employee skills training	2.95
Applied for government funding	2.77
Firms that provided management skills training	2.61
Purchase on-line	2.60
Improved competitive position	2.27
Do market research on-line	2.22
Have a web page	2.17
Engaged in joint ventures with local companies	2.16
Have high-speed access	2.13
Participated in industry association activities	2.08
Firms that used incentives to encourage employee innovation	2.03
Commenced exporting	No statistical relationship established
Partnered with Memorial University	No statistical relationship established
Partnered with local colleges	No statistical relationship established
University Research Institutions in other provinces	No statistical relationship established
Government Research Institutions in other provinces	No statistical relationship established
Research Facilities outside Canada	No statistical relationship established
Commercialization of Research	No statistical relationship established
Location of business	No statistical relationship established
Years in operation	No statistical relationship established
Number of employees	No statistical relationship established
Employment levels	No statistical relationship established
Your highest level of formal education	No statistical relationship established
Firms that used continuous improvement or other QA programs	No statistical relationship established
Firms that benchmarked performance	No statistical relationship established
Firms that monitored customer satisfaction levels	No statistical relationship established
Use e-mail	No statistical relationship established
Sell on-line	No statistical relationship established

Table 3.11 above demonstrates the importance of partnering on adapting existing technologies to provide a new good or service. Partnering with local government research institutions, with an odds ratio of 5.36 was the most statistically significant factor in determining whether a firm adapted existing technologies or not. Engaging in joint ventures with local and international companies was also important from a statistical

perspective. These firms were respectively, 2.96 and 2.16 times more likely to adapt existing technologies to provide a new good or service.

External R&D funding was also statistically significant, as firms that obtained external R&D funding had a 4.23 higher probability of adapting existing technologies than those that had not obtained external funding.

It is also interesting to note that firms which increased exporting were 3.72 times more likely to adapt existing technologies, while no relationship could be established for those that commenced exporting.

Once again, firms that benefited from innovative solutions offered by employees; that provided employee skills training; that provided management skills training; and that used incentives to encourage employee innovation were respectively 3.44, 2.95, 2.61 and 2.03 times more likely to adapt existing technologies to provide a new good or service to the market.

Firms that adapted existing technologies to provide a new good or service were generally more involved in on-line activities as well. Firms were more likely to adapt existing technologies if they had access to the Internet (3.19 higher probability), purchased on-line (2.60 higher probability), conducted market research on-line (2.22 higher probability), had a web page (2.17 higher probability) and had high-speed Internet access (2.13 higher probability).

A statistical relationship was also established for firms that adapted existing technologies to provide a new good or service and:

- applied for government funding;
- improved competitive position; and
- participated in industry association activities.

3.3.7 Firms that adapt existing technologies to improve internal processes

One hundred and ninety-seven respondents answered Question 21(b) about whether they had adapted existing technologies to improve internal processes. One hundred and forty-four (73%) responded that they had adapted existing technologies to improve internal processes in the last three years and 53 (27%) had not. Eighteen respondents failed to answer this question.

Table 3.12: Dependent Variable - Firms that Adapt Existing Technologies to Improve Internal Processes

Independent Variables	Odds Ratio
Partnered with local government research institutions	8.50
Firms that benefited from innovative solutions offered by employees	5.04
Have access to the Internet	3.97
Firms that used incentives to encourage employee innovation	3.68
Firms that provided employee skills training	3.67
Firms that benchmarked performance	3.06
Firms that provided management skills training	3.04
Use e-mail	2.81
Purchase on-line	2.63
Firms that used continuous improvement or other QA programs	2.49
Firms that monitored customer satisfaction levels	2.43
Have a web page	2.41
Have high-speed access	2.23
Improved competitive position	1.93
Obtained external R&D funding	No statistical relationship established
Commenced exporting	No statistical relationship established
Engaged in joint ventures with local companies	No statistical relationship established
Engaged in joint ventures with international companies	No statistical relationship established
Participated in industry association activities	No statistical relationship established
Applied for government funding	No statistical relationship established
Increased exporting	No statistical relationship established
Partnered with Memorial University	No statistical relationship established
Partnered with local colleges	No statistical relationship established
University Research Institutions in other provinces	No statistical relationship established
Government Research Institutions in other provinces	No statistical relationship established
Research Facilities outside Canada	No statistical relationship established
Commercialization of Research	No statistical relationship established
Location of business	No statistical relationship established
Years in operation	No statistical relationship established
Number of employees	No statistical relationship established
Employment levels	No statistical relationship established
Your highest level of formal education	No statistical relationship established
Sell on-line	No statistical relationship established
Do market research on-line	No statistical relationship established

Table 3.12 verifies that a significant statistical relationship was established between firms that partnered with local government research institutions and those that adapted existing technologies to improve internal processes. Firms that partnered with local government research institutions were 8.5 times more likely to adapt existing technology to improve

internal processes than firms that did not partner. Yet, no statistical relationship could be established for firms engaged in joint ventures or for firms that partnered with facilities such as Memorial University, local colleges, or other research institutions.

The next significant relationship established was for firms that benefited from innovative solutions offered by employees. These firms were 5.04 times more likely to adapt existing technology to improve internal processes. Likewise, firms that used incentives to encourage employee innovation; used employee skills training; and used management skills training were correspondingly 3.68, 3.67 and 3.04 times more likely to adapt existing technologies.

Similar to firms adapting existing technologies to provide a new good or service, firms that adapted to improve internal processes were more involved on-line. Specifically, firms were 3.97 times more likely to adapt to improve internal processes if they had access to the Internet (3.97 higher probability). This enhanced probability was 2.81 for use of e-mail; 2.63 for on-line purchases; 2.41 if the firm had its own web page; and 2.23 for firms with access to high-speed Internet.

A statistical relationship was also established for firms that adapted existing technologies to improve internal processes and:

- benchmarked performance;
- used continuous improvement or other quality assurance programs;
- monitored customer satisfaction levels; and
- improved competitive position.

3.3.8 Regression analysis summary

Table 3.13 below is a summary of the previous analysis of the factors that influenced innovation and research and development.

Table 3.13: Summary of Regression Analysis

Independent Variables - Factors Contributing to Innovation and R&D	Dependent Variables - Innovation and R&D Activity						
	Introduced New Goods or Services to the Market	Introduced Significantly Improved Goods or Services to the Market	Introduced New or Improved Production Processes	Introduced New or Improved Internal Processes	Engaged in R&D	Adapted Existing Technologies to Provide a New Good or Service	Adapted Existing Technologies to Improve Internal Processes
	Odds Ratios						
Applied for government funding	3.02	1.89	1.89	1.98	**7.96**	2.77	NSR
Commenced exporting	2.76	2.01	2.01	2.15	2.71	NSR	NSR
Commercialization of research	NSR	NSR	NSR	NSR	4.89	NSR	NSR
Engaged in joint ventures with international companies	2.95	3.99	**3.99**	NSR	2.18	2.96	NSR
Engaged in joint ventures with local companies	NSR	**4.54**	**4.54**	2.29	NSR	2.16	NSR
Government research institutions in other provinces	NSR	NSR	NSR	NSR	NSR	NSR	NSR
Have high-speed Internet access	2.21	1.85	1.85	2.24	NSR	2.15	2.23
Improved competitive position	2.11	3.89	3.89	**4.06**	3.18	2.27	1.93
Increased exporting	2.28	2.06	2.06	2.54	2.24	3.72	NSR
Obtained external R&D funding	2.77	2.73	2.73	NSR	NSR	**4.23**	NSR
Participated in industry association activities	NSR	2.53	2.03	2.72	2.81	2.08	NSR
Partnered with local colleges	3.20	NSR	NSR	NSR	NSR	NSR	NSR
Partnered with local government research institutions	NSR	3.57	3.57	NSR	3.56	**5.36**	**8.50**
Partnered with Memorial University	NSR	NSR	NSR	2.25	4.52	NSR	NSR
Research facilities outside Canada	NSR	NSR	NSR	NSR	NSR	NSR	NSR
University research institutions in other provinces	NSR	NSR	NSR	NSR	NSR	NSR	NSR
Location of business	NSR	NSR	NSR	NSR	NSR	NSR	NSR
Years in operation	NSR	NSR	NSR	NSR	NSR	NSR	NSR
Number of employees	NSR	NSR	NSR	NSR	NSR	NSR	NSR
Employment levels	NSR	NSR	NSR	NSR	NSR	NSR	NSR
Benefited from innovative solutions offered by employees	2.86	**4.31**	2.90	**7.59**	4.39	3.44	**5.04**
Firms that provided employee skills training	2.78	2.43	2.32	2.45	NSR	2.95	3.67
Your highest level of formal education	NSR	NSR	NSR	NSR	**10.67**	NSR	NSR
Firms that used incentives to encourage employee innovation	NSR	2.11	2.37	3.73	NSR	2.03	3.68
Firms that provided management skills training	NSR	NSR	NSR	2.75	NSR	2.61	3.04
Used continuous improvement or other QA programs	NSR	1.86	2.58	3.02	NSR	NSR	2.49
Firms that benchmarked performance	NSR	NSR	2.19	2.76	NSR	NSR	3.06
Firms that monitored customer satisfaction levels	NSR	2.30	NSR	2.65	NSR	NSR	2.43
Use e-mail	3.06	3.26	NSR	NSR	NSR	NSR	2.81
Have access to the Internet	**3.58**	3.27	NSR	2.78	NSR	3.19	3.97
Have a web page	2.83	NSR	NSR	NSR	NSR	2.17	2.41
Purchase on-line	NSR	2.06	NSR	2.01	2.06	2.60	2.63
Sell on-line	**5.08**	3.65	3.09	NSR	NSR	NSR	NSR
Do market research on-line	NSR	NSR	NSR	2.50	3.68	2.22	NSR

Bold = the two highest odds ratios for innovation activity *NSR = no significant statistical relationship established*

In summary, statistically significant relationships were established for firms that had the following characteristics and were involved in innovative activities.

1. **Firms that applied for government funding and:**
   (a) introduced new goods or services to the market
   (b) introduced significantly improved goods or services to the market
   (c) introduced new or improved production processes
   (d) introduced new or improved internal processes
   (e) engaged in R&D
   (f) adapted existing technologies to provide a new good or service

2. **Firms that commenced exporting and:**
   (a) introduced new goods or services to the market
   (b) introduced significantly improved goods or services to the market
   (c) introduced new or improved production processes
   (d) introduced new or improved internal processes
   (e) engaged in R&D

3. **Firms that commercialized research and:**
   (a) engaged in R&D

4. **Firms that engaged in joint ventures with international companies and:**
   (a) introduced new goods or services to the market
   (b) introduced significantly improved goods or services to the market
   (c) introduced new or improved production processes
   (d) engaged in R&D
   (e) adapted existing technologies to provide a new good or service

5. **Firms that engaged in joint ventures with local companies and:**
   (a) introduced significantly improved goods or services to the market
   (b) introduced new or improved production processes
   (c) introduced new or improved internal processes
   (d) adapted existing technologies to provide a new good or service

6. **Firms that used government research facilities in other provinces and:**
   Note: no significant statistical relationships established

7. **Firms that have high-speed Internet access and:**
   (a) introduced new goods or services to the market
   (b) introduced significantly improved goods or services to the market
   (c) introduced new or improved production processes
   (d) introduced new or improved internal processes
   (e) adapted existing technologies to provide a new good or service
   (f) adapted existing technologies to improve internal processes

8. **Firms that have improved their competitive position and:**
   (a) introduced new goods or services to the market
   (b) introduced significantly improved goods or services to the market
   (c) introduced new or improved production processes
   (d) introduced new or improved internal processes
   (e) engaged in R&D
   (f) adapted existing technologies to provide a new good or service
   (g) adapted existing technologies to improve internal processes

9. **Firms that have increased exporting and:**
   (a) introduced new goods or services to the market
   (b) introduced significantly improved goods or services to the market
   (c) introduced new or improved production processes
   (d) introduced new or improved internal processes
   (e) engaged in R&D
   (f) adapted existing technologies to provide a new good or service

10. Firms that have obtained external R&D funding and:
(a) introduced new goods or services to the market
(b) introduced significantly improved goods or services to the market
(c) introduced new or improved production processes
(d) adapted existing technologies to provide a new good or service

11. Firms that have participated in industry association activities and:
(a) introduced significantly improved goods or services to the market
(b) introduced new or improved production processes
(c) introduced new or improved internal processes
(d) engaged in R&D
(e) adapted existing technologies to provide a new good or service

12. Firms that have partnered with local colleges and:
(a) introduced new goods or services to the market

13. Firms that have partnered with local government research institutions and:
(a) introduced significantly improved goods or services to the market
(b) introduced new or improved production processes
(c) engaged in R&D
(d) adapted existing technologies to provide a new good or service
(e) adapted existing technologies to improve internal processes

14. Firms that have partnered with Memorial University and:
(a) introduced new or improved internal processes
(b) engaged in R&D

15. Firms that have partnered with research facilities outside Canada and:
Note: no significant statistical relationships established

16. Firms that have partnered with university research institutions in other provinces and:
Note: no significant statistical relationships established

17. Location of business and:
Note: no significant statistical relationships established

18. Years in operation and:
Note: no significant statistical relationships established

19. Number of employees and:
Note: no significant statistical relationships established

20. Employment levels and:
Note: no significant statistical relationships established

21. Firms that benefited from innovative solutions offered by employees and:
(a) introduced new goods or services to the market
(b) introduced significantly improved goods or services to the market
(c) introduced new or improved production processes
(d) introduced new or improved internal processes
(e) engaged in R&D
(f) adapted existing technologies to provide a new good or service
(g) adapted existing technologies to improve internal processes

22. Firms that provided employee skills training and:
(a) introduced new goods or services to the market
(b) introduced significantly improved goods or services to the market
(c) introduced new or improved production processes
(d) introduced new or improved internal processes
(e) adapted existing technologies to provide a new good or service
(f) adapted existing technologies to improve internal processes

23. Highest level of formal education and:
(a) engaged in R&D

24. Firms that used incentives to encourage employee innovation and:
(a) introduced significantly improved goods or services to the market
(b) introduced new or improved production processes
(c) introduced new or improved internal processes
(d) adapted existing technologies to provide a new good or service
(e) adapted existing technologies to improve internal processes

25. Firms that provided management skills training and:
(a) introduced new or improved internal processes
(b) adapted existing technologies to provide a new good or service
(c) adapted existing technologies to improve internal processes

26. Firms that used continuous improvement or other QA programs and:
(a) introduced significantly improved goods or services to the market
(b) introduced new or improved production processes
(c) introduced new or improved internal processes
(d) adapted existing technologies to improve internal processes

27. Firms that benchmarked performance and:
(a) introduced new or improved production processes
(b) introduced new or improved internal processes
(c) adapted existing technologies to improve internal processes

28. Firms that monitored customer satisfaction levels and:
(a) introduced significantly improved goods or services to the market
(b) introduced new or improved internal processes
(c) adapted existing technologies to improve internal processes

29. Firms that use e-mail and:
(a) introduced new goods or services to the market
(b) introduced significantly improved goods or services to the market
(c) adapted existing technologies to improve internal processes

30. Firms that have access to the Internet and:
(a) introduced new goods or services to the market
(b) introduced significantly improved goods or services to the market
(c) introduced new or improved internal processes
(d) adapted existing technologies to provide a new good or service
(e) adapted existing technologies to improve internal processes

31. Firms that have a web page and:
(a) introduced new goods or services to the market
(b) adapted existing technologies to provide a new good or service
(c) adapted existing technologies to improve internal processes

32. Firms that purchase on-line and:
(a) introduced significantly improved goods or services to the market
(b) introduced new or improved internal processes
(c) engaged in R&D
(d) adapted existing technologies to provide a new good or service
(e) adapted existing technologies to improve internal processes

33. Firms that sell on-line and:
(a) introduced new goods or services to the market
(b) introduced significantly improved goods or services to the market
(c) introduced new or improved production processes

34. Firms that do market research on-line and:

(a) introduced new or improved internal processes
(b) engaged in R&D
(c) adapted existing technologies to provide a new good or service

3.4 Barriers To Innovation

Question 35 provided respondents with a list of potential barriers to innovation and asked them to rank each barrier on a scale of 1 to 5, where 1 is not important, or is not a barrier, and 5 is a very important barrier to innovation for the firm. Table 3.14 summarizes the number of responses and shows the calculated mean score for each factor.

Table 3.14: Barriers to Innovation – Number of Responses For Importance of Each Barrier to the Respondent Firms

Potential Barriers & Challenges to Innovation	Responses: Importance of Barrier to Firm							Mean Score
	Not Important	Somewhat Important	Moderately Important	Important	Very Important	Not Applicable	Missing	
Overall costs relative to expected payback	7	8	19	52	103	9	*17*	*4.25*
Costs of marketing/commercialization of new/improved good or service	8	10	26	51	95	10	*15*	*4.13*
Costs of production investment	11	12	25	52	81	16	*18*	*3.99*
Costs of research & development	15	18	15	47	89	16	*15*	*3.96*
Costs of design & engineering	17	13	26	47	70	25	*17*	*3.81*
Difficult to obtain government funding	21	19	28	48	59	18	*22*	*3.60*
Difficulties in predicting demand	27	15	41	52	48	13	*19*	*3.43*
Difficult to obtain private sector funding	28	25	24	37	54	27	*20*	*3.38*
Lack of time to generate ideas and take them forward	31	17	44	37	55	13	*18*	*3.37*
Lack of government (non-financial) supports	30	21	28	28	38	23	*46*	*3.16*
Government policy or regulatory environment	37	17	23	19	37	42	*40*	*3.02*
Problems in adapting marketing function	35	35	37	35	26	28	*19*	*2.89*
Limited internal research for technical support skills	42	40	33	33	28	23	*16*	*2.80*
Lack of relevant scientific or technical information	42	33	37	32	19	36	*16*	*2.71*
Lack of awareness of available expertise at research institutions	47	28	32	32	22	36	*18*	*2.71*
Not required by government environmental regulations/enforcement	45	16	36	19	20	49	*30*	*2.65*
Difficult to obtain necessary technology	50	35	26	34	20	32	*18*	*2.63*
Limited internal management skills	48	43	30	35	19	22	*18*	*2.62*
Lack of technical support from suppliers	49	41	35	33	14	24	*19*	*2.55*
Difficult to network/partner with firms from out of province	58	25	40	19	23	30	*20*	*2.54*
No need to because no competitive pressure	48	21	32	21	15	51	*27*	*2.52*
Difficult to obtain support from research institutions	55	30	29	24	17	41	*19*	*2.47*
No available expertise at research institutions	54	35	29	26	12	43	*16*	*2.40*
Difficult to network/partner with other local firms	64	31	31	22	18	31	*18*	*2.39*
Not interested	69	17	19	11	11	54	*34*	*2.04*

A scale of 1 to 5 was used to rank importance, where 1 was 'not important' and 5 was 'very important'. Mean is the average calculated by multiplying the importance option by the number of responses for the option, summing the total for each importance option, and dividing this sum by the total number of responses. Only those that provided a response to importance were used - not applicable and missing responses were not included. The following table is an example of how mean was calculated.

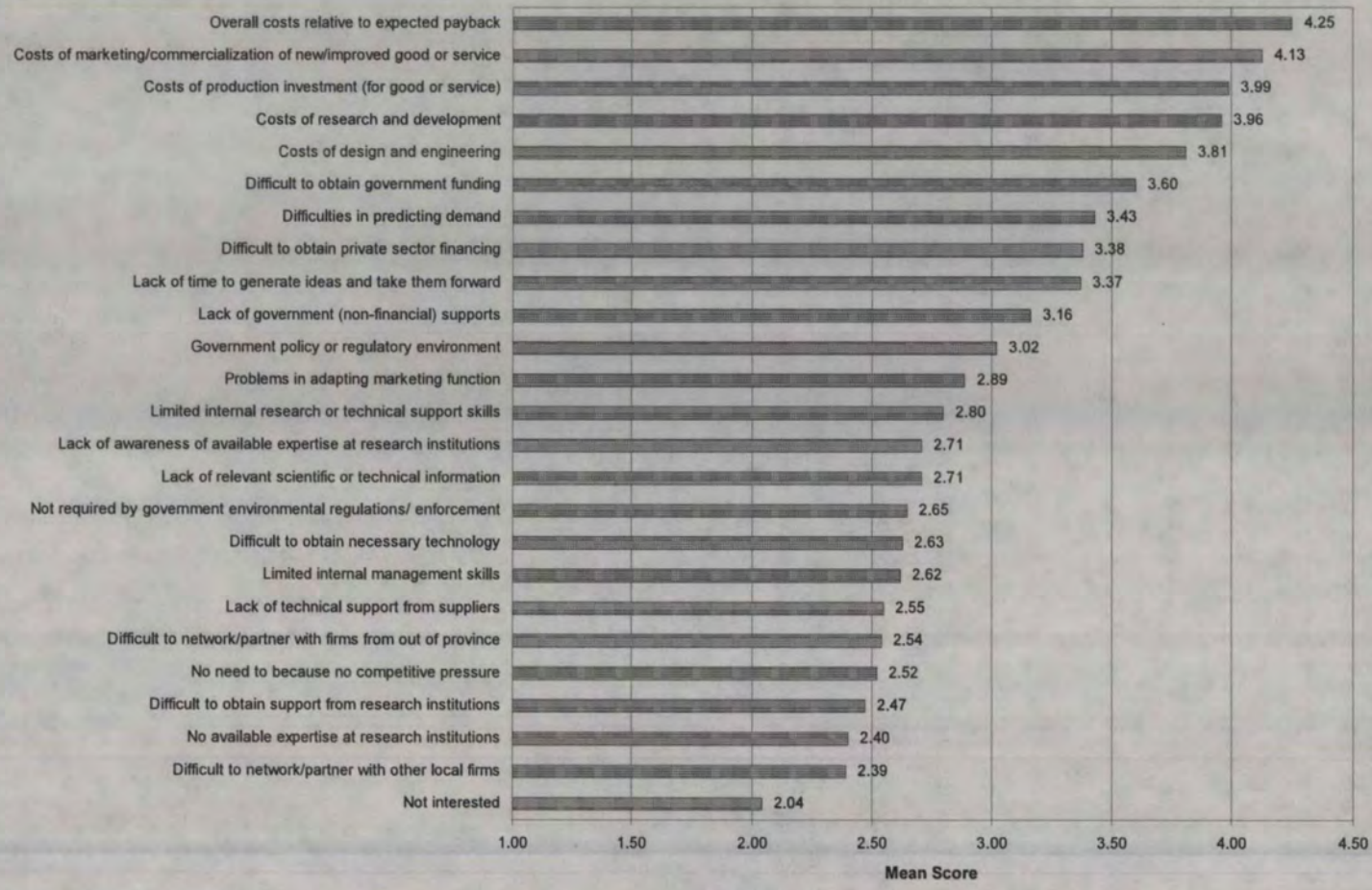
Importance Scale (option)	*1*	*2*	*3*	*4*	*5*	*Total*
Number of Participant Responses	*42*	*17*	*23*	*19*	*8*	*109*
	42	*34*	*69*	*76*	*40*	*261*

$$\text{Mean} = \frac{261}{109} = 2.39$$

Throughout this report mean is calculated in the same way for similar importance and/or satisfaction responses.

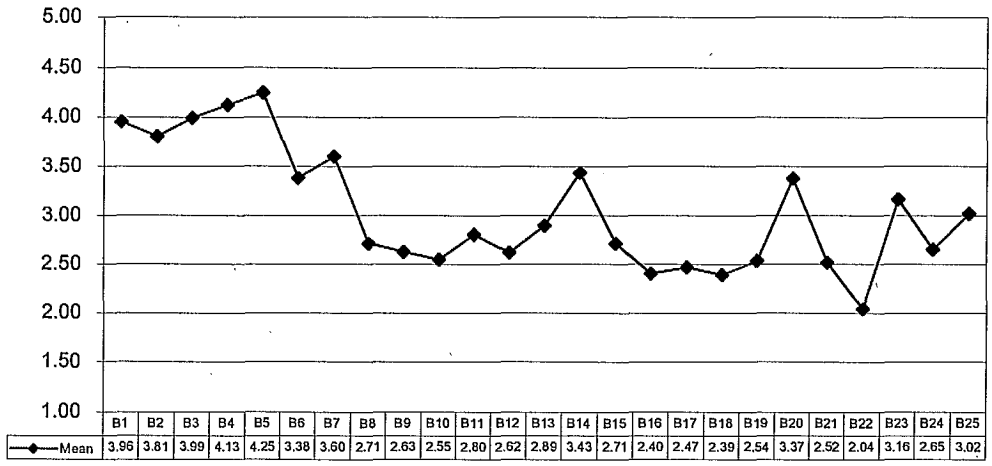
Table 3.14 and Figure 3.8 illustrate that cost-related barriers (with mean scores ranging from 4.25 – 3.81) constituted the most statistically significant challenges to innovation activity. Almost equally significant were funding factors. Difficulty in obtaining government funding with an average score of 3.6, and difficulty in obtaining private sector financing with an average score of 3.38 were very important factors. Market-related factors were also significant obstacles for the expansion of innovation activity, as was time to generate ideas and take them forward.

Figure 3.8: Barriers to Innovation - Mean Score



The importance of potential barriers or challenges to innovation is further illustrated in Figure 3.9. The barriers corresponding to each score are provided in the list below. For instance, (B5) clearly shows the high importance of the overall costs of innovation relative to expected payback as a barrier to innovation.

Figure 3.9: Barriers to Innovation - Importance Mean Scores



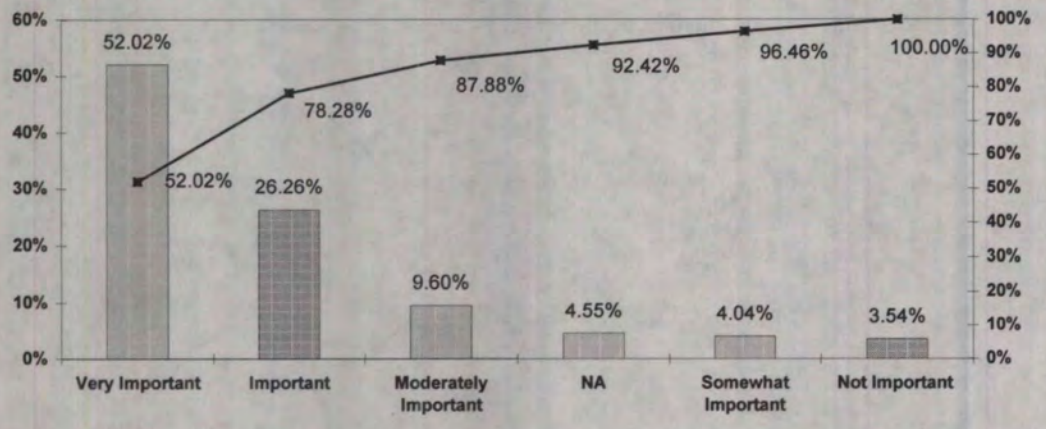
	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15	B16	B17	B18	B19	B20	B21	B22	B23	B24	B25
Mean	3.96	3.81	3.99	4.13	4.25	3.38	3.60	2.71	2.63	2.55	2.80	2.62	2.89	3.43	2.71	2.40	2.47	2.39	2.54	3.37	2.52	2.04	3.16	2.65	3.02

Mean Score: *scale of 1 to 5, where 1 is not important to the firm and 5 is very important*

B1	Costs of research and development
B2	Costs of design and engineering
B3	Costs of production investment (for good or service)
B4	Costs of marketing/commercialization of new/improved good or service
B5	Overall costs relative to expected payback
B6	Difficult to obtain private sector financing
B7	Difficult to obtain government funding
B8	Lack of relevant scientific or technical information
B9	Difficult to obtain necessary technology
B10	Lack of technical support from suppliers
B11	Limited internal research or technical support skills
B12	Limited internal management skills
B13	Problems in adapting marketing function
B14	Difficulties in predicting demand
B15	Lack of awareness of available expertise at research institutions
B16	No available expertise at research institutions
B17	Difficult to obtain support from research institutions
B18	Difficult to network/partner with other local firms
B19	Difficult to network/partner with firms from out of province
B20	Lack of time to generate ideas and take them forward
B21	No need to because no competitive pressure
B22	Not interested
B23	Lack of government (non-financial) supports
B24	Not required by government environmental regulations/enforcement
B25	Government policy or regulatory environment

The following charts highlight firms' responses for the top two barriers.

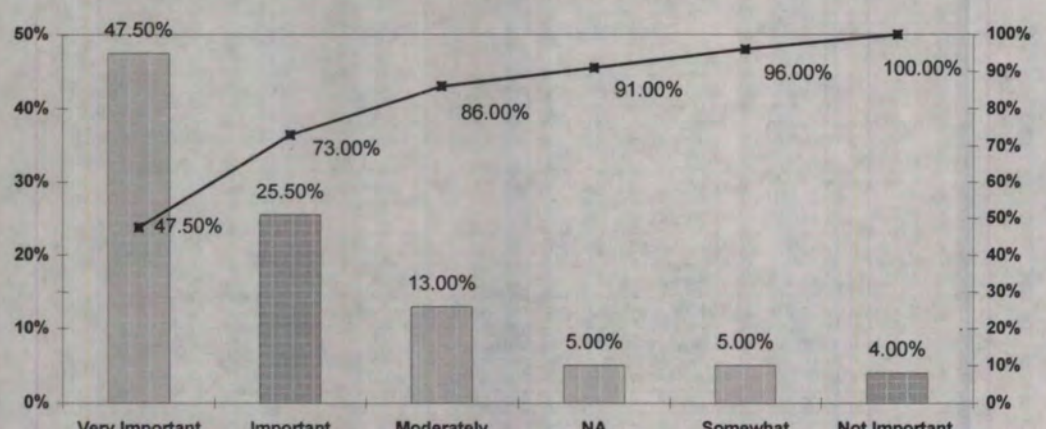
Figure 3.10: Barriers - Overall Costs Relative to Expected Payback



Missing = 17

Overall costs relative to expected payback was an important or very important barrier for 78% of the 198 respondents to this question. It is interesting that only 3.5% felt that this was not an important factor.

Figure 3.11: Barriers - Costs of Marketing and Commercialization



Missing = 15

Costs of marketing and commercialization were either important or very important for 73% of the 200 respondents to this question. Only 4% felt it was not important.

An opportunity was also provided in Question 35 for respondents to identify any barriers other than those listed. The following were additional barriers suggested by the respondents.

- delays in time from application to decision by agency/department administering programs;
- lack of union support;
- government should not only pride themselves as a model IT user but they should also become a model client for startup IT companies;
- competition from learning and research institutions that have access to funding and other people's resources; and
- rapid changes in government personnel.

Respondents were given the opportunity to expand (comment) on *Government policy or regulatory environment* as a barrier to innovation. Seventeen firms chose to comment and the majority referred to actions needed by government to support the environmental industry. The full list of comments is attached in Appendix C-3.

Firms were also provided an opportunity to offer additional comments about barriers to innovation and 17 took advantage and commented. Comments ranged from red tape involved in government applications to a slow down in market conditions. The full list of comments in provided in Appendix C-4

3.5 Innovation Drivers

Question 36 provided respondents with a list of common drivers for the introduction of new or improved goods, services or processes. They were asked to rank the importance of the individual drivers to their firm on a scale of 1 to 5, where 1 indicates the driver is not important and 5 indicates it is very important. In the same question, if they had introduced new or improved goods, services or processes to their firms, they were asked to rank their level of satisfaction with the impact on their firm, where 1 is very dissatisfied and 5 is very satisfied. Table 3.15 presents a summary of the rankings.

Table 3.15: Drivers of Innovation – Number of Responses For Importance of Each Driver and Satisfaction with the Impact of Driver on Firm

	Importance of Driver To Firm							Satisfaction with Impact Upon Firm						
Common Drivers of Innovation	Not Important	Somewhat Important	Moderately Important	Important	Very Important	Not Applicable	Missing	Very Dissatisfied	Dissatisfied	Neutral	Satisfied	Very Satisfied	Not Applicable	Missing
Increase market share	2	5	11	33	125	15	*24*	1	17	28	34	20	15	*100*
Open new markets	3	9	12	39	118	12	*22*	1	23	23	41	18	13	*96*
Maintain market share	3	5	9	42	116	15	*25*	0	11	29	42	20	13	*100*
Improve quality of goods or services	5	5	12	44	115	11	*23*	7	20	55	23	12	117	*98*
Respond to changing market demands	4	5	12	47	111	11	*25*	1	11	26	45	16	14	*102*
Reduce production time	13	14	13	27	97	28	*23*	0	10	27	38	15	26	*99*
Reduce cost of labor	19	24	15	38	88	11	*20*	2	3	37	47	14	20	*92*
Increase production capacity	18	13	13	36	81	32	*22*	1	6	24	39	18	29	*98*
Meet regulations or standards	12	14	23	39	77	24	*26*	0	5	25	34	20	27	*104*
Increase delivery speed to market	9	12	19	49	73	26	*27*	12	29	38	9	23	111	*104*
Improve production flexibility	10	13	24	45	68	30	*25*	0	7	32	40	10	25	*101*
Improve material handling	16	18	17	43	62	35	*24*	4	23	45	14	1	29	*98*
Respond to changing supplier capabilities	15	13	28	47	57	29	*26*	5	28	34	12	30	109	*106*
Reduce environmental impacts	13	16	27	40	52	41	*26*	1	-	28	27	14	38	*107*

Table 3.16 provides the mean scores for both the importance of and satisfaction with the drivers. The difference between the mean importance score and the mean satisfaction score was calculated as the mean gap score for each driver. That is, the difference between how important the innovation driver was for the firm relative to how satisfied the firm was with the impact of the driver upon their operations.

Table 3.16: Innovation Drivers - Mean and Gap Score Summary

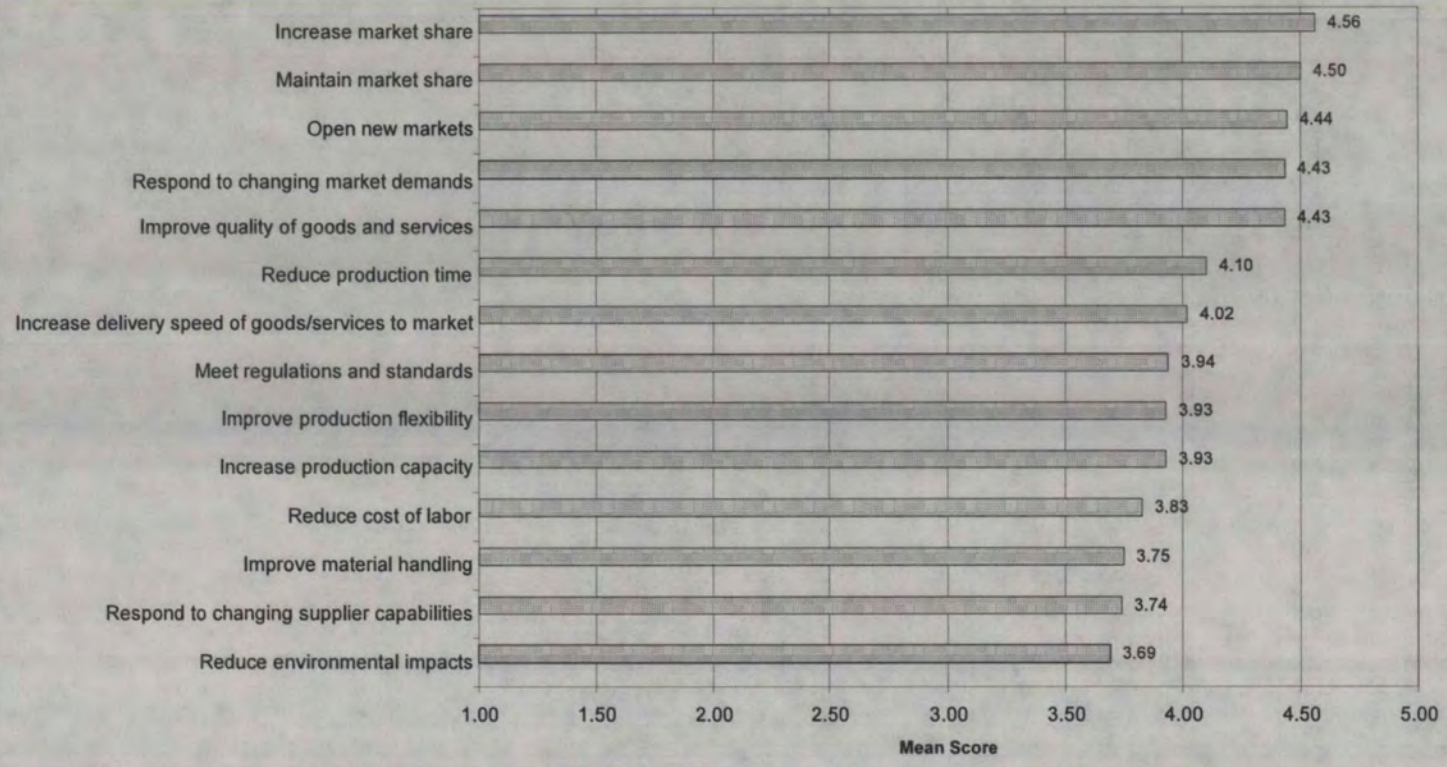
Key Drivers	Importance Mean Score	Satisfaction Mean Score	Mean Gap Score
Increase market share	4.56	3.55	-1.01
Maintain market share	4.50	3.70	-0.81
Open new markets	4.44	3.49	-0.95
Improve quality of goods and services	4.43	3.11	-1.32
Respond to changing market demands	4.43	3.65	-0.78
Reduce production time	4.10	3.64	-0.46
Increase delivery speed of goods/services to market	4.02	3.02	-1.00
Meet regulations and standards	3.94	3.82	-0.12
Increase production capacity	3.93	3.76	-0.16
Improve production flexibility	3.93	3.60	-0.33
Reduce cost of labor	3.83	3.66	-0.17
Improve material handling	3.75	2.83	-0.92
Respond to changing supplier capabilities	3.74	3.31	-0.43
Reduce environmental impacts	3.69	3.76	0.07

Importance: *scale of 1 to 5, where 1 is not important to the firm and 5 is very important*
Satisfaction: *scale of 1 to 5, where 1 is very dissatisfied with impact on firm and 5 is very satisfied*

The ranking of key drivers emphasizes access to markets as a priority for firms. Firms viewed increasing market share as most important, with a mean score of 4.56, followed by maintaining market share (4.5), opening new markets (4.44), improving the quality of goods and services (4.43) and responding to changing market conditions (4.43).

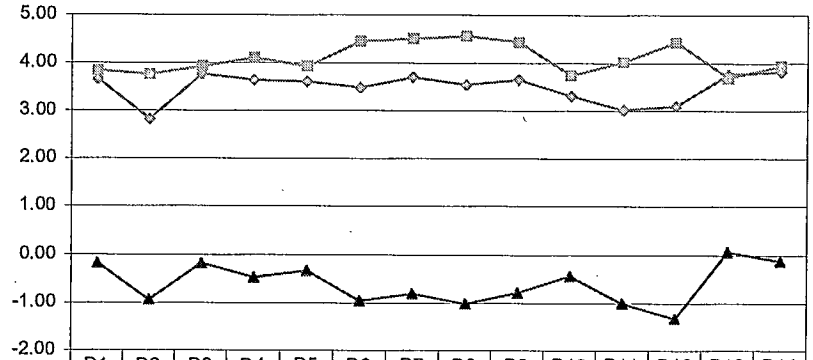
By contrast, firms ranked meeting regulations and standards as 3.94 and they ranked reducing environmental impacts at 3.69.

Figure 3.12: Innovation Drivers - Mean Score



The relative importance of the drivers of innovation differs slightly from the satisfaction levels reported by the respondents, as illustrated in Figure 3.13.

Figure 3.13: Innovation Drivers
Mean and Gap Score



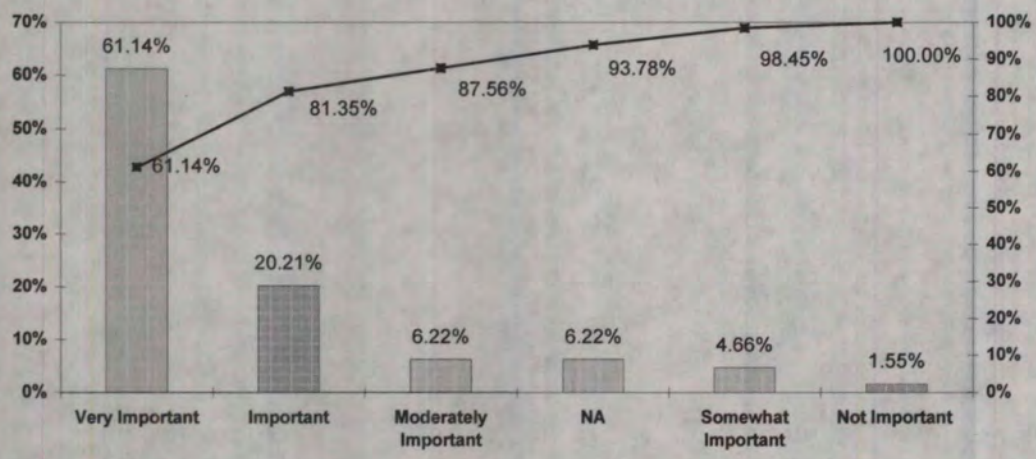
	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11	D12	D13	D14
Importance	3.83	3.75	3.93	4.10	3.93	4.44	4.50	4.56	4.43	3.74	4.02	4.43	3.69	3.94
Satisfaction	3.66	2.83	3.76	3.64	3.60	3.49	3.70	3.55	3.65	3.31	3.02	3.11	3.76	3.82
Gap Score	-0.17	-0.92	-0.17	-0.46	-0.33	-0.95	-0.80	-1.01	-0.78	-0.43	-1.00	-1.32	0.07	-0.12

Importance: *scale of 1 to 5, where 1 is not important to the firm and 5 is very important*
Satisfaction: *scale of 1 to 5, where 1 is very dissatisfied with impact on firm and 5 is very satisfied*

D1	Reduce cost of labor
D2	Improve material handling
D3	Increase production capacity
D4	Reduce production time
D5	Improve production flexibility
D6	Open new markets
D7	Maintain market share
D8	Increase market share
D9	Respond to changing market demands
D10	Respond to changing supplier capabilities
D11	Increase delivery speed of goods/services to market
D12	Improve quality of goods and services
D13	Reduce environmental impacts
D14	Meet regulations and standards

The following charts highlight firms' responses for the top two drivers of innovation.

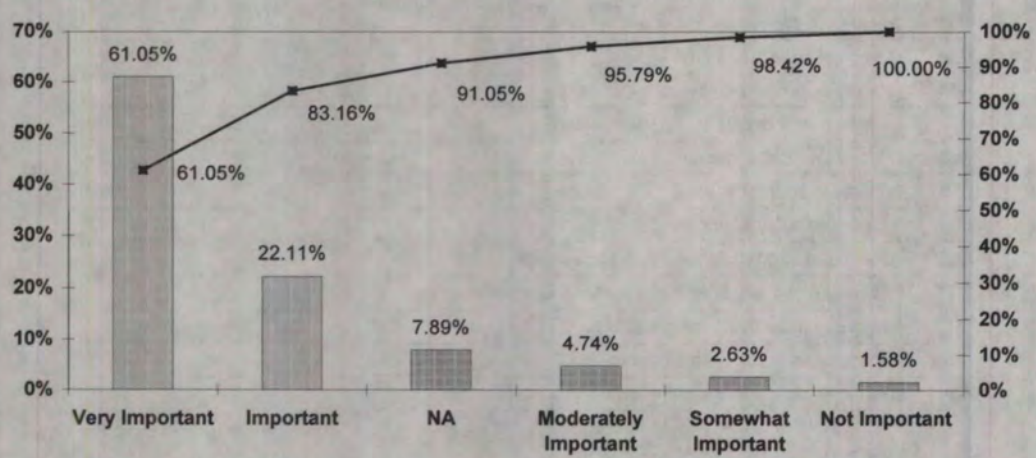
Figure 3.14: Driver - Open New Markets



Missing = 22

Opening new markets was as an important or very important driver of innovation for 81% of the 193 that reported on this question. Only 1.5% of the respondents felt this was not an important driver.

Figure 3.15: Driver - Maintain Market Share



Missing = 25

Maintaining market share was reported by 84% of the 190 that responded to the question as being important or very important. Only 3 (1.6%) of those that responded felt it was not an important driver.

Question 36 provided respondents with the opportunity to list any drivers of innovation in addition to those given in the survey. The following additional drivers were noted:

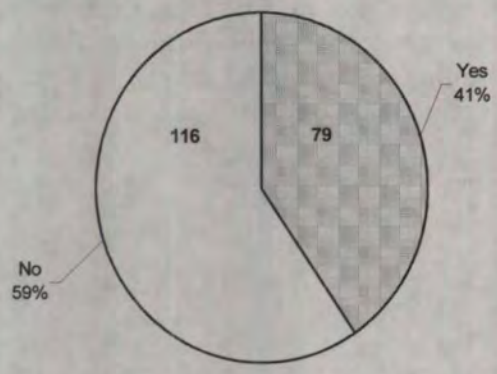
- available skills base;
- ISO certifications (very expensive);
- employee job satisfaction; and
- competitive government.

When asked for optional comments about drivers of innovation, 12 firms responded. However, most of the comments were about challenges the firms are facing such as, "small scale manufacturing companies have problems in local market competing with mainland companies" and " bilingual translations for packaging...are a major roadblock to our company expanding our product line...". The complete list of comments is contained in Appendix C-6.

3.6 Role of Government Funding in Innovation

Firms were asked if they had applied for government funding to support innovation-related activities in the last three years. Figure 3.16 shows that 195 firms responded to this question and 79 indicated they had applied for funding and 116 had not. Twenty respondents chose not to answer this question.

Figure 3.16: Did Your Company Apply for Government Funding for Innovation-Related Activities in the Last Three Years?



Missing = 20

Respondents were then asked if they had received funding under a number of specific types of funding programs and how satisfied they were with the experience. A summary of the responses is presented in Table 3.17.

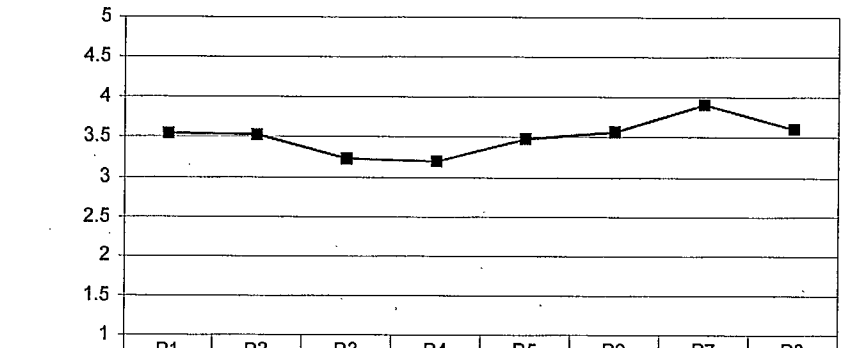
Table 3.17: Government Funding Programs (Number of Respondents)

	Did You Receive Funding?			How Satisfied Were You With the Funding Experience?							
Funding Program	**Yes**	**No**	**Missing**	**Very Dissatisfied**	**Dissatisfied**	**Neutral**	**Satisfied**	**Very Satisfied**	**No Opinion**	**Missing**	**Mean**
Acquisition or adaptation of technology	18	43	154	3	1	5	9	13	6	*178*	*3.90*
New product or process research and development	28	38	149	7	3	6	10	16	5	*168*	*3.60*
Productivity or quality improvement programs	11	45	159	4	1	6	8	8	6	*182*	*3.56*
Training and skills development programs	30	32	153	7	1	7	15	11	5	*169*	*3.54*
Marketing programs	28	37	150	5	6	5	17	11	3	*168*	*3.52*
Programs for developing business ideas	18	43	154	3	3	8	9	7	6	*179*	*3.47*
Export incentives and services	13	48	154	6	1	8	10	5	3	*182*	*3.23*
Prototyping or product testing	16	48	151	5	2	10	8	5	5	*180*	*3.20*

The large numbers of *'missing'* observations in the table above can be misleading. This is not simply the number of firms that chose not to respond, but more appropriately represents firms that did not answer because they did not apply for funding. As illustrated in Figure 3.16 the maximum number that could have responded was 79.

For each program there were more responses to the satisfaction question than there were participants that had received funding. For example, 27 respondents chose to indicate their level of satisfaction with *'productivity or quality improvement programs'* while only 11 reported they had received funding under this type of program. Not surprisingly, participants that applied, but had not received funding, possibly wanted to express their dissatisfaction with the experience.

Figure 3.17: Satisfaction with Government Funding Programs



	P1	P2	P3	P4	P5	P6	P7	P8
Mean	3.54	3.52	3.23	3.2	3.47	3.56	3.9	3.6

Mean Score: *Ranked on a scale of 1 to 5, where 1 is very dissatisfied with government funding experience and 5 is very satisfied*

P1	Training and skills development programs
P2	Marketing programs
P3	Export incentives and services
P4	Prototyping or product testing
P5	Programs for developing business ideas
P6	Productivity or quality improvement programs
P7	Acquisition or adoption of technology
P8	New product or process research and development

Firms were to identify other programs that they applied for in addition to those given in the survey. Only 6 firms listed any other programs, which were sub-programs of either ACOA or the National Research Council's Industrial Research Assistance Program (IRAP). See Appendix C-7 for complete list.

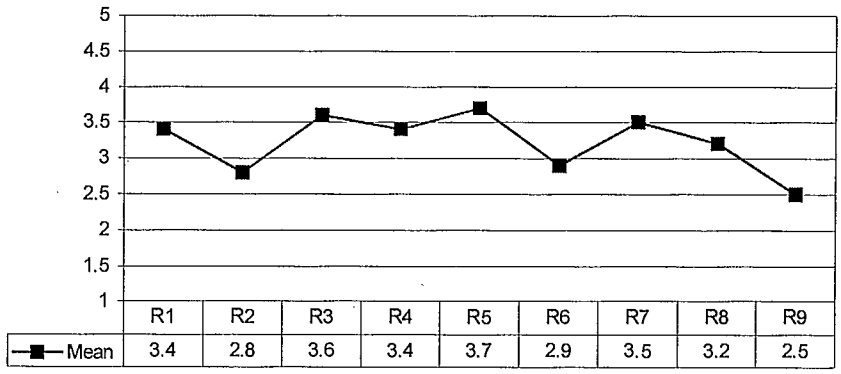
Respondents were also questioned about the reasons for not applying for government funding under the various programs in the last three years. They were asked to indicate the importance to their firm of the reasons for not applying. Table 3.18 summarizes the total number of responses for each reason and provides the mean score in order of importance. Figure 3.18 shows the results graphically.

Table 3.18: Reasons for Not Applying for Government Funding and/or Challenges in Applying (Number of Respondents)

Reasons and/or Challenges	Not Important	Somewhat Important	Moderately Important	Important	Very Important	Not Applicable	Total Responses	Mean Score
Activity not eligible	21	1	8	19	21	26	96	3.4
Not interested in government funding	39	5	12	9	17	20	102	2.8
Unaware of program relevant to needs	16	6	13	22	32	15	104	3.6
Unsure of how to apply for relevant programs	21	4	10	20	24	22	101	3.4
Too much time required for application process	17	9	4	18	35	20	103	3.7
No local contact for program delivery	24	9	11	14	12	27	97	2.9
Application process too complex	17	8	8	16	28	23	100	3.5
Unable to provide required matching funds	21	10	8	11	22	25	95	3.2
Do not need additional funding	26	9	7	6	9	27	84	2.5

Mean Score: *Ranked importance on a scale of 1 to 5, where 1 is insignificant or not a reason for not applying and 5 is a very important reason for not applying for government funding.*

Figure 3.18: Importance of Reasons for Not Applying for Government Assistance



Mean Score: *Ranked importance on a scale of 1 to 5, where 1 is insignificant or not a reason for not applying, and 5 is a very important reason for not applying for government funding.*

R1	Activity not eligible
R2	Not interested in government funding
R3	Unaware of program relevant to needs
R4	Unsure of how to apply for relevant programs
R5	Too much time required for application process
R6	No local contact for program delivery
R7	Application process too complex
R8	Unable to provide required matching funds
R9	Do not need additional funding

Table 3.18 and Figure 3.18 confirm that the most important reason for not applying for government funding, with an average score of 3.7, was too much time required for application processes. The second most important reason was that firms were unaware of programs relevant to their needs (3.6). This was followed closely by complex application process (3.5).

Firms were also asked for additional comments about government funding. Twenty-nine respondents made comments, which ranged from total satisfaction with government funding to frustration with the funding process. The full list of comments is attached in Appendix C-9.

3.7 Role of Partnerships and Alliances in Facilitating Innovation

Question 38 examined whether firms had partnered with local colleges, Memorial University or other research institutions. The frequency of responses is summarized in Table 3.19.

Table 3.19: Partnering with Education, Government & Other Research Institutions (Number of Responses)

Partnering Facility	Did You Attempt to Partner?		Did You Partner?		Was it Successful?	
	Yes	No	Yes	No	Yes	No
Memorial University & associated research institutions	46	135	33	67	31	32
Local colleges	24	145	23	55	21	25
Local government research institutions	22	149	14	59	12	28
University research institutions in other provinces	8	161	6	57	5	27
Government research institutions in other provinces	6	162	6	58	6	28
Research facilities outside Canada	9	163	9	50	7	28

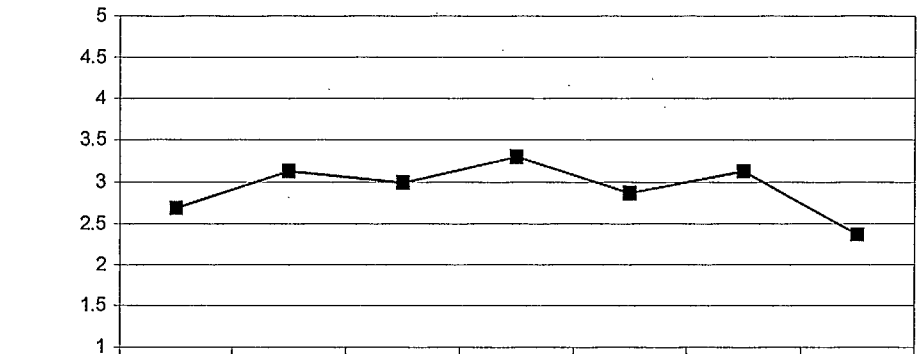
Of those firms that attempted to partner with Memorial University, 72% did partner and 94% of these partnerships were successful. Comparably, 96% of firms that attempted to partner with local colleges did partner and 91% were successful. One hundred percent of firms that attempted to partner with government research institutions in other provinces and research facilities outside Canada were successful in partnering, and the partnerships were highly successful.

If firms did not partner with education, government or other research institutions in their innovation activities, they were asked how important a number of specific factors were in the decision not to partner. Table 3.20 presents the responses and the mean score calculations for not partnering.

Table 3.20: Reasons for not Partnering with Education, Government or Other Research Institutions

Reasons for Not Partnering	Not Important	Somewhat Important	Moderately Important	Important	Very Important	Not Applicable	Missing	Mean Score
Unaware of what services/expertise are available	20	9	15	23	27	31	90	3.30
Never considered it	23	9	13	21	23	37	89	3.13
Too expensive	20	9	9	17	21	43	96	3.13
Did not know how to access expertise	24	11	13	20	19	34	94	2.99
Skills/expertise my firm required are not available	31	4	14	15	20	37	94	2.87
Not interested	33	6	17	10	18	42	89	2.69
Services could not be provided in time required	39	8	8	12	12	40	96	2.37

Figure 3.19: Reasons for not Partnering in Innovation Activities



	R1	R2	R3	R4	R5	R6	R7
Mean	2.69	3.13	2.99	3.3	2.87	3.13	2.37

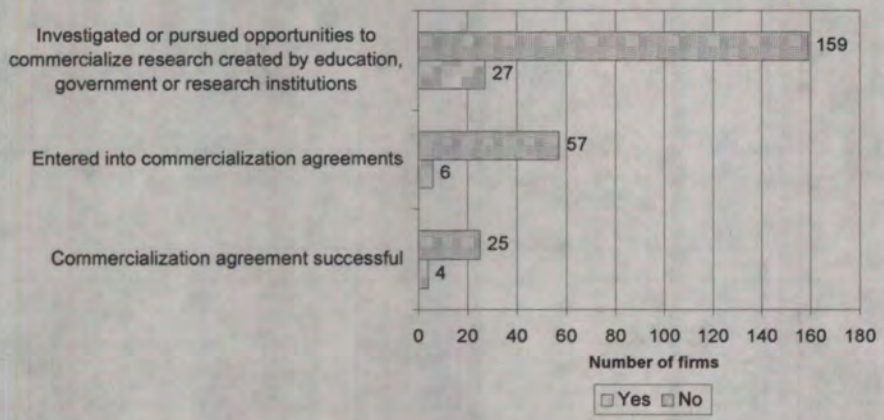
Mean Score: *Ranked importance on a scale of 1 to 5, where 1 is not an important reason for not partnering and 5 is a very important reason for not partnering in innovation activities.*

R1	Not interested
R2	Never considered it
R3	Did not know how to access expertise
R4	Unaware of what services/expertise are available
R5	Skills/expertise my firm required are not available
R6	Too expensive
R7	Services could not be provided in time required

3.7.1 Commercialization of research by education, government or other research facilities

Firms were asked if they had investigated or pursued opportunities to commercialize research created by education, government or other research institutions; if they had entered into any commercialization agreements; and if they did, were they successful. Figure 3.20 profiles the responses.

Figure 3.20: Firms' Commerciliazation of Research by Education, Government or Other Research Facilities



One hundred and eighty-six firms answered this question. Twenty-seven (15%) replied that they pursued some form of commercialization and 159 (85%) suggested they had not. Twenty-nine firms did not include an answer to this question.

Only six firms (10%) had entered into a commercialization agreement and 57 firms (90%) had not. One hundred and fifty-two firms did not answer this question.

Only 29 respondents reported whether the agreement they entered into was successful or not. Twenty-five (86%) were not successful and 4 firms (14%) were.

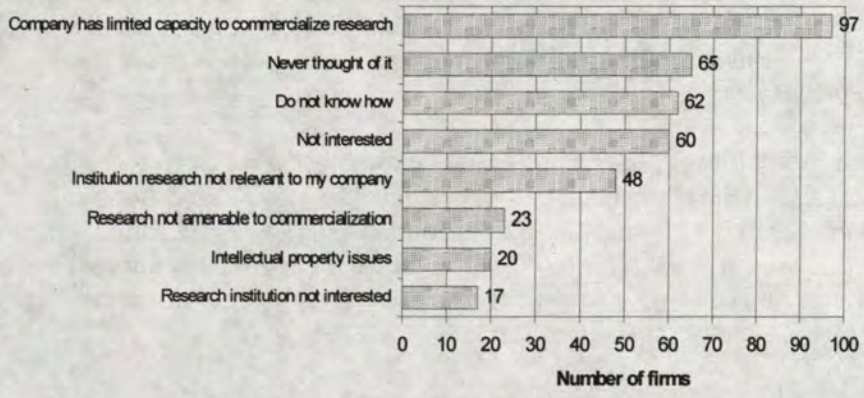
Table 3.21 and Figure 3.21, demonstrates why firms did not enter into commercialization agreements or why the ones entered into were not successful.

Table 3.21: Reasons Why Commercialization Agreement Was Not Attempted, or If Attempted Was Not Successful (Number of Respondents)

	Frequency Distribution		
	Yes	No	Missing
Company has limited capacity to commercialize research (time, capital)	97	39	79
Never thought of it	65	58	92
Do not know how	62	60	93
Not interested	60	69	86
Institution research not relevant to my company	48	60	107
Research not amenable to commercialization	23	77	115
Intellectual property issues	20	89	106
Research institution not interested	17	89	109

Missing = respondents that chose not to answer question

Figure 3.21: Reasons Commercialization Agreement Not Attempted/Successful



The main reason research commercialization agreements with education, government or other research facilities were not successful was because the firm had limited capacity (time, capital) to commercialize research. Other reasons related simply to complacency on the part of firms that had never even thought of it or were just not interested.

Firms that entered into commercialization agreements with education, government or other research institutions and the commercialization was not successful were asked why it had not been successful. Eleven firms responded to this question and the main reason (given by 3 firms) was the process is still incomplete or on-going. The list of responses is contained in Appendix C-12.

3.8 Importance of Human Resources Issues for Innovation

Tables 3.22 to 3.31 present the results of the regression analysis of human resources characteristics impacting innovation in firms. A summary is provided in Table 3.32.

Table 3.22: Dependent Variable - Firms that Introduced New Goods or Services to the Market

Independent Variables	Odds Ratio
Firms that benefited from innovative solutions offered by employees	2.86
Firms that provided employee skills training	2.78
Your highest level of formal education	No statistical relationship established
Firms that used incentives to encourage employee innovation	No statistical relationship established
Firms that provided management skills training	No statistical relationship established
Firms that used continuous improvement or other QA programs	No statistical relationship established
Firms that benchmarked performance	No statistical relationship established
Firms that monitored customer satisfaction levels	No statistical relationship established

Table 3.22 illustrates the statistically significant relationship between firms that benefited from innovative solutions offered by employees and firms that provided employee skills training. These firms were 2.86 and 2.78 times more likely to introduce new goods or services to the market.

No statistically significant relationship could be established for firms that introduced new goods or services to the market and the highest level of formal education of the owner or manager; whether they used incentives to encourage employee innovation; whether they provided management skills training; whether they used continuous improvement or other quality assurance programs; whether they benchmarked performance; or whether they monitored customer satisfaction levels.

Table 3.23: Dependent Variable - Firms that Introduced Significantly Improved Goods or Services to the Market

Independent Variables	Odds Ratio
Firms that benefited from innovative solutions offered by employees	4.31
Firms that provided employee skills training	2.43
Firms that monitored customer satisfaction levels	2.30
Firms that used incentives to encourage employee innovation	2.11
Firms that used continuous improvement or other QA programs	1.86
Your highest level of formal education	No statistical relationship established
Firms that provided management skills training	No statistical relationship established
Firms that benchmarked performance	No statistical relationship established

The importance of employee involvement in innovative activities is obvious: firms that benefited from innovative solutions offered by employees were 4.3 times more likely to introduce significantly improved goods or services.

The odds ratios for introducing significantly improved goods or services to the market were 2.43 for firms that provided employee skills training, 2.30 for those that monitored customer satisfaction levels, 2.11 for firms that used incentives to encourage innovation and 1.86 for those firms that used continuous improvement or other quality assurance programs.

No statistically significant relationship could be established between firms that introduced significantly improved goods or services to the market and the highest level of formal education of the owner or manager, firms that provided management skills training and those firms that benchmarked performance.

Similar statistically significant relationships and relationships where no significant relationship could be established are presented in Tables 3.24 to 3.31. Table 3.32 provides a summary of the human resources factors influencing innovation and R&D.

Table 3.24: Dependent Variable - Firms that Engaged in Research and Development (R&D)

Independent Variables	Odds Ratio
Your highest level of formal education (PhD)	10.67
Firms that benefited from innovative solutions offered by employees	4.39
Firms that used incentives to encourage employee innovation	No statistical relationship established
Firms that provided employee skills training	No statistical relationship established
Firms that provided management skills training	No statistical relationship established
Firms that used continuous improvement or other QA programs	No statistical relationship established
Firms that benchmarked performance	No statistical relationship established
Firms that monitored customer satisfaction levels	No statistical relationship established

Table 3.25: Dependent Variable - Firms that Introduced New or Improved Production Processes

Independent Variables	Odds Ratio
Firms that benefited from innovative solutions offered by employees	2.90
Firms that used continuous improvement or other QA programs	2.58
Firms that used incentives to encourage employee innovation	2.37
Firms that provided employee skills training	2.32
Firms that benchmarked performance	2.19
Your highest level of formal education	No statistical relationship established
Firms that provided management skills training	No statistical relationship established
Firms that monitored customer satisfaction levels	No statistical relationship established

Table 3.26: Dependent Variable - Firms that Introduced New or Improved Internal Processes

Independent Variables	Odds Ratio
Firms that benefited from innovative solutions offered by employees	7.59
Firms that used incentives to encourage employee innovation	3.73
Firms that used continuous improvement or other QA programs	3.02
Firms that benchmarked performance	2.76
Firms that provided management skills training	2.75
Firms that monitored customer satisfaction levels	2.65
Firms that provided employee skills training	2.45
Your highest level of formal education	No statistical relationship established

Table 3.27: Dependent Variable - Firms that Acquired Machinery, Equipment or Technologies

Independent Variables	Odds Ratio
Firms that benefited from innovative solutions offered by employees	4.69
Firms that provided employee skills training	4.66
Firms that used incentives to encourage employee innovation	2.48
Firms that provided management skills training	2.35
Your highest level of formal education	No statistical relationship established
Firms that used continuous improvement or other QA programs	No statistical relationship established
Firms that benchmarked performance	No statistical relationship established
Firms that monitored customer satisfaction levels	No statistical relationship established

3.28: Dependent Variable - Firms that Adapted Existing Technologies to Provide a New Good or Service to the Market

Independent Variables	Odds Ratio
Firms that benefited from innovative solutions offered by employees	3.44
Firms that provided employee skills training	2.95
Firms that provided management skills training	2.61
Firms that used incentives to encourage employee innovation	2.03
Your highest level of formal education	No statistical relationship established
Firms that used continuous improvement or other QA programs	No statistical relationship established
Firms that benchmarked performance	No statistical relationship established
Firms that monitored customer satisfaction levels	No statistical relationship established

3.29: Dependent Variable - Firms that Adapted Existing Technologies to Improve Internal Processes

Independent Variables	Odds Ratio
Firms that benefited from innovative solutions offered by employees	5.04
Firms that used incentives to encourage employee innovation	3.68
Firms that provided employee skills training	3.67
Firms that benchmarked performance	3.06
Firms that provided management skills training	3.04
Firms that used continuous improvement or other QA programs	2.49
Firms that monitored customer satisfaction levels	2.43
Your highest level of formal education	No statistical relationship established

3.30: Dependent Variable - Firms that Obtained External R&D Funding

Independent Variables	Odds Ratio
Firms that benefited from innovative solutions offered by employees	4.95
Firms that provided employee skills training	3.78
Your highest level of formal education	No statistical relationship established
Firms that used incentives to encourage employee innovation	No statistical relationship established
Firms that provided management skills training	No statistical relationship established
Firms that used continuous improvement or other QA programs	No statistical relationship established
Firms that benchmarked performance	No statistical relationship established
Firms that monitored customer satisfaction levels	No statistical relationship established

Table 3.31: Dependent Variable - Firms that Applied for the Scientific Research & Experimental Development Tax Credit

Independent Variables	Odds Ratio
Your highest level of formal education (PhD)	6.29
Firms that used continuous improvement or other QA programs	2.36
Firms that benefited from innovative solutions offered by employees	No statistical relationship established
Firms that used incentives to encourage employee innovation	No statistical relationship established
Firms that provided employee skills training	No statistical relationship established
Firms that provided management skills training	No statistical relationship established
Firms that benchmarked performance	No statistical relationship established
Firms that monitored customer satisfaction levels	No statistical relationship established

A number of statistically significant relationships were established between human resources related factors and the innovation activities of firms. For example, firms for which the owners'/managers' highest level of education was a PhD were 10.67 times more likely to engage in R&D than those without a PhD and 6.29 times more likely to apply for the SR&ED tax credit than those without a PhD.

Table 3.32: Summary of Human Resources Related Issues Affecting Innovation & R&D

Independent Variables – Human Resource Factors	Dependent Variables – Innovation Activities									
	Introduced New Goods or Services to the Market	Introduced Significantly Improved Goods or Services to the Market	Engaged in R&D	Introduced New or Improved Production Processes	Introduced New or Improved Internal Processes	Acquired Machinery, Equipment or Technology	Adapted Existing Technologies to Provide a New Good or Service	Adapted Existing Technologies to Improve Internal Processes	Obtained External R&D Funding	Applied for the SR&ED Tax Credit
	Odds Ratios									
Firms that benefited from innovative solutions offered by employees	2.86	4.31	4.39	2.90	7.59	4.69	3.44	5.04	4.95	NSR
Highest level of formal education (PhD)	NSR	NSR	10.67	NSR	NSR	NSR	NSR	NSR	NSR	6.29
Firms that used continuous improvement or other QA programs	NSR	1.86	NSR	2.58	3.02	NSR	NSR	2.49	NSR	2.36
Firms that used incentives to encourage employee innovation	NSR	2.11	NSR	2.37	3.73	2.48	2.03	3.68	NSR	NSR
Firms that provided employee skills training	2.78	2.43	NSR	2.32	2.45	4.66	2.95	3.67	3.78	NSR
Firms that provided management skills training	NSR	NSR	NSR	NSR	2.75	2.35	2.61	3.04	NSR	NSR
Firms that benchmarked performance	NSR	NSR	NSR	2.19	2.76	NSR	NSR	3.06	NSR	NSR
Firms that monitored customer satisfaction levels	NSR	2.30	NSR	NSR	2.65	NSR	NSR	2.43	NSR	NSR

NSR = no statistically significant relationship established

The odds ratio for firms that benefited from innovative solutions offered by employees was: 2.86 times for introducing new or improved goods or services to the market; 4.31 for introducing new or improved production or other internal processes; 4.39 for engaging R&D; 2.90 for introducing new or improved production processes; 7.59 for introducing new or improved internal processes; 4.69 for acquiring machinery, equipment or technology; 3.44 for adapting existing technologies to provide a new good or service; 5.04 for adapting existing technologies to improve internal processes; and 4.95 for obtaining external R&D funding. No statistically significant relationship could be established for firms that benefited from innovative solutions offered by employees and applying for the SR&ED tax credit.

The remaining human resources factors can be extrapolated from the table in the same manner. The importance of human resources factors to the innovative activities of firms is clearly demonstrated in Table 3.32, as 50% of the factors have statistically significant relationships with innovation activities of firms.

3.9 Future Expectations for Innovation Activity of Firms in Survey

Respondents were asked a series of questions about their future expectations of employment levels, sales and profits over the next three years. A summary of the responses is shown in Table 3.33.

Table 3.33: Firm's Future Expectations of Employment, Sales & Profit (Number of Respondents)

	Frequency Distribution		
	Employment Level	Sales	Profit
Will increase more than 10%	84	107	96
Will increase less than 10%	37	41	35
Will remain the same	48	26	30
Will decline	17	11	15
Do not know	18	14	21
Missing	*11*	*16*	*17*

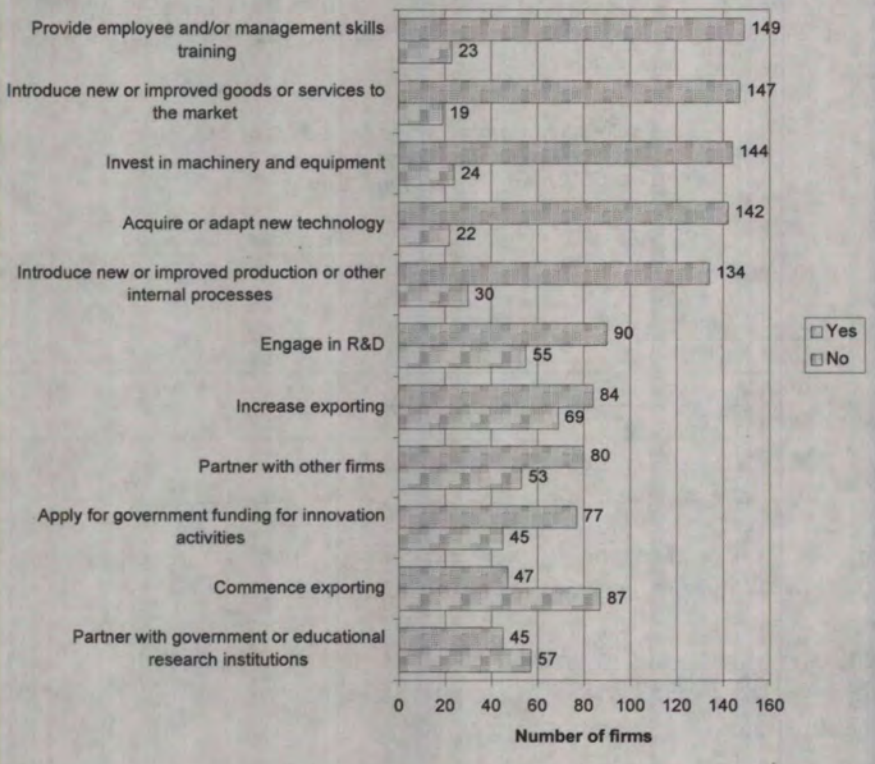
The majority of firms that responded were expecting an increase in employment levels (59%), sales (74%) and profits (66%) over the next three years.

Respondents were then asked a series of questions about their intentions to innovate over the next three years. Table 3.34 below summarizes the responses to this question and Figure 3.22 illustrates their intentions graphically.

Table 3.34: Firms' Intentions Over the Next Three Years (Number of Respondents)

Over the next three years, does your company intend to:	Yes	No	Don't Know	Missing
Provide employee and/or management skills training	149	23	31	12
Introduce new or improved goods or services to the market	147	19	40	9
Invest in machinery and equipment	144	24	34	13
Acquire or adapt new technology	142	22	39	12
Introduce new or improved production or other internal processes	134	30	36	15
Engage in R&D	90	55	52	18
Increase exporting	84	69	37	25
Partner with other firms (e.g., joint ventures)	80	53	67	15
Apply for government funding for innovation activities	77	45	69	24
Commence exporting	47	87	46	35
Partner with government or educational research institutions	45	57	86	27

Figure 3.22: Firm's Intentions Over the Next Three Years



The most frequently reported intentions were to provide employee and/or management skills training (149 firms); followed by the introduction of new or improved goods or services to the market (147 firms); investment in machinery and equipment (144 firms); and acquiring or adapting new technology (142 firms). The least frequently mentioned intentions were partnering with government or educational research institutions (45 firms) and commencing exporting (47 firms).

Further results from the statistical analysis are presented in Tables 3.35 to 3.38. A series of logistic regressions were used to determine the statistical significance and nature of the relationship between characteristics of firms in the sample and expected innovation activities.

Table 3.35: Dependent Variable - Firms that *Expect to* Introduce New or Improved Goods or Services to the Market

Independent Variables	Odds Ratio
Firms that have attempted to partner with local colleges	5.00
Firms that have obtained external R&D funding	4.57
Firms that have attempted to partner with local government research institutions	4.41
Firms that have introduced new goods or services to the market	4.14
Firms that have investigated or pursued opportunities to commercialize research	3.47
Firms that have applied for government funding to support innovation-related activities	2.99
Firms that have engaged in research and development	2.86
Firms that have attempted to partner with Memorial University and associated research institutions	2.66
Firms that have introduced new or improved production processes	2.14
Firms that have improved its competitive position	2.10
Firms that have introduced significantly improved goods or services to the market	1.91
Firms that have introduced other new or improved internal processes	1.89
Firms with high-speed access	No statistical relationship established
Firms that have adapted existing technologies to provide a new good or service to market	No statistical relationship established
Firms that have adapted existing technologies to improve internal processes	No statistical relationship established
Firms that have commenced exporting	No statistical relationship established
Firms that have increased exporting	No statistical relationship established
Firms that have engaged in joint ventures with local companies	No statistical relationship established
Engaged in joint ventures with international companies	No statistical relationship established
Firms that have attempted to partner with university research institutions in other provinces	No statistical relationship established
Firms that have attempted to partner with government research institutions in other provinces	No statistical relationship established
Firms that have attempted to partner with research facilities outside Canada	No statistical relationship established

Table 3.35 illustrates that if a company had previously partnered with local colleges, obtained external R&D funding or partnered with local government research institutions they were likely to do it again to facilitate introducing new or improved goods and or services. That is, firms that had attempted to partner with local colleges were 5 times more likely to introduce new goods or services to the market again and similarly, firms that obtained external R&D funding were 4.57 times more likely to introduce new goods or services to the market.

Table 3.36: Dependent Variable - Firms That *Expect to* Introduce New or Improved Production or Other Internal Processes

Independent Variables	Odds Ratio
Firms that have introduced new or improved production processes	4.03
Firms that have engaged in research and development	3.80
Firms that have increased exporting	3.79
Firms that have introduced significantly improved goods or services to the market	3.20
Firms that have adapted existing technologies to improve internal processes	3.00
Firms that have introduced new goods or services to the market	2.76
Firms that have introduced other new or improved internal processes	2.72
Firms that have commenced exporting	2.34
Firms that have applied for government funding to support innovation-related activities	2.10
Firms that have improved its competitive position	1.91
Firms that have adapted existing technologies to provide a new good or service to market	No statistical relationship established
Firms that have obtained external R&D funding	No statistical relationship established
Firms that have engaged in joint ventures with local companies	No statistical relationship established
Engaged in joint ventures with international companies	No statistical relationship established
Firms that have attempted to partner with Memorial University and associated research institutions	No statistical relationship established
Firms that have attempted to partner with local colleges	No statistical relationship established
Firms that have attempted to partner with local government research institutions	No statistical relationship established
Firms that have attempted to partner with university research institutions in other provinces	No statistical relationship established
Firms that have attempted to partner with government research institutions in other provinces	No statistical relationship established
Research facilities outside Canada	No statistical relationship established
Firms that have investigated or pursued opportunities to commercialize research	No statistical relationship established
Firms with high-speed access	No statistical relationship established

Table 3.36 demonstrates firms that introduced new or improved production processes, engaged in R&D and increased exporting were more likely to introduce new or improved production or other internal processes. That is, firms that introduced new or improved production processes were 4 times more likely to do it again.

Table 3.37: Dependent Variable - Firms That Expected to Engage in Research and Development (R&D)

Independent Variables	Odds Ratio
Firms that have engaged in research and development	17.25
Firms that have obtained external R&D funding	13.89
Firms that have attempted to partner with research facilities outside Canada	11.08
Firms that have attempted to partner with university research institutions in other provinces	10.00
Firms that have applied for government funding to support innovation-related activities	8.33
Firms that have attempted to partner with local government research institutions	5.00
Firms that have investigated or pursued opportunities to commercialize research	4.43
Firms that have increased exporting	3.04
Firms that have attempted to partner with Memorial University and associated research institutions	2.98
Firms that have adapted existing technologies to improve internal processes	2.89
Firms that have commenced exporting	2.11
Firms that have adapted existing technologies to provide a new good or service to market	2.04
Firms that have introduced new goods or services to the market	1.97
Firms that have introduced significantly improved goods or services to the market	1.92
Firms that have introduced new or improved production processes	No statistical relationship established
Firms that have introduced other new or improved internal processes	No statistical relationship established
Firms that have engaged in joint ventures with local companies	No statistical relationship established
Engaged in joint ventures with international companies	No statistical relationship established
Firms that have improved its competitive position	No statistical relationship established
Firms that have attempted to partner with local colleges	No statistical relationship established
Firms that have attempted to partner with government research institutions in other provinces	No statistical relationship established
Firms with high-speed access	No statistical relationship established

Table 3.37 identifies a statistically significant relationship for firms that have undertaken R&D before. These firms were 17.25 times more likely to undertake research and development activities again than those companies not having done it before. Also, firms that obtained external R&D funding had a probability of undertaking R&D that was 14 times higher than firms that did not have access to external R&D funding.

Firms that had applied for government funding to support innovation related activities were 8 times more likely to pursue research and development activities than firms that did not have this type of track record.

Table 3.38: Dependent Variable - Firms That Expect to Acquire or Adapt New Technology

Independent Variables	Odds Ratio
Firms that have engaged in research and development	4.80
Firms that have investigated or pursued opportunities to commercialize research	3.65
Firms that have increased exporting	3.20
Firms that have obtained external R&D funding	3.18
Firms that have commenced exporting	2.95
Firms that have introduced significantly improved goods or services to the market	2.87
Firms that have applied for government funding to support innovation-related activities	2.76
Firms that have adapted existing technologies to provide a new good or service to market	2.62
Firms that have adapted existing technologies to improve internal processes	2.61
Firms that have improved its competitive position	2.53
Firms that have engaged in joint ventures with local companies	2.40
Firms that have attempted to partner with Memorial University and associated research institutions	2.30
Firms that have introduced new goods or services to the market	2.16
Firms with high-speed access	1.93
Firms that have introduced other new or improved internal processes	1.91
Firms that have introduced new or improved production processes	No statistical relationship established
Engaged in joint ventures with international companies	No statistical relationship established
Firms that have attempted to partner with local colleges	No statistical relationship established
Firms that have attempted to partner with local government research institutions	No statistical relationship established
Firms that have attempted to partner with university research institutions in other provinces	No statistical relationship established
Firms that have attempted to partner with government research institutions in other provinces	No statistical relationship established
Research facilities outside Canada	No statistical relationship established

The probability of firms acquiring or adopting new technologies in the immediate future was 4.8 times higher for firms that had previously engaged in research and development.

If firms had investigated or pursued opportunities to commercialize research, they had a 3.7 times higher likelihood of acquiring or adapting new technology than a company that had not examined the commercialization of research.

Firms that had increased exporting had a 3.2 times higher probability of acquiring or adapting new technology than did companies that had not increased exporting recently.

In concluding the survey questionnaire, respondents were asked: *"What, in your opinion, are the most significant factors, positive and negative, affecting the future competitiveness of your firm?"* and they were invited to: *"Please provide any additional comments you would like to share".*

In total, firms made 145 comments on factors affecting future competitiveness and 56 additional comments were provided. The following are samples of the comments.

Sample of Responses: ***What, in your opinion, are the most significant factors, positive and negative, affecting the future competitiveness of your firm?***
Local labor and transportation costs
Moving into marketplace at a high price. Patent protects but does not guarantee price will be acceptable
Being a private company competing with public companies is difficult while still trying to keep up with technology
Additional equipment and new marketing strategies
State of Newfoundland economy. Number of new entrants to industry. Quality improvement of goods provided. Employee retention. Government and corporate spending on promotional items
Offshore oil development. Voisey's Bay development. Strength of fisheries.
Marketing
Lack of time/resources to deal with expansion, introduction of new services, customer service quality and internal processes. Lack of funding available for new ideas
Human resources
Length of time getting product to market (product currently under development). Costs of development. Finding qualified resources in the IT sector in this province
Maintain current management innovativeness.
Having ISO standards in place; amount of work available in province.

Sample of Responses: ***Please provide any additional comments you would like to share.***
Local growth is stymied in that the market place is too small and controlled by too few. New opportunities are virtually non-existent. To be successful you have to be resourceful to expand naturally and to look outside for opportunities. For large-scale projects, labour attitude has to improve. Ottawa has to be more equitable and the provincial government has got to get off its (laurels) or the last Newfoundlander left can turn off the lights when they move to Canada!
We have had good experience with ACOA/HRDC but the processes are extremely fragile. Guidelines are extremely cumbersome for small companies. Accessing marketing human resources is essential but financially impossible to obtain for a small firm. More assistance in these areas is needed
Municipal, provincial and federal governments are among our major clients, however, efforts to apply tendering policies to professional services has led to lower profit margins, poorer quality assurance and increased threat of liability
ACOA and ACOA/CEDA most helpful
Thank me by paying me. My time is worth something
We need to get out of the dory!
We need a forum for long term economic development in the province. The provincial government does not understand what this is and is not interested in finding out. I could write a book on the subject. There is no long term sustainable plan for the province. We have no leadership and no direction!
More thought into helping small business which do succeed instead of larger companies which have the time to invest into programs that are of no benefit to us, which would be good if we could take time to spend on applying and all the leg work required before qualifying for certain programs

The complete lists of comments are found in Appendix C-15 and Appendix C-16.

4. OBSERVATIONS AND CONCLUSIONS

Businesses can innovate in all of their activities and all businesses, no matter what sector or size, need to innovate to compete and grow in today's global, knowledge-based economy. Governments cannot however, force businesses to innovate. Firms must want to innovate for themselves. Government(s) can create the right environment, where innovation can flourish and the findings of this study provides a broad framework for policy makers in this regard.

This study examined a number of important characteristics of firms that were involved to different degrees in innovative activities in Newfoundland and Labrador. The following are observations that can be gleaned from this research.

Networking

In recent years, Harvard Business School guru Professor Michael Porter has been influential in promoting the idea that the innovative capacity of a firm is improved both by sharing information and resources between complementary firms that cooperate even while competing and, by acquiring specialized inputs from public and private organizations through networking.

The results of this survey support Professor Porter's model of networking. Networking represents an opportunity for companies to come together to share experiences, and explore opportunities to share resources and blend complementary capabilities to provide new or improved innovative goods and services or processes.

In this study, firms that participated in industry association activities and collaborated with researchers in industry, government and universities were more likely to carry out innovative activities than firms that did not. The same hold true for firms that entered into joint ventures with local and international firms. However, there is a need to develop and maintain stronger links between academia and the private sector in order that research produced in the university and other government research institutions has an opportunity to be commercialized.

Exporting

The export capability of a business is often seen as a key indicator of innovativeness. Innovation can play an important role in helping a firm to sustain or improve its export position. The analysis undertaken in this study has confirmed that a statistical relationship exists between firms that commenced exporting or increased exporting and their innovation and R&D activities. Firms that have either commenced or increased exporting are more likely to be innovative than firms that have not.

Customer Relationship Management

Innovation is related to everything that impacts on customer satisfaction and needs and adds value to products and services offered to the marketplace. Innovative companies have an in-depth understanding of the markets in which they operate, a real awareness of the needs of their customers and they anticipate what the customer's future needs will be.

When asked to rank the key drivers of innovation and R&D activity, survey respondents emphasized access to markets as a priority. They viewed increasing market share as most important, followed by maintaining market share, opening new markets, improving the quality of goods and services and responding to changing market conditions.

The importance of customer relationship management (CRM) is further reinforced by the survey results in that firms which monitored customer satisfaction levels and benchmarked performance were more likely to introduce significantly improved goods or services to the market. To improve their innovative performance firms need to understand their markets and customers better. This corroborates the view that innovative companies need to connect closely and effectively with their customers.

Cost of Innovation

Evidence in this survey confirms the cost of innovation and R&D is a major barrier for firms in Newfoundland and Labrador. Local firms require considerable investment in innovation and R&D to be successful in highly competitive global markets and cost-related barriers were reported as the most significant barriers to innovation activities and R&D. The role of government in offsetting the cost of innovation and R&D is also very important.

Government Funding

R&D cannot be left entirely to the private sector. There are many legitimate reasons for government(s) to support innovation activities and R&D. Assistance aimed at helping firms gain a competitive advantage in a global marketplace is but one of these. The basic question is whether innovation and R&D can be stimulated by research grants and tax incentives alone. As this study demonstrates, a statistically significant relationship exists between innovation and human resources factors. Hence, financial incentives aimed at increasing innovation and R&D activity can succeed only if there are sufficient numbers of trained personnel with the creativity to introduce new or improved ideas, products and processes to the firm.

Management and Employee Skills Training

In the new knowledge-driven economy there is a real need for management and employees to be flexible and to be able to adapt to change. Innovation and R&D involve complex processes that need to be managed – it doesn't just happen. Knowing what products, services, processes or technology to maintain, change or develop entails understanding the nature of the risks involved and actively managing them. Greater skills in managing the innovation process are required. Firms need to invest in new knowledge and skills and attract bright, creative people into the firm. They need to continually consider their management structures making sure there are no barriers to successful innovation.

Joint Ventures and Alliances

Firms cannot rely only on their internal strengths to gain a competitive advantage in local and/or international markets today. Inter-firm and inter-organization collaborations, alliances, joint ventures, partnering and the like have gained unprecedented momentum in recent years. Likewise, R&D consortia and the like become increasingly popular, especially in basic research activities. Innovation activities are often shared between two or more firms in joint ventures or alliances. This survey supports the importance of joint ventures in innovative activity. Firms that engaged in joint ventures with international companies and with local companies, or firms that partnered with local government research institutions were more likely to be involved in innovation activities and R&D than firms that were not involved.

Innovation Culture and Creative Ideas

The life-blood of innovation is ideas. Innovative companies possess a culture in which creative ideas of employees can flourish. The results of this survey demonstrate that firms benefiting from innovative solutions offered by employees had a higher probability of engaging in innovative activities such as introducing new or improved internal processes or obtaining external R&D funding. These innovative cultures do not happen by accident, they have to be created and maintained. Innovative companies motivate employees to bring forward ideas to improve the way they work and suggest ways in which the company can bring new ideas to market as products or new services. Firms that used incentives to encourage employee innovation were more likely to engage in innovative activities than those that did not.

Private-Public Research Partnering

This study confirms a high success rate for firms that partnered with Memorial University, local colleges, local government research institutions and universities, government and other research institutions outside the province. Even though less than

20% attempted to partner, the majority of those firms that ended up partnering were successful. For instance, 90% of those that partnered with local colleges were successful.

However, for firms that did not attempt to partner, the most common reason was *unaware of what services/expertise are available* and *never considered it.*

If Newfoundland and Labrador is to close the gap with the rest of Atlantic Canada and the rest of the country, there must be increased partnering between the private sector and public research institutions. Linkages between university, public sector research organizations and the private sector are essential if innovation and R&D activities are to be stimulated.

Commercializing Research

This study reported successes in the commercialization of university research. While only a few firms investigated or pursued opportunities to commercialize research by education, government or research institutions, the majority of those that did enter into commercialization agreements were successful. The lack of commercialization activity was due primarily to limited capacity of firms to commercialize research and a lack of awareness of the opportunities (i.e., never thought of it or did not know how). There is an obvious lack of collaboration between the research organizations and the private sector. Unless companies are made aware of the opportunities to commercialize university and other research, the result will be lost opportunities and the associated benefits that could be derived from the research.

Scientific Research & Experimental Development Tax Credits

Tax incentives attempt to promote innovative activity by reducing the cost of research and development activities to the participating firms. Under the Scientific Research and Experimental Development (SR&ED) tax credit, firms can receive a tax credit against eligible spending. However, this study confirms that the SR&ED tax credit is not widely used in Newfoundland and Labrador. Only 20% of survey respondents applied for the tax credit and of those, only 50% were successful.

Promoting R&D

There is strong evidence in this study that firms in Newfoundland and Labrador are aware of the changing business environment and the real need for new ideas, products and services to compete in a global, knowledge-based economy. There is, however, a lack of awareness with respect to both recognizing the complexity of the innovation process and the need to build innovative capacity and links between various research institutions and organizations that facilitate innovation. While government(s) recognize the need to encourage innovation and R&D, focused policies are needed to create awareness and stimulate innovation in new and existing businesses.

Appendix A:
Survey Questionnaire

Business Innovation Survey

Introduction: Innovation is the creation and adoption of new goods, services or processes, or the adaptation and fusion of existing technologies. It is the process by which new or improved goods or services are developed and introduced into the marketplace, or new or improved processes are introduced to the firm. It can include R&D, engineering & industrial design, market investigation, organizational restructuring, and skills development.

Innovation is a key priority of the Government of Canada. It is well documented that our competitive position is eroding and it is suggested that Canadian firms must aggressively create new ideas and bring them to market in order to remain competitive. The objective of this survey is to identify the factors that contribute, positively or negatively, to the ability of firms in Newfoundland and Labrador to develop, adopt and market leading-edge innovations. The results will be analyzed to assist the Atlantic Canada Opportunities Agency and Industry Canada plan and implement strategies aimed to address these challenges.

Confidentiality: All responses will be kept in strict confidence. There are no identifying codes on the returned surveys so that it is not possible to identify individual respondents. Further, individual responses cannot be used as identifiers as all data will be summarized for analysis and in the final report.

Questionnaire: This survey should be completed by the owner or senior member of your firm, and should take approximately 20 minutes. It includes a series of questions about your firm's activities, challenges to innovating, and future intentions. Please begin with information about the size and nature of your firm.

If you have any questions about this study, please telephone Barry Sheppard, at 754-3235. The questionnaire should be returned in the addressed postage paid envelope by **March 15th** to Barry Sheppard Consulting, P.O. Box 8001, St. John's, NF, A1B 3M7.

Thank you for taking the time to complete and return this survey.

SECTION I: ABOUT YOUR BUSINESS

1. Location of business:

- ☐ St. John's Metropolitan Area
- ☐ Other Avalon
- ☐ Eastern Newfoundland
- ☐ Central Newfoundland
- ☐ Western/Northern
- ☐ Labrador

2. Years in Operation:

- ☐ Less than 1 year
- ☐ 1 to 3 years
- ☐ 4 to 5 years
- ☐ 6 to 10 years
- ☐ More than 10 years

3. Please indicate the number of employees, including yourself, in your business:

- ☐ 1 to 4
- ☐ 5 to 9
- ☐ 10 to 19
- ☐ 20 to 49
- ☐ 50 to 99
- ☐ 100 +

4. Over the last three years, employment levels have:

- ☐ Remained the same
- ☐ Declined
- ☐ Increased less than 10%
- ☐ Increased more than 10%

5. In what industry do you operate?

(a) Please select from the North American Industry Classification System (NAICS):

- ☐ **Agriculture and related**
- ☐ **Forestry and related**
- ☐ **Fishing and related**
- ☐ **Mining and related**
- ☐ **Oil and gas and related**
- ☐ **Construction**
- **Manufacturing (see below)**
  - o Food, Beverage or Tobacco production
  - o Textiles & Textile Mill production
  - o Clothing Manufacturing
  - o Leather & Allied Products
  - o Wood & Paper Products
  - o Printing Services
  - o Petroleum and Coal Products
  - o Chemical Manufacturing
  - o Plastics and Rubber Products
  - o Non-Metallic Mineral Products
  - o Primary Metal Manufacturing
  - o Fabricated Metal Products
  - o Machinery Manufacturing
  - o Computer and Electronic Products Mfg.
  - o Electrical Equipment, Appliance & Component
  - o Transport. Equipment Mfg., incl. Boat Bldg.
  - o Furniture & Related Products
  - o Other Manufacturing (please specify)

  _____
- ☐ **Wholesale Trade**
- ☐ **Retail Trade**
- ☐ **Transportation and Warehousing**
- **Information and Cultural Industries (below)**
  - o Book and software publishing
  - o Motion picture and Sound Recording
  - o Radio/TV/Internet Publishing & Broadcasting
  - o Telecommunications – Satellite, Wireless etc.
  - o Internet Service Providers, Data Processing
  - o Other Information Services (please specify)

  _____
- ☐ **Finance and Insurance**
- ☐ **Real Estate and Rental and Leasing**
- **Professional, Scientific, & Technical Services**
  - o Legal, Accounting, Architectural
  - o Engineering, Geophysical Survey and Mapping
  - o Industrial & Computer Systems Design
  - o Mgt, Scientific and Technical Consulting
  - o Scientific Research & Development
- ☐ **Management of Companies and Enterprises**
- ☐ **Administrative and Support**
- ☐ **Waste Management & Remediation Services**
- ☐ **Educational Services**
- ☐ **Health Care and Social Assistance**
- ☐ **Arts, Entertainment and Recreation**
- ☐ **Accommodation and Food Services**
- ☐ **Other Service Industry (please specify)**

  _____

(b) If the NAICS code in (a) is not easily applicable to your company, please self-describe in space below:

_____

6. Please indicate your highest level of formal education:

- ☐ High school
- ☐ University or college
- ☐ Professional designation
- ☐ Post graduate studies/PhD

7. Please indicate the percentage of your (normal) annual sales by territory:

Province of NF & Lab	_____%
Rest of Canada	_____%
United States	_____%
Other Countries	_____%
Total	**100%**

8. Over the last three years, sales have:

- ☐ Remained the same
- ☐ Declined
- ☐ Increased less than 10%
- ☐ Increased more than 10%

9. Over the last three years, profits have:

- ☐ Remained the same
- ☐ Declined
- ☐ Increased less than 10%
- ☐ Increased more than 10%

10. Does your company:	**Yes**	**No**
a) Use e-mail	☐	☐
b) Have access to the Internet	☐	☐
If yes to b) does your company:		
c) Have high-speed access	☐	☐
d) Have a web page	☐	☐
e) Purchase on-line	☐	☐
f) Sell on-line	☐	☐
g) Do market research on-line	☐	☐

SECTION II: YOUR RECENT ACTIVITIES

Over the past three years, has your company:	Yes	No
11. Introduced new goods or services to the market? If yes, what percentage of your current annual sales do they account for? _____%	☐	☐
12. Introduced significantly improved goods or services to the market?	☐	☐
13. Discontinued selling any goods or services?	☐	☐
14. Introduced new or improved production processes?	☐	☐
15. Introduced other new or improved internal processes? (planning, logistics, marketing etc.)	☐	☐
16. Benefited from innovative solutions offered by employees?	☐	☐
17. Used incentives to encourage employee innovation?	☐	☐
18. Provided employee skills training?	☐	☐
19. Provided management skills training?	☐	☐
20. Acquired machinery, equipment or technologies?	☐	☐
21. Adapted existing technologies to:		
a) Provide a new good or service to market?	☐	☐
b) Improve internal processes?	☐	☐
22. Engaged in research and development (R&D)? If no, go to question 24	☐	☐
23. Obtained external R&D funding? If yes, please indicate the source(s):	☐	☐
☐ Venture Capital ☐ Research Institution ☐ Financial Institution ☐ Government program ☐ Other (please specify) _____		
24. a) Applied for *the Scientific Research & Experimental Development* tax credit?	☐	☐
b) If yes, was the application successful?	☐	☐
c) If you did not apply, please indicate the reason(s): _____ _____		
25. a) Applied for a patent? Or,	☐	☐
b) Otherwise acted to protect intellectual property?	☐	☐
26. Used continuous improvement or other quality assurance programs?	☐	☐
27. Benchmarked performance (i.e. compared to industry performance)?	☐	☐
28. Monitored customer satisfaction levels?	☐	☐
29. Commenced exporting?	☐	☐
30. Increased exporting?	☐	☐
31. Engaged in joint ventures with local companies?	☐	☐
32. Engaged in joint ventures with international companies?	☐	☐
33. Participated in industry association activities?	☐	☐
34. Improved its competitive position?	☐	☐
If yes, please describe the main factors you attribute this to: _____ _____		

SECTION III: CHALLENGES TO INNOVATION

35. The following is a list of potential barriers to innovation: that is, the introduction of new or improved goods, services or internal processes.

Please indicate the importance of each to your company. Please select the box that corresponds to the scale of 1 to 5: 1 indicates the factor has no importance, or *is not a barrier*, while 5 indicates the factor is a very important barrier to your company.

	Not important	Somewhat Important	Moderately Important	Important	Very Important	Not applicable
	1	**2**	**3**	**4**	**5**	**N/A**
Costs of research and development	☐	☐	☐	☐	☐	☐
Costs of design and engineering	☐	☐	☐	☐	☐	☐
Costs of production investment (for good or service)	☐	☐	☐	☐	☐	☐
Costs of marketing/commercialization of new/improved good or service	☐	☐	☐	☐	☐	☐
Overall costs relative to expected payback	☐	☐	☐	☐	☐	☐
Difficult to obtain private sector financing	☐	☐	☐	☐	☐	☐
Difficult to obtain government funding	☐	☐	☐	☐	☐	☐
Lack of relevant scientific or technical information	☐	☐	☐	☐	☐	☐
Difficult to obtain necessary technology	☐	☐	☐	☐	☐	☐
Lack of technical support from suppliers	☐	☐	☐	☐	☐	☐
Limited internal research or technical support skills	☐	☐	☐	☐	☐	☐
Limited internal management skills	☐	☐	☐	☐	☐	☐
Problems in adapting marketing function	☐	☐	☐	☐	☐	☐
Difficulties in predicting demand	☐	☐	☐	☐	☐	☐
Lack of awareness of available expertise at research institutions	☐	☐	☐	☐	☐	☐
No available expertise at research institutions	☐	☐	☐	☐	☐	☐
Difficult to obtain support from research institutions	☐	☐	☐	☐	☐	☐
Difficult to network/partner with other local firms	☐	☐	☐	☐	☐	☐
Difficult to network/partner with firms from out of province	☐	☐	☐	☐	☐	☐
Lack of time to generate ideas and take them forward	☐	☐	☐	☐	☐	☐
No need to because no competitive pressure	☐	☐	☐	☐	☐	☐
Not interested	☐	☐	☐	☐	☐	☐
Lack of government (non-financial) supports	☐	☐	☐	☐	☐	☐
Not required by government environmental regulations/enforcement	☐	☐	☐	☐	☐	☐
Government policy or regulatory environment	☐	☐	☐	☐	☐	☐
Please expand_____						
Other: _____	☐	☐	☐	☐	☐	☐

Optional Comments:

_____

_____

_____

36. The following are common drivers to introduce new or improved goods, services or processes.

Please indicate in Column A the importance of each factor to your firm using a scale of 1 to 5, where 1 indicates the driver is not important and 5 indicates it is very important.

If you have introduced new or improved goods, services, or processes, please indicate in Column B your level of satisfaction with the actual impact upon your firm.

	A. Importance of Driver to Innovation						B. Satisfaction with Impact Upon Firm					
	Not important	Somewhat Important	Moderately Important	Important	Very Important	Not Applicable	Very Dissatisfied	Dissatisfied	Neutral	Satisfied	Very Satisfied	Not Applicable
	1	2	3	4	5	9	1	2	3	4	5	9
Reduce cost of labour	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Improve material handling	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Increase production capacity	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Reduce production time	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Improve production flexibility	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Open new markets	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Maintain market share	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Increase market share	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Respond to changing market demands	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Respond to changing supplier capabilities	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Increase delivery speed of goods/services to market	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Improve quality of goods or services	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Reduce environmental impacts	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Meet regulations or standards	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Other: _____	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Other: _____	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Optional Comments:

_____

_____

_____

37. Government Funding

(a) Did your company apply for government funding to support innovation-related activities in the last three years? If no, go to (c). ☐ Yes ☐ No

(b) Please indicate the program for which you applied, whether or not you received the funding, and, how satisfied you were with the experience.

Please indicate your level of satisfaction by checking the appropriate box corresponding to the scale of 1 to 5, where 1 is very dissatisfied and 5 is very satisfied.

Please list program(s) you applied for and provide comments (optional) in spaces provided below:	**Received Funding?** Yes	No	1 Very Dissatisfied	2 Dissatisfied	3 Neutral	4 Satisfied	5 Very Satisfied	9 No Opinion
1. Training and skills development programs	☐	☐	☐	☐	☐	☐	☐	☐
2. Marketing programs	☐	☐	☐	☐	☐	☐	☐	☐
3. Export incentives and services	☐	☐	☐	☐	☐	☐	☐	☐
4. Prototyping or product testing	☐	☐	☐	☐	☐	☐	☐	☐
5. Programs for developing business ideas	☐	☐	☐	☐	☐	☐	☐	☐
6. Productivity or quality improvement programs	☐	☐	☐	☐	☐	☐	☐	☐
7. Acquisition or adaptation of technology	☐	☐	☐	☐	☐	☐	☐	☐
8. New product or process research and development	☐	☐	☐	☐	☐	☐	☐	☐
9. Other_____								

(c) If you have not applied for government assistance in the last three years, or have faced challenges in doing so, please indicate the importance of the following reasons to your firm. Where applicable, please check the box corresponding to the scale of 1 to 5, where 1 is insignificant, *or not a reason*, and 5 is a very significant reason.

	1 Not Important	2 Somewhat	3 Moderately	4 Important	5 Very Important	N/A Not Applicable
Activity not eligible	☐	☐	☐	☐	☐	☐
Not interested in government funding	☐	☐	☐	☐	☐	☐
Unaware of program relevant to needs	☐	☐	☐	☐	☐	☐
Unsure of how to apply for relevant program	☐	☐	☐	☐	☐	☐
Too much time required for application process	☐	☐	☐	☐	☐	☐
No local contact for program delivery	☐	☐	☐	☐	☐	☐
Application process too complex	☐	☐	☐	☐	☐	☐
Unable to provide required matching funds	☐	☐	☐	☐	☐	☐
Do not need additional funding	☐	☐	☐	☐	☐	☐
Other: _____	☐	☐	☐	☐	☐	☐

(d) Optional Comments: _____

38. Education, Government and Other Research Institutions/Facilities Partnerships/Contracts

(a) For each facility listed below, please indicate:

	i. Did you attempt to Partner?		ii. Did you Partner?		iii. Was it Successful?	
	Yes	No	Yes	No	Yes	No
Memorial University and associated research institutions	☐	☐	☐	☐	☐	☐
Local colleges	☐	☐	☐	☐	☐	☐
Local government research institutions	☐	☐	☐	☐	☐	☐
University research institutions in other provinces	☐	☐	☐	☐	☐	☐
Government research institutions in other provinces	☐	☐	☐	☐	☐	☐
Research facilities outside Canada	☐	☐	☐	☐	☐	☐
Other: _____	☐	☐	☐	☐	☐	☐

(b) If you did not partner with or contract education, government or other research institutions/facilities in your innovation activities, please indicate the importance of the following factors in your decision.

Please check the box corresponding to the scale of 1 to 5 where 1 is not important and 5 is very important.

	Not important	Somewhat	Moderately	Important	Very Important	Not Applicable
	1	2	3	4	5	N/A
Not interested	☐	☐	☐	☐	☐	☐
Never considered it	☐	☐	☐	☐	☐	☐
Did not know how to access expertise	☐	☐	☐	☐	☐	☐
Unaware of what services/expertise are available	☐	☐	☐	☐	☐	☐
Skills/expertise my firm required are not available	☐	☐	☐	☐	☐	☐
Too expensive	☐	☐	☐	☐	☐	☐
Services could not be provided in time required	☐	☐	☐	☐	☐	☐
Other: _____	☐	☐	☐	☐	☐	☐

39. Commercialization of Research by Education, Government or Other Research Facilities

		Yes	No
(a)	Have you investigated or pursued opportunities to commercialize research created by education, government or other research institutions?	☐	☐
(b)	If yes to (a), have you entered into a commercialization agreement?	☐	☐
(c)	If yes to (b), was it successful? If no, why not? _____	☐	☐

		Yes	No
(d)	If you answered no to (a) or (b), please indicate whether or not the following reasons were important to you.		
	Not interested	☐	☐
	Never thought of it	☐	☐
	Do not know how	☐	☐
	Company has limited capacity to commercialize research (time, capital)	☐	☐
	Research institution not interested	☐	☐
	Intellectual property issues	☐	☐
	Research not amenable to commercialization	☐	☐
	Institution research not relevant to my company	☐	☐
	Other: _____	☐	☐

(e) Optional Comments: _____

SECTION IV: FUTURE EXPECTATIONS/INTENTIONS

40. In the next three years, it is expected that company:

	A. Employment Levels	B. Sales	C. Profits
Will Remain the same	☐	☐	☐
Will Decline	☐	☐	☐
Will Increase less than 10%	☐	☐	☐
Will Increase more than 10%	☐	☐	☐
Do not know	☐	☐	☐

41. In the next three years, my company's competitive position is expected to:

Remain Same	Decline	Improve	Do not know
☐	☐	☐	☐

		Yes	No	Don't know
42.	**Over the next three years, does your company intend to:**			
43.	Introduce new or improved goods or services to the market?	☐	☐	☐
44.	Introduce new or improved production or other internal processes?	☐	☐	☐
45.	Acquire or adapt new technology?	☐	☐	☐
46.	Invest in machinery and equipment?	☐	☐	☐
47.	Engage in research and development (R&D)?	☐	☐	☐
48.	Provide employee and/or management skills training?	☐	☐	☐
49.	Commence exporting?	☐	☐	☐
50.	Increase exporting?	☐	☐	☐
51.	Partner with other firms (e.g. joint ventures)?	☐	☐	☐
52.	Apply for government funding for innovation activities?	☐	☐	☐
53.	Partner with government or educational research institutions?	☐	☐	☐

54. What, in your opinion, are the most significant factors, positive and negative, affecting the future competitiveness of your firm?

_____

_____

_____

55. Please provide us with any additional comments you would like to share.

_____

_____

_____

_____

_____

_____

Thank you for taking the time to complete and return this survey.

Appendix B:
Methodology for Statistical Analysis

Statistical Analysis

Methodology

Step One – Establish a Statistical Relationship.

Cross tabulations were performed on the relevant responses to the survey in order to identify possible relationships between variables. The cross tabulation procedure forms two-way and multi-way tables that allows for a variety of tests to determine statistical association between the variables. The statistical test depends on the nature of the data. For example, with continuous data, relationships between variables can be identified by correlation analysis. However, the data produced from the survey was counts of categorical responses. The cross tabulation procedure allows for a Chi-Square test for homogeneity of proportions. Consider the following example where the relationship between firms that introduced new goods and services to market and those who apply for government funding for innovation purposes.

Past 3 Yrs - Intro. New Goods or Services * Government Funding – Cross tabulation

		Government Funding for Innovation		Total
		No	Yes	
Past 3 Yrs - Intro. New Goods or Services	No	53	17	70
	Yes	62	60	122
Total		115	77	192

The null hypothesis is that is that there is no difference in the two population proportions, that is, the proportion of yes responses is equal for each group. If indeed that is the case, then applying for government funding for innovation purposes makes no difference to those that introduce new goods and services. The test results are given in the following example and there is evidence that the proportions are different and that those who apply for government funding are more likely to introduce new goods and services.

Step Two: Identifying the Nature of the Relationship Using a Logistic Model

The likelihood of innovating is modeled as classification problem where the characteristics of those who innovate are separated from those who don't. The dependent variable is binary where yes to an innovator question is recorded as 1 and 0 with a no answer.

Chi-Squared Test for Homogeneity of Proportions

Observed Frequencies			
	Apply for Government Funding		
Introduce New Goods	C1	C2	Total
R1	53	17	70
R2	62	60	122
Total	115	77	192

Expected Frequencies			
	Apply for Government Funding		
Introduce New Goods	C1	C2	Total
R1	41.92708	28.07292	70
R2	73.07292	48.92708	122
Total	115	77	192

Data	
Level of Significance	0.05
Number of Rows	2
Number of Columns	2
Degrees of Freedom	1

Results	
Critical Value	3.841455
Chi-Square Test Statistic	11.47576
p-Value	0.000705
Reject the null hypothesis	

Expected frequency assumption is met.

A logistic model is used to model the binary decision of innovating. Consider the following:

$$\Pr(Y=1|Z)=\frac{e^{Z}}{1+e^{z}}$$

where Y =1 is yes to an innovator question and Z is a vector explanatory variables. The probability of innovating use can be written as:

$$\Pr(Innovating)=\frac{1}{1+e^{-z}}$$

The vector of explanatory variables (Z) are the variables identified in Step One above. The likelihood or odds of innovating can be calculated as the probability of innovating divided by the probability of not innovating. This approach allows for the calculation of the odds ratio that can be used measure how important the explanatory variables are to the innovation process. For example, the estimated odds ratio for the those firms that applied for government funding and introduced new goods and services to the market is 3.2. That is, firms that apply for government funding are 3.2 times more likely to introduce new goods and services than those firms who do not apply for government funding.

Appendix C:
Verbatim Responses

Appendix C-1

Question 24 (c): Reasons Firms Did Not Apply for Scientific Research & Experimental Development Tax Credit

Verbatim Responses: If you did not apply for the SR&ED tax credit, please indicate the reasons.
The process was too complicated and federal government personnel to aid were not available or accessible
Not aware
No information
Did not know about it
Type of research was information related and potential development is for new services, not product.
Not applicable
Don't know
No SRED attempted
Did not believe funding would be granted
Lack of qualified tax return preparers in area
Not aware of it
Have not applied yet. We have set up meetings with professional to complete application.
Was unaware of until now; research being done currently for 2002
Did not know about it
Not familiar with tax credit
Not applicable to our sector
Not seen as applicable
Do not apply
Not aware that it existed. If I were aware it existed would not have thought it applied to me
No need
Was not aware
Not aware of credit
Unaware of credit
Wasn't aware of it
Currently in the process of preparing an application
Lack of awareness
Still ongoing
1. I did not know about it. 2. ACOA idea of R&D seems to be focused on manufacturing, not knowledge capital improvement, as required in a consulting business
Unfamiliarity with application
Not applicable to the business
Only incorporated one year. Not yet in a position to submit
Not for profit corporation
Obtained general information from government of Canada. Advised by CA firm - company would not benefit from credit
Wrong side of the overpass
R&D is a new component in current fiscal year
Not aware of it
Process not fully developed yet
Was unaware of programs
Too much red tape, takes too long
Do not know what is available
Presently doing so
Already in government debt
Did not know there was a tax credit

Appendix C-2

Question 34: Factors Attributed to Improved Competitive Position

Verbatim Responses: If your company improved its competitive position, please describe the main factors you attribute this to.
It appears that banks are not interested doing business in (Newfoundland) and have neglected their responsibility to small business. If it wasn't for ACOA I don't think there would be any new business starts or innovation attempted in this province
New technology not available in Canada at the time
Better production process/technology.
Automation, new equipment
Started another processing facility in Nova Scotia thereby increasing volumes & market recognition.
Through proven experience
Patent protection opens market place
Advertising, web site
Increased production
Adopted new computer system/increased sales staff
Training and process improvements
Complete ISP (internet service provider)
ISO certification
Enhanced/improved technology
Good R&D and promotion of new products
Better service through continuous improvement and employee training
Maturing of industry and client base
R&D activities
Cost reduction and greater share of the market
Realization by the client that we offered a superior product
International J.V., technology improvement, superior of service offering
Lowered or maintained cost of input supplies by aggressive purchasing; introduced laser technology to firm and improved upon process currently available to market
We continue to expand our materials handling equipment and inventory in out to grow our business' market share
Alliances/corporate focus/reasonable cash flow
Manufacture (products) with best designs and lowest price on the island
Price (value)
Engineering skills, equipment purchases, etc.
Purchased (equipment) to make (products) compatible with world markets
More efficient printing and die cutting equipment with faster order processing
New retail sales office
Increased out-of-province work
Elimination of a competitor
The Internet
Increased marketing/positioning. Took a more targeted approach to strategies and improved equipment and processes of business
Higher level of skills, etc within organization. Networking - getting out there to show everyone your abilities
Better quality, lower prices, improved outlet
Increased production
Investment in equipment, improvement in production process, productivity improvements, QA programs
Greater effort to advertise by brochures, personal contacts
Specialized niche
Improved quality and delivery times

Product services
Alliances with other companies - expanded into contractual sales
Improved design of products manufactured
New processes and equipment
Marketing
Remaining focused on select service lines of business. Offering quality services. Identifying market needs and responding directly to them
Increased technology, increased equipment efficiency, decreased debt
Improve efficiency and marketing
Through highly skilled staff and marketing sales
Machinery
Bundling services
Controlled input costs
More and better technology to meet marketplace demands
Partnerships with international companies improved current product.
Made different changes to product to gain strength in wholesales market
Opened office in Nova Scotia
Customer service. Productivity
Most of our improved competitive position has been a result of the company's growth (size) as well as its growing list of clients
Track record of quality products and service
Lower rates
QC standards
Different (product) design
Provide comprehensive service, level of quality
1. By bringing in global experience, best practices/products into the province and training local personnel. 2. Training not just in the technical product, but in international modes of doing business/quality/customer care, etc.
Better product
New products
Added new technology/processes
More broad range scale of services. Complete packages
Overcame entry barriers/ built complex relationships
Proliferation of Internet, better understand by customers of benefit of outstanding
Expertise in specific fields
(Company) is a worldwide operation
Lobby efforts, marketing and sales activities, productivity measures
Partnering, joint ventures, marketing
Networking with clients
Internal efficiencies and promotion of services
Larger working facility, new equipment
By continued customer service
Opening an office in Halifax, NS.
ISO 9001: 1994 registration
Buying new equipment
Innovation, changing with demand
Purchase of new equipment to bring things under our control
Provides a quality product with on time delivery
Reducing cost through scale
Access to useful information, meeting with industry partners
By demonstrating the quality of our products

Branding, quality improvements
More professional management team, better communication with employees, improved process control and flow

Appendix C-3

Question 35: Government Policy or Regulatory Environment Barriers to Innovation

Verbatim Responses: Please expand on the importance of government policy or regulatory environment as a barrier to innovation in your firm.
Environmental regulations strict but not logical, hit and miss
Companies have to carry the cost of sending employees for three day training in health and safety despite the fact we have a clean record for 22 years. We have to pay for the courses, pay the employee and pay a person to cover
Policy/legislation weak or ad hoc / no enforcement unskilled enforcement at GSC
Regulatory environment demands may put small boat builders out of business
Lack of qualified consultants
Cost of each regulation
Hopeless in their dealings with industry - Husky, Terra Nova, Voisey's, etc. Labor - both unions and labor board
Government in Newfoundland is too damned fragmented and at cross purposes
Plain and simple, the main barrier is the prohibitive cost incurred to get goods to retail outlets
"Reluctant" government financial support
Government does not use its supply and service requirements to support local companies or innovation within province
Need government support to provide material that is usually dumped
Government policy not predictable/transparent - too much political interference in what could be a viable industry
Insufficient resources/funding available for aspiring entrepreneurs to access in a timely manner. The internal resources required apply/follow up on applications relative to the payoff - or resources access would make one question the worthiness of attempts to access these programs. Before you know the opportunity may be after closing or competitor in the US or other countries are likely to introduce it because the R&D resources are more-easily accessible
Government in Newfoundland and Labrador still not that business friendly
Lack of enforcement of safety requirements both federally and provincially
Lack of environmental regulations. Existing regulations are outdated

Appendix C-4

Question 35: Barriers to Innovation

Verbatim Responses: Please provide any additional comments regarding barriers to innovation in your firm.
Could you please look into exporting our products and services? (www.AttitudeNEWFOUNDLAND.com Inc.)
Red tape involved in any government application is enough to turn people off
A company cannot invest in innovation for growth provincially or to export, when all energy must be focused on protecting market share due to a lack of, or inconsistent enforcement of policies and legislation
Oceanic Consulting has not worked for our company. NRC/IMD would be better off doing their own tank testing as a research attitude is needed by companies like ourselves and not a profit oriented approach
Question is confusing
Government policy and interaction with big business is totally lacking. Government management of labor issues is totally lacking. Unions are the scourge of business
Private sector financing ex. Working capital. Interest rates. Too high rates, added expense for admin fee and registration fee

There not many regulations related to our sector to consider as far as barriers are covered
1. Expertise in apparel manufacturing in Newfoundland does not exist. 2. Cost to market outside Newfoundland is costly
Level of importance as a challenge? Complicated question, very difficult to answer and awkward wording
The consistency of demand is difficult to judge based on the fluctuation in the oil and gas industry
Not clear on all the details relating to R&D of new product
I think our industry environment in Newfoundland is pretty good if one wants to progress
Provincial government through its actions is not supportive of growth and success of the industry
This survey seems to be a means to checking if SME's are aware of how to access current government funding programs. Howe does ACOA define innovation? To me it is the introduction of new goods and services to a region. The barriers to introducing global knowledge based services into the region are the cost of bringing these technologies here and implementing them in local people, or sending those people to a "center of excellence" region to acquire the knowledge or gain appropriate experience to bring back here. Not necessarily developing something from scratch through R&D
Market conditions have slowed down and all projects on hold unless payback is substantial
Government personnel should have a "can do" approach and should be supportive of innovative approaches from clients

Appendix C-5
Question 36: Drivers of Innovation

Verbatim Responses: Please provide any additional drivers of innovation for your firm.
Available skills base
ISO certification (very expensive)
Employee job satisfaction
Competitive government

Appendix C-6
Question 36: Drivers of Innovation

Verbatim Responses: Please provide any additional comments regarding drivers of innovation for your firm.
New equipment in the coming months should improve quality, and production time
Market share is hard to achieve due to new companies and excessive amount of new courses being introduced in my field of work. Feel the market is over populated and government is cheating many
We have just completed R&D portion of prototype development and REMMS process. We are finding it very difficult to obtain funds (loans) to complete prototype to Sea Trials (outfitting and powering). BDB cannot help us (not within their mandate) and other sources of funding may not meet with success either. With company putting in 1/2+ of project costs there should be a lending source for a company with 24 yrs of operation. Company is expanding into tool manufacture (molds) as well as high performance composite vessels
Not planning to introduce new goods
Again, no trained workforce. No expertise in Newfoundland for apparel
Small light scale manufacturing companies have problems in local market competing with mainland companies
We meet and in most cases exceed regulations and standards
Like all surveys that try to capture an encyclopedia in a "simple" table, the above is a disaster!
1. Once again the focus here is on manufacturing of goods not the delivery of services. 2. I don't consider the above to be common drivers to introduce new or improved goods/services/processes. They are just elements of running a stable manufacturing business. 3. I suggest, if ACOA wants to know what the real drivers to innovation are, they should engage SME's in a focus group setting and ask, as opposed to rating factors which in many ways, do not reflect the issues faced by SMEs

The government should assist in funding for bilingual translations for packaging to meet Industry Canada regulations. These translations are a major roadblock to our company expanding our product line and areas of Canada our products are sold to. Industry Canada has threatened seizure of product that does not meet regulations - we have the letters to prove this, yet some products imported from southeast Asia have no French labeling. This provides foreign companies with a competitive advantage
We are constantly improving. We are Kosher certified undergoing ISO 9002 and HACCP
With the exception of one piece of machinery, all our equipment is quite old (30+ yrs)

Appendix C-7

Question 37 (b): Government Funding Programs Firms Applied for to Support Innovation-Related Activities.

Verbatim Responses: Please list other program(s) for which you applied for government funding.
Funding for exporting our products and services
Additions to tourism. Site developed first stage 1999 by private enterprise
This process is bull ()! When I apply for a loan, it's because I have no more money to invest. My assets should be my portion, not my money
Very unorganized funding program - am launching an official complaint
NRC's - T/E, ACOA-BDP,ACOA-CEDA,ACOA-CAS
Advertising. ACOA - expansion - repayable loan - no interest) IRAP - research, development, problem-solving

Appendix C-8

Question 37 (c): Reasons for Not Applying for Government Assistance.

Verbatim Responses: Please provide any additional reasons for not applying for government assistance or any challenges encountered in applying.
Poor economic environment

Appendix C-9

Question 37 (d): Government Funding to Support Innovation-Related Activities.

Verbatim Responses: Please provide any additional comments regarding your firm's government funding experience(s).
Have not applied for government assistance but is planning to
There isn't an area that we seem to fit for funding
We have received NRC assistance to acquire transfer of new technology
Our multimedia division is state of the art. The products being developed here in Newfoundland and Labrador could be exported to other locations and markets
Tried to get funding to assist in pay for training employees
The commitment of time, effort, and conditions are not worth funding. The perception is that if you are successful then you don't need funding only the desperate and least likely will acquire funding
Previous experience showed that funding would take much too long to get innovation to implementation
Very satisfied with all the assistance required from ACOA and IRAP. We were turned down for skill development by HRDC when the need arose (have not been assisted in the 24 yrs of operating). We lost key employee because of this rejection and our project had to slow down and jump yet another road block
Currently engaged in activities (for last 3 yrs) for which we would seek government assistance
Funding applied for under DETC program but was not eligible. It should have been! Government (especially provincial) has no idea what development is, the needs and how to approach it!
TWS training and skill development by HRDC market development plan - ITRD

Government funding is not the problem or the panacea. Lower levels of taxation by region including federal taxation should allow successful companies to create jobs throughout Newfoundland. Grant chases are not successful in the end.
Have sent proposals to government funding agencies, only to find out we do not qualify because we are private enterprises. Where do long term sustainable jobs come from if not private enterprise?
Leave us alone. Stop funding competitors
We are very interested in government support in this area and it will make a major impact on the decision to invest. The timing in the last 3 yrs was not suitable but we would be very interested in these initiatives in the next 1-3 yrs
One big advantage to SME's is in cost and operations control. There should be some effort towards improving market practice
ACOA no interest loan
Government funding not applicable
Was never presented with the 'package' or the option, on the other hand, made no effort to go seek it out!
Can small companies get any grants from government with no payback
Government funding difficult to access - if you have a successful company trying to expand. Very necessary to know the right people
No plans to expand in the past three years. Did not want to borrow more!
There should be a more relaxed method of small businesses to access funds and investment monies. Small business cannot develop and export markets without assistance especially with a low dollar value when traveling to develop new opportunities
Government funding available to those who have certain government officials on their side or belong to the right side of the overpass
Government assistance is mostly directed to areas outside of metro St. John's area
All companies should have equal access to the same funding. I am sick and tired of competing with people who are funded by the government, who only last long enough to spend the free money and not provide customer service, making it harder to serve customers
Turn around time too long. Changing personnel - time lag to come up to speed
Already owes too much government money in loans and back taxes and increased worker's compensation (can't cope)
No funding in last 3 years

Appendix C-10

Question 38 (a): Partnerships with Education, Government, and Other Research Institutions

Verbatim Responses: Please list other facilities you partnered with or attempted to partner with.
ACOA/competition regulations not fair
Private company - Oceanic Consulting taking the place of NRC/IMD - for-profit without R&D attitude
Government departments with research capacity/capabilities
International organizations
None available for my type of business.
NRC
IRAP – MUN

Appendix C-11

Question 38 (b): Reasons for Not Partnering with Education, Government, or Other Research Institutions in Innovation Activities

Verbatim Responses: Please indicate any other reasons for not partnering or contracting with education, government or other research institutions.
Process too time consuming and slow
No follow through - talk only
Would have if business had got off the ground
Business too small
No requirement
No opportunity - project
Did not need their specialization
Don't need R&D to be innovative
Using resources just to stay afloat
These institutions do not possess leading-edge skill required for our business applications

Appendix C-12

Question 39 (c): Reasons Why Commercialization of Research by Education, Government or Other Research Facilities Was Not Successful

Verbatim Responses: If your firm entered into a commercialization agreement that was not successful, indicate why.
To date, no commercial sales
Not ready yet.
Business too small
Government didn't approve for ice machine for quality control program.
But it is ongoing process
Did not need it
Don't know what this means
Not complete in terms of regulatory approval.
Not relevant
As of March 11, 2002, the agent responsible has not prepared the agreement which was due Jan. 1, 2002.
Was not aware

Appendix C-13

Question 39 (d): Reasons for Not Investigating or Pursuing Opportunities to Commercialize Research by Education, Government or Other Research Facilities

Verbatim Responses: Please indicate any other reasons for not entering into a commercialization agreement(s) with education, government or other research facilities.
Do not know much about this commercialization
Business to small
Never identified suitable areas.
It's necessary to have

Appendix C-14

Question 39 (e): Commercialization of Research by Education, Government or Other Research Facilities

Verbatim Responses: Please provide any other comments regarding your firm's experience(s) with commercialization agreements with education, government or other research facilities.
Not an area that warrants much activity for us
Left it to university to commercialize if they desire
Most of R&D had to take place "in house"
Have not reached the point yet
Professors seem to commercialize themselves as evidenced by the professor who has an economic consulting company on the side doing this survey
Appeared government support/programs to other companies that through time frame of company and previous monies granted should be able to financially support themselves. Everything in (--) has been our own money and is no government money approved to give us quality assurance (and other nearby plants) for primary product. Very important for mussel processing.
Too much money and time and paperwork

Appendix C-15

Question 54: Factors Affecting the Future Competitiveness of Your Firm

Verbatim Responses: What are the most significant factors, positive and negative, affecting the future competitiveness of your firm?
Lack of banking services - capital funding in non-existent. Foreign expatriates making purchase and contract decisions in favor of non-resident firms supported by Newfoundlanders in employ, lack of sustainable O&G industry, lack of development in all industry
Maintaining a high standard product for clients
Ability to understand resource and market issues
Good marketing, effective raw material cost control production processes. Negative - cheaper products lesser quality on market hard to compete in Newfoundland
More competition, easier because of automation for new business to start
Local labor costs, transportation costs
Market for export potential
Access to funding for capital expansion
Development of the oil and gas industry. Availability of technology to transfer/export.
Being able to market and sell our product
Moving into marketplace at a high price. Patent protects but does not guarantee price will be acceptable
Being a private company competing with public companies is difficult while still trying to keep up with technology
The economy and government spending
Additional equipment and new marketing strategies
Construction of new premises to allow for new products and increased market share. Streamlining of operation. Negative - not being able to accomplish above
Increased market size to distribute cost of overhead across
State of Newfoundland economy. Number of new entrants to industry. Quality improvement of goods provided. Employee retention. Government and corporate spending on promotional items.
Our ability to respond to many challenges. That we expect to in the oil and gas industry
Offshore oil development in Newfoundland. Voisey's Bay development. Strength of fisheries.
Marketing
Lack of time/resources to deal with expansion, introduction of new services, customer service quality and internal processes. Lack of funding available for new ideas
Human resources

Length of time getting product to market (product currently under development). Costs of development. Finding qualified resources in the IT sector in this province
Maintain current management innovativeness
It's like the fishery, it's getting to be too many people trying to get a limited amount of business. It Has tripled in the last six to eight years
Having ISO standards in place; amount of work available in province
Pricing, out of province competitors, raw material cost, labour shortage
Technology developments that are competitive to existing practice employee training and skill improvement
Government funding not equally distributed should reduce taxes across the board for an equal playing field and let industry compete fairly and equally
Internal drive and ambition - may need some government support to meet all the hurdles.
Level playing in local economy
Continued growth of the oil and gas industry in Newfoundland
R&D, marketing, access to funding
Cost reduction, demand
Freight costs
Availability of support service
+ whether our new product will sell. - competition from mainland companies
Ever-changing needs of our clients
Skills shortage
Value of Canadian dollar vs. US dollar (cost of consumable supplies, equipment). Further fragmentation of market by new entrants. Our willingness to expand into new export markets by doing the necessary R&D
Cash flow
Maintaining profit level in small market
Marketing, unskilled labor
Time needed to start up a new business requires so much financial commitment and risk to individuals that the payoff is not always enough
Cost of certification/workers compensation/insurance
Getting Newfoundlanders to use manufactured right here products over products imported from outside the province
Freight cost whether via ocean or over the road. The cost of fuel has escalated increases to freight costs by over 25% in the last 3 years which makes it difficult to compete in exporting markets
Monopolization of all government business by X-Wave. Government is killing the IT sector by signing long term contracts rather then tendering in small packets for their IT requirements
1. Increased level of business activity in area generally. 2. Companies willing to consider non-traditional approaches to management
Shift in population from outports to Avalon area or to the mainland
The amount of development available from offshore oil and gas, mining (Voisey's Bay), and the lower Churchill. Government failures to get the developments going with local benefits
Price cutting by competition. Black market sales, underground economy. New government regulation on related to health and safety, worker's comp, etc. Environmental regulations
The ever increasing cost of Workers Compensation and without reviewing the impact on companies. A positive note would be to have an institution in place to benefit both employees and companies
Government policy. Unfair competition from government and university. Government procurement procedures. Economic climate
Reliability, competitive
Availability of product. Criteria relaxed small business can access funding from government programs
Increasing materials cost. Increasing globalization of suppliers and competitors and increased difficulty communicating with them and governments are subsidizing them
Maintaining competitive pricing. Increased innovation and lack of resource to harness innovation can/will greatly affect our company's competitive future. We must be ahead of this wave and thus proactive on our business approaches
The ability to establish and maintain markets, to put effective quality control and procedures in place and to move outside Newfoundland markets
Growing market, exposure and awareness have increased for our firm. Negative: all large government tenders continue to be sent to firms outside the province

Dedication of the Newfoundland aquaculture Industry Association members, realization of government officials (federal) of the importance of increased aquaculture ventures in Newfoundland played in job creation and increased revenue
World marketplace (economy)
Quality, productivity, pricing (sales)
Receiving capital assistance to market unique products (i.e. Hand-carved signs with gold leaf, wall murals for tourism promotion
What the market will pay for products vs. what production cost will be
Efficient purchasing of required inputs, purchase of efficient production equipment and improved internal production systems
Skilled employees
Marketing strategies, quality in products and service, employee skills training, advertising and customer relations
1. Marketing. 2. Training workers for quality. 3. Finances to continue
Keeping current with technology in short term and anticipation in the long term
Financing growth. Marketing and sales force
Competition with large(r) fully-integrated management consulting firms from outside the province - negative in terms of their access to more resources than a small local company; positive in terms of pricing and ability to respond to immediate, local market needs requiring local expertise, etc.
Continues research and development activities - positive. Bureaucracy and 'can't do it' attitude in government
The inconsistency in the market is the largest deterrent to growth and investment. We need more investment in our oil and gas industry through exploration and production to drive the service sector forward
Employee training. (invested $900000 in new machinery over last two years)
Marketing our products must get funding to advertise our products to other areas of the province
Strength of the market for our services offshore Newfoundland
High end projects
High transportation costs
Rising cost especially in transportation sector
Freight and transportation. Labor costs
Too much competition in small market. Well established, low debt load, hopefully this will help. Good reputation
Offshore and mining development, road construction saving, fishing, shipping, commercial and residential development
Changing technology is forcing our company to purchase new equipment faster, causing an erosion of ready cash
Negative: major underground competition (CBN area)
Amount of sales. Volume to support hiring of new employees. Being able to take advantage of any support programs offered by government
Decreasing customer base due to declining population
Marketing, product delivery to market place. Mainland companies
A small business in a closed market with a limited customer base
Cost wars
Access to funding
Market conditions and willingness of government and partners with businesses for growth.
Lack of raw material
The fish quotas for Canada limit potential investment in processing equipment
1. Difficult to balance costs of R&D, training, etc with revenues. 2. Provincial government stumbling block to growth through its actions. 3. Location issues - air travel/airline industry killing competitiveness through cost as well as inconvenience
Lack of trained personnel. Cost of transportation of goods (coming and going)
Scientific research needed
Smaller companies with lower rates
1. Time.

2. Maintaining an adequate and varied inventory. 3. Getting my product into the local (Newfoundland/Lab) retail marketplace. 4. Size and equipped nature of production plant (i.e. my garage). 5. Cost of raw and component materials. 6. Markup (surcharge) added by retail outlets makes the sale of quality item very prohibitive. The non-discerning consumer (buyer) would rather purchase a lower quality item (trash) at a cheaper price. I can't sell my stuff for such a low price!
Marketing
Lack of support and knowledge from government concerning financial aid to pursue new ideas and products also the hassle in obtaining those funds
Economic climate in Newfoundland
Positive: access to global best practice. Negative: Lack of local sales opportunity in Newfoundland influenced by uncompetitive government failing to attract inward investment. (may be more productive to move businesses to Alberta or Ontario)
Internet, economic conditions, procurement policies of government, new manufacturing technologies, competition from multinationals (which benefit from lion's share of government procurement)
Getting enough money to get business off the ground
Cooperation with government, partnering with government, time it takes government to process applications
Affordable financing to provide the required facilities and equipment and to stay abreast to rapidly changing technology
Availability of local raw material
Government policy and regulatory interference. Industry not operated as business, but more like huge social program
Local offshore activity
Access to capital - debt/equity in a timely manner - access to skilled, trained work force. An entrepreneurial environment in Newfoundland - less barriers erected by government
Canadian $ (stay low)
Positive: higher demand for product, better economic climate. Negative: shortage of skilled people
Competition with international companies now in Newfoundland. The decline in the oil and gas industry. Geographic location and prejudices
Obtaining assistance to develop the R&D and steer it in the direction required
Cost of transportation of raw materials and finished goods
Funding required for biotech R&D and product development. Speedy approval through regulatory stages
The price of paper which in Newfoundland influences the production at the Newfoundland peppermill and in turn affects our production and sales locally
Ability to secure sufficient raw material. Ability to market products effectively
Bank financing; Government interferes in the marketplace
No skilled people
1. Ability to respond quickly to customer needs and incorporate leading-edge software technologies and stay fast, lean and flexible. 2. Ability to secure partners for marketing, distribution
Access to skilled labor. Economic environment especially natural resource sectors
People entering the safety field that are not competent. Government has not set standards for safety consulting services, e.g. Does not require persons to be Canadian __Safety Professionals.
market growth
In the IT field things happen fast. We have been trying for more than 12 months to get funding lined up for a project. At one time it was a go and then it wasn't, and then the funding agency wanted more research. At the same time, our competition did more than $2.5 million in sales in the very same market that ACOA is questioning. Go figure. (we have already come up against this competitor and beat them in RFP for cities in the US) Our problem is we need to now enhance our product and get it to market. First go at it, we build a product but didn't have resources to get it to market, thus slow sales
People opting for lower cost product consequently, in some instances, jobs being performed by unskilled laborers
The mindset of people in my area to buy local
Sufficient capital to acquire large scale computing resources is the #1 factor affecting growth and competitiveness. This is true for many Atlantic (especially Newfoundland) companies
Competition from foreign companies and from research institutions in some areas (research inst. being

contracted directly by foreign companies). Offshore oil and gas environment (exploration and production expansion)
The ability to export and increase sales in the US. The trucking logistics with regards to shipping frozen food to the US from Newfoundland requires further research. Is there a demand in this type of business??
1. Labor cost 2. Government forces on health and safety, etc, inspect, etc.
The ability to provide products into the marketplace on time
Our ability to change with the times
Negative: Tax, all levels of Government from municipal to federal. Training costs for new employees. Freight costs. Worker's compensation costs. Positive: when employees are trained they are stable
POSITIVE: quality product. NEGATIVE: competing with government funded competition.
Cost of doing business, scale of operation
1. Inability to have a level playing field with USA, EU. 2. Innovative ideas are here we can create but we need regulations that are friendly and access to funding
We do manufacture a good hardwood and larch product of native wood. For the past 12 months we have been catching up on back bills and paying current bills
Lowering cost/unit labor, increase production, establish international markets
Skilled labor
Well-skilled employees
The fishery and its decline. The cost, time associated with advertising
Steady work and projects in Newfoundland and Lab.
Lack of Government support local/regional business. Lack of Government regulations
Access and affordability of technology. Access to right skills

Appendix C-16
Question 55: Additional Comments

Verbatim Responses: Please provide any additional comments you would like to share.
Local growth is stymied in that market place is too small and controlled by too few. New opportunities are virtually non-existent. To be successful you have to be resourceful to expand naturally and to look outside for opportunities. For large scale projects labour attitude has to improve, Ottawa has to be more equitable and the provincial government has got to get off its ass or the last Newfoundlander left can off the lights when they move to Canada!!
We have had good experience with ACOA/HRDC but the processes are extremely fragile. Guidelines extremely cumbersome for small companies. Accessing marketing human resources is essential but financially impossible to obtain for a small firm. More assistance in these areas is needed. Call me for more:
Municipal, provincial and federal governments are among our major clients, however, efforts to apply tendering policies to professional services has led to lower profit margins, poorer quality assurance and increased threat of liability
We have a decline in the fisher, and now the College of the North Atlantic is offering courses in Hydraulics that I tried to get fifteen years ago. People with basic hydraulics are, notice taking work away from some of the company that are just trying the service. Too many of one thing is not good for the industry. No one seems to know what's going on
Our company mostly provides services not goods to the oil and gas industry
ACOA and ACOA/CEDA most helpful
Thank me by paying me. My time is worth something
We are exporting fish products and berries. We have no production on own.
We need to get out of the dory!
We need a forum for long term economic development in the province. The provincial government does not understand what this is and is not interested in finding out. I could write a book on the subject. There is no long term sustainable plan for the province. We have no leadership and no direction!
More thought into helping small business which do succeed instead of larger companies which has the time to invest into programs that are of no benefit to us, which would be good if we could take time to spend on applying and all the leg work required before qualifying for certain programs
There should be some sort of assistance for those willing to risk everything and start a new business in

Newfoundland. It is difficult to expect owners of companies to work 3-5 yrs without any income. This is more so for any research/prototype innovative business
We need to be more focused on marketing. Newfoundland is lacking in all sectors of marketing. When we do secondary processing of our resources the marketing is weak. If we don't do secondary processing of our resources the market is strong for raw material. We have to work on it.
Industry Canada and ACOA would have far greater impact by disappearing and then taking the savings and lowering taxation in our region
Almost exactly one month ago to the day that I am completing this survey, I ceased operations and accepted a salaried position
Lack of exploration in the offshore and mining sectors. The negative union attitudes and resulting low productivities it produces. To be an employer is to be a target. We owe people their living
I started to complete this survey and suddenly I said what am I thinking. The story I am telling is in the past. I have been put out of business through no fault of my own. If you want to know more, contact Ron Callahan, Newfoundland Aggregates (1991) Ltd. 709-647-3500
Too much of this survey is repetition
Generally survey is N/A to us but we've filled it out as best we could
We are only a small operation and need aid finding funding for market research and proper business plan development
Small businesses are not helped, they are victims of community taxes, government non-paying workloads (HST) and governments desire to always buy at the lowest price. The cost of advertising prohibits growth in small business
Sept 11 hurt - we're now fighting back!
Next time do it using internet
Questionnaire is more applicable to R&D and manufacturing sector, we are sales/service company but are always interested in new technologies we can apply
When an industry is started and educational institutions in Newfoundland do not train students for this type of manufacturing then government programs should be for these companies: a company may train a sewing machine operator but the operator may not want to do that skill after training. HRDC does not provide companies an __ program. When this happens the next untrained person who comes into the company has then to cost company to train. The time cost to company makes company not competitive because of timing to train
Overall, my reaction to this survey was its length/number of questions asked - perhaps too long, detailed (responses will tell)
We feel we have a new line of products ready for Atlantic Canada, with prototypes sitting in our shop, but can't get government assistance to help us do marketing
We are a subsidiary of an international corporation and have access to significant capital if opportunity arises. We have made use of Memorial University and College of the North Atlantic for several R&D and training functions when opportunities existed and we will again in the future
As above. Larger volume and improvements in above sectors
If businesses in this area are going to strive and survive something has to be done about people collecting EI and welfare taking work away from the legitimate companies. It's not only in our industry. Seems nothing is being done and the people involved are doing it out in the open without a care of getting caught because no one is looking. The way I look at it is that the government is in competition with us for providing the money to these people!
We are a family one man business - semi-retired, the proprietor working part time for severe health reasons. We employ contract labor occasionally, according to workload. We are not computerized and have no plans for innovation or expansion. Nevertheless we offer unique metalsmith services (and equipment) to Labrador, and have very little competition
Survey should be online and shorter!
It amazes and disgusts me to know that with so much unemployment in our area, there are so few who are honestly willing to work for anything besides "stamps" (a few weeks of work). When the required 'time' is up, productivity, availability, and interest soon fades
Government barriers with regard to EI programs. Government barriers with regards to self-employment, producing seasonal products
Government funding is inadequate. Job creation programs should be stronger. Lacking skills and knowledge for high tech internet initiative. From government - no support
We are very interested in innovation and are well positioned in terms of our ability to innovate. Issues around our governments lack of support to the industry in terms of offering companies a fair and competitive process to earn contracts and at reasonable rates are a significant impediment and forces companies to be dependent on grants and loans in order to innovate versus investment of earned revenues. Furthermore, the problems in

the airline industry and its poor service/high costs and complete absence of competition is killing the export service business and making other locations more attractive to generate the growth and revenues in order to fund innovation and success
Too long, not relevant
What SMEs do not usually need to innovate: 1. loans 2. Machinery 3. Institutional R&D. What SMEs do usually need to innovate: 1. local opportunities to get started 2. Access to market information 3. Available resource pool 4. Access to global best practices/technology
Studies demonstrate that small business accounts for a large portion of all new innovations; despite this fact, government (especially Newfoundland) is more preoccupied with - and directs most of its support to - large scale business. Current government policy in Newfoundland virtually ensures that we will become a province dominated by Wal-Marts, Price Clubs, Future Shops and Staples. These companies benefit from hidden government subsidies, government procurement and anti-competitive practices (which go unchallenged). Smaller local companies lack adequate profits on which to base innovation efforts or are totally dependent on government grants to do so
After 6 years trying to get a business going there are still 2 problems - not enough money to get the business going then and now, and no support from the retail sector where we sell our made in Newfoundland products
It appears the organizations with friends in the higher brackets of government advance much quicker than those who battle all the elements on their own
Native people control our supply of raw material and it is difficult to obtain good quality material to supply our requirements
Newfoundland is not a climate conducive to innovation/new venture creation. Access to the lifeblood-capital is limited - slow at best when available. To attract private investment to develop/commercialize the innovative elements requires a more helpful/responsive approach attitude from Government depts./agencies. When it takes 6-12 months to have a decision on an application - companies will either give up/move or die waiting for the capital. Additional, the resources required to access existing programs for capital in the time lines commonly occurring, result in internal resources being directed at monitoring/ follow up to these programs and away from innovation
Government and Government institutions like the College of the North Atlantic need to become more business friendly. More understanding of the importance of business to process necessary
Considering relocating to Nova Scotia
Obtaining Government funding and assistance is like pulling teeth, a difficult and painful process. Agencies should provide more assistance in helping small business develop their ideas
When our production is slowed down at this location due to downtime at one of the Newfoundland papermills we try to produce and ship to our Moncton location thus allowing us to continue producing product and avoiding downtime
I found parts of this survey confusing. My company is small and caters to a local niche market. We are somewhat limited by supply of raw material and are therefore hesitant to seek new markets that we may not be able to supply
Very hard to get training funds as no schools or colleges or university can supply the training I need
Government insistence to dump money into rural Newfoundland, while ignoring the larger centres. You're not going to stay in rural Newfoundland. So in order to keep them in the province larger centres must be developed to provide employment and leisure facilities. If we do not provide an environment for youth they will leave
The Government should smarten up and stop funding fly-by-night operations whose main aim is to see how much money can be sucked fro the Government and spent on other things or the same should be there for everyone
1. More trained Government personnel in funding agencies. People who are knowledgeable or willing to. 2. Level playing field i.e. EU, USA have subsidies of 45% we need creative funding to help Newfoundland (and Canada) businesses to be innovative and good funding to reach global markets
What it boils down to for a small, professional company like ours is that we do not have time to spare from __ cash flow to dedicate to proposal development for R&D $
Our biggest drawback is trying to catch up with Government back taxes, workers comp
We are a new company, still lots to learn. There's obviously lots to know

IRAP provided us with 1.2 the cost of a trip to Toronto to Humber College. Problem solving with castings and new technologies back in October 1996

Appendix C-17
Additional Comments

Verbatim Responses: Comments outside of questions.
I have a home based business with sales of between $12000 and $15000. No real employees so most of this would not apply to me. I notice in your location of business, there is no "south coast Burin Peninsula"
Most important need for small business: skills and funds for marketing

Appendix D:
Business Survey – Number of Responses by Question

Q1. Location of business:

St. John's Metropolitan Area	116
Other Avalon	24
Eastern Newfoundland	12
Central Newfoundland	24
Western/Northern Newfoundland	22
Labrador	5
Missing	11

Q2. Years in operation:

Less than 1 year	3
1 to 3 years	25
4 to 5 years	31
6 to 10 years	32
More than 10 years	121
Missing	3

Q3. Number of employees:

1 to 4	54
5 to 9	52
10 to 19	42
20 to 49	38
50 to 99	12
100 +	12
Missing	4

Q4. Over the last three years, employment levels have:

Remained the same	85
Declined	24
Increased less than 10%	35
Increased more than 10%	68
Missing	3

Q5. In what industry do you operate?

Agriculture and related	3
Forestry and related	4
Fishing and related	21
Mining and related	2
Oil and gas and related	25
Construction	13
Manufacturing	
Food, beverage or tobacco production	9
Textiles & textile mill production	1
Clothing manufacturing	4
Leather & allied products	
Wood & paper products	7
Printing services	9
Petroleum & coal products	
Chemical manufacturing	
Plastics & rubber products	5
Non-metallic mineral products	
Primary metal manufacturing	1
Fabricated metal products	8
Machinery manufacturing	2
Computer & electronic products mfg.	4
Electrical equipment & appliances	
Transport equipment manufacturing (including boat building	4
Furniture & retail products	6
Other manufacturing	14
Wholesale trade	7
Retail trade	7
Transportation and warehousing	2

Information and cultural industries	
Book & software publishing	3
Motion picture & sound recording	1
Radio/TV/Internet publishing & broadcasting	1
Telecommunications – satellite, wireless	1
Internet service providers, data processing	
Other information services	9
Finance and insurance	1
Real estate and rental leasing	4
Professional, scientific & Technical services	
Legal, accounting, architectural	1
Engineering, geophysical survey & mapping	1
Industrial & computer systems design	1
Management, scientific & technical consulting	8
Scientific research and development	
Management of companies and enterprises	2
Administrative and support	2
Waste management & remediation services	2
Educational services	3
Health care and social assistance	1
Arts, entertainment & recreation	1
Accommodation and food services	7
Other service industry	8

Q6. Please indicate your highest level of formal education:

High school	38
University or college	116
Professional designation	26
Post graduate studies/PhD	28
Missing	6

Q7. Please indicate the percentage of your (normal) annual sales by territory:

Percentage of Sales	Newfoundland and Labrador	Rest of Canada	United States	Other Countries
0%	8	35	61	61
1-5%	15	30	11	24
6-10%	5	18	10	3
11-20%	7	14	6	7
21-30%	3	13	6	6
31-40%	4	8	4	1
41-50%	7	7	6	5
51-60%	6	3	2	2
61-70%	3	3	4	0
71-80%	15	3	1	0
81-90%	20	1	2	3
91-100%	104	3	2	4
Missing	18	77	100	99

Q8. Over the last three years, sales have:

Remained the same	46
Declined	30
Increased less than 10%	29
Increased more than 10%	99
Missing	10

Q9. Over the last three years, profits have:

Remained the same	67
Declined	48
Increased less than 10%	36
Increased more than 10%	51
Missing	13

Q10. . Does your company:

	Yes	No	Missing
Use e-mail	187	24	4
Have access to the Internet	192	18	5
Have high-speed access	126	64	25
Have a web page	133	59	23
Purchase on-line	68	108	38
Sell on-line	38	133	43
Do market research on-line	110	77	28

Over the past three years, has your company:

	Innovative Activities	Yes	No	Missing
Q11.	Introduced new goods or services to the market?	132	76	7
Q12.	Introduced significantly improved goods or services to the market?	112	83	19
Q13.	Discontinued selling any goods or services?	48	152	13
Q14.	Introduced new or improved production processes?	104	94	17
Q15.	Introduced other new or improved internal processes? (planning, logistics, marketing etc.)	124	80	11
Q16.	Benefited from innovative solutions offered by employees?	110	94	11
Q17.	Used incentives to encourage employee innovation?	90	113	12
Q18.	Provided employee skills training?	158	48	9
Q19.	Provided management skills training?	113	92	10
Q20.	Acquired machinery, equipment or technologies?	163	40	12
Q21.	Adapted existing technologies to:			
	(a) Provide a new good or service to market?	115	86	14
	(b) Improve internal processes?	144	53	18
Q22.	Engaged in research and development (R&D)?	87	104	24
Q23.	Obtained external R&D funding?	39	72	104
Q24.	(a) Applied for *the Scientific Research & Experimental Development* tax credit?	39	157	19
	(b) If yes, was the application successful?	28	27	160
Q25.	(a) Applied for a patent? Or,	9	188	18
	(b) Otherwise acted to protect intellectual property?	39	135	41
Q26.	Used continuous improvement or other quality assurance programs?	116	86	13
Q27.	Benchmarked performance (i.e. compared to industry performance)?	78	120	17
Q28.	Monitored customer satisfaction levels?	153	48	14
Q29.	Commenced exporting?	52	147	16
Q30.	Increased exporting?	61	139	15
Q31.	Engaged in joint ventures with local companies?	61	142	12
Q32.	Engaged in joint ventures with international companies?	59	145	11
Q33.	Participated in industry association activities?	148	56	11
Q34.	Improved its competitive position?	118	74	23

Q35. Please indicate the importance of each of the following barriers/challenges to innovation to your company:

Barriers/Challenges	Not important	Somewhat important	Moderately important	Important	Very important	Not applicable	Missing
Costs of research and development	15	18	15	47	89	16	15
Costs of design and engineering	17	13	26	47	70	25	17
Costs of production investment (for good or service)	11	12	25	52	81	16	18
Costs of marketing/commercialization of new/improved good/service	8	10	26	51	95	10	15
Overall costs relative to expected payback	7	8	19	52	103	9	17
Difficult to obtain private sector financing	28	25	24	37	54	27	20
Difficult to obtain government funding	21	19	28	48	59	18	22
Lack of relevant scientific or technical information	42	33	37	32	19	36	16
Difficult to obtain necessary technology	50	35	26	34	20	32	18
Lack of technical support from suppliers	49	41	35	33	14	24	19
Limited internal research or technical support skills	42	40	33	33	28	23	16
Limited internal management skills	48	43	30	35	19	22	18
Problems in adapting marketing function	35	35	37	35	26	28	19
Difficulties in predicting demand	27	15	41	52	48	13	19
Lack of awareness of available expertise at research institutions	47	28	32	32	22	36	18
No available expertise at research institutions	54	35	29	26	12	43	16
Difficult to obtain support from research institutions	55	30	29	24	17	41	19
Difficult to network/partner with other local firms	64	31	31	22	18	31	18
Difficult to network/partner with firms from out of province	58	25	40	19	23	30	20
Lack of time to generate ideas and take them forward	31	17	44	37	55	13	18
No need to because no competitive pressure	48	21	32	21	15	51	27
Not interested	69	17	19	11	11	54	34
Lack of government (non-financial) supports	30	21	28	28	38	23	46
Not required by government environmental regulations/enforcement	45	16	36	19	20	49	30
Government policy or regulatory environment	37	17	23	19	37	42	40

Q36. Please indicate the importance and satisfaction of each of the following drivers of innovation to your firm:

	Importance of Driver to Innovation							Satisfaction with Impact Upon Firm						
Drivers	**Not important**	**Somewhat important**	**Moderately important**	**Important**	**Very important**	**Not applicable**	**Missing**	**Very dissatisfied**	**Dissatisfied**	**Neutral**	**Satisfied**	**Very satisfied**	**Not applicable**	**Missing**
Reduce cost of labour	19	24	15	38	88	11	20	2	3	37	47	14	20	92
Improve material handling	16	18	17	43	62	35	24	4	23	45	14	1	29	98
Increase production capacity	18	13	13	36	81	32	22	1	6	24	39	18	29	98
Reduce production time	13	14	13	27	97	28	23	0	10	27	38	15	26	99
Improve production flexibility	10	13	24	45	68	30	25	0	7	32	40	10	25	101
Open new markets	3	9	12	39	118	12	22	1	23	23	41	18	13	96
Maintain market share	3	5	9	42	116	15	25	0	11	29	42	20	13	100
Increase market share	2	5	11	33	125	15	24	1	17	28	34	20	15	100
Respond to changing market demands	4	5	12	47	111	11	25	1	11	26	45	16	14	102
Respond to changing supplier capabilities	15	13	28	47	57	29	26	5	28	34	12	30	109	106
Increase delivery speed of goods/services to market	9	12	19	49	73	26	27	12	29	38	9	23	111	104
Improve quality of goods or services	5	5	12	44	115	11	23	7	20	55	23	12	117	98
Reduce environmental impacts	13	16	27	40	52	41	26	1	0	28	27	14	38	107
Meet regulations or standards	12	14	23	39	77	24	26	0	5	25	34	20	27	104

Q37. (a) Did your company apply for government funding to support innovation-related activities in the last three years?

Yes	No	Missing
79	116	20

Q37. (b) Please indicate the program for which you applied, whether or not you received the funding, and, how satisfied you were with the experience.

	Received Funding		Missing	Very dissatisfied	Dissatisfied	Neutral	Satisfied	Very satisfied	No Opinion	Missing
	Yes	No								
Training and skills development programs	30	32	152	7	1	7	15	11	3	169
Marketing programs	28	37	150	5	6	5	17	11	1	168
Export incentives and services	13	48	154	6	1	8	10	5	2	182
Prototyping or product testing	16	48	151	5	2	10	8	5	4	180
Programs for developing business ideas	18	43	153	3	3	8	9	7	5	179
Productivity or quality improvement programs	11	45	159	4	1	6	8	8	5	182
Acquisition or adaptation of technology	18	43	153	3	1	5	9	13	5	178
New product or process research and development	28	38	149	7	3	6	10	16	5	168

Q37. (c) If you have not applied for government assistance in the last three years, or have faced challenges in doing so, please indicate the importance of the following reasons to your firm.

	Not important	Somewhat important	Moderately important	Important	Very important	Not applicable	Missing
Activity not eligible	23	1	11	27	30	29	94
Not interested in government funding	40	6	15	15	26	24	89
Unaware of program relevant to needs	18	7	18	31	37	19	85
Unsure of how to apply for relevant program	23	4	13	29	29	27	90
Too much time required for application process	19	10	4	23	50	23	86
No local contact for program delivery	27	10	16	16	18	31	97
Application process too complex	20	10	11	24	37	26	87
Unable to provide required matching funds	23	14	10	18	29	29	92
Do not need additional funding	31	9	7	9	13	34	105

Q38. (a) Education, government and other research institutions/facilities partnerships/contracts:

	Did you attempt to partner?			Did you partner?			Was it successful?		
	Yes	No	Missing	Yes	No	Missing	Yes	No	Missing
Memorial University and associated research institutions	46	135	34	33	67	115	31	32	152
Local colleges	24	145	45	23	55	137	21	25	169
Local government research Institutions	22	149	44	14	59	142	12	28	175
University research institutions in other provinces	8	161	46	6	57	152	5	27	183
Government research institutions in other provinces	6	162	47	6	58	151	6	28	181
Research facilities outside Canada	9	163	43	9	50	156	7	28	180

Q38. (b) If you did not partner with or contract education, government or other research institutions/facilities in your innovation activities, please indicate the importance of the following factors in your decision.

	Not important	Somewhat important	Moderately important	Important	Very important	Not applicable	Missing
Not interested	33	6	17	10	18	42	89
Never considered it	23	9	13	21	23	37	89
Did not know how to access expertise	24	11	13	20	19	34	94
Unaware of what services/expertise are available	20	9	15	23	27	31	90
Skills/expertise my firm required are not available	31	4	14	15	20	37	94
Too expensive	20	9	9	17	21	43	96
Services could not be provided in time required	39	8	8	12	12	40	96

Q39. (a) Have you investigate or pursued opportunities to commercialize research created by education, government or other research institutions?

Yes	No	Missing
27	159	29

Q39. (b) If yes to (a), have you entered into a commercialization agreement?

Yes	No	Missing
6	57	152

Q39. (c) If yes to (b), was it successful?

Yes	No	Missing
4	25	186

Q39. (d) If you answered no to (a) or (b), please indicate whether or not the following reasons were important to you.

	Yes	No	Missing
Not interested	60	69	85
Never thought of it	65	58	90
Do not know how	62	60	92
Company has limited capacity to commercialize research (time, capital)	97	39	78
Research institution not interested	17	89	108
Intellectual property issues	20	89	105
Research not amenable to commercialization	23	77	114
Institution research not relevant to my company	48	60	102

Q40. In the next three years, it is expected that company:

	Employment Levels	Sales	Profits
Will Remain the same	48	26	30
Will Decline	17	11	15
Will Increase less than 10%	37	41	35
Will Increase more than 10%	84	107	96
Do not know	18	14	21
Missing	11	16	17

Q41. In the next three years, my company's competitive position is expected to:

Remain the same	45
Decline	10
Improve	124
Do not know	15
Missing	18

Over the next three years, does your company intent to:

		Yes	No	Don't know	Missing
Q43.	Introduce new or improved goods or services to the market?	147	19	40	9
Q44.	Introduce new or improved production or other internal processes?	134	30	36	15
Q45.	Acquire or adapt new technology?	142	22	39	12
Q46.	Invest in machinery and equipment?	144	24	34	13
Q47.	Engage in research and development (R&D)?	90	55	52	17
Q48.	Provide employee and/or management skills training?	149	23	31	12
Q49.	Commence exporting?	47	87	46	35
Q50.	Increase exporting?	84	69	37	25
Q51.	Partner with other firms (e.g. joint ventures)?	80	53	67	15
Q52.	Apply for government funding for innovation activities?	77	45	69	24
Q53.	Partner with government or educational research institutions?	45	57	86	26