Cat. No. 88F0006XIE01013

Innovation in Canadian Manufacturing: Provincial Estimates

Statistics Canada Statistique Canada

Canada

Innovation in Canadian Manufacturing: Provincial Estimates

Survey of Innovation

1999

Susan Schaan, Frances Anderson and Guy Sabourin

Science, Innovation and Electronic Information Division

September 2001

88F0006XIE No. 13

This working paper is the result of a collaborative project between the Science, Innovation and Electronic Information Division, Statistics Canada, Industry Canada, Natural Resources Canada and the National Research Council of Canada

Working Papers

The Working Papers publish research related to science and technology issues. All papers are subject to internal review. The views expressed in the articles are those of the authors and do not necessarily reflect the views of Statistics Canada nor, in this case, the views of Industry Canada, Natural Resources Canada or the National Research Council of Canada.

CONTACTS FOR MORE INFORMATION

Science, Innovation and Electronic Information Division

Director Dr. F.D. Gault (613-951-2198)

Assistant Director Brian Nemes (613-951-2530)
Assistant Director Paul McPhie (613-951-9038)

The Science and Innovation Information Program

Chief, Indicators Development
Dr. Frances Anderson (613-951-6307)

Chief, Knowledge Indicators
Michael Bordt (613-951-8585)

Chief, Innovation
Daood Hamdani (613-951-3490)

Chief, Life Science Unit
Antoine Rose (613-951-9919)

Science and Innovation Surveys Section

Chief
Bert Plaus (613-951-6347)

FAX: (613-951-9920)

The Science and Innovation Information Program

The purpose of this Program is to develop **useful indicators of science and technology activity** in Canada based on a framework that ties them together into a coherent picture. To achieve the purpose, statistical indicators are being developed for five key entities:

- **Actors**: persons and institutions engaged in S&T activities. Measures include distinguishing R&D performers, identifying universities that license their technologies, and determining the field of study of graduates.
- **Activities**: the creation, transmission or use of S&T knowledge including research and development, innovation, and use of technologies.
- **Linkages**: the means by which S&T knowledge is transferred among actors. Measures include the flow of graduates to industries, the licensing of a university's technology to a company, co-authorship of scientific papers, and the source of ideas for innovation in industry.
- **Outcomes**: the medium-term consequences of activities. Outcomes of an innovation in a firm may be improved productivity, improved product quality and/or more highly skilled jobs. An outcome of a firm adopting a new technology may be a greater market share for that firm.
- **Impacts**: the longer-term consequences of activities, linkages and outcomes. Wireless telephony is the result of many activities, linkages and outcomes. It has wide-ranging economic and social impacts such as increased connectedness.

The development of these indicators and their further elaboration is being done at Statistics Canada, in collaboration with other government departments and agencies, and a network of contractors.

Prior to the start of this work, the ongoing measurements of S&T activities were limited to information and data on the investment of money and human resources in research and development (R&D). For governments, there were also measures of related scientific activity (RSA) such as surveys and routine testing. These measures presented a narrow picture of science and technology in Canada. More measures were needed to improve the picture.

Innovation makes firms competitive and we are continuing with our efforts to understand the characteristics of innovative and non-innovative firms, especially in the service sector that dominates the Canadian Economy. The capacity to innovate resides in people and measures are being developed of the characteristics of people in those industries that lead science and technology activity. In these same industries, measures are being made of the creation and the loss of jobs as part of understanding the impact of technological change.

The federal government is a principal player in science and technology where it invests over $5 billion dollars each year. In the past, it has been possible to say only *how much* the federal government spends and *where* it spends it. Our report **Federal Scientific Activities, 1998 (Cat. No. 88-204)** first published indicators by socio-economic objectives to show *what* the S&T money was spent on. As well as offering a basis for a public debate on the priorities of government spending, all of this information has been used to provide a context for performance reports of individual departments and agencies.

As of April 1999, the Science and Innovation Information Program has been established as a part of Statistics Canada's Science, Innovation and Electronic Information Division.

The final version of the framework that guides the future elaboration of indicators was published in December, 1998 (**Science and Technology Activities and Impacts: A Framework for a Statistical**

Information System, Cat. No. 88-522). The framework has given rise to **A Five-Year Strategic Plan for the Development of an Information System for Science and Technology** (Cat. No. 88-523).

It is now possible to report on the Canadian system on science and technology and show the role of the federal government in that system.

Our working papers and research papers are available at no cost on the Statistics Canada Internet site at http://www.statcan.ca/cgi-bin/downpub/research.cgi?subject=193.

Table of Contents

The Science and Innovation Information Program 3

Table of Contents 5

Preface 7

Highlights 9

Acknowledgements 13

Introduction 15

1. The Survey 19

2. How innovative are Canadian manufacturing firms? 21

3. How does innovation take place? 22

4. Why do firms innovate? 30

5. What are the factors affecting innovation? 31

6. What is the result of innovation? 35

References 39

Annex 1: Manufacturing Industry Stratification 41

Annex 2: Statistical Tables 43

1. Percent of Innovative Manufacturing Firms During the Period 1997 – 1999, by Province 45
2. Sources of Information That Contributed to Innovation for Innovators in Manufacturing During the Period 1997 - 1999 47
3. Percentage of Innovative Manufacturing Firms Engaged In Activities Linked To Product or Process Innovation During the Period 1997 – 1999, by Province 58
4. Research and Development by Innovators in Manufacturing During the Period 1997 – 1999 59
5. Cooperative and Collaborative Arrangements of Innovators in Manufacturing During the Period 1997 – 1999, by Province 62
6. Methods Used by Innovators in Manufacturing to Protect Intellectual Property During the Period 1997 - 1999 66
7. Application for Patents in Canada and the United States by Innovators in Manufacturing During the Period 1997 – 1999, by Province 69
8. Objectives of Innovation for Innovators in Manufacturing During the Period 1997 - 1999 70

9. Problems and Obstacles That Innovative Manufacturing Firms Faced When They Innovated During the Period 1997 - 1999 81
10. Use of Government Support Programs by Innovators in Manufacturing During the Period 1997 – 1999, by Province 87
11. Impact on Sales in 1999 of New Products (Goods or Services) Introduced by Innovators in Manufacturing During the Period 1997 – 1999, by Province 93
12. Impact of Innovation on Innovative Manufacturing Firms During the Period 1997 – 1999 96
13. Change in the Total Number of Employees for Innovators in Manufacturing During the Period 1997 – 1999, by Province 102

Annex 3: Questionnaire 103

Preface

This is the second in a series of working papers that will examine the results from the Survey of Innovation 1999. The previous working paper provided national estimates of innovation in manufacturing. This second paper provides statistical tables of provincial estimates of innovation in manufacturing. Subsequent papers will include an examination of innovation in selected natural resource industries at the national level and at the provincial level. Research papers will follow these working papers.

Innovation is vital to economic growth and development. It is through innovation that new products are introduced to the market, new production processes are developed and introduced and organizational changes are made.

The Survey of Innovation 1999 surveyed manufacturing and was the first innovation survey of selected natural resource industries. Statistics Canada has conducted several surveys of innovation since 1993 to better understand innovation in Canada. The 1993 Survey of Innovation and Advanced Technology surveyed manufacturing firms. The Survey of Innovation 1996 surveyed the communications, financial services and technical business services industries. The 1999 Survey of Innovation, Advanced Technologies and Practices in the Construction and Related Industries was the first survey of advanced technologies and practices in the construction sector. The 1999 Survey of Innovation provided an opportunity to supplement the study of Innovation, Advanced Technologies and Practices in the Construction and Related Industries and to examine the relationship between construction and manufacturing. To explore this relationship, questions were added to the 1999 Survey of Innovation to explore manufacturing and natural resource suppliers to the construction industry. A question on the linkage between manufacturing and natural resource firms was also included.

The information compiled from the Survey of Innovation can be used by firms for market analysis, by trade associations to study performance and other characteristics of their industries, and by government to develop national and regional economic policies.


ELECTRONIC PUBLICATIONS AVAILABLE AT
www.statcan.ca

Highlights

The Survey

Statistics Canada conducted the Survey of Innovation during the fall of 1999. Design of the questionnaire was done by the Science, Innovation and Electronic Information Division of Statistics Canada in collaboration with Industry Canada, Natural Resources Canada and the Institute for Research in Construction of the National Research Council of Canada, with the participation of the Canadian Construction Research Board.

How innovative are Canadian manufacturing firms?

Results from the Survey of Innovation 1999 show that 80% of Canadian manufacturing firms were innovative during the period 1997-1999. At the provincial level, the innovation rate for manufacturers falls in a narrow range of 73% to 83%.

How does innovation take place?

The most frequently chosen internal source (internal to the firm) of information needed for suggesting or contributing to the development of new or significantly improved products or processes for innovative manufacturing firms in Canada was management staff (74%). All provinces, with the exception of Quebec, reported management staff as the most frequently chosen internal source of information (internal to the firm). In Quebec, production staff were the most frequently chosen internal source of information for innovation.

The most important external source (external to the firm) of information needed for suggesting or contributing to the development of new or significantly improved products or process for innovative manufacturing firms in Canada was trade fairs and exhibitions (66%). Most provinces, with the exception of Newfoundland, Prince Edward Island, and Alberta, reported trade fairs and exhibitions as the most frequently chosen external source (external to the firm) of information needed for suggesting or contributing to the development of new or significantly improved products or processes for innovative manufacturing firms. In Manitoba, trade fairs and exhibitions and suppliers of equipment, material and components were tied as the most commonly chosen external source of information. In Newfoundland and Alberta, suppliers of equipment, material and components were the most frequently chosen external source, whereas in Prince Edward Island, clients were the most frequently chosen external source of information for innovation.

Firms indicated whether they engaged in several activities linked to offering new or significantly improved products or to introducing new or significantly improved production/manufacturing processes during the period 1997-1999. Over 60% of all innovative manufacturing firms in Canada indicated that they engaged in at least one of five activities linked to product or process innovation. The majority (86%) of innovative manufacturers in Canada have engaged in the acquisition of machinery, equipment or other technology linked to new or significantly improved products or production/manufacturing processes during the period 1997-1999. All provinces reported the acquisition of process equipment as the most commonly chosen activity linked to

innovation with the exception of Alberta and Newfoundland, where training linked to innovation was chosen with equal frequency.

At the national level, over two thirds (68%) of innovative manufacturing firms indicated that they undertook R&D activities during the period 1997-1999. At the provincial level, the percent of innovative manufacturing firms that indicated undertaking R&D activities during the same period fell within the range of 61% to 78%.

During the period 1997-1999, one-third of innovative manufacturing firms were involved in cooperative and collaborative arrangements to develop new or significantly improved products or processes. At the provincial level, the percent of innovative manufacturing firms with cooperative and collaborative arrangements during this period fell within a narrow range from almost 27% to just under 40%.

Almost three-quarters of innovative manufacturing firms in Canada used some method to protect their intellectual property during the period 1997-1999. The preferred method chosen by two thirds of them was confidentiality agreements. Confidentiality agreements were the most commonly chosen method in all provinces except Quebec. In Quebec, the most commonly chosen method of intellectual property protection by innovative manufacturing firms was trademarks.

Why do firms innovate?

The objective of innovation during the period 1997-1999 most commonly indicated by innovative manufacturing firms in Canada was "to improve product quality". All provinces had "to improve product quality" as their most common objective of innovation with the exception of Manitoba and Prince Edward Island. The most commonly chosen objective of innovative manufacturing firms in Manitoba was "to improve production capacity", and in Prince Edward Island it was "to extend product range".

What are the factors affecting innovation?

The most widespread problem or obstacle which slowed down or caused problems when innovative manufacturing firms developed new or significantly improved products or introduced new or significantly improved processes during the period 1997-1999 was the "inability to devote staff to projects on an on-going basis because of production requirements". This was chosen by over half of the innovative manufacturing firms in Canada (56%), and by all provinces except Newfoundland, Nova Scotia and Quebec. The problem or obstacle most frequently indicated by over half of the innovative manufacturing firms in these three provinces was the "high cost of development".

Over half (58%) of innovative manufacturing firms in Canada indicated that they used either a federal or provincial government support program during the period 1997-1999. The most frequently used program by innovative manufacturing firms in Canada was research and development (R&D) tax credits sponsored by the federal or a provincial government (40%). These programs were the most common types of programs used by innovative manufacturing

firms in all provinces except in Newfoundland, where federal or provincial government support for training was the most commonly used program.

What is the result of innovation?

Approximately the same percentage of innovative manufacturing firms in Canada had sales from new products (80%) or significantly improved products (77%) introduced between 1997 and 1999. At the provincial level, the percent of innovative manufacturing firms with sales from new products ranged from 72% to 87% and those with significantly improved products ranged from 69% to 81%.

When innovative manufacturing firms in Canada were asked to indicate their agreement to a list of important impacts of the new and significantly improved products and processes, over three-quarters (77%) agreed that it "allowed the firm to keep up with competitors". This was the most commonly agreed upon impact of innovation for innovative manufacturing firms in all provinces with the exception of New Brunswick, where the most frequently agreed upon impact was that innovation "increased the firm's ability to adapt flexibly to different client demands".


ELECTRONIC PUBLICATIONS AVAILABLE AT
www.statcan.ca

Acknowledgements

The Survey of Innovation 1999 was a collaborative project with contributions from Industry Canada, Natural Resources Canada and the Institute for Research in Construction of the National Research Council of Canada, with the participation of the Canadian Construction Research Board.

The testing of the questionnaire was done by Statistics Canada's Questionnaire Design Resource Centre and was carried out by Allan Gower, Marie-Josée Williams and Anna Paletta.

The questionnaire mail-out and collection/data capture was carried out by Survey Operations Division, under the direction of Lloyd Nieman and Linda Balloch.

The Business Survey Methods Division was responsible for the methodology of the survey. In particular, the authors would like to thank Yves Morin and Nicolas Lavigne.

Within the Science, Innovation and Electronic Information Division special thanks goes to Brian Nemes and Brenda Hutchinson for their contributions to the survey. Additional thanks are extended to Claire Racine-Lebel for her assistance in preparing the working paper for publication.

Finally, the authors would like to thank the 5455 manufacturing firms who completed the questionnaire. Without their cooperation and goodwill, this working paper would not have been possible.


ELECTRONIC PUBLICATIONS AVAILABLE AT
www.statcan.ca

Introduction

This working paper is the second in a series of studies that results from a collaborative project between the Science, Innovation and Electronic Information Division of Statistics Canada, Industry Canada, Natural Resources Canada and the Institute for Research in Construction of the National Research Council of Canada, with the participation of the Canadian Construction Research Board. The objective of the project is to provide information on innovation and related activities with an ultimate view to its use in developing policies and programs. This paper will examine the characteristics of innovative manufacturing firms in Canadian provinces based on results from the Survey of Innovation 1999.

What is innovation?

The Oslo Manual (OECD/Eurostat, 1997) outlines proposed guidelines for collecting and interpreting innovation data. This manual identifies two types of innovation – product and process. In the case of product innovation, the product must have been introduced to the market. A process innovation must have been used within the production process. An innovative firm is one that has offered a new or significantly improved product or introduced a new or significantly improved production/manufacturing process during the last three years.

The term "product" includes both goods and services as innovation outputs. Product innovations can be broken down into "new" or "significantly improved" categories. A new product is one that is new to the firm, whose characteristics or intended uses differ significantly from those products previously produced by the firm. A significantly improved product is an existing product whose performance has been significantly enhanced or upgraded. A complex product consisting of a number of components or integrated subsystems may be improved by partial changes to one of the components or subsystems. Changes to a firm's existing products which are purely aesthetic or which only involve minor modifications are not considered to be innovations.

New production/manufacturing processes are those which are new to the firm. They involve the introduction of new production/manufacturing methods, procedures, systems, machinery or equipment into the firm. These must differ significantly from the firm's previous processes. Significantly improved production/manufacturing processes involve significant changes to existing processes which may be intended to produce new or significantly improved products or processes. Minor or routine changes to processes are not considered to be innovations.

Innovations may be oriented towards product, process or both product and process. By definition, an innovation must necessarily be a firm first; however, the degree of novelty may vary. An innovation may involve a major breakthrough discovery that is a first in the world or it can be an innovation that is a first in Canada.

How does innovation take place?

Innovation and innovative activities may be carried out within the firm or may involve the acquisition of goods, services or knowledge from outside sources. The process of innovation can be assisted by a variety of sources of information including internal sources (within the firm), external market sources, educational and research institutions, and generally available information. Collaborations are one means by which innovation can occur through joint efforts from both inside and outside the firm.

There are numerous sources of information that can play a role in suggesting or contributing to innovation. Within a firm, R&D staff, marketing staff, production staff and management staff are all potential sources. Interactions with related firms in the corporate group (e.g. parent or subsidiary), suppliers of equipment, material and components, clients, consultancy firms, universities and colleges, federal or provincial agencies and research laboratories, and even clients can be an external source of information. Trade fairs and exhibitions, the Internet or computer based information networks, professional conferences, meetings and publications are all sources of information that are generally available to a firm.

Innovative firms can undertake a variety of activities linked to offering or introducing new or significantly improved products or processes. These include R&D, the acquisition of technology, or the acquisition of machinery and equipment with improved technological performance connected to firm innovation, activities in the preparations for production such as industrial engineering and industrial design, tooling up and production start-up, and training linked to innovation.

Cooperative and collaborative arrangements involve the active participation in joint projects between a firm and other firms or organizations for the purpose of innovation. Pure contracting-out work, where there is no active participation, is not regarded as collaboration or cooperation. The reasons for these arrangements can be related to financial considerations (sharing costs, spreading risk), access to knowledge (R&D, critical expertise), prototype development, scaling-up production processes, accessing new markets and accessing new distribution channels.

An innovative firm can take steps to protect the intellectual property on which its innovations are based. Patents, trademarks, copyrights, confidentiality agreements or trade secrets are some of the methods that can be used by a firm to protect intellectual property.

Why do firms innovate?

The objectives of innovation can be related to productivity, product or some other motivation. The reduction of labour costs, increase in production capacity, reduction of production time and improvements to production flexibility are all productivity motivations. The extension of product range, improvement to product quality, increasing the speed of delivering products to the market and the replacement of products that are being phased out are some objectives related to the product. Other objectives of innovation include the reduction of materials consumption, reduction of environmental damage, reduction of energy consumption, and to deal with or to respond to new government regulations.

What are the factors affecting innovation?

The identification of obstacles to innovation is significant to policy development since many government measures are an attempt to overcome these. Various aspects of public policy can be better understood through an examination of a firm's perception of obstacles to innovation. Two key areas are dealt within this working paper - obstacles in general and government support programs.

There are many possible factors that can slow down or cause problems for firms when they innovate. High costs, the inability to devote staff to innovation projects on an on-going bases because of production requirements, or the inability to qualify for government assistance programs or R&D tax credits are a few. A lack of one or more of the following inputs to innovation can also present obstacles: skilled personnel, financing, marketing capability, information on relevant technology, required external technical support services, access to expertise in universities and/or government laboratories for assistance, cooperation with other firms, customer responsiveness to new products. Organizational rigidities within the firm can hinder innovation and government regulations can affect innovation capability.

Public policy can provide incentives for innovation. Government support programs include R&D tax credits, R&D grants, venture capital support, technology support and assistance, information or Internet services, and support for training. Failure to qualify for these programs can be an obstacle to innovation.

What is the result of innovation?

There are a variety of approaches to assessing the effect of innovation on a firm. The proportion of sales from new or significantly improved products is one measure of impact. Innovation can also impact to varying degrees on productivity, profitability, speed of supplying and/or delivering products, and the ability to adapt flexibly to different client demands. Other results of innovation can be an increase in domestic market share, increase in international market share, maintenance of profit margins, and keeping up with competitors. Finally, there can be an effect on human resources, where the number of employees in a firm may increase, decrease or remain the same.


ELECTRONIC PUBLICATIONS AVAILABLE AT
www.statcan.ca

1. The Survey

Questionnaire development

The questionnaire was designed by the Science, Innovation and Electronic Information Division of Statistics Canada in collaboration with Industry Canada, the Institute for Research in Construction of the National Research Council of Canada and Natural Resources Canada. Statistics Canada carried out interviews with individual firms in both official languages to ensure that the questions were well understood. Feedback from respondents was incorporated into the questionnaire design.

Characteristics and Coverage

The Survey of Innovation was conducted by Statistics Canada from October to December 1999 with the first data release of preliminary estimates on January 31, 2000.

The questionnaire consisted of thirteen sections with questions on competitive environment; firm success factors; new and significantly improved products and processes; sources of information; objectives; problems and obstacles; impact; cooperative and collaborative arrangements; most important new or significantly improved product or process; building and construction products; natural resource products; research and development, intellectual property and human resources; and government support programs.

Sampling Methodology

The target population was all firms in the manufacturing sectors (NAICS 31-33) (North American Industry Classification System, Statistics Canada, 1998) or in selected natural resource industries (NAICS 1133, 212, 2211). This working paper will analyse the survey results for manufacturing industries at the provincial level. Subsequent working papers will analyse the results for the selected natural resource industries.

The target population was based on a list of businesses compiled from respondents to existing production surveys conducted by Manufacturing, Construction and Energy Division (MCED) at Statistics Canada.

A total of 9,303 sample units were defined for the manufacturing industries from respondents to the Annual Survey of Manufactures. The sampling unit was neither at the enterprise nor the establishment level, but rather, it was a grouping (or cluster) of establishments. Within each province for each enterprise, all establishments of the same NAICS 4-digit code were grouped to form one sampling unit or "provincial enterprise". To reduce response burden, provincial enterprises with revenues of less than $250,000 were not included in the population and neither were those with less than 20 employees.

The sample was randomly drawn from the population of provincial enterprises stratified by province. Thirty-one industry categories for manufacturing based on NAICS codes were used. Details of the industry codes used are found in Annex 1.

As part of a Federal-Provincial Agreement, the sample in Quebec was augmented. In total, a sample of 5944 provincial enterprises in manufacturing was drawn.

Data Collection

All sample units were contacted to determine the name and correct mailing address for respondent, the Chief Executive Officer (CEO) of the business or the person designated by the CEO. Questionnaires were mailed out with mail, telephone and fax follow ups carried out for non respondents.

Edit and Imputation

Validity and flow edits were built into the data capture system and were applied during data collection and data entry. Validity edits ensured that responses to particular questions fell within a limited range of possible values. Post collection consistency edits were applied to complete[1] questionnaires.

Imputation was used for non-response to non-mandatory questions on complete questionnaires. Donors were always from the same stratum as defined in Annex 1. No individual record was used as a donor more than four times for any given question.

Response and Non-response

The response rate for the Survey of Innovation 1999 was calculated as the total number of completed questionnaires as a percentage of the total active, in-scope survey sample. The overall response rate for the survey for manufacturing industries was 95%, for a total of 5455 completed questionnaires.

Sampling Error

Answers to the survey questions presented in this report are population estimates; that is, they represent the percentage of businesses in the population that exhibit a particular characteristic. The population estimates are generated through the application of sample weights when tabulations are generated.

As the sample drawn for this survey is but one of many possible samples that could have been drawn, there is a sampling error attributed to it. Standard errors are used to provide a guide as to the reliability of the results. All estimates presented in this paper have been evaluated for reliability and an indication of the data reliability is included in each table according to the convention presented in Annex 2.

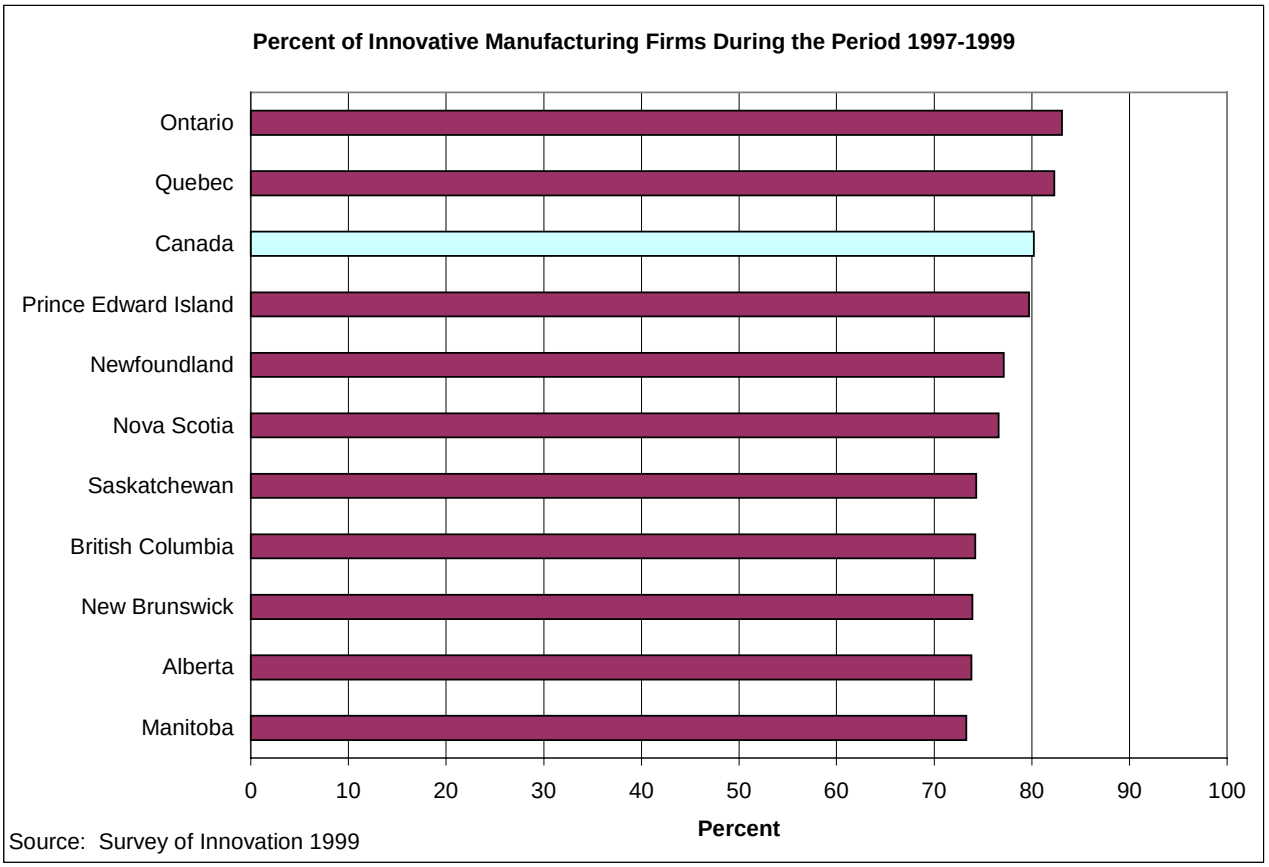
[1] Complete questionnaires are those which have responses to questions 3, 4, 5, 6, 12, 21, 22 and 23.

2. How innovative are Canadian manufacturing firms?

Percentage of Innovative Manufacturing Firms

Results from the Survey of Innovation 1999 show that 80% of Canadian manufacturing firms were innovative, i.e. the firm offered a new or significantly improved product to its clients and/or introduced a new or significantly improved production/manufacturing process during the period 1997-1999.

At the provincial level, the innovation rate for manufacturers falls in a narrow range of 73% to 83%. Both Ontario and Quebec had a higher percentage of innovative manufacturing firms than Canada overall.



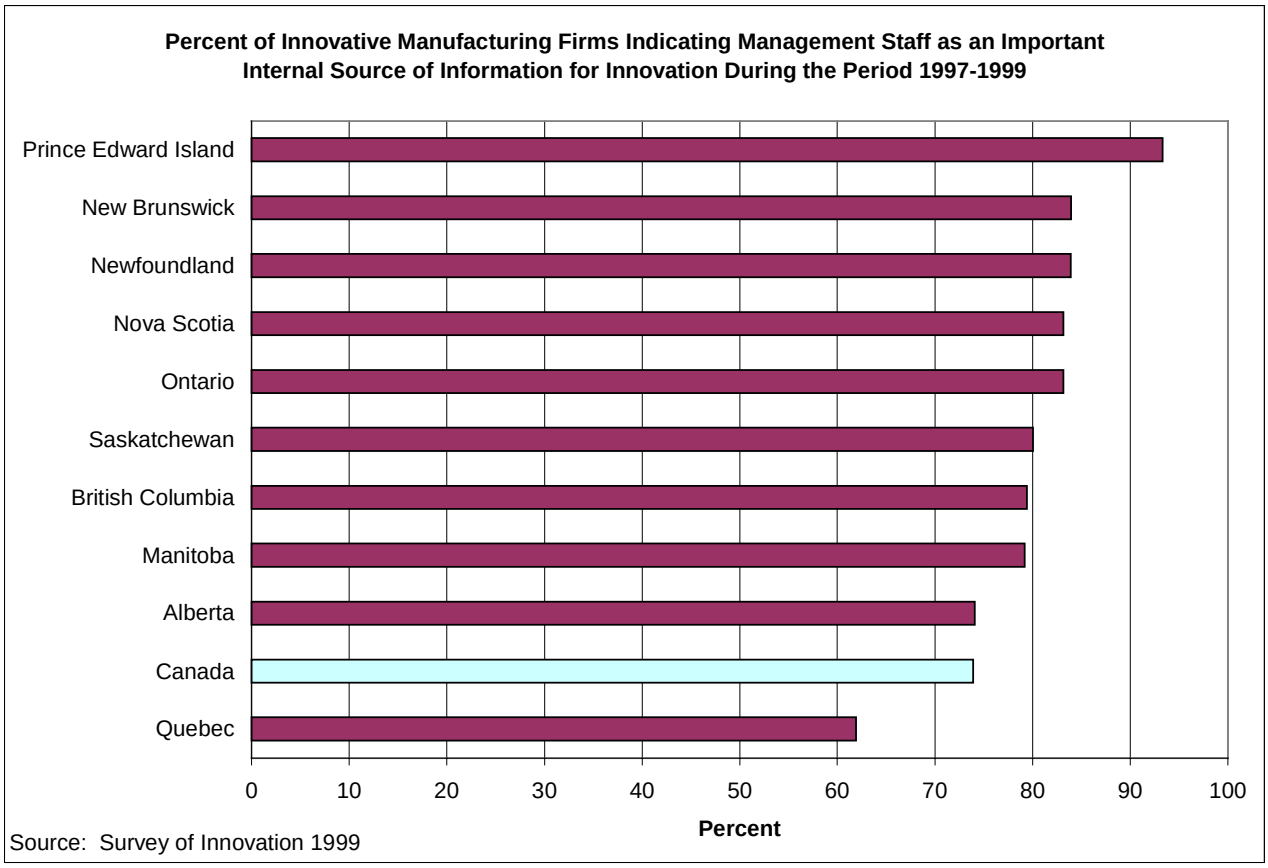
3. How does innovation take place?

Sources of Information for Innovation

The most frequently chosen internal source (internal to the firm) of information needed for suggesting or contributing to the development of new or significantly improved products or processes for innovative manufacturing firms in Canada was management staff (74%).

All provinces, with the exception of Quebec, had management staff as the most frequently chosen internal source (internal to the firm) of information needed for suggesting or contributing to the development of new or significantly improved products or processes for innovative manufacturing firms. In Quebec, production staff was the most frequently chosen internal source of information indicated by over two-thirds (69%) of innovative manufacturing firms (see Table 2, Annex 2).

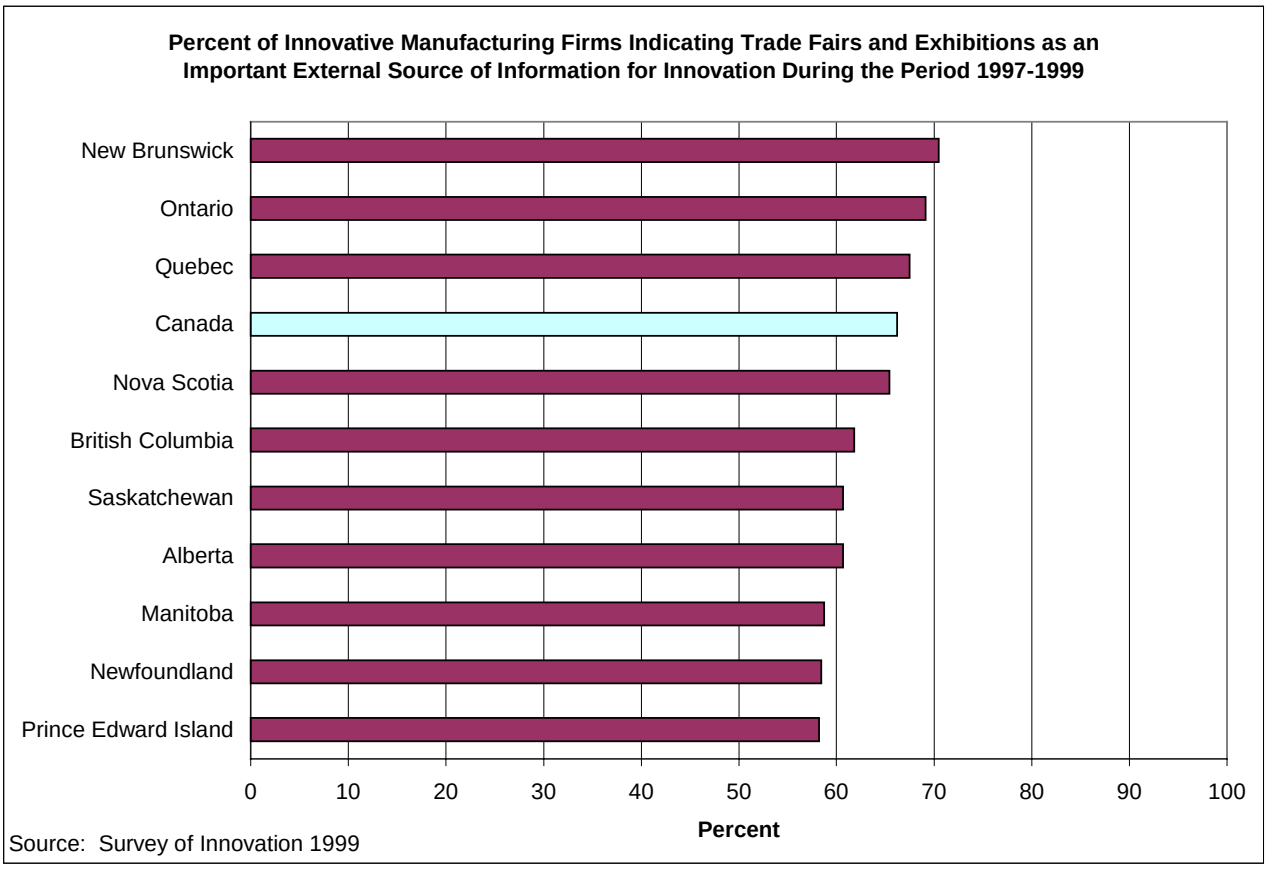
Prince Edward Island and New Brunswick had the highest percentage of innovative manufacturing firms choosing management staff as an internal source of information needed for suggesting or contributing to the development of new or significantly improved products or processes.



The most important external sources (external to the firm) of information for suggesting or contributing to the development of new or significantly improved products or process for innovative manufacturing firms in Canada was trade fairs and exhibitions (66%).

Most provinces, with the exception of Newfoundland, Prince Edward Island, and Alberta, had trade fairs and exhibitions as the most frequently chosen external source (external to the firm) of information for suggesting or contributing to the development of new or significantly improved products or processes for innovative manufacturing firms. In Manitoba, trade fairs and exhibitions and suppliers of equipment, material and components were tied as the most commonly chosen external source of information. In Newfoundland and Alberta, suppliers of equipment, material and components were the most frequently chosen external source, whereas in Prince Edward Island, clients were the most frequently chosen external source of information for innovation.

New Brunswick and Ontario had the highest percentage of innovative manufacturing firms indicating trade fairs and exhibitions as an important source of information needed for suggesting or contributing to the development of new or significantly improved products or processes. Newfoundland and Alberta's most frequent choice was suppliers of equipment, material and components. In Prince Edward Island clients were the most frequently chosen external source of information (see Table 2, Annex 2).

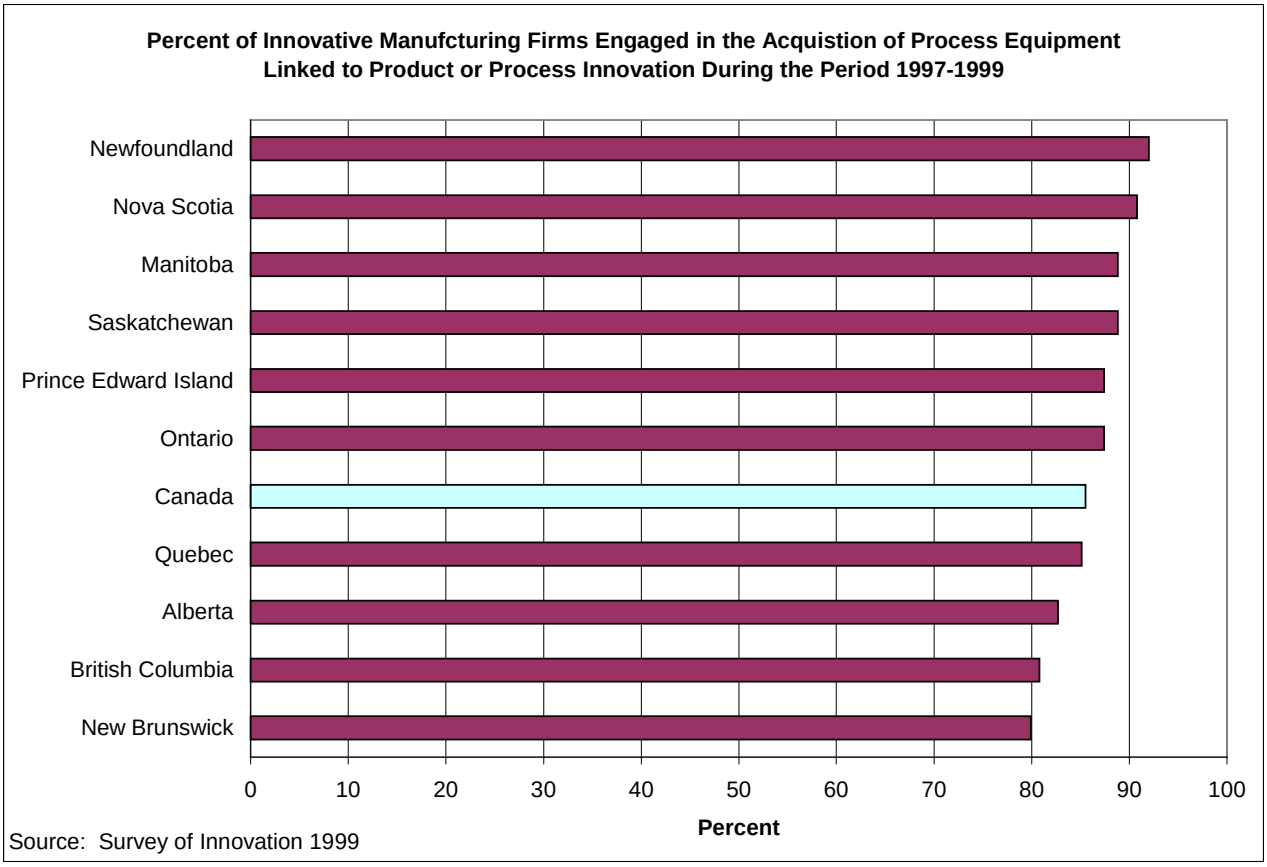


Activities Linked to Innovation

Firms indicated whether they engaged in several activities linked to offering new or significantly improved products or to introducing new or significantly improved production/manufacturing processes during the period 1997-1999. Over 60% of all innovative manufacturing firms in Canada indicated that they engaged in at least one of five activities linked to product or process innovation.

The majority (86%) of innovative manufacturing firms in Canada have engaged in the acquisition of machinery, equipment or other technology linked to new or significantly improved products or production/manufacturing processes during the period 1997-1999. Most provinces had the acquisition of process equipment as the most commonly chosen activity linked to innovation with the exception of Alberta and Newfoundland where training was chosen with equal frequency (see Table 3, Annex 1).

Newfoundland and Nova Scotia had the highest percentage of innovative manufacturing firms engaged in the acquisition of machinery, equipment or other technology linked to new or significantly improved products or processes.

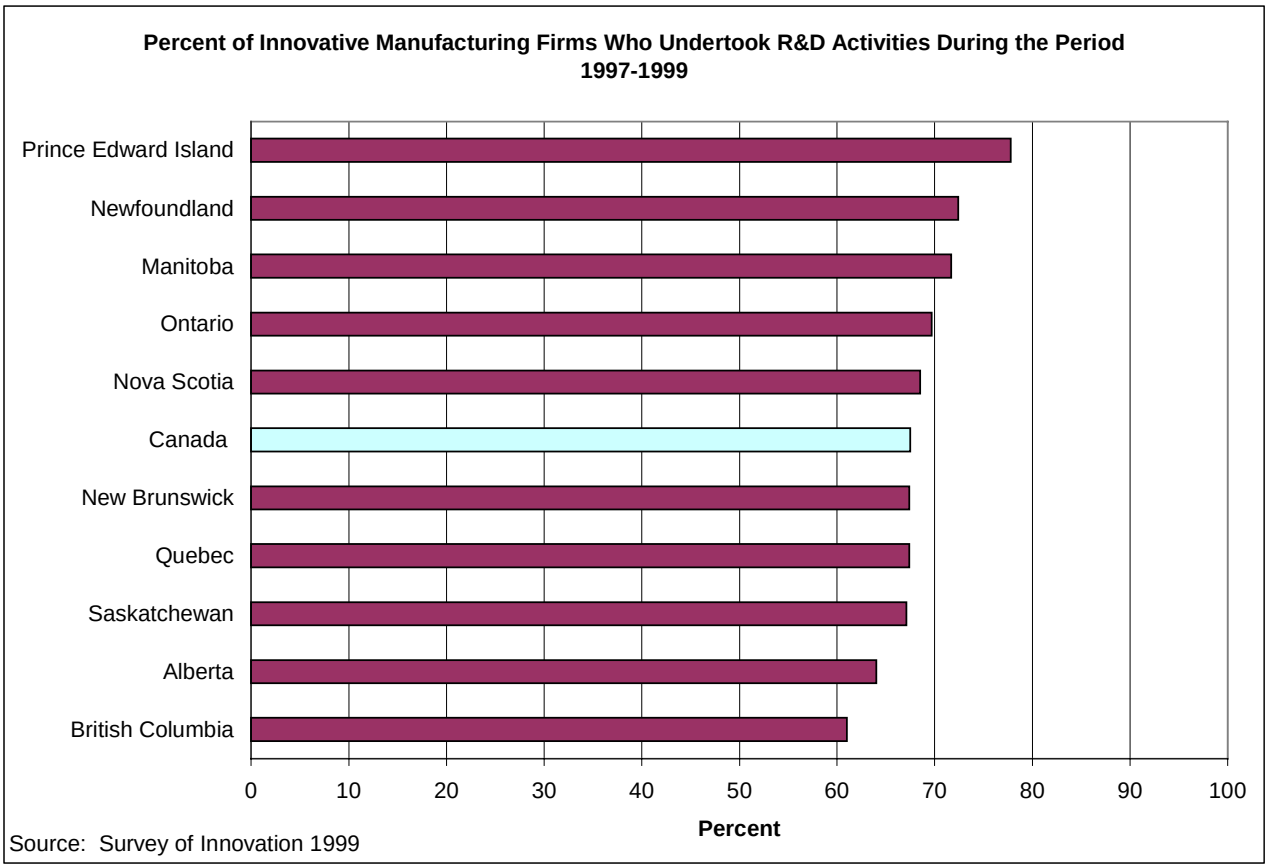


Research and Development

Over two-thirds (68%) of innovative manufacturing firms in Canada indicated that they undertook R&D activities[2] during the period 1997 to 1999.

At the provincial level, the percent of innovative manufacturing firms that indicated that they undertook R&D activities during the same period fell within the range of 61% to 78%.

Over three-quarters of innovative manufacturing firms in Prince Edward Island indicated that they undertook R&D activities during the period 1997-1999, followed by Newfoundland.



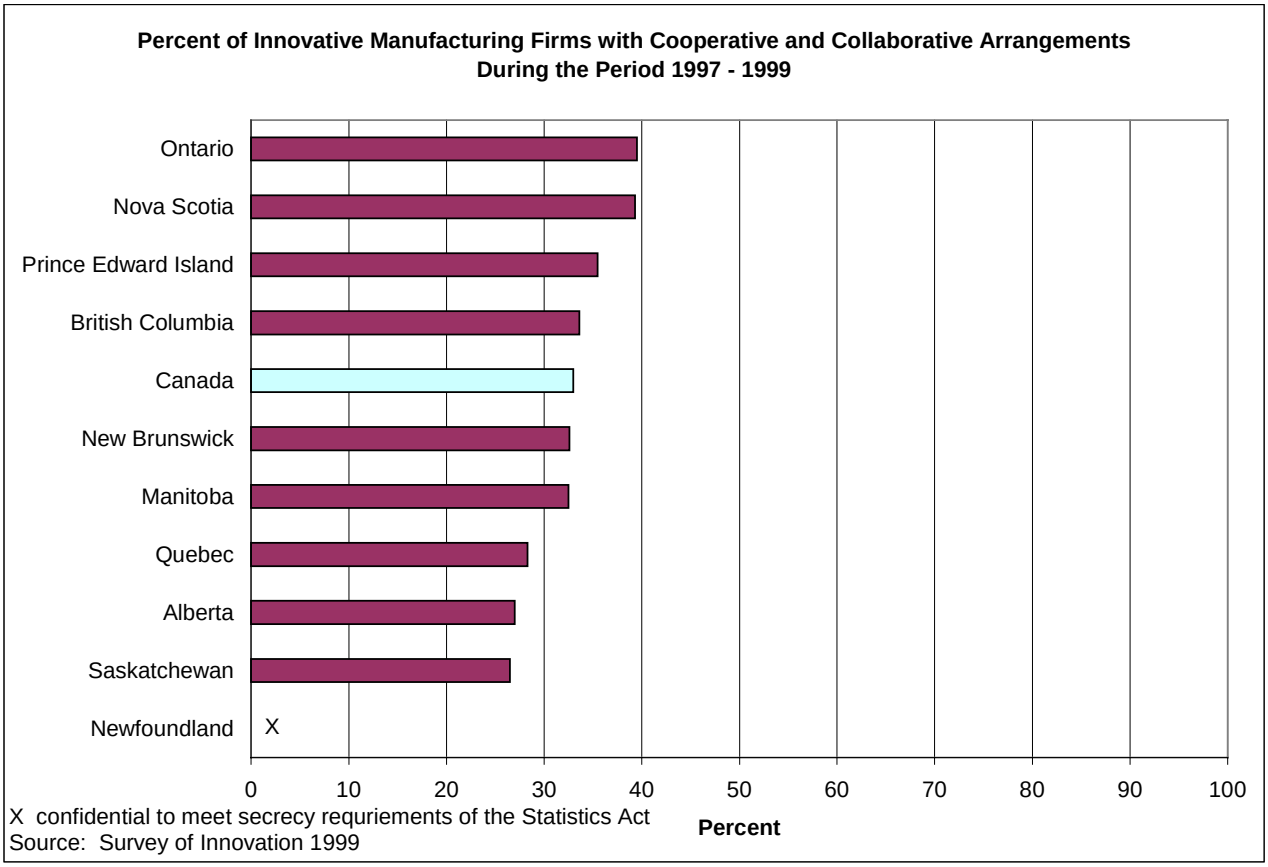
[2]R&D results from the Survey of Innovation 1999 diverge from R&D results from the Survey of Research and Development in Canadian Industry (RDCI). For a discussion of this issue see Daood Hamdani, "Why Do the Surveys of Innovation and R&D Diverge?" in *Innovation Analysis Bulletin*, Vol. 2. No. 3 (September 2000), Statistics Canada Catalogue No. 88-003-XIE.

Cooperative and Collaborative Arrangements

During the period 1997-1999, one third (33%) of innovative manufacturing firms in Canada were involved in cooperative and collaborative arrangements to develop new or significantly improved products or processes.

At the provincial level, the percent of innovative manufacturing firms with cooperative and collaborative arrangements during the period 1997-1999 falls within a narrow range from almost 27% to almost 40%.

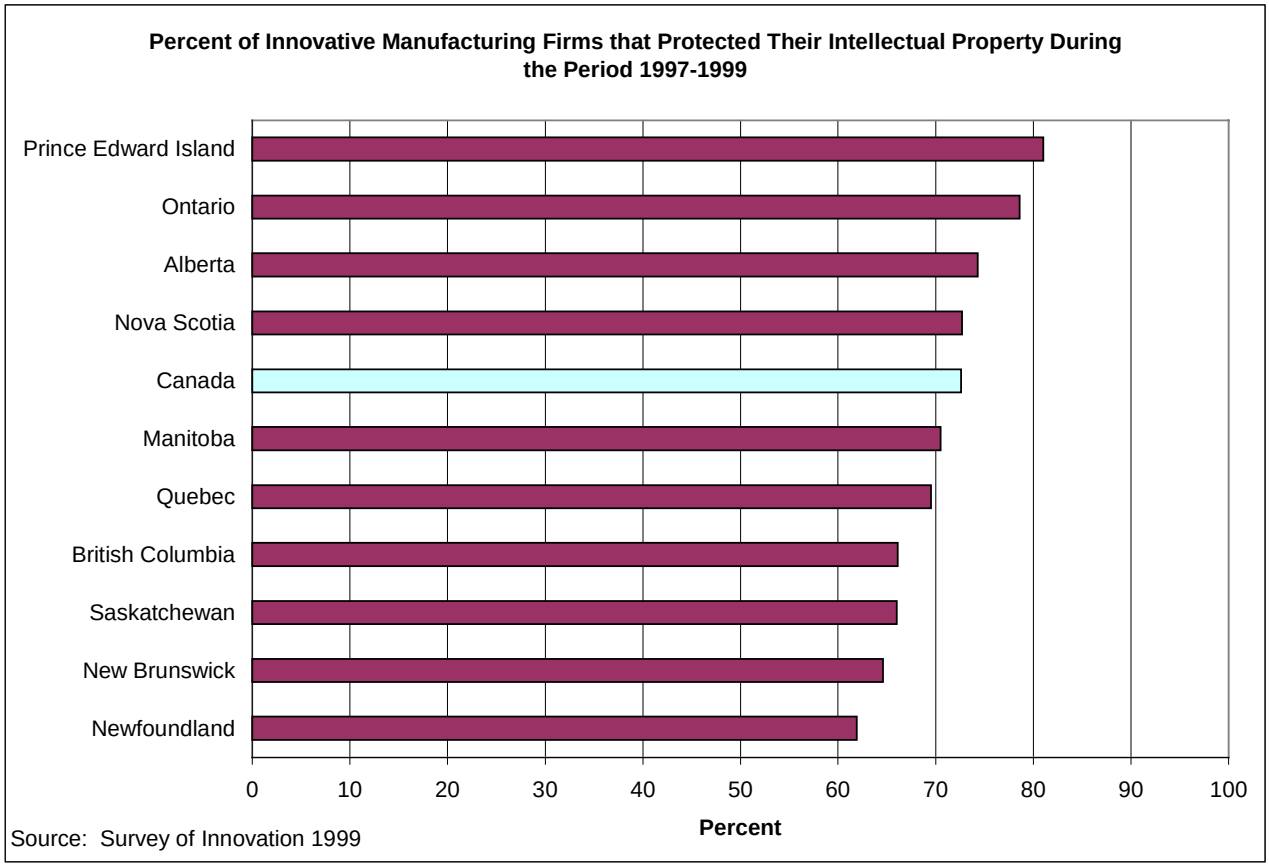
Ontario had the highest percentage of innovative manufacturing firms with cooperative and collaborative arrangements, followed by Nova Scotia.



Intellectual property

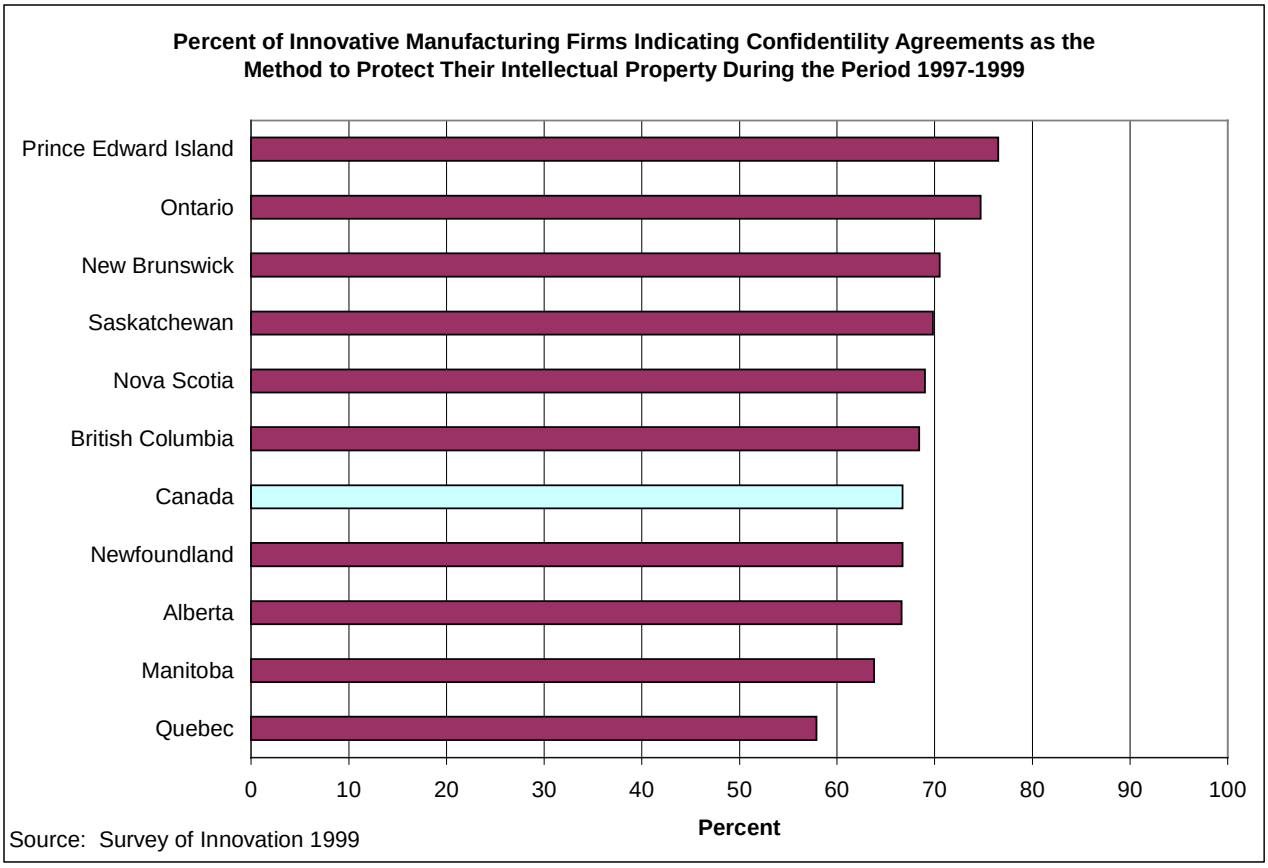
Approximately three-quarters (73%) of the innovative manufacturing firms in Canada used some method to protect their intellectual property.

During the period 1997-1999, Prince Edward Island had the highest percentage of innovative manufacturing firms that protected their intellectual property, followed by Ontario.



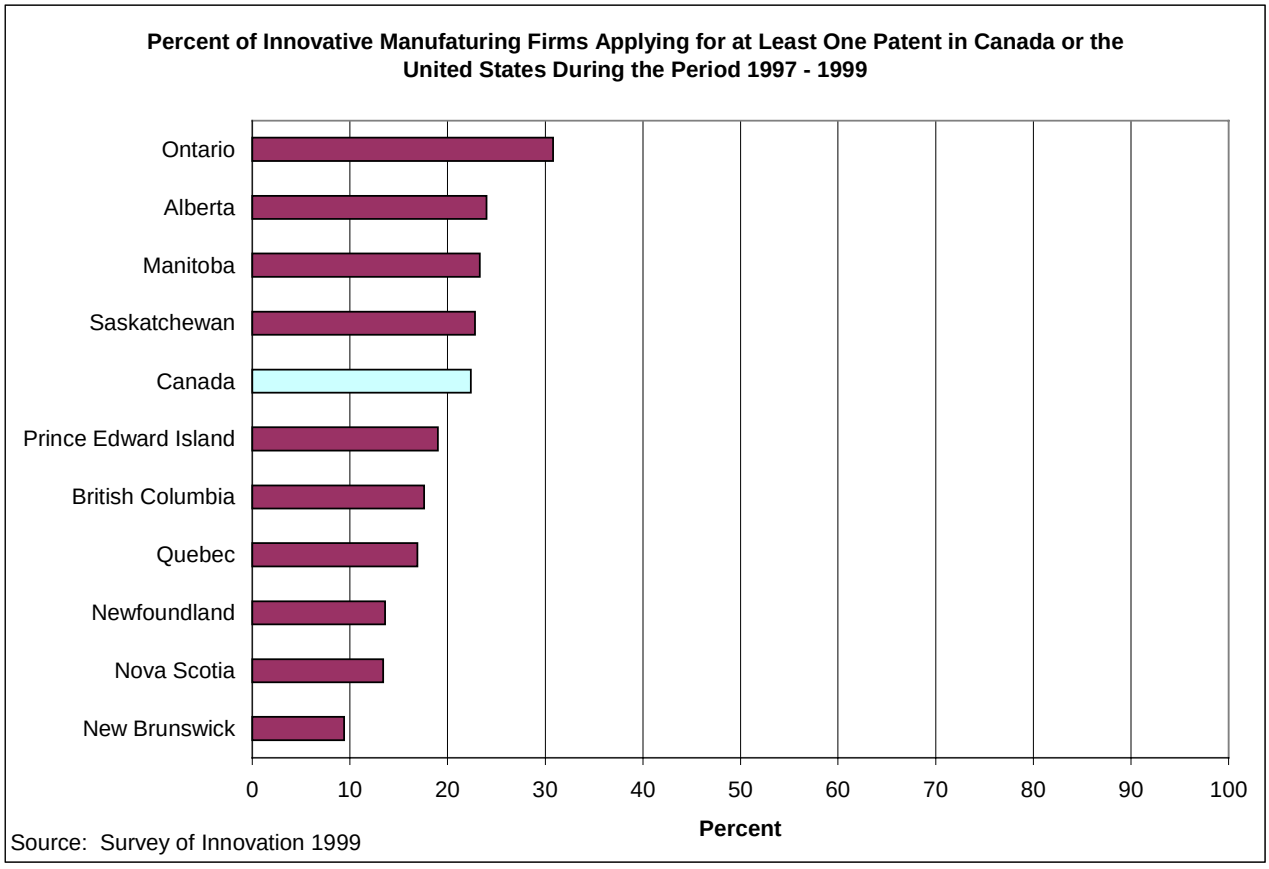
The preferred method chosen by two thirds of the innovative manufacturing firms in Canada who protected their intellectual property was confidentiality agreements (67%).

Confidentiality agreements were the most commonly chosen method by innovative manufacturing firms to protect intellectual property in all provinces except Quebec. In Quebec, the most commonly chosen method of intellectual property protection by innovative manufacturing firms was trademarks (see Table 6, Annex 2).



Less than one quarter (22%) of innovative manufacturing firms in Canada indicated that they had applied for at least one patent during the past three years, 1997-1999.

Ontario had the highest percentage of patent applications at just under one third of innovative manufacturing firms, followed by Alberta.



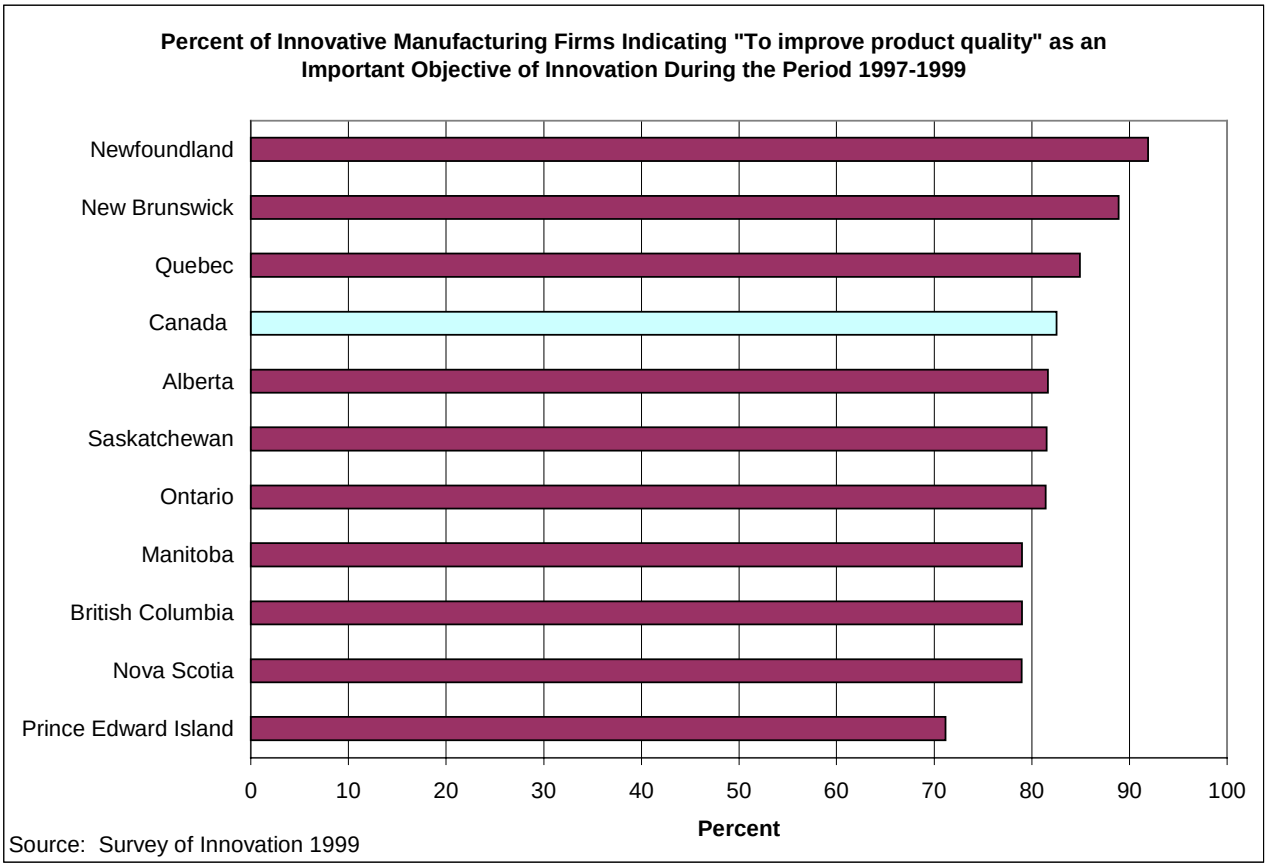
4. Why do firms innovate?

Objectives of Innovation

The important[3] objective of innovation most commonly indicated by innovative manufacturing firms in Canada was "to improve product quality" (83%).

Most provinces had "to improve product quality" as their most common objective of innovation with the exception of Manitoba and Prince Edward Island. The most commonly chosen objective of innovative manufacturing firms in Manitoba was "to improve production capacity". The most commonly chosen objective of innovative manufacturing firms in Prince Edward Island was "to extend product range" (see Table 9, Annex 2).

Newfoundland and New Brunswick had the highest percentage of innovative manufacturing firms indicating "to improve product quality" as the main reason why their firm offered new or significantly improved products or introduced new or significantly improved processes during the period 1997-1999.



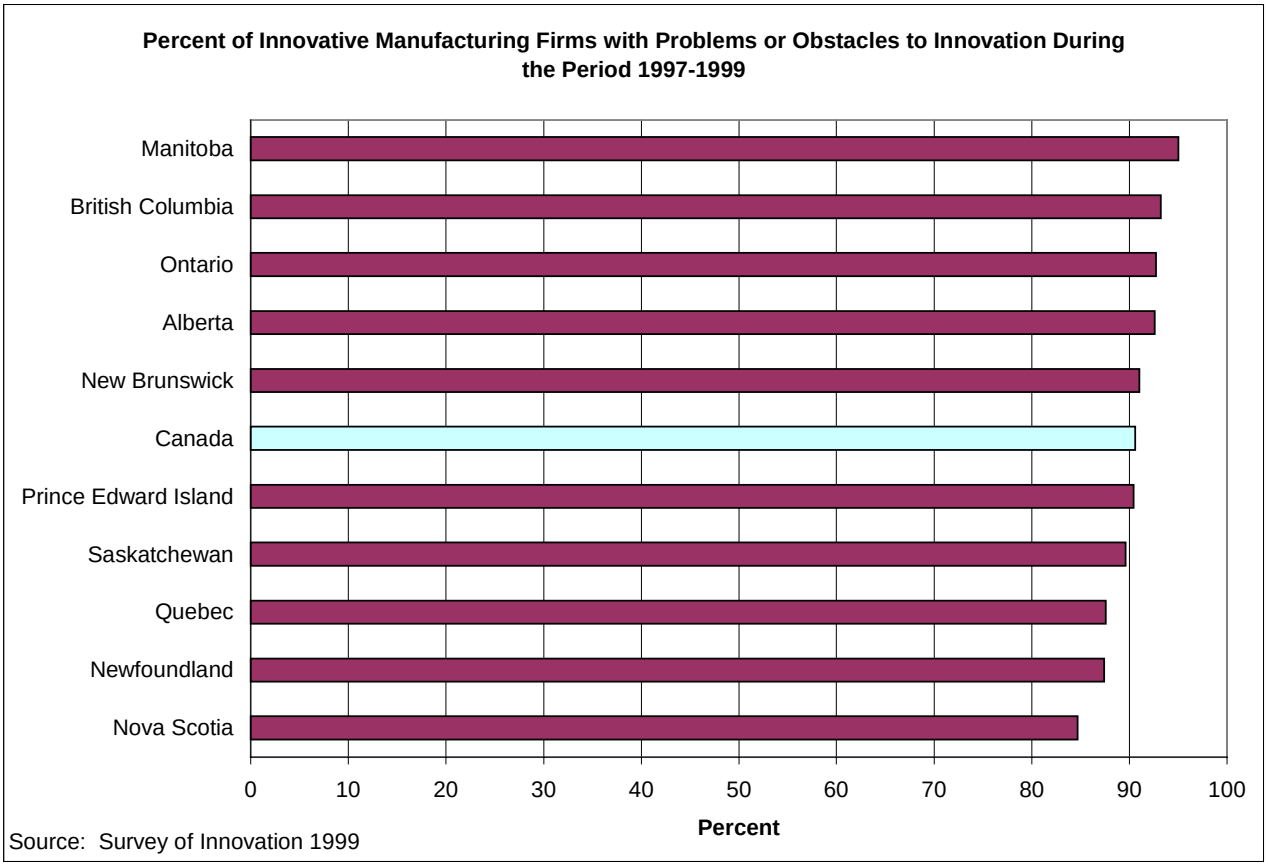
[3] Respondents indicated the importance of twelve objectives of innovation using a scale from 1 to 5 for each, where 1 is high importance and 5 is low importance. "Important" indicates a response of 4 or 5.

5. What are the factors affecting innovation?

Problems and Obstacles Faced by Innovative Manufacturing Firms

Most innovative manufacturing firms in Canada (91%) faced problems or obstacles that slowed down or caused problems when they developed new or significantly improved products or introduced new or significantly improved processes.

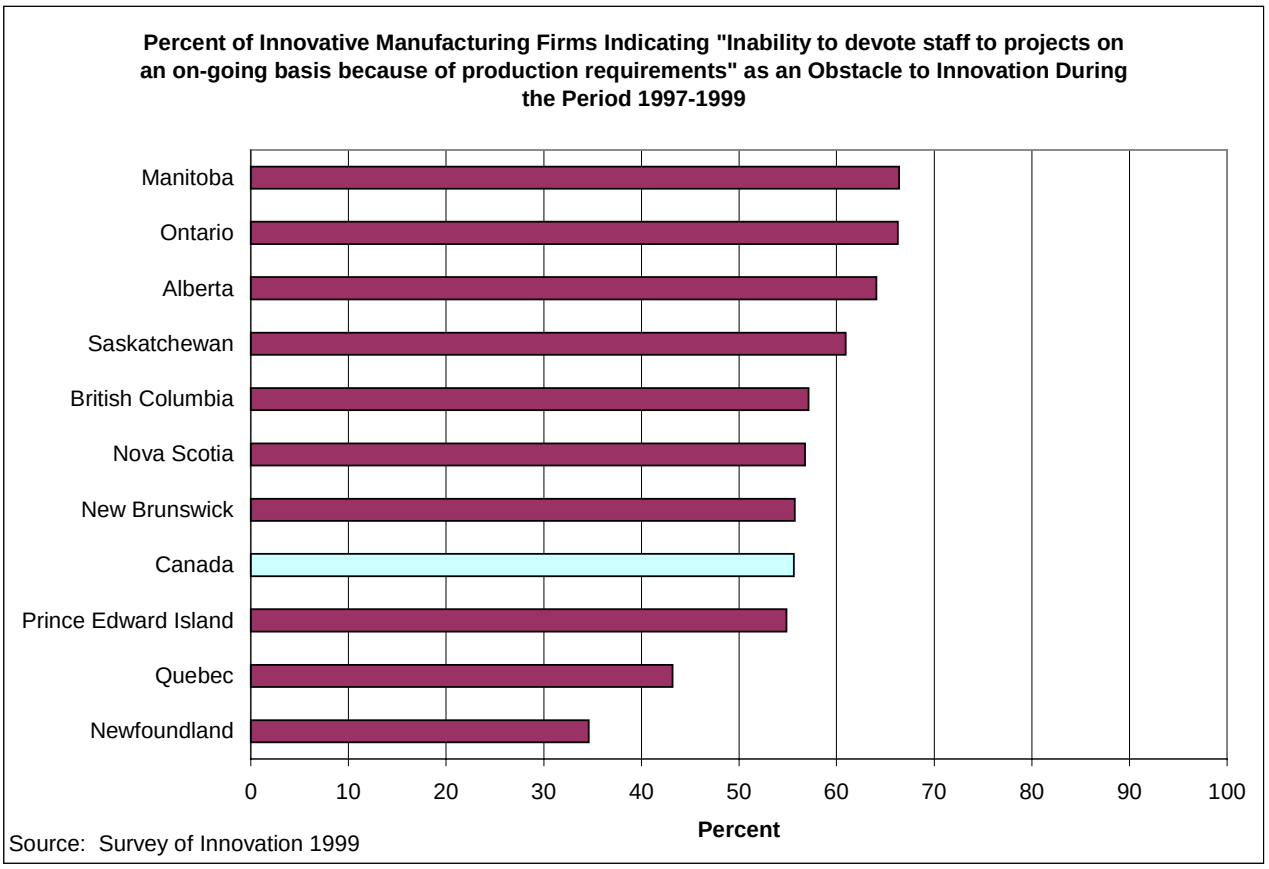
At the provincial level, the percent of innovative manufacturing firms that faced problems which slowed down or caused problems for their firm when they developed new or significantly improved products or introduced new or significantly improved processes during the period 1997-1999 fell within the range of 85% and 95%. Innovative manufacturing firms in Manitoba had the highest percentage of firms indicating problems or obstacles to innovation followed by British Columbia.



The most widespread obstacle to innovation was the “inability to devote staff to projects on an on-going basis because of production requirements”, chosen by over half of the innovative manufacturing firms in Canada (56%).

The “inability to devote staff to projects on an on-going basis because of production requirements” was the problem or obstacle most frequently indicated by innovative manufacturing firms in Prince Edward Island, New Brunswick, Ontario, Manitoba, Saskatchewan, Alberta and British Columbia. The problem or obstacle most frequently indicated by over half of the innovative manufacturing firms in Newfoundland, Nova Scotia and Quebec, was the “high cost of development” (see Table 9, Annex 2).

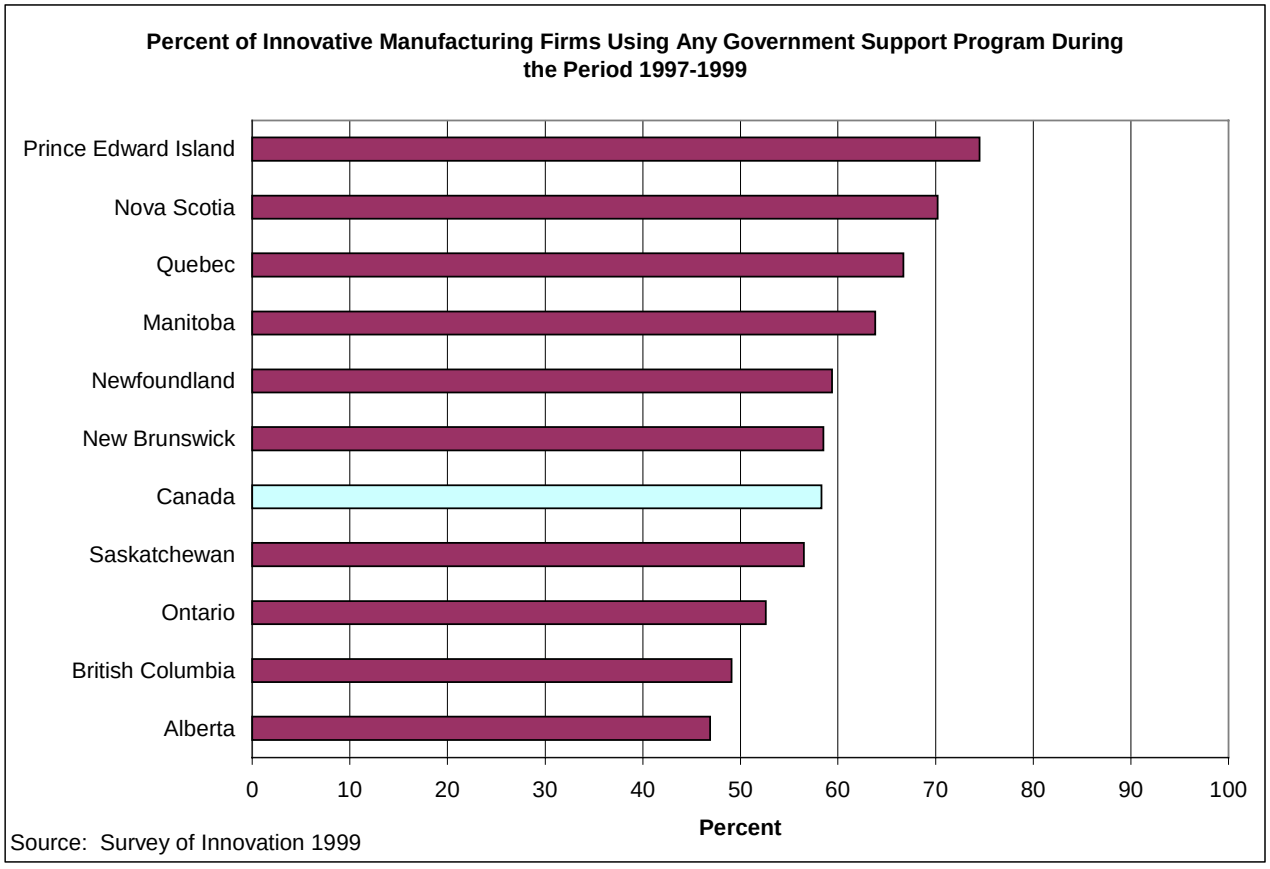
Manitoba had the highest percentage of innovative manufacturing firms indicating that the “inability to devote staff to projects on an on-going basis because of production requirements” was a problem or obstacle to innovation, followed by Ontario.



Government Support Programs

Over half (58%) of innovative manufacturing firms in Canada indicated that they used either a federal or provincial government support program during the period 1997-1999.

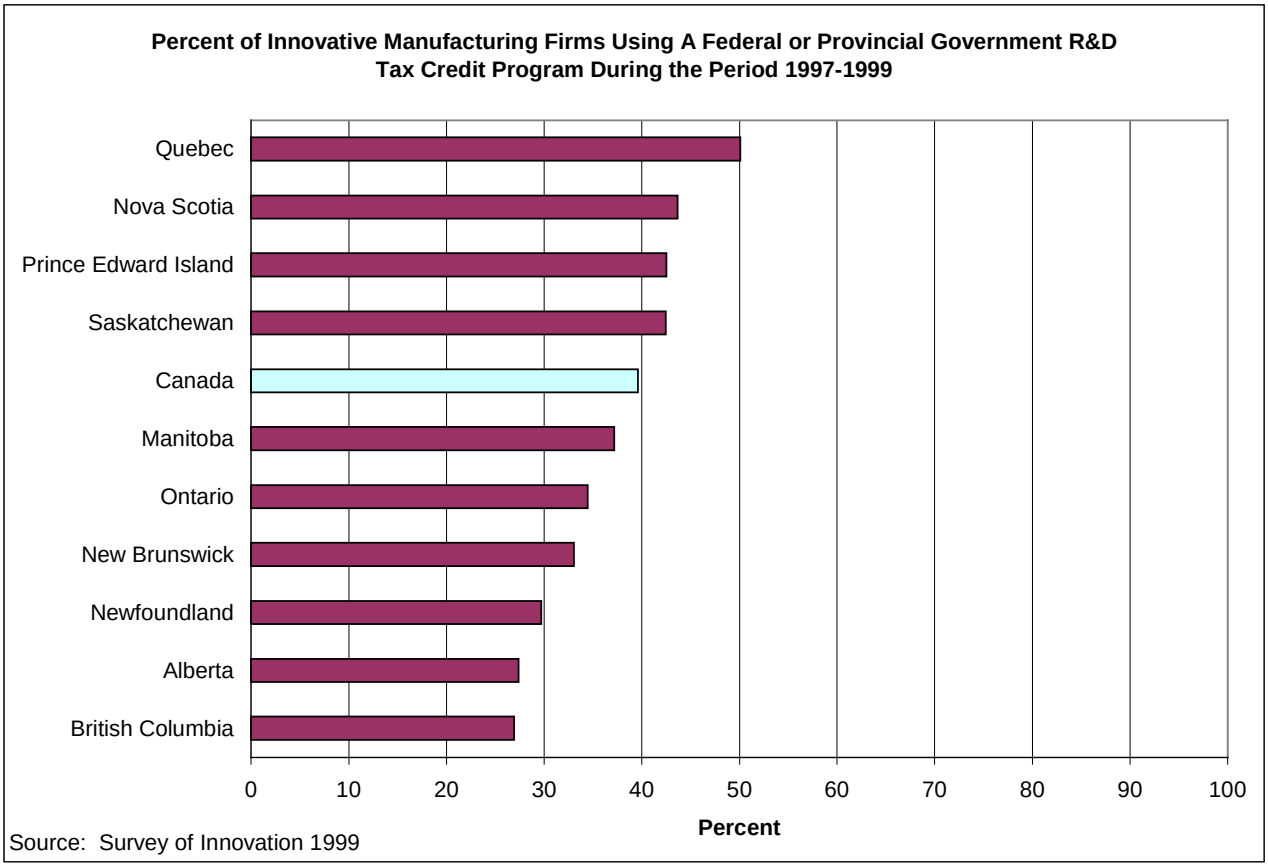
Three quarters of the innovative manufacturing firms in Prince Edward Island indicated that they used a program sponsored by either the federal or provincial government compared to just under half of innovative manufacturing firms in Alberta.



The most frequently used program by innovative manufacturing firms in Canada was research and development (R&D) tax credits sponsored by the federal or a provincial government (40%).

Research and development (R&D) tax credit programs sponsored by the federal or a provincial government were the most common types of programs used by innovative manufacturing firms in all provinces except in Newfoundland where government support for training was the most commonly used program (see Table 10, Annex 2).

Quebec had the highest percentage of firms using a federal or provincial government R&D tax credit program followed by Nova Scotia.



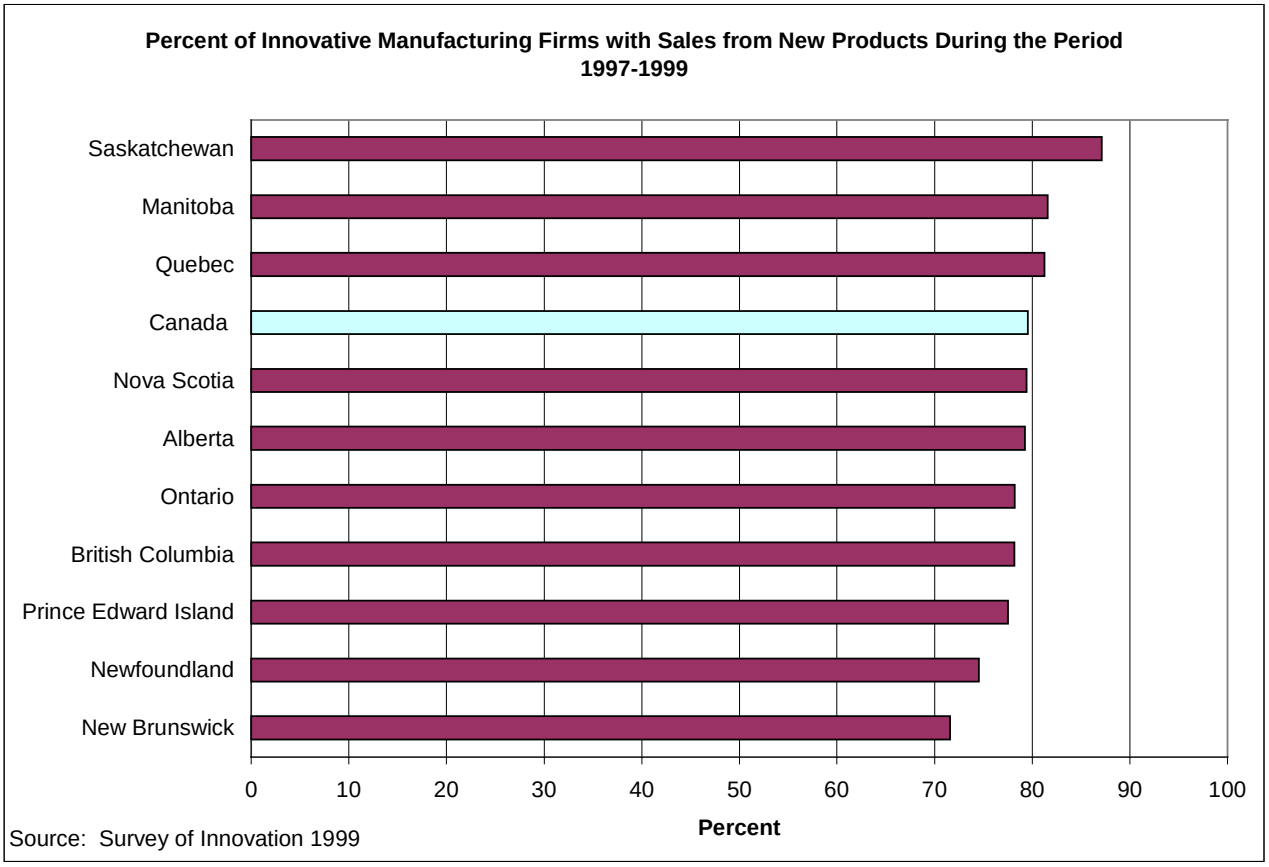
6. What is the result of innovation?

Impact of Innovation

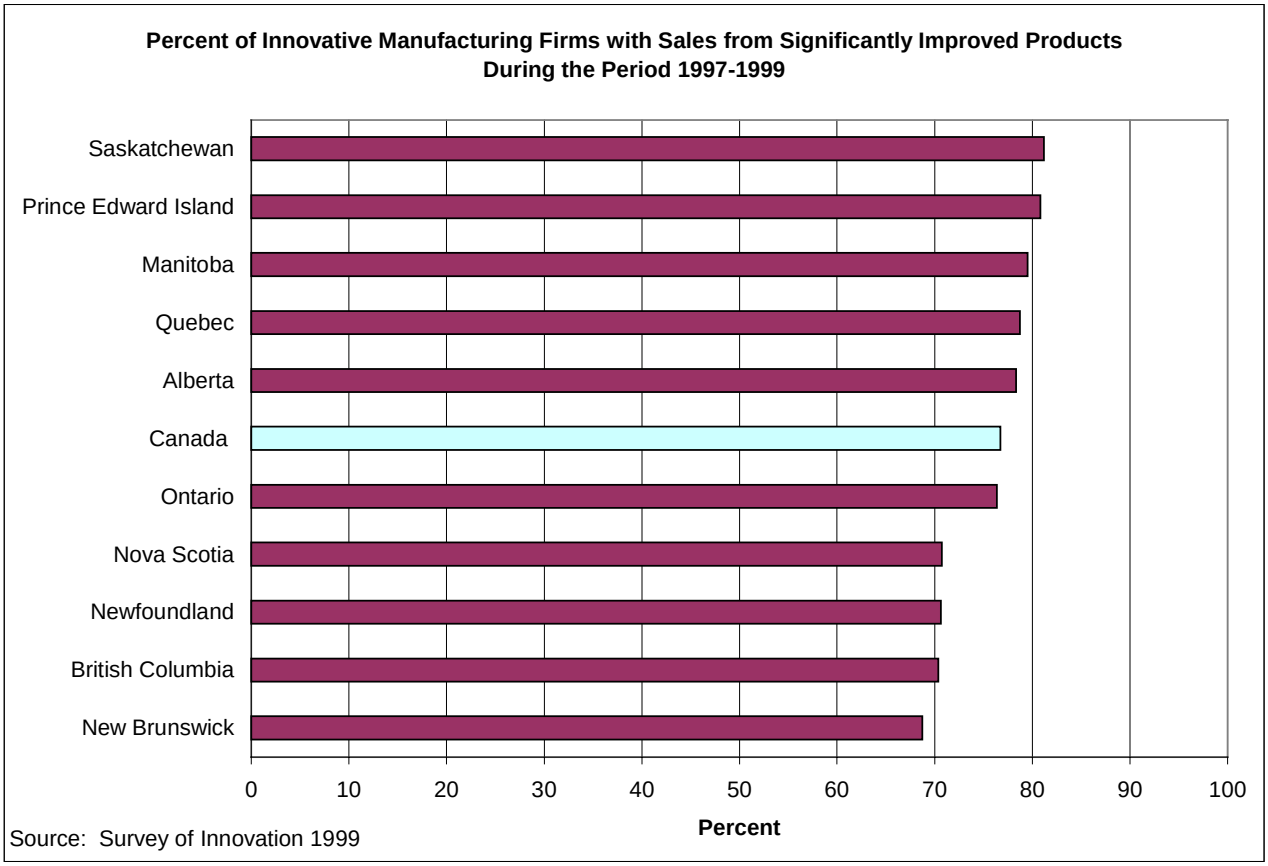
Approximately the same percentage of innovative manufacturing firms in Canada had sales from new products (80%) or significantly improved products (77%) introduced between 1997 and 1999.

At the provincial level, the percent of innovative manufacturing firms with sales from new products ranged from 72% to 87% and those with significantly improved products ranged from 69% to 81%.

Saskatchewan had the highest percentage of innovative manufacturing firms with sales from new products during the period 1997-1999, followed by Manitoba.



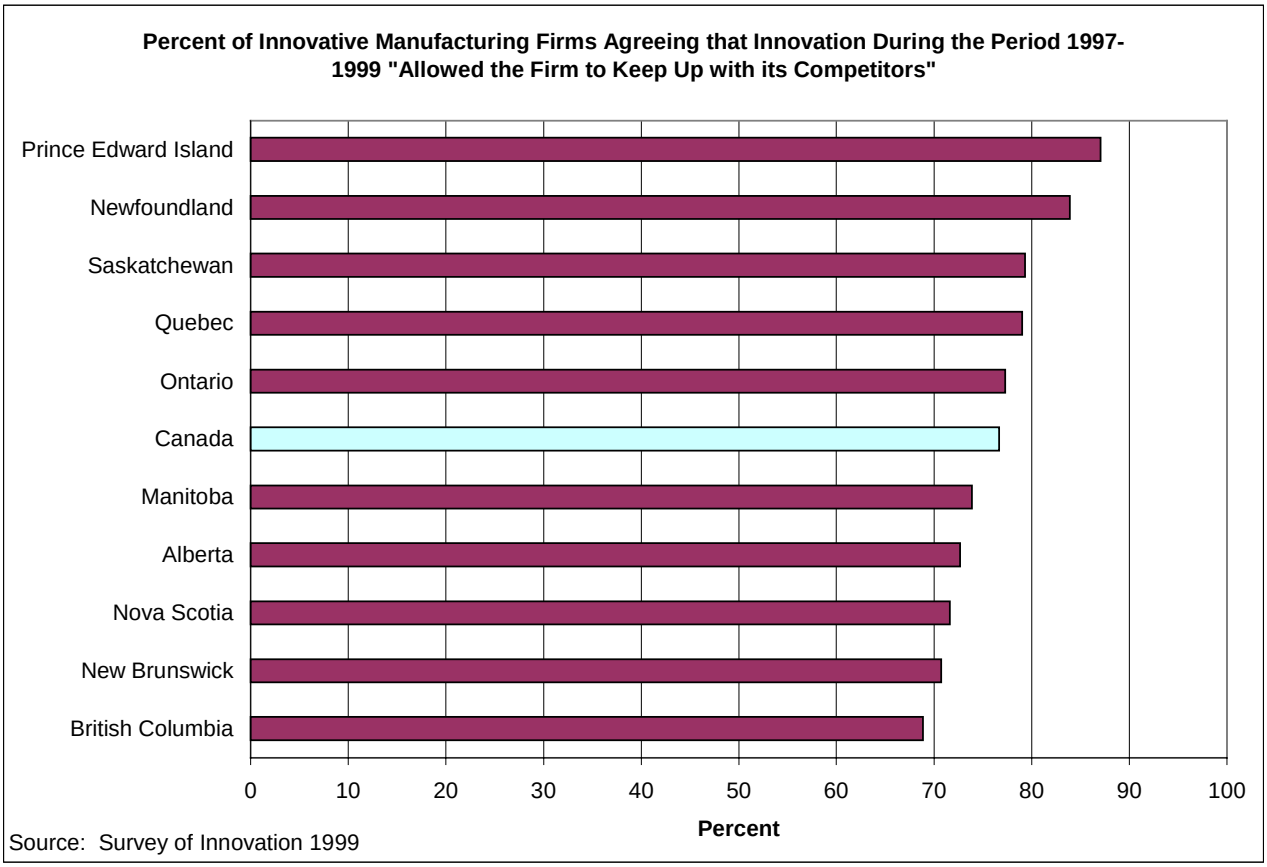
Saskatchewan had the highest percentage of innovative manufacturing firms with sales from significantly improved products during the period 1997-1999, followed by Prince Edward Island.



When innovative manufacturing firms in Canada were asked to indicate their agreement[4] to a list of important impacts of the new and significantly improved products and processes, over three-quarters (77%) agreed that it "allowed the firm to keep up its competitors".

This was the most commonly agreed upon impact of innovation for innovative manufacturing firms in all provinces with the exception of New Brunswick. Their most frequently agreed upon impact was that innovation "increased the firm's ability to adapt flexibly to different client demands" (see Table 12, Annex 2).

Prince Edward Island had the highest percentage of innovative manufacturing firms indicating that the impact of innovation was that it "allowed the firm to keep up with its competitors", followed by Newfoundland.



[4] Respondents responded using a scale from 1 to 5, where 1 is strongly disagree and 5 is strongly agree. "Agreeing" indicates a response of 4 or 5.


ELECTRONIC PUBLICATIONS AVAILABLE AT
www.statcan.ca

References

Hamdani, Daood, 2000. "Why Do the Surveys of Innovation and R&D Diverge?" in *Innovation Analysis Bulletin*, Vol. 2, No. 3, Statistics Canada Catalogue No. 88-003-XIE.

OECD/Eurostat, 1997. Proposed Guidelines for Collecting and Interpreting Technological Innovation Data (Oslo Manual), Paris.

Statistics Canada, 1998. North American Industry Classification System - NAICS Canada, Statistics Canada Catalogue No. 12-501-XPE.


ELECTRONIC PUBLICATIONS AVAILABLE AT
www.statcan.ca

Annex 1: Manufacturing Industry Stratification

The following tables contain the industry strata that were used in the sample selection process and the population and sample size. Industries are based on the 1997 North American Industry Classification System (NAICS) codes.

Population, Survey of Innovation 1999

Stratum Number	NAICS	Description	NF	PE	NS	NB	QC	ON	MB	SK	AB	BC	YT	NT	Total
7	311	Food Manufacturing	29	18	50	46	294	203	34	22	70	90	0	0	856
8	312	Beverage and Tobacco Product Manufacturing	3	2	5	6	32	22	3	3	10	13	0	0	99
9	313	Textile Mills	0	0	4	4	115	44	5	0	0	2	0	0	174
10	314	Textile Product Mills	0	1	5	2	55	46	7	2	9	12	0	0	139
11	315	Clothing Manufacturing	0	0	4	8	380	104	21	5	13	36	0	0	571
12	316	Leather and Allied Product Manufacturing	1	0	1	2	45	17	4	1	4	5	0	0	80
	321	Wood Product Manufacturing													
13	3211	Sawmills and Wood Preservation	6	2	16	15	133	25	5	6	14	67	0	1	290
14	3212	Veneer, Plywood and Engineered Wood Product Manufacturing	0	0	3	7	37	24	3	3	14	26	0	0	117
15	3219	Other Wood Product Manufacturing	0	1	5	8	125	81	7	3	22	53	0	0	305
16	322	Paper Manufacturing	4	1	8	14	106	100	11	4	16	35	0	0	299
17	323	Printing and Related Support Activities	1	1	12	7	189	233	27	9	46	73	0	0	598
18	324	Petroleum and Coal Products Manufacturing	1	0	3	3	13	16	3	3	8	7	0	0	57
	325	Chemical Manufacturing													
19	3251 + 3252 + 3253 + 3255 + 3256 + 3259	Basic Chemical Manufacturing + Resin, Synthetic Rubber, and Artificial and Synthetic Fibres and Filaments Manufacturing + Pesticide, Fertilizer and Other Agricultural Chemical Manufacturing + Paint, Coating and Adhesive Manufacturing + Soap, Cleaning Compound and Toilet Preparation Manufacturing + Other Chemical Product Manufacturing	1	3	3	8	153	162	13	7	39	29	0	0	418
20	3254	Pharmaceutical and Medicine Manufacturing	0	1	1	0	33	20	2	1	1	3	0	0	62
21	326	Plastics and Rubber Products Manufacturing	3	0	9	10	218	213	20	5	33	55	0	0	566
22	327	Non-Metallic Mineral Products Manufacturing	7	2	15	15	116	114	13	9	30	57	0	0	378
23	331	Primary Metal Manufacturing	0	1	2	3	73	92	15	4	16	21	0	0	227
24	332	Fabricated Metal Product Manufacturing	5	3	13	17	389	521	41	23	127	122	0	0	1261
	333	Machinery Manufacturing													
25	3331 + 3332	Agricultural, Construction and Mining Machinery Manufacturing + Industrial Machinery Manufacturing	0	1	2	4	87	62	9	17	40	22	0	0	244
26	3333 + 3334 + 3335 + 3336 + 3339	Commercial and Service Industry Machinery Manufacturing + Ventilation, Heating, Air-Conditioning and Commercial Refrigeration Equipment Manufacturing + Metalworking Machinery Manufacturing + Engine, Turbine, and Power Transmission Equipment Manufacturing + Other General Purpose Machinery Manufacturing	0	1	6	3	190	322	17	10	39	43	0	0	631
	334	Computer and Electronic Product Manufacturing													
27	3341	Computer and Peripheral Equipment Manufacturing	0	0	0	0	19	16	3	1	0	7	0	0	46
28	3342	Communications Equipment Manufacturing	1	0	0	1	27	21	2	0	7	9	0	0	68
29	3343	Audio and Video Equipment Manufacturing	0	0	0	0	0	6	0	0	0	0	0	0	6
30	3344	Semiconductor and other Electronic Equipment Manufacturing	0	0	1	1	24	19	0	0	3	4	0	0	52
31	3345 + 3346	Navigational, Measuring, Medical and Control Instruments Manufacturing + Manufacturing and Reproducing Magnetic and Optical Equipment	1	0	4	1	49	51	4	2	10	13	0	0	135
32	335	Electrical Equipment, Appliance and Component Manufacturing	0	0	4	1	84	95	4	3	12	19	0	0	222
	336	Transportation Equipment Manufacturing													
33	3361+ 3362 + 3363	Motor Vehicle Manufacturing + Motor Vehicle Body and Trailer Manufacturing + Motor Vehicle Parts Manufacturing	0	0	6	3	68	168	14	6	25	34	0	0	324
34	3364	Aerospace Product and Parts Manufacturing	0	3	3	0	30	22	4	0	3	7	0	0	72
35	3365 + 3366 + 3369	Railroad Rolling Stock Manufacturing + Ship and Boat Building + Other Transportation Equipment Manufacturing	2	1	9	1	22	19	2	1	0	23	0	0	80
36	337	Furniture and Related Product Manufacturing	1	1	3	8	219	153	18	6	44	47	0	0	500
37	339	Miscellaneous Manufacturing	3	0	9	8	140	160	14	4	35	52	0	1	426
	Total, Manufacturing Industries		**69**	**43**	**206**	**206**	**3465**	**3,151**	**325**	**160**	**690**	**986**	**0**	**2**	**9,303**

Sample, Survey of Innovation 1999

Stratum Number	NAICS	Description	NF	PE	NS	NB	QC	ON	MB	SK	AB	BC	YT	NT	Total
7	311	Food Manufacturing	17	18	17	17	246	94	17	22	52	62	0	0	562
8	312	Beverage and Tobacco Product Manufacturing	3	2	5	6	28	20	3	3	9	13	0	0	92
9	313	Textile Mills	0	0	3	4	94	33	4	0	0	1	0	0	139
10	314	Textile Product Mills	0	1	2	2	38	28	5	2	2	10	0	0	90
11	315	Clothing Manufacturing	0	0	3	6	232	66	14	5	7	31	0	0	364
12	316	Leather and Allied Product Manufacturing	1	0	1	1	35	12	2	1	2	3	0	0	58
	321	Wood Product Manufacturing													
13	3211	Sawmills and Wood Preservation	4	2	15	15	103	24	5	6	14	51	0	1	240
14	3212	Veneer, Plywood and Engineered Wood Product Manufacturing	0	0	2	6	27	19	3	3	14	26	0	0	100
15	3219	Other Wood Product Manufacturing	0	1	4	5	84	43	6	3	17	41	0	0	204
16	322	Paper Manufacturing	4	1	8	14	96	65	10	4	16	35	0	0	253
17	323	Printing and Related Support Activities	1	1	7	6	82	75	24	8	24	47	0	0	275
18	324	Petroleum and Coal Products Manufacturing	1	0	3	3	13	16	2	3	8	7	0	0	56
	325	Chemical Manufacturing													
19	3251 + 3252 + 3253 + 3255 + 3256 + 3259	Basic Chemical Manufacturing + Resin, Synthetic Rubber, and Artificial and Synthetic Fibres and Filaments Manufacturing + Pesticide, Fertilizer and Other Agricultural Chemical Manufacturing + Paint, Coating and Adhesive Manufacturing + Soap, Cleaning Compound and Toilet Preparation Manufacturing + Other Chemical Product Manufacturing	1	3	3	8	133	90	11	7	39	29	0	0	324
20	3254	Pharmaceutical and Medicine Manufacturing	0	1	1	0	28	20	2	1	1	3	0	0	57
21	326	Plastics and Rubber Products Manufacturing	3	0	9	10	148	100	20	5	33	43	0	0	371
22	327	Non-Metallic Mineral Products Manufacturing	7	2	13	15	90	60	11	8	26	44	0	0	276
23	331	Primary Metal Manufacturing	0	1	2	3	69	60	14	4	16	21	0	0	190
24	332	Fabricated Metal Product Manufacturing	4	3	8	15	224	120	15	15	67	71	0	0	542
	333	Machinery Manufacturing													
25	3331 + 3332	Agricultural, Construction and Mining Machinery Manufacturing + Industrial Machinery Manufacturing	0	1	1	4	59	50	8	17	35	21	0	0	196
26	3333 + 3334 + 3335 + 3336 + 3339	Commercial and Service Industry Machinery Manufacturing + Ventilation, Heating, Air-Conditioning and Commercial Refrigeration Equipment Manufacturing + Metalworking Machinery Manufacturing + Engine, Turbine, and Power Transmission Equipment Manufacturing + Other General Purpose Machinery Manufacturing	0	1	4	3	121	100	12	9	35	34	0	0	319
	334	Computer and Electronic Product Manufacturing													
27	3341	Computer and Peripheral Equipment Manufacturing	0	0	0	0	12	16	3	1	0	7	0	0	39
28	3342	Communications Equipment Manufacturing	1	0	0	1	21	21	2	0	5	9	0	0	60
29	3343	Audio and Video Equipment Manufacturing	0	0	0	0	0	6	0	0	0	0	0	0	6
30	3344	Semiconductor and other Electronic Equipment Manufacturing	0	0	1	1	18	19	0	0	3	4	0	0	46
31	3345 + 3346	Navigational, Measuring, Medical and Control Instruments Manufacturing + Manufacturing and Reproducing Magnetic and Optical Equipment	1	0	4	1	26	48	3	2	9	13	0	0	107
32	335	Electrical Equipment, Appliance and Component Manufacturing	0	0	4	1	68	57	4	3	11	19	0	0	167
	336	Transportation Equipment Manufacturing													
33	3361+ 3362 + 3363	Motor Vehicle Manufacturing + Motor Vehicle Body and Trailer Manufacturing + Motor Vehicle Parts Manufacturing	0	0	4	3	47	87	12	6	17	33	0	0	209
34	3364	Aerospace Product and Parts Manufacturing	0	3	3	0	21	16	4	0	3	7	0	0	57
35	3365 + 3366 + 3369	Railroad Rolling Stock Manufacturing + Ship and Boat Building + Other Transportation Equipment Manufacturing	2	1	4	1	19	10	1	1	0	19	0	0	58
36	337	Furniture and Related Product Manufacturing	1	1	3	7	116	70	9	4	31	33	0	0	275
37	339	Miscellaneous Manufacturing	1	0	6	5	84	60	5	3	13	34	0	1	212
	Total Manufacturing Industries		**52**	**43**	**140**	**163**	**2,382**	**1,505**	**231**	**146**	**509**	**771**	**0**	**2**	**5,944**

Annex 2: Statistical Tables

The reliability of the data has been assessed using the following convention:

Code	Rating	Standard Error
A	Very good	≤2.5%
B	Good	>2.5% and ≤7.5%
C	Good to poor- use with caution	>7.5 and ≤15%
D	Very poor- may not be acceptable	>15%

Symbols:

x confidential to meet secrecy requirements of the Statistics Act.


ELECTRONIC PUBLICATIONS AVAILABLE AT
www.statcan.ca

Table 1
Percent of Innovative Manufacturing Firms During the Period 1997 – 1999, by Province

	Innovators		Product Innovators		Process Innovators		Both Product and Process Innovators		Only Product Innovators		Only Process Innovators	
	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability
Canada	80.2	A	68.0	A	65.8	A	53.5	A	14.4	A	12.3	A
Newfoundland	77.1	B	59.0	B	65.2	B	47.2	B	11.9	B	18.1	A
Prince Edward Island	79.7	A	69.4	A	69.5	A	59.2	A	10.2	A	10.3	A
Nova Scotia	76.6	B	63.9	B	62.7	B	50.0	B	13.8	A	12.7	A
New Brunswick	73.9	B	58.4	B	61.3	B	45.8	B	12.6	A	15.5	A
Quebec	82.3	A	71.2	A	67.8	A	56.7	A	14.5	A	11.1	A
Ontario	83.1	A	69.6	A	69.7	A	56.3	A	13.3	A	13.4	A
Manitoba	73.3	A	62.7	A	57.3	A	46.8	A	16.0	A	10.6	A
Saskatchewan	74.3	A	64.7	A	59.1	A	49.6	A	15.1	A	9.6	A
Alberta	73.8	A	62.4	A	58.1	A	46.7	A	15.7	A	11.3	A
British Columbia	74.2	A	60.9	A	57.0	A	43.7	A	17.1	A	13.3	A

Source: Survey of Innovation 1999


ELECTRONIC PUBLICATIONS AVAILABLE AT
www.statcan.ca

Table 2
Sources of Information That Contributed to Innovation for Innovators in Manufacturing During the Period 1997 - 1999
Province by Source of Information

	Percent	Reliability
Canada		
Firms that used a source of information	96.1	A
Of these, % that used the following:		
Internal sources of information		
Research and development (R&D) staff	53.4	A
Marketing staff	66.4	A
Production staff	72.5	A
Management staff	76.9	A
Other internal source	14.7	A
External sources of information		
Related firms in your corporate group (e.g. parent or subsidiary)	35.9	A
Suppliers of equipment, material and components	65.4	A
Clients	65.4	A
Competitors	36.3	A
Consultancy firms	19.2	A
Universities and colleges	8.5	A
Federal government agencies and research laboratories (e.g. National Research Council of Canada)	8.7	A
Provincial agencies and research laboratories	5.6	A
Generally available sources of information		
Trade fairs and exhibitions	68.9	A
Internet or computer based information networks	38.2	A
Professional conferences, meetings and publications	51.1	A
Other sources of information	8.7	A

Source: Survey of Innovation 1999

Table 2 (continued)
Sources of Information That Contributed to Innovation for Innovators in Manufacturing During the Period 1997 - 1999
Province by Source of Information

	Percent	Reliability
Newfoundland		
Firms that used a source of information	91.6	A
Of these, % that used the following:		
Internal sources of information		
Research and development (R&D) staff	47.0	B
Marketing staff	55.3	B
Production staff	86.6	B
Management staff	91.6	B
Other internal source	2.3	A
External sources of information		
Related firms in your corporate group (e.g. parent or subsidiary)	54.2	B
Suppliers of equipment, material and components	88.9	B
Clients	50.4	B
Competitors	27.9	B
Consultancy firms	30.1	B
Universities and colleges	8.4	B
Federal government agencies and research laboratories (e.g. National Research Council of Canada)	12.6	B
Provincial agencies and research laboratories	27.5	B
Generally available sources of information		
Trade fairs and exhibitions	63.8	B
Internet or computer based information networks	44.7	B
Professional conferences, meetings and publications	63.7	B
Other sources of information	8.8	B

Source: Survey of Innovation 1999

Table 2 (continued)
Sources of Information That Contributed to Innovation for Innovators in Manufacturing During the Period 1997 - 1999
Province by Source of Information

	Percent	Reliability
Prince Edward Island		
Firms that used a source of information	100.0	A
Of these, % that used the following:		
Internal sources of information		
Research and development (R&D) staff	58.4	A
Marketing staff	74.5	A
Production staff	67.7	A
Management staff	93.3	A
Other internal source	19.6	A
External sources of information		
Related firms in your corporate group (e.g. parent or subsidiary)	41.6	A
Suppliers of equipment, material and components	64.7	A
Clients	87.2	A
Competitors	39.0	A
Consultancy firms	25.9	A
Universities and colleges	19.2	A
Federal government agencies and research laboratories (e.g. National Research Council of Canada)	26.1	A
Provincial agencies and research laboratories	25.7	A
Generally available sources of information		
Trade fairs and exhibitions	58.2	A
Internet or computer based information networks	38.4	A
Professional conferences, meetings and publications	51.8	A
Other sources of information	16.3	A

Source: Survey of Innovation 1999

Table 2 (continued)
Sources of Information That Contributed to Innovation for Innovators in Manufacturing During the Period 1997 - 1999
Province by Source of Information

	Percent	Reliability
Nova Scotia		
Firms that used a source of information	96.6	A
Of these, % that used the following:		
Internal sources of information		
Research and development (R&D) staff	50.5	B
Marketing staff	68.3	B
Production staff	85.1	A
Management staff	86.1	A
Other internal source	13.5	A
External sources of information		
Related firms in your corporate group (e.g. parent or subsidiary)	44.8	B
Suppliers of equipment, material and components	74.2	B
Clients	64.2	B
Competitors	45.0	B
Consultancy firms	24.5	A
Universities and colleges	7.8	A
Federal government agencies and research laboratories (e.g. National Research Council of Canada)	16.5	A
Provincial agencies and research laboratories	15.7	A
Generally available sources of information		
Trade fairs and exhibitions	76.2	B
Internet or computer based information networks	47.7	B
Professional conferences, meetings and publications	56.5	B
Other sources of information	7.7	A

Source: Survey of Innovation 1999

Table 2 (continued)
Sources of Information That Contributed to Innovation for Innovators in Manufacturing During the Period 1997 - 1999
Province by Source of Information

	Percent	Reliability
New Brunswick		
Firms that used a source of information	99.1	A
Of these, % that used the following:		
Internal sources of information		
Research and development (R&D) staff	47.6	B
Marketing staff	60.7	A
Production staff	64.7	B
Management staff	84.7	A
Other internal source	8.3	A
External sources of information		
Related firms in your corporate group (e.g. parent or subsidiary)	37.2	B
Suppliers of equipment, material and components	67.6	B
Clients	65.5	A
Competitors	38.4	A
Consultancy firms	28.1	B
Universities and colleges	9.7	A
Federal government agencies and research laboratories (e.g. National Research Council of Canada)	17.2	B
Provincial agencies and research laboratories	15.1	B
Generally available sources of information		
Trade fairs and exhibitions	71.1	A
Internet or computer based information networks	38.6	B
Professional conferences, meetings and publications	52.6	B
Other sources of information	5.4	A

Source: Survey of Innovation 1999

Table 2 (continued)
Sources of Information That Contributed to Innovation for Innovators in Manufacturing During the Period 1997 - 1999
Province by Source of Information

	Percent	Reliability
Quebec		
Firms that used a source of information	94.1	A
Of these, % that used the following:		
Internal sources of information		
Research and development (R&D) staff	56.4	A
Marketing staff	71.5	A
Production staff	73.6	A
Management staff	65.8	A
Other internal source	12.1	A
External sources of information		
Related firms in your corporate group (e.g. parent or subsidiary)	31.5	A
Suppliers of equipment, material and components	63.2	A
Clients	68.4	A
Competitors	35.1	A
Consultancy firms	18.7	A
Universities and colleges	9.6	A
Federal government agencies and research laboratories (e.g. National Research Council of Canada)	10.6	A
Provincial agencies and research laboratories	6.9	A
Generally available sources of information		
Trade fairs and exhibitions	71.7	A
Internet or computer based information networks	37.5	A
Professional conferences, meetings and publications	50.3	A
Other sources of information	7.5	A

Source: Survey of Innovation 1999

Table 2 (continued)
Sources of Information That Contributed to Innovation for Innovators in Manufacturing During the Period 1997 - 1999
Province by Source of Information

	Percent	Reliability
Ontario		
Firms that used a source of information	99.6	A
Of these, % that used the following:		
Internal sources of information		
Research and development (R&D) staff	54.5	A
Marketing staff	65.7	A
Production staff	71.8	A
Management staff	83.5	A
Other internal source	17.4	A
External sources of information		
Related firms in your corporate group (e.g. parent or subsidiary)	42.2	A
Suppliers of equipment, material and components	68.9	A
Clients	64.6	A
Competitors	36.4	A
Consultancy firms	19.3	A
Universities and colleges	8.6	A
Federal government agencies and research laboratories (e.g. National Research Council of Canada)	6.3	A
Provincial agencies and research laboratories	2.9	A
Generally available sources of information		
Trade fairs and exhibitions	69.4	A
Internet or computer based information networks	39.5	A
Professional conferences, meetings and publications	51.2	A
Other sources of information	9.7	A

Source: Survey of Innovation 1999

Table 2 (continued)
Sources of Information That Contributed to Innovation for Innovators in Manufacturing During the Period 1997 - 1999
Province by Source of Information

	Percent	Reliability
Manitoba		
Firms that used a source of information	91.2	A
Of these, % that used the following:		
Internal sources of information		
Research and development (R&D) staff	57.8	B
Marketing staff	59.1	B
Production staff	74.8	A
Management staff	86.8	A
Other internal source	14.1	A
External sources of information		
Related firms in your corporate group (e.g. parent or subsidiary)	32.5	B
Suppliers of equipment, material and components	64.4	B
Clients	63.7	B
Competitors	38.5	B
Consultancy firms	22.8	B
Universities and colleges	7.4	A
Federal government agencies and research laboratories (e.g. National Research Council of Canada)	7.7	A
Provincial agencies and research laboratories	7.8	A
Generally available sources of information		
Trade fairs and exhibitions	64.4	B
Internet or computer based information networks	27.9	B
Professional conferences, meetings and publications	49.8	B
Other sources of information	10.8	A

Source: Survey of Innovation 1999

Table 2 (continued)
Sources of Information That Contributed to Innovation for Innovators in Manufacturing During the Period 1997 - 1999
Province by Source of Information

	Percent	Reliability
Saskatchewan		
Firms that used a source of information	91.8	A
Of these, % that used the following:		
Internal sources of information		
Research and development (R&D) staff	56.6	A
Marketing staff	62.9	A
Production staff	75.4	A
Management staff	87.2	A
Other internal source	18.1	A
External sources of information		
Related firms in your corporate group (e.g. parent or subsidiary)	37.9	A
Suppliers of equipment, material and components	59.6	A
Clients	63.9	A
Competitors	40.6	A
Consultancy firms	23.2	A
Universities and colleges	15.1	A
Federal government agencies and research laboratories (e.g. National Research Council of Canada)	13.6	A
Provincial agencies and research laboratories	9.7	A
Generally available sources of information		
Trade fairs and exhibitions	66.1	A
Internet or computer based information networks	47.7	A
Professional conferences, meetings and publications	62.4	A
Other sources of information	6.4	A

Source: Survey of Innovation 1999

Table 2 (continued)
Sources of Information That Contributed to Innovation for Innovators in Manufacturing During the Period 1997 - 1999
Province by Source of Information

	Percent	Reliability
Alberta		
Firms that used a source of information	92.8	A
Of these, % that used the following:		
Internal sources of information		
Research and development (R&D) staff	48.4	A
Marketing staff	59.3	A
Production staff	70.9	A
Management staff	79.8	A
Other internal source	11.0	A
External sources of information		
Related firms in your corporate group (e.g. parent or subsidiary)	30.7	A
Suppliers of equipment, material and components	63.6	A
Clients	61.1	A
Competitors	35.3	A
Consultancy firms	19.8	A
Universities and colleges	4.7	A
Federal government agencies and research laboratories (e.g. National Research Council of Canada)	6.3	A
Provincial agencies and research laboratories	4.0	A
Generally available sources of information		
Trade fairs and exhibitions	57.6	A
Internet or computer based information networks	34.4	A
Professional conferences, meetings and publications	51.3	A
Other sources of information	6.3	A

Source: Survey of Innovation 1999

Table 2 (continued)
Sources of Information That Contributed to Innovation for Innovators in Manufacturing During the Period 1997 - 1999
Province by Source of Information

	Percent	Reliability
British Columbia		
Firms that used a source of information	96.0	A
Of these, % that used the following:		
Internal sources of information		
Research and development (R&D) staff	41.4	A
Marketing staff	58.0	A
Production staff	68.5	A
Management staff	82.7	A
Other internal source	18.7	A
External sources of information		
Related firms in your corporate group (e.g. parent or subsidiary)	30.6	A
Suppliers of equipment, material and components	59.7	A
Clients	61.0	A
Competitors	38.0	A
Consultancy firms	14.9	A
Universities and colleges	5.8	A
Federal government agencies and research laboratories (e.g. National Research Council of Canada)	7.0	A
Provincial agencies and research laboratories	4.0	A
Generally available sources of information		
Trade fairs and exhibitions	64.4	A
Internet or computer based information networks	37.5	A
Professional conferences, meetings and publications	50.4	A
Other sources of information	11.4	A

Source: Survey of Innovation 1999

Table 3
Percentage of Innovative Manufacturing Firms Engaged In Activities Linked To Product or Process Innovation During the Period 1997 – 1999, by Province

	Activity Linked to Innovation									
	Research and Development		Acquisition of Process Equipment		Industrial Design + Engineering		Tooling Up and Production Start-up		Training	
	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability
Canada	76.9	A	85.5	A	64.7	A	70.8	A	81.3	A
Newfoundland	68.9	B	92.0	A	71.3	B	72.0	B	92.0	A
Prince Edward Island	87.2	A	87.4	A	54.5	A	68.2	A	77.4	A
Nova Scotia	73.8	B	90.8	A	60.3	B	72.6	B	82.7	B
New Brunswick	73.3	A	79.9	B	61.1	B	69.1	B	79.2	B
Quebec	81.3	A	85.1	A	66.9	A	71.7	A	79.8	A
Ontario	75.7	A	87.4	A	64.7	A	70.9	A	84.0	A
Manitoba	70.1	B	88.8	A	69.7	B	72.7	A	82.4	A
Saskatchewan	76.8	A	88.8	A	64.5	A	71.7	A	77.0	A
Alberta	72.6	A	82.7	A	61.5	A	70.5	A	83.0	A
British Columbia	70.7	A	80.8	A	58.8	A	66.5	A	76.5	A

Source: Survey of Innovation 1999

Table 4
Research and Development by Innovators in Manufacturing During the Period 1997 – 1999
Province by R&D Activity

	Percent	Reliability
Canada		
Firms who undertook R&D activities	67.5	A
Of these, % for whom R&D is:		
Carried out by a separate and distinct R&D department	45.2	A
Contracted out to other firms	28.5	A
Both carried out by a separate and distinct R&D department and contracted out to other firms	15.6	A
Only carried out by a separate and distinct R&D department	29.6	A
Only contracted out to other firms	12.9	A
Neither carried out by a separate and distinct R&D department nor contracted out to other firms	41.9	A
Newfoundland		
Firms who undertook R&D activities	72.4	B
Of these, % for whom R&D is:		
Carried out by a separate and distinct R&D department	53.1	B
Contracted out to other firms	40.1	B
Both carried out by a separate and distinct R&D department and contracted out to other firms	18.4	B
Only carried out by a separate and distinct R&D department	34.8	B
Only contracted out to other firms	21.7	B
Neither carried out by a separate and distinct R&D department nor contracted out to other firms	25.1	B
Prince Edward Island		
Firms who undertook R&D activities	77.8	A
Of these, % for whom R&D is:		
Carried out by a separate and distinct R&D department	37.5	A
Contracted out to other firms	46.1	A
Both carried out by a separate and distinct R&D department and contracted out to other firms	20.9	A
Only carried out by a separate and distinct R&D department	16.6	A
Only contracted out to other firms	25.2	A
Neither carried out by a separate and distinct R&D department nor contracted out to other firms	37.3	A
Nova Scotia		
Firms who undertook R&D activities	68.5	B
Of these, % for whom R&D is:		
Carried out by a separate and distinct R&D department	46.2	B
Contracted out to other firms	31.7	B
Both carried out by a separate and distinct R&D department and contracted out to other firms	17.4	B
Only carried out by a separate and distinct R&D department	28.8	B
Only contracted out to other firms	14.3	B
Neither carried out by a separate and distinct R&D department nor contracted out to other firms	39.5	B

Source: Survey of Innovation 1999

Table 4 (continued)
Research and Development by Innovators in Manufacturing During the Period 1997 - 1999
Province by R&D Activity

	Percent	Reliability
New Brunswick		
Firms who undertook R&D activities	67.4	A
Of these, % for whom R&D is:		
Carried out by a separate and distinct R&D department	38.3	B
Contracted out to other firms	30.8	B
Both carried out by a separate and distinct R&D department and contracted out to other firms	15.7	B
Only carried out by a separate and distinct R&D department	22.6	B
Only contracted out to other firms	15.1	A
Neither carried out by a separate and distinct R&D department nor contracted out to other firms	46.6	B
Quebec		
Firms who undertook R&D activities	67.4	A
Of these, % for whom R&D is:		
Carried out by a separate and distinct R&D department	38.6	A
Contracted out to other firms	26.9	A
Both carried out by a separate and distinct R&D department and contracted out to other firms	14.0	A
Only carried out by a separate and distinct R&D department	24.6	A
Only contracted out to other firms	12.8	A
Neither carried out by a separate and distinct R&D department nor contracted out to other firms	48.6	A
Ontario		
Firms who undertook R&D activities	69.7	A
Of these, % for whom R&D is:		
Carried out by a separate and distinct R&D department	52.1	A
Contracted out to other firms	28.3	A
Both carried out by a separate and distinct R&D department and contracted out to other firms	17.4	A
Only carried out by a separate and distinct R&D department	34.7	A
Only contracted out to other firms	10.9	A
Neither carried out by a separate and distinct R&D department nor contracted out to other firms	37.0	A
Manitoba		
Firms who undertook R&D activities	71.7	B
Of these, % for whom R&D is:		
Carried out by a separate and distinct R&D department	44.5	B
Contracted out to other firms	31.6	B
Both carried out by a separate and distinct R&D department and contracted out to other firms	12.3	A
Only carried out by a separate and distinct R&D department	32.1	B
Only contracted out to other firms	19.2	B
Neither carried out by a separate and distinct R&D department nor contracted out to other firms	36.3	B

Source: Survey of Innovation 1999

Table 4 (continued)
Research and Development by Innovators in Manufacturing During the Period 1997 - 1999
Province by R&D Activity

	Percent	Reliability
Saskatchewan		
Firms who undertook R&D activities	67.1	A
Of these, % for whom R&D is:		
Carried out by a separate and distinct R&D department	53.7	A
Contracted out to other firms	33.4	A
Both carried out by a separate and distinct R&D department and contracted out to other firms	20.4	A
Only carried out by a separate and distinct R&D department	33.3	A
Only contracted out to other firms	13.0	A
Neither carried out by a separate and distinct R&D department nor contracted out to other firms	33.3	A
Alberta		
Firms who undertook R&D activities	64.0	A
Of these, % for whom R&D is:		
Carried out by a separate and distinct R&D department	48.8	A
Contracted out to other firms	36.1	A
Both carried out by a separate and distinct R&D department and contracted out to other firms	19.0	A
Only carried out by a separate and distinct R&D department	29.8	A
Only contracted out to other firms	17.1	A
Neither carried out by a separate and distinct R&D department nor contracted out to other firms	34.1	A
British Columbia		
Firms who undertook R&D activities	61.0	A
Of these, % for whom R&D is:		
Carried out by a separate and distinct R&D department	43.4	A
Contracted out to other firms	25.4	A
Both carried out by a separate and distinct R&D department and contracted out to other firms	12.0	A
Only carried out by a separate and distinct R&D department	31.4	A
Only contracted out to other firms	13.4	A
Neither carried out by a separate and distinct R&D department nor contracted out to other firms	43.2	A

Source: Survey of Innovation 1999

Table 5
Cooperative and Collaborative Arrangements of Innovators in Manufacturing During the Period 1997 – 1999, by Province

	Percent	Reliability
Canada		
% Having Cooperative or Collaborative Arrangements	33.0	A
Reasons for Having Arrangements		
Sharing costs	41.5	A
Spreading risk	26.8	A
Accessing research and development R&D	52.2	A
Prototype development	47.9	A
Scaling-up production processes	24.3	A
Accessing critical expertise	55.1	A
Accessing new markets	44.5	A
Accessing new distribution channels	25.6	A
Other	6.0	A
Newfoundland		
% Having Cooperative or Collaborative Arrangements	x	x
Reasons for Having Arrangements		
Sharing costs	x	x
Spreading risk	x	x
Accessing research and development R&D	x	x
Prototype development	x	x
Scaling-up production processes	x	x
Accessing critical expertise	x	x
Accessing new markets	x	x
Accessing new distribution channels	x	x
Other	x	x
Prince Edward Island		
% Having Cooperative or Collaborative Arrangements	35.5	A
Reasons for Having Arrangements		
Sharing costs	18.2	A
Spreading risk	35.9	A
Accessing research and development R&D	63.5	A
Prototype development	72.4	B
Scaling-up production processes	36.5	A
Accessing critical expertise	81.8	A
Accessing new markets	44.8	A
Accessing new distribution channels	18.2	A
Other	0.0	A

Source: Survey of Innovation 1999

Table 5 (continued)
Cooperative and Collaborative Arrangements of Innovators in Manufacturing During the Period 1997 – 1999, by Province

	Percent	Reliability
Nova Scotia		
% Having Cooperative or Collaborative Arrangements	39.3	B
Reasons for Having Arrangements		
Sharing costs	38.8	B
Spreading risk	24.4	B
Accessing research and development R&D	55.9	B
Prototype development	57.2	B
Scaling-up production processes	27.1	B
Accessing critical expertise	67.9	B
Accessing new markets	45.0	B
Accessing new distribution channels	27.0	B
Other	6.6	B
New Brunswick		
% Having Cooperative or Collaborative Arrangements	32.6	B
Reasons for Having Arrangements		
Sharing costs	57.9	B
Spreading risk	30.9	B
Accessing research and development R&D	45.5	B
Prototype development	32.2	B
Scaling-up production processes	33.2	B
Accessing critical expertise	56.5	B
Accessing new markets	51.0	B
Accessing new distribution channels	30.9	B
Other	9.8	A
Quebec		
% Having Cooperative or Collaborative Arrangements	28.3	A
Reasons for Having Arrangements		
Sharing costs	42.0	A
Spreading risk	22.5	A
Accessing research and development R&D	53.3	A
Prototype development	36.5	A
Scaling-up production processes	16.4	A
Accessing critical expertise	51.2	A
Accessing new markets	48.9	A
Accessing new distribution channels	24.4	A
Other	5.5	A

Source: Survey of Innovation 1999

Table 5 (continued)
Cooperative and Collaborative Arrangements of Innovators in Manufacturing During the Period 1997 – 1999, by Province

	Percent	Reliability
Ontario		
% Having Cooperative or Collaborative Arrangements	39.5	A
Reasons for Having Arrangements		
Sharing costs	39.8	A
Spreading risk	28.8	A
Accessing research and development R&D	52.8	A
Prototype development	57.5	A
Scaling-up production processes	32.1	A
Accessing critical expertise	56.0	A
Accessing new markets	41.7	A
Accessing new distribution channels	26.6	A
Other	5.2	A
Manitoba		
% Having Cooperative or Collaborative Arrangements	32.5	B
Reasons for Having Arrangements		
Sharing costs	46.9	B
Spreading risk	37.9	B
Accessing research and development R&D	60.5	B
Prototype development	47.0	B
Scaling-up production processes	25.3	B
Accessing critical expertise	77.6	B
Accessing new markets	33.8	B
Accessing new distribution channels	11.2	B
Other	5.7	B
Saskatchewan		
% Having Cooperative or Collaborative Arrangements	26.5	A
Reasons for Having Arrangements		
Sharing costs	58.7	B
Spreading risk	43.8	B
Accessing research and development R&D	47.5	B
Prototype development	31.4	B
Scaling-up production processes	17.5	B
Accessing critical expertise	45.5	B
Accessing new markets	57.5	B
Accessing new distribution channels	37.0	B
Other	6.6	A

Source: Survey of Innovation 1999

Table 5 (continued)
Cooperative and Collaborative Arrangements of Innovators in Manufacturing During the Period 1997 – 1999, by Province

	Percent	Reliability
Alberta		
% Having Cooperative or Collaborative Arrangements	27.0	A
Reasons for Having Arrangements		
Sharing costs	47.6	B
Spreading risk	38.8	B
Accessing research and development R&D	48.8	B
Prototype development	45.6	B
Scaling-up production processes	19.0	A
Accessing critical expertise	52.9	B
Accessing new markets	41.4	B
Accessing new distribution channels	26.5	B
Other	7.9	A
British Columbia		
% Having Cooperative or Collaborative Arrangements	33.6	A
Reasons for Having Arrangements		
Sharing costs	38.3	A
Spreading risk	20.2	A
Accessing research and development R&D	45.8	A
Prototype development	48.7	A
Scaling-up production processes	17.6	A
Accessing critical expertise	55.4	A
Accessing new markets	43.1	A
Accessing new distribution channels	25.2	A
Other	9.0	A

Source: Survey of Innovation 1999

Table 6
Methods Used by Innovators in Manufacturing to Protect Intellectual Property During the Period 1997 - 1999
Province by Method

	Percent	Reliability
Canada		
Firms that protected intellectual property	72.6	A
Of these, % that used:		
Patents	40.3	A
Trademarks	54.8	A
Copyrights	18.8	A
Confidentiality agreements	66.7	A
Trade secrets	39.1	A
Other	3.7	A
Newfoundland		
Firms that protected intellectual property	61.9	B
Of these, % that used:		
Patents	31.6	B
Trademarks	57.6	B
Copyrights	19.2	B
Confidentiality agreements	66.7	B
Trade secrets	42.4	B
Other	0.0	A
Prince Edward Island		
Firms that protected intellectual property	81.0	A
Of these, % that used:		
Patents	35.4	A
Trademarks	55.9	A
Copyrights	15.8	A
Confidentiality agreements	76.5	A
Trade secrets	40.0	A
Other	0.0	A
Nova Scotia		
Firms that protected intellectual property	72.7	A
Of these, % that used:		
Patents	30.9	B
Trademarks	45.4	B
Copyrights	17.7	B
Confidentiality agreements	69.0	B
Trade secrets	48.8	B
Other	5.7	A

Source: Survey of Innovation 1999

Table 6 (continued)
Methods Used by Innovators in Manufacturing to Protect Intellectual Property During the Period 1997 - 1999
Province by Method

	Percent	Reliability
New Brunswick		
Firms that protected intellectual property	64.6	A
Of these, % that used:		
Patents	23.6	A
Trademarks	56.6	B
Copyrights	12.1	A
Confidentiality agreements	70.5	B
Trade secrets	40.3	B
Other	2.6	A
Quebec		
Firms that protected intellectual property	69.5	A
Of these, % that used:		
Patents	32.8	A
Trademarks	59.9	A
Copyrights	11.7	A
Confidentiality agreements	57.9	A
Trade secrets	33.5	A
Other	2.6	A
Ontario		
Firms that protected intellectual property	78.6	A
Of these, % that used:		
Patents	49.9	A
Trademarks	52.1	A
Copyrights	24.7	A
Confidentiality agreements	74.7	A
Trade secrets	42.5	A
Other	4.8	A
Manitoba		
Firms that protected intellectual property	70.5	A
Of these, % that used:		
Patents	39.9	B
Trademarks	47.3	B
Copyrights	21.4	B
Confidentiality agreements	63.8	B
Trade secrets	36.7	B
Other	5.1	A

Source: Survey of Innovation 1999

Table 6 (continued)
Methods Used by Innovators in Manufacturing to Protect Intellectual Property During the Period 1997 - 1999
Province by Method

	Percent	Reliability
Saskatchewan		
Firms that protected intellectual property	66.0	A
Of these, % that used:		
Patents	52.8	A
Trademarks	59.5	A
Copyrights	32.5	A
Confidentiality agreements	69.8	A
Trade secrets	40.6	A
Other	1.9	A
Alberta		
Firms that protected intellectual property	74.3	A
Of these, % that used:		
Patents	42.8	A
Trademarks	53.2	A
Copyrights	26.5	A
Confidentiality agreements	66.6	A
Trade secrets	45.7	A
Other	2.2	A
British Columbia		
Firms that protected intellectual property	66.1	A
Of these, % that used:		
Patents	32.9	A
Trademarks	49.7	A
Copyrights	15.6	A
Confidentiality agreements	68.4	A
Trade secrets	40.0	A
Other	4.5	A

Source: Survey of Innovation 1999

Table 7
Application for Patents in Canada and the United States by Innovators in Manufacturing During the Period 1997 – 1999, by Province

	Applied For At Least One Patent		Of These, % That Applied For Patents In:											
			Canada		United States		Both Canada and the United States		Canada Only		United States Only		Neither Canada nor the United States	
	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability
Canada	22.4	A	85.2	A	75.4	A	65.8	A	19.5	A	9.6	A	5.1	A
Newfoundland	13.6	B	x	x	x	x	x	x	x	x	x	x	x	x
Prince Edward Island	19.0	A	x	x	x	x	x	x	x	x	x	x	x	x
Nova Scotia	13.4	A	85.4	B	68.3	B	58.5	C	26.8	B	9.8	B	4.9	A
New Brunswick	9.4	A	92.3	A	50.1	B	42.5	B	49.9	B	7.7	A	0.0	A
Quebec	16.9	A	87.8	A	70.4	A	64.3	A	23.5	A	6.1	A	6.1	A
Ontario	30.8	A	82.9	A	79.7	A	68.3	A	14.6	A	11.4	A	5.7	A
Manitoba	23.3	A	95.8	A	75.2	B	71.1	B	24.8	B	4.2	A	0.0	A
Saskatchewan	22.8	A	96.1	A	65.4	B	65.4	B	30.8	B	0.0	A	3.9	A
Alberta	24.0	A	80.4	A	73.8	B	59.9	B	20.5	B	13.9	A	5.7	A
British Columbia	17.6	A	85.4	A	79.7	B	66.2	B	19.2	B	13.6	A	1.1	A

Source: Survey of Innovation 1999

Table 8
Objectives of Innovation for Innovators in Manufacturing During the Period 1997 - 1999
Province by Objective

	Relevant		Importance									
			Low		Moderately Low		Medium		Moderately High		High	
	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability
Canada												
Productivity												
To reduce labour costs	93.7	A	9.9	A	9.6	A	17.9	A	25.4	A	37.3	A
To increase production capacity	95.6	A	4.2	A	6.0	A	11.0	A	29.3	A	49.5	A
To reduce production time	93.7	A	6.1	A	7.3	A	15.4	A	30.1	A	41.1	A
To improve production flexibility	94.3	A	4.6	A	7.6	A	18.3	A	32.9	A	36.6	A
Product												
To extend product range	94.0	A	3.4	A	5.3	A	15.2	A	29.4	A	46.8	A
To improve product quality	96.3	A	1.4	A	2.7	A	10.2	A	31.6	A	54.1	A
To increase speed of delivering products to the market	93.6	A	5.6	A	7.9	A	18.5	A	25.6	A	42.4	A
To replace products being phased out	82.8	A	16.8	A	16.7	A	22.0	A	21.6	A	23.0	A
Other												
To reduce materials consumption	82.5	A	18.3	A	17.3	A	21.7	A	21.5	A	21.2	A
To reduce environmental damage	74.7	A	24.8	A	19.5	A	22.5	A	17.2	A	16.0	A
To reduce energy consumption	79.9	A	24.3	A	21.4	A	25.6	A	16.7	A	12.0	A
To deal with or to respond to new government regulations	71.0	A	31.3	A	20.6	A	23.0	A	13.1	A	12.1	A

Source: Survey of Innovation 1999

Table 8 (continued)
Objectives of Innovation for Innovators in Manufacturing During the Period 1997 - 1999
Province by Objective

	Relevant		Importance									
			Low		Moderately Low		Medium		Moderately High		High	
	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability
Newfoundland												
Productivity												
To reduce labour costs	100.0	A	8.0	A	5.6	A	25.2	B	14.0	B	47.2	B
To increase production capacity	97.9	A	6.8	B	3.9	B	12.1	B	30.7	B	46.4	B
To reduce production time	97.9	A	8.2	B	10.0	B	13.6	B	28.2	B	40.0	B
To improve production flexibility	95.8	A	2.9	A	10.2	B	16.4	B	34.7	B	35.8	B
Product												
To extend product range	93.7	A	4.1	B	9.3	B	12.7	B	31.7	B	42.1	B
To improve product quality	100.0	A	0.0	A	3.9	A	4.2	A	14.3	B	77.6	B
To increase speed of delivering products to the market	90.2	B	4.6	A	26.0	B	4.6	A	30.6	B	34.1	B
To replace products being phased out	83.6	B	21.3	B	20.9	B	20.9	B	17.6	A	19.2	B
Other												
To reduce materials consumption	86.4	B	22.7	B	18.6	B	23.5	B	12.1	A	23.1	B
To reduce environmental damage	89.9	B	15.2	B	10.5	B	29.6	B	27.2	B	17.5	B
To reduce energy consumption	93.7	A	19.0	B	20.5	B	22.8	B	29.1	B	8.6	B
To deal with or to respond to new government regulations	79.0	B	30.5	B	10.2	B	20.4	B	19.5	B	19.5	B

Source: Survey of Innovation 1999

Table 8 (continued)
Objectives of Innovation for Innovators in Manufacturing During the Period 1997 - 1999
Province by Objective

	Relevant		Importance									
			Low		Moderately Low		Medium		Moderately High		High	
	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability
Prince Edward Island												
Productivity												
To reduce labour costs	90.6	A	14.5	A	10.6	A	21.4	A	14.3	A	39.2	A
To increase production capacity	90.4	A	7.4	A	0.0	A	10.8	A	35.0	A	46.8	A
To reduce production time	87.4	A	11.4	A	7.6	A	25.8	A	25.6	A	29.6	A
To improve production flexibility	90.4	A	3.7	A	3.5	A	31.9	A	32.3	A	28.6	A
Product												
To extend product range	100.0	A	0.0	A	0.0	A	9.8	A	41.8	A	48.4	A
To improve product quality	93.5	A	0.0	A	0.0	A	23.9	A	27.3	A	48.8	A
To increase speed of delivering products to the market	90.4	A	18.2	A	14.3	A	10.8	A	27.8	A	28.8	A
To replace products being phased out	87.2	A	25.8	A	33.3	A	26.1	A	0.0	A	14.8	A
Other												
To reduce materials consumption	77.4	A	16.7	A	16.5	A	37.9	A	24.8	A	4.1	A
To reduce environmental damage	80.6	A	16.1	A	19.7	A	28.4	A	24.1	A	11.7	A
To reduce energy consumption	77.4	A	20.8	A	16.5	A	33.4	A	21.2	A	8.1	A
To deal with or to respond to new government regulations	77.4	A	20.8	A	20.8	A	33.9	A	12.2	A	12.4	A

Source: Survey of Innovation 1999

Table 8 (continued)
Objectives of Innovation for Innovators in Manufacturing During the Period 1997 - 1999
Province by Objective

	Relevant		Importance									
			Low		Moderately Low		Medium		Moderately High		High	
	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability
Nova Scotia												
Productivity												
To reduce labour costs	91.7	A	12.4	A	8.6	A	22.5	B	31.5	B	25.1	B
To increase production capacity	95.3	A	11.9	B	0.7	A	15.7	B	34.5	B	37.2	B
To reduce production time	93.8	A	8.0	A	2.8	A	24.0	B	30.3	A	34.9	B
To improve production flexibility	93.2	A	5.8	A	4.2	A	19.8	B	39.2	B	31.0	B
Product												
To extend product range	91.6	A	0.0	-	9.5	A	19.0	A	28.5	B	42.9	B
To improve product quality	93.3	A	2.9	A	2.1	A	10.4	A	34.6	B	50.0	B
To increase speed of delivering products to the market	92.6	A	9.1	A	7.4	A	18.1	B	33.6	B	31.8	B
To replace products being phased out	80.2	A	30.0	B	16.7	A	18.0	B	22.6	B	12.6	A
Other												
To reduce materials consumption	92.3	A	17.5	B	21.7	B	26.5	B	15.9	A	18.3	A
To reduce environmental damage	86.1	A	23.3	B	13.2	B	19.1	B	24.4	B	20.0	A
To reduce energy consumption	86.8	A	22.6	B	15.7	B	26.4	B	19.9	A	15.4	A
To deal with or to respond to new government regulations	82.9	A	27.6	B	27.2	B	18.4	B	15.3	A	11.6	A

Source: Survey of Innovation 1999

Table 8 (continued)
Objectives of Innovation for Innovators in Manufacturing During the Period 1997 - 1999
Province by Objective

	Relevant		Importance									
			Low		Moderately Low		Medium		Moderately High		High	
	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability
New Brunswick												
Productivity												
To reduce labour costs	96.0	A	14.3	A	6.9	A	20.2	A	23.9	A	34.7	B
To increase production capacity	96.7	A	8.8	A	1.5	A	6.6	A	38.5	B	44.7	B
To reduce production time	94.4	A	9.5	A	7.0	A	18.4	A	27.8	A	37.4	B
To improve production flexibility	95.9	A	3.7	A	3.1	A	8.8	A	41.3	B	42.9	B
Product												
To extend product range	97.0	A	2.5	A	3.0	A	20.3	A	33.3	B	40.9	B
To improve product quality	99.2	A	0.9	A	1.0	A	8.6	A	34.3	B	55.3	B
To increase speed of delivering products to the market	95.5	A	5.9	A	10.2	A	13.0	A	31.6	B	39.5	B
To replace products being phased out	79.8	A	22.9	B	15.6	A	28.3	B	17.3	A	15.9	A
Other												
To reduce materials consumption	88.6	A	15.9	A	17.8	A	23.0	B	14.4	A	28.9	B
To reduce environmental damage	81.3	A	18.9	B	17.4	B	25.4	B	19.4	B	19.0	A
To reduce energy consumption	86.9	A	24.5	A	19.0	A	22.7	A	22.3	B	11.5	A
To deal with or to respond to new government regulations	74.6	B	25.4	B	17.7	A	31.1	B	14.8	B	11.1	A

Source: Survey of Innovation 1999

Table 8 (continued)
Objectives of Innovation for Innovators in Manufacturing During the Period 1997 - 1999
Province by Objective

	Relevant		Importance									
			Low		Moderately Low		Medium		Moderately High		High	
	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability
Quebec												
Productivity												
To reduce labour costs	93.0	A	11.4	A	10.2	A	19.3	A	25.0	A	34.1	A
To increase production capacity	95.0	A	3.9	A	5.9	A	13.2	A	30.2	A	46.8	A
To reduce production time	93.2	A	6.5	A	7.6	A	16.2	A	29.2	A	40.4	A
To improve production flexibility	93.7	A	5.1	A	7.7	A	18.6	A	33.0	A	35.6	A
Product												
To extend product range	92.9	A	2.9	A	5.3	A	15.6	A	29.8	A	46.4	A
To improve product quality	96.8	A	0.6	A	2.8	A	8.9	A	33.2	A	54.5	A
To increase speed of delivering products to the market	94.2	A	6.0	A	8.5	A	19.9	A	24.7	A	41.0	A
To replace products being phased out	81.4	A	14.0	A	15.9	A	22.8	A	24.7	A	22.5	A
Other												
To reduce materials consumption	78.7	A	18.1	A	17.2	A	22.9	A	22.0	A	19.8	A
To reduce environmental damage	69.4	A	28.1	A	18.8	A	20.2	A	16.1	A	16.7	A
To reduce energy consumption	76.2	A	24.8	A	22.0	A	24.1	A	17.1	A	12.0	A
To deal with or to respond to new government regulations	67.4	A	31.1	A	21.0	A	22.2	A	12.9	A	12.7	A

Source: Survey of Innovation 1999

Table 8 (continued)
Objectives of Innovation for Innovators in Manufacturing During the Period 1997 - 1999
Province by Objective

	Relevant		Importance									
			Low		Moderately Low		Medium		Moderately High		High	
	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability
Ontario												
Productivity												
To reduce labour costs	94.6	A	8.2	A	9.1	A	15.9	A	25.2	A	41.5	A
To increase production capacity	95.9	A	3.5	A	6.2	A	9.0	A	28.7	A	52.6	A
To reduce production time	94.7	A	5.1	A	6.2	A	13.9	A	32.3	A	42.5	A
To improve production flexibility	94.9	A	3.5	A	6.7	A	18.9	A	32.8	A	38.1	A
Product												
To extend product range	95.6	A	3.5	A	6.0	A	15.5	A	27.9	A	47.2	A
To improve product quality	96.0	A	1.8	A	2.8	A	10.6	A	30.6	A	54.2	A
To increase speed of delivering products to the market	93.8	A	4.5	A	6.6	A	18.4	A	25.3	A	45.2	A
To replace products being phased out	85.1	A	17.5	A	15.0	A	22.3	A	20.5	A	24.7	A
Other												
To reduce materials consumption	85.6	A	18.2	A	16.9	A	20.6	A	23.0	A	21.3	A
To reduce environmental damage	79.2	A	23.3	A	19.7	A	24.1	A	18.0	A	14.9	A
To reduce energy consumption	82.6	A	24.2	A	21.4	A	25.4	A	16.4	A	12.5	A
To deal with or to respond to new government regulations	73.8	A	30.8	A	20.7	A	24.8	A	12.3	A	11.3	A

Source: Survey of Innovation 1999

Table 8 (continued)
Objectives of Innovation for Innovators in Manufacturing During the Period 1997 - 1999
Province by Objective

	Relevant		Importance									
			Low		Moderately Low		Medium		Moderately High		High	
	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability
Manitoba												
Productivity												
To reduce labour costs	95.7	A	11.7	A	3.8	A	16.7	A	29.6	B	38.1	B
To increase production capacity	98.6	A	4.3	A	2.0	A	9.1	A	31.5	B	53.2	B
To reduce production time	97.6	A	4.4	A	4.7	A	15.2	A	30.8	B	44.9	B
To improve production flexibility	96.3	A	6.9	A	7.2	A	20.3	A	35.3	B	30.3	B
Product												
To extend product range	91.5	A	4.9	A	3.8	A	10.6	A	38.6	B	42.2	B
To improve product quality	98.5	A	3.0	A	3.0	A	13.8	A	29.4	B	50.8	B
To increase speed of delivering products to the market	97.4	A	8.3	A	5.7	A	18.5	A	30.9	B	36.6	B
To replace products being phased out	81.7	A	10.2	A	25.6	B	24.0	A	16.2	A	24.0	A
Other												
To reduce materials consumption	86.9	A	14.7	A	18.9	A	24.1	B	10.6	A	31.7	B
To reduce environmental damage	77.1	A	27.8	B	15.6	A	18.9	A	16.0	B	21.6	B
To reduce energy consumption	84.3	A	30.0	B	11.4	A	30.0	B	12.4	A	16.2	B
To deal with or to respond to new government regulations	72.0	B	32.7	B	18.3	A	22.2	B	14.7	A	12.1	A

Source: Survey of Innovation 1999

Table 8 (continued)
Objectives of Innovation for Innovators in Manufacturing During the Period 1997 - 1999
Province by Objective

	Relevant		Importance									
			Low		Moderately Low		Medium		Moderately High		High	
	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability
Saskatchewan												
Productivity												
To reduce labour costs	94.9	A	7.6	A	10.7	A	17.2	A	28.1	A	36.5	A
To increase production capacity	95.1	A	7.6	A	9.2	A	7.1	A	25.4	A	50.7	A
To reduce production time	95.1	A	8.1	A	4.9	A	16.0	A	27.6	A	43.4	A
To improve production flexibility	96.9	A	6.0	A	7.2	A	17.6	A	28.2	A	40.9	A
Product												
To extend product range	94.0	A	5.5	A	4.5	A	15.1	A	29.0	A	45.9	A
To improve product quality	96.7	A	3.9	A	3.0	A	8.8	A	32.0	A	52.3	A
To increase speed of delivering products to the market	96.7	A	5.3	A	9.0	A	21.8	A	26.4	A	37.5	A
To replace products being phased out	82.8	A	23.2	A	19.5	A	18.9	A	16.3	A	22.1	A
Other												
To reduce materials consumption	82.5	A	20.8	A	21.8	A	22.3	A	13.4	A	21.8	A
To reduce environmental damage	74.7	A	30.6	A	23.0	A	23.3	A	18.0	A	5.2	A
To reduce energy consumption	80.2	A	29.6	A	22.0	A	25.6	A	13.5	A	9.3	A
To deal with or to respond to new government regulations	78.7	A	41.1	A	20.3	A	16.6	A	11.2	A	10.8	A

Source: Survey of Innovation 1999

Table 8 (continued)
Objectives of Innovation for Innovators in Manufacturing During the Period 1997 - 1999
Province by Objective

	Relevant		Importance									
			Low		Moderately Low		Medium		Moderately High		High	
	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability
Alberta												
Productivity												
To reduce labour costs	93.2	A	8.5	A	11.1	A	17.9	A	23.6	A	38.9	A
To increase production capacity	96.7	A	3.8	A	8.2	A	8.4	A	26.2	A	53.4	A
To reduce production time	90.2	A	5.2	A	9.5	A	15.4	A	27.5	A	42.3	A
To improve production flexibility	94.4	A	4.1	A	10.9	A	14.7	A	31.1	A	39.2	A
Product												
To extend product range	94.9	A	4.0	A	3.5	A	15.5	A	28.2	A	48.7	A
To improve product quality	95.6	A	1.6	A	2.7	A	10.2	A	36.2	A	49.2	A
To increase speed of delivering products to the market	92.1	A	5.6	A	7.9	A	15.7	A	26.0	A	44.8	A
To replace products being phased out	83.3	A	18.6	A	20.8	A	16.8	A	20.5	A	23.3	A
Other												
To reduce materials consumption	82.9	A	17.9	A	16.5	A	20.2	A	24.2	A	21.2	A
To reduce environmental damage	76.7	A	18.8	A	21.6	A	27.7	A	15.5	A	16.4	A
To reduce energy consumption	79.9	A	21.5	A	20.4	A	34.3	A	14.5	A	9.3	A
To deal with or to respond to new government regulations	71.2	A	31.4	A	22.3	A	22.9	A	11.7	A	11.8	A

Source: Survey of Innovation 1999

Table 8 (continued)
Objectives of Innovation for Innovators in Manufacturing During the Period 1997 - 1999
Province by Objective

	Relevant		Importance									
			Low		Moderately Low		Medium		Moderately High		High	
	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability
British Columbia												
Productivity												
To reduce labour costs	92.4	A	9.2	A	10.7	A	17.5	A	27.0	A	35.6	A
To increase production capacity	94.8	A	4.9	A	7.2	A	12.3	A	26.4	A	49.2	A
To reduce production time	92.9	A	7.5	A	10.6	A	14.4	A	28.2	A	39.4	A
To improve production flexibility	93.0	A	6.2	A	9.4	A	18.5	A	30.5	A	35.4	A
Product												
To extend product range	93.0	A	4.0	A	4.0	A	12.0	A	30.2	A	49.8	A
To improve product quality	94.7	A	1.6	A	1.8	A	13.3	A	27.0	A	56.4	A
To increase speed of delivering products to the market	89.9	A	6.2	A	9.2	A	17.2	A	24.5	A	42.9	A
To replace products being phased out	80.6	A	19.8	A	18.6	A	20.1	A	19.2	A	22.4	A
Other												
To reduce materials consumption	80.5	A	21.0	A	17.3	A	18.5	A	21.4	A	21.9	A
To reduce environmental damage	72.3	A	23.8	A	23.2	A	21.1	A	16.3	A	15.6	A
To reduce energy consumption	79.4	A	23.1	A	25.7	A	24.2	A	16.1	A	10.9	A
To deal with or to respond to new government regulations	70.0	A	34.5	A	18.1	A	19.6	A	15.5	A	12.3	A

Source: Survey of Innovation 1999

Table 9
Problems and Obstacles That Innovative Manufacturing Firms Faced When They Innovated During the Period 1997 - 1999
Province by Problems and Obstacles

	Percent	Reliability
Canada		
Firms that faced problems and obstacles	90.6	A
Of these, % that faced the following:		
High cost of development	58.7	A
Inability to devote staff to projects on an on-going basis because of production requirements	61.4	A
Inability to qualify for government assistance programs or research and development (R&D) tax credits	16.9	A
Lack of skilled personnel	41.3	A
Lack of financing	28.8	A
Lack of marketing capability	19.6	A
Lack of information on relevant technology	15.7	A
Lack of external technical support services	13.4	A
Lack of access to expertise in universities	5.6	A
Lack of access to expertise in government laboratories	4.7	A
Lack of cooperation with other firms	6.9	A
Lack of customer responsiveness to new products	21.2	A
Organizational rigidities in the firm	21.1	A
Government regulations	11.6	A
Other	12.4	A
Newfoundland		
Firms that faced problems and obstacles	87.4	B
Of these, % that faced the following:		
High cost of development	64.8	B
Inability to devote staff to projects on an on-going basis because of production requirements	39.6	B
Inability to qualify for government assistance programs or research and development (R&D) tax credits	26.4	B
Lack of skilled personnel	47.2	B
Lack of financing	38.4	B
Lack of marketing capability	18.0	B
Lack of information on relevant technology	24.0	B
Lack of external technical support services	24.4	B
Lack of access to expertise in universities	8.4	B
Lack of access to expertise in government laboratories	9.2	B
Lack of cooperation with other firms	8.4	B
Lack of customer responsiveness to new products	28.8	B
Organizational rigidities in the firm	20.8	B
Government regulations	20.0	B
Other	9.6	A

Source: Survey of Innovation 1999

Table 9 (continued)
Problems and Obstacles That Innovative Manufacturing Firms Faced When They Innovated During the Period 1997 - 1999
Province by Problems and Obstacles

	Percent	Reliability
Prince Edward Island		
Firms that faced problems and obstacles	90.4	A
Of these, % that faced the following:		
High cost of development	60.1	A
Inability to devote staff to projects on an on-going basis because of production requirements	60.7	A
Inability to qualify for government assistance programs or research and development (R&D) tax credits	18.0	A
Lack of skilled personnel	36.0	A
Lack of financing	39.5	A
Lack of marketing capability	21.1	A
Lack of information on relevant technology	25.2	A
Lack of external technical support services	21.5	A
Lack of access to expertise in universities	0.0	A
Lack of access to expertise in government laboratories	10.8	A
Lack of cooperation with other firms	7.4	A
Lack of customer responsiveness to new products	21.3	A
Organizational rigidities in the firm	21.9	A
Government regulations	10.8	A
Other	17.6	A
Nova Scotia		
Firms that faced problems and obstacles	84.7	B
Of these, % that faced the following:		
High cost of development	69.1	B
Inability to devote staff to projects on an on-going basis because of production requirements	67.0	B
Inability to qualify for government assistance programs or research and development (R&D) tax credits	24.3	B
Lack of skilled personnel	33.6	B
Lack of financing	34.1	B
Lack of marketing capability	23.8	B
Lack of information on relevant technology	22.7	B
Lack of external technical support services	12.9	A
Lack of access to expertise in universities	3.9	A
Lack of access to expertise in government laboratories	3.9	A
Lack of cooperation with other firms	8.4	A
Lack of customer responsiveness to new products	33.0	B
Organizational rigidities in the firm	20.9	B
Government regulations	16.6	B
Other	7.7	A

Source: Survey of Innovation 1999

Table 9 (continued)
Problems and Obstacles That Innovative Manufacturing Firms Faced When They Innovated During the Period 1997 - 1999
Province by Problems and Obstacles

	Percent	Reliability
New Brunswick		
Firms that faced problems and obstacles	91.0	A
Of these, % that faced the following:		
High cost of development	56.8	B
Inability to devote staff to projects on an on-going basis because of production requirements	61.2	B
Inability to qualify for government assistance programs or research and development (R&D) tax credits	13.7	A
Lack of skilled personnel	39.6	B
Lack of financing	27.6	B
Lack of marketing capability	19.4	B
Lack of information on relevant technology	20.8	B
Lack of external technical support services	11.1	A
Lack of access to expertise in universities	0.0	A
Lack of access to expertise in government laboratories	0.0	A
Lack of cooperation with other firms	1.6	A
Lack of customer responsiveness to new products	18.4	A
Organizational rigidities in the firm	18.1	A
Government regulations	7.4	A
Other	8.4	A
Quebec		
Firms that faced problems and obstacles	87.6	A
Of these, % that faced the following:		
High cost of development	58.3	A
Inability to devote staff to projects on an on-going basis because of production requirements	49.3	A
Inability to qualify for government assistance programs or research and development (R&D) tax credits	16.8	A
Lack of skilled personnel	37.0	A
Lack of financing	28.3	A
Lack of marketing capability	19.5	A
Lack of information on relevant technology	14.1	A
Lack of external technical support services	12.4	A
Lack of access to expertise in universities	5.9	A
Lack of access to expertise in government laboratories	4.1	A
Lack of cooperation with other firms	7.9	A
Lack of customer responsiveness to new products	16.3	A
Organizational rigidities in the firm	16.5	A
Government regulations	14.8	A
Other	13.3	A

Source: Survey of Innovation 1999

Table 9 (continued)
Problems and Obstacles That Innovative Manufacturing Firms Faced When They Innovated During the Period 1997 - 1999
Province by Problems and Obstacles

	Percent	Reliability
Ontario		
Firms that faced problems and obstacles	92.7	A
Of these, % that faced the following:		
High cost of development	58.4	A
Inability to devote staff to projects on an on-going basis because of production requirements	71.5	A
Inability to qualify for government assistance programs or research and development (R&D) tax credits	15.5	A
Lack of skilled personnel	45.3	A
Lack of financing	28.2	A
Lack of marketing capability	18.5	A
Lack of information on relevant technology	16.3	A
Lack of external technical support services	14.7	A
Lack of access to expertise in universities	6.0	A
Lack of access to expertise in government laboratories	5.1	A
Lack of cooperation with other firms	6.0	A
Lack of customer responsiveness to new products	23.8	A
Organizational rigidities in the firm	27.4	A
Government regulations	9.1	A
Other	11.1	A
Manitoba		
Firms that faced problems and obstacles	95.0	A
Of these, % that faced the following:		
High cost of development	57.4	B
Inability to devote staff to projects on an on-going basis because of production requirements	69.9	B
Inability to qualify for government assistance programs or research and development (R&D) tax credits	19.9	A
Lack of skilled personnel	51.2	B
Lack of financing	27.0	B
Lack of marketing capability	13.0	A
Lack of information on relevant technology	14.3	A
Lack of external technical support services	13.0	A
Lack of access to expertise in universities	4.4	A
Lack of access to expertise in government laboratories	5.0	A
Lack of cooperation with other firms	8.7	A
Lack of customer responsiveness to new products	24.5	A
Organizational rigidities in the firm	22.0	A
Government regulations	9.6	A
Other	8.4	A

Source: Survey of Innovation 1999

Table 9 (continued)
Problems and Obstacles That Innovative Manufacturing Firms Faced When They Innovated During the Period 1997 - 1999
Province by Problems and Obstacles

	Percent	Reliability
Saskatchewan		
Firms that faced problems and obstacles	89.6	A
Of these, % that faced the following:		
High cost of development	64.6	A
Inability to devote staff to projects on an on-going basis because of production requirements	68.0	A
Inability to qualify for government assistance programs or research and development (R&D) tax credits	19.8	A
Lack of skilled personnel	54.1	A
Lack of financing	36.1	A
Lack of marketing capability	32.5	A
Lack of information on relevant technology	21.9	A
Lack of external technical support services	19.9	A
Lack of access to expertise in universities	10.5	A
Lack of access to expertise in government laboratories	10.6	A
Lack of cooperation with other firms	11.2	A
Lack of customer responsiveness to new products	22.2	A
Organizational rigidities in the firm	26.1	A
Government regulations	19.1	A
Other	17.3	A
Alberta		
Firms that faced problems and obstacles	92.6	A
Of these, % that faced the following:		
High cost of development	57.5	A
Inability to devote staff to projects on an on-going basis because of production requirements	69.2	A
Inability to qualify for government assistance programs or research and development (R&D) tax credits	18.5	A
Lack of skilled personnel	43.9	A
Lack of financing	26.4	A
Lack of marketing capability	16.6	A
Lack of information on relevant technology	14.1	A
Lack of external technical support services	13.0	A
Lack of access to expertise in universities	7.5	A
Lack of access to expertise in government laboratories	6.0	A
Lack of cooperation with other firms	6.3	A
Lack of customer responsiveness to new products	27.4	A
Organizational rigidities in the firm	21.8	A
Government regulations	6.5	A
Other	16.0	A

Source: Survey of Innovation 1999

Table 9 (continued)
Problems and Obstacles That Innovative Manufacturing Firms Faced When They Innovated During the Period 1997 - 1999
Province by Problems and Obstacles

	Percent	Reliability
British Columbia		
Firms that faced problems and obstacles	93.2	A
Of these, % that faced the following:		
High cost of development	59.5	A
Inability to devote staff to projects on an on-going basis because of production requirements	61.3	A
Inability to qualify for government assistance programs or research and development (R&D) tax credits	18.2	A
Lack of skilled personnel	37.9	A
Lack of financing	32.0	A
Lack of marketing capability	24.8	A
Lack of information on relevant technology	17.0	A
Lack of external technical support services	10.9	A
Lack of access to expertise in universities	2.7	A
Lack of access to expertise in government laboratories	3.7	A
Lack of cooperation with other firms	5.6	A
Lack of customer responsiveness to new products	22.1	A
Organizational rigidities in the firm	15.2	A
Government regulations	11.1	A
Other	13.8	A

Source: Survey of Innovation 1999

Table 10
Use of Government Support Programs by Innovators in Manufacturing During the Period 1997 – 1999, by Province

	% Using a Program		Of These, % Using Programs Sponsored By:									
			Federal Government		Provincial Governments		Both Federal and Provincial Governments		Federal Government Only		Provincial Governments Only	
	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability
Canada												
% using any program	58.3	A	82.2	A	73.0	A	55.3	A	27.0	A	17.8	A
Of these, % using the following programs:												
Research and development (R&D) tax credits	67.9	A	94.3	A	62.0	A	56.3	A	38.0	A	5.7	A
Government research and development grants	20.1	A	79.4	A	43.1	A	22.5	A	56.9	A	20.6	A
Government venture capital support	5.3	A	42.4	B	71.4	A	13.7	A	28.6	A	57.6	B
Government technology support and assistance programs	16.0	A	56.9	A	61.6	A	18.5	A	38.4	A	43.1	A
Government information or Internet services	19.9	A	81.0	A	62.5	A	43.5	A	37.5	A	19.0	A
Government support for training	38.3	A	38.4	A	80.2	A	18.6	A	19.8	A	61.6	A
Other	4.1	A	62.2	B	52.0	B	14.1	B	48.0	B	37.8	B
Newfoundland												
% using any program	59.4	B	77.6	B	59.4	B	37.1	B	40.6	B	22.4	B
Of these, % using the following programs:												
Research and development (R&D) tax credits	50.0	B	100.0	A	27.0	C	27.0	C	73.0	C	0.0	A
Government research and development grants	18.8	B	x	x	x	x	x	x	x	x	x	x
Government venture capital support	21.2	A	x	x	x	x	x	x	x	x	x	x
Government technology support and assistance programs	40.0	B	75.0	C	73.6	B	48.6	C	26.4	B	25.0	C
Government information or Internet services	10.0	B	x	x	x	x	x	x	x	x	x	x
Government support for training	53.5	B	62.6	C	56.0	C	18.7	B	44.0	C	37.4	C
Other	0.0	A	x	x	x	x	x	x	x	x	x	x

Source: Survey of Innovation 1999

Table 10 (continued)
Use of Government Support Programs by Innovators in Manufacturing During the Period 1997 – 1999, by Province

	% Using a Program		Of These, % Using Programs Sponsored By:									
			Federal Government		Provincial Governments		Both Federal and Provincial Governments		Federal Government Only		Provincial Governments Only	
	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability
Prince Edward Island												
% using any program	74.5	A	78.4	A	56.8	A	35.2	A	43.2	A	21.6	A
Of these, % using the following programs:												
Research and development (R&D) tax credits	57.1	A	100.0	A	23.5	B	23.5	B	76.5	B	0.0	A
Government research and development grants	39.7	A	66.3	B	56.3	B	22.5	B	43.8	B	33.8	B
Government venture capital support	8.4	A	x	x	x	x	x	x	x	x	x	x
Government technology support and assistance programs	30.8	A	57.3	B	71.0	B	28.2	B	29.0	B	42.7	B
Government information or Internet services	22.1	A	x	x	x	x	x	x	x	x	x	x
Government support for training	52.6	A	66.5	B	58.5	B	25.0	A	41.5	B	33.5	B
Other	4.2	A	x	x	x	x	x	x	x	x	x	x
Nova Scotia												
% using any program	70.2	B	83.4	B	77.2	B	60.6	B	22.8	B	16.6	B
Of these, % using the following programs:												
Research and development (R&D) tax credits	62.2	B	89.6	B	56.6	B	46.2	B	43.4	B	10.4	B
Government research and development grants	25.4	B	85.3	B	48.9	B	34.2	B	51.1	B	14.7	B
Government venture capital support	13.5	B	34.8	C	74.4	B	9.2	B	25.6	B	65.2	C
Government technology support and assistance programs	24.3	A	78.8	B	69.4	A	48.2	B	30.6	A	21.2	B
Government information or Internet services	32.7	B	77.3	B	63.9	B	41.1	B	36.1	B	22.7	B
Government support for training	31.3	B	57.6	B	71.6	B	29.3	B	28.4	B	42.4	B
Other	12.0	B	31.1	C	92.2	A	23.3	B	7.8	A	68.9	C

Source: Survey of Innovation 1999

Table 10 (continued)
Use of Government Support Programs by Innovators in Manufacturing During the Period 1997 – 1999, by Province

	% Using a Program		Of These, % Using Programs Sponsored By:									
			Federal Government		Provincial Governments		Both Federal and Provincial Governments		Federal Government Only		Provincial Governments Only	
	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability
New Brunswick												
% using any program	58.5	B	86.5	A	64.1	B	50.6	B	35.9	B	13.5	A
Of these, % using the following programs:												
Research and development (R&D) tax credits	56.5	B	95.7	A	41.9	A	37.6	A	58.1	A	4.3	A
Government research and development grants	22.6	B	59.6	C	51.6	C	11.2	A	48.4	C	40.4	C
Government venture capital support	2.4	A	x	x	x	x	x	x	x	x	x	x
Government technology support and assistance programs	23.1	B	38.5	B	73.5	B	11.9	B	26.5	B	61.5	B
Government information or Internet services	19.8	B	92.8	B	32.8	C	25.6	B	67.2	C	7.2	B
Government support for training	43.3	B	46.2	B	73.6	B	19.8	A	26.4	B	53.8	B
Other	6.3	B	x	x	x	x	x	x	x	x	x	x
Quebec												
% using any program	66.7	A	81.1	A	88.5	A	69.6	A	11.5	A	18.9	A
Of these, % using the following programs:												
Research and development (R&D) tax credits	75.1	A	92.8	A	84.9	A	77.7	A	15.1	A	7.2	A
Government research and development grants	23.5	A	75.9	A	51.9	A	27.8	A	48.1	A	24.1	A
Government venture capital support	6.7	A	37.2	B	81.1	B	18.3	A	18.9	B	62.8	B
Government technology support and assistance programs	18.1	A	50.1	A	69.4	A	19.5	A	30.6	A	49.9	A
Government information or Internet services	13.8	A	75.4	A	70.7	A	46.1	A	29.3	A	24.6	A
Government support for training	39.1	A	29.5	A	88.9	A	18.4	A	11.1	A	70.5	A
Other	3.9	A	50.0	B	60.6	B	10.5	B	39.4	B	50.0	B

Source: Survey of Innovation 1999

Table 10 (continued)
Use of Government Support Programs by Innovators in Manufacturing During the Period 1997 – 1999, by Province

	% Using a Program		Of These, % Using Programs Sponsored By:									
			Federal Government		Provincial Governments		Both Federal and Provincial Governments		Federal Government Only		Provincial Governments Only	
	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability
Ontario												
% using any program	52.6	A	83.9	A	61.1	A	45.0	A	38.9	A	16.1	A
Of these, % using the following programs:												
Research and development (R&D) tax credits	65.5	A	96.4	A	42.9	A	39.3	A	57.1	A	3.6	A
Government research and development grants	15.6	A	87.8	A	31.3	B	19.1	B	68.7	B	12.2	A
Government venture capital support	2.1	A	75.6	C	24.4	C	0.0	-	75.6	C	24.4	C
Government technology support and assistance programs	10.7	A	65.1	B	46.8	B	11.9	B	53.2	B	34.9	B
Government information or Internet services	23.9	A	87.5	A	59.2	B	46.7	B	40.8	B	12.5	A
Government support for training	37.5	A	41.3	B	75.8	A	17.2	A	24.2	A	58.7	B
Other	3.0	A	72.3	C	34.9	C	7.1	B	65.1	C	27.7	C
Manitoba												
% using any program	63.8	B	82.9	B	67.5	B	50.5	B	32.5	B	17.1	B
Of these, % using the following programs:												
Research and development (R&D) tax credits	58.3	B	94.0	A	63.1	B	57.1	B	36.9	B	6.0	A
Government research and development grants	13.4	A	77.7	B	42.7	B	20.4	B	57.3	B	22.3	B
Government venture capital support	9.1	A	23.2	C	…	D	15.8	B	…	D	76.8	C
Government technology support and assistance programs	17.0	B	55.9	B	52.2	C	8.0	A	47.8	C	44.1	B
Government information or Internet services	18.1	B	85.0	B	48.5	C	33.5	C	51.5	C	15.0	B
Government support for training	47.0	B	50.4	B	75.1	B	25.5	B	24.9	B	49.6	B
Other	3.6	A	x	x	x	x	x	x	x	x	x	x

Source: Survey of Innovation 1999

Table 10 (continued)
Use of Government Support Programs by Innovators in Manufacturing During the Period 1997 – 1999, by Province

	% Using a Program		Of These, % Using Programs Sponsored By:									
			Federal Government		Provincial Governments		Both Federal and Provincial Governments		Federal Government Only		Provincial Governments Only	
	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability
Saskatchewan												
% using any program	56.5	A	83.9	A	77.8	A	61.7	A	22.2	A	16.1	A
Of these, % using the following programs:												
Research and development (R&D) tax credits	75.1	A	91.7	A	63.6	A	55.3	A	36.4	A	8.3	A
Government research and development grants	24.8	A	81.1	B	39.5	B	20.7	B	60.5	B	18.9	B
Government venture capital support	11.8	A	x	x	x	x	x	x	x	x	x	x
Government technology support and assistance programs	21.9	A	77.6	B	52.8	B	30.4	B	47.2	B	22.4	B
Government information or Internet services	38.7	A	73.3	B	73.9	B	47.3	B	26.1	B	26.7	B
Government support for training	50.6	A	59.7	B	73.9	A	33.5	B	26.1	A	40.3	B
Other	1.6	A	x	x	x	x	x	x	x	x	x	x
Alberta												
% using any program	46.9	A	82.8	A	60.0	A	42.7	A	40.0	A	17.2	A
Of these, % using the following programs:												
Research and development (R&D) tax credits	58.4	A	93.2	B	34.4	B	27.6	A	65.6	B	6.8	B
Government research and development grants	19.6	A	73.1	B	29.6	B	2.8	B	70.4	B	26.9	B
Government venture capital support	5.0	A	34.7	C	65.3	C	0.0	-	34.7	C	65.3	C
Government technology support and assistance programs	16.0	A	47.0	B	66.0	B	13.1	A	34.0	B	53.0	B
Government information or Internet services	31.0	A	74.9	B	64.0	B	39.0	B	36.0	B	25.1	B
Government support for training	25.1	A	50.7	B	66.3	B	17.0	B	33.7	B	49.3	B
Other	8.2	A	100.0	A	…	D	…	D	…	D	0.0	A

Source: Survey of Innovation 1999

Table 10 (continued)
Use of Government Support Programs by Innovators in Manufacturing During the Period 1997 – 1999, by Province

	% Using a Program		Of These, % Using Programs Sponsored By:									
			Federal Government		Provincial Governments		Both Federal and Provincial Governments		Federal Government Only		Provincial Governments Only	
	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability
British Columbia												
% using any program	49.1	A	80.2	A	49.7	A	29.9	A	50.3	A	19.8	A
Of these, % using the following programs:												
Research and development (R&D) tax credits	54.8	A	97.4	A	14.2	A	11.6	A	85.8	A	2.6	A
Government research and development grants	18.6	A	86.7	A	23.5	B	10.3	B	76.5	B	13.3	A
Government venture capital support	3.5	A	45.9	C	54.1	C	0.0	A	45.9	C	54.1	C
Government technology support and assistance programs	16.4	A	71.7	B	43.9	B	15.6	B	56.1	B	28.3	B
Government information or Internet services	23.5	A	77.6	B	54.5	B	32.1	B	45.5	B	22.4	B
Government support for training	38.8	A	46.5	B	68.3	B	14.8	A	31.7	B	53.5	B
Other	5.1	A	55.8	C	44.2	C	0.0	A	55.8	C	44.2	C

Source: Survey of Innovation 1999

Table 11
Impact on Sales in 1999 of New Products (Goods or Services) Introduced by Innovators in Manufacturing During the Period 1997 – 1999, by Province

			Percentage of Sales From New Products											
			1 % to 5 %		6 % to 15 %		16 % to 25 %		26 % to 50 %		51 % to 75 %		76 % to 100 %	
	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability
Canada														
Product Innovators	84.7	A												
Of These, % Having Sales From New Products	93.9	A	30.9	A	34.4	A	19.7	A	10.2	A	3.1	A	1.5	A
Of These, % Having Sales From Significantly Improved Products	90.6	A	29.0	A	34.4	A	20.8	A	10.6	A	3.6	A	1.6	A
Newfoundland														
Product Innovators	76.6	B												
Of These, % Having Sales From New Products	97.3	A	37.6	B	13.6	B	9.9	B	23.0	B	8.0	B	8.0	B
Of These, % Having Sales From Significantly Improved Products	92.2	B	31.2	B	30.7	B	10.4	B	15.8	B	5.9	A	5.9	B
Prince Edward Island														
Product Innovators	87.1	A												
Of These, % Having Sales From New Products	89.0	A	25.1	A	42.0	A	20.8	A	0.0	A	0.0	A	12.2	A
Of These, % Having Sales From Significantly Improved Products	92.8	A	24.3	A	40.0	A	23.8	A	4.1	A	0.0	A	7.8	A
Nova Scotia														
Product Innovators	83.4	A												
Of These, % Having Sales From New Products	95.2	A	31.1	B	36.2	B	14.4	A	10.9	B	7.4	A	0.0	-
Of These, % Having Sales From Significantly Improved Products	84.8	A	31.2	B	43.7	B	17.8	B	5.4	A	0.9	A	0.9	A
New Brunswick														
Product Innovators	79.0	A												
Of These, % Having Sales From New Products	90.6	A	37.6	B	31.6	B	21.1	B	7.6	A	2.1	A	0.0	-
Of These, % Having Sales From Significantly Improved Products	87.0	B	45.7	B	23.9	B	15.1	A	11.1	A	2.2	A	2.2	A

Source: Survey of Innovation 1999

Table 11 (continued)
Impact on Sales in 1999 of New Products (Goods or Services) Introduced by Innovators in Manufacturing During the Period 1997 to 1999, by Province

			Percentage of Sales From New Products											
			1 % to 5 %		6 % to 15 %		16 % to 25 %		26 % to 50 %		51 % to 75 %		76 % to 100 %	
	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability
Quebec														
Product Innovators	86.5	A												
Of These, % Having Sales From New Products	93.9	A	31.1	A	35.1	A	17.3	A	11.4	A	3.1	A	1.9	A
Of These, % Having Sales From Significantly Improved Products	91.0	A	30.1	A	32.0	A	20.2	A	11.1	A	4.4	A	2.2	A
Ontario														
Product Innovators	83.8	A												
Of These, % Having Sales From New Products	93.3	A	28.7	A	34.5	A	23.1	A	9.1	A	3.2	A	1.4	A
Of These, % Having Sales From Significantly Improved Products	91.1	A	26.3	A	35.7	A	22.7	A	10.7	A	3.8	A	0.8	A
Manitoba														
Product Innovators	85.6	A												
Of These, % Having Sales From New Products	95.3	A	40.0	B	30.5	B	18.5	A	7.9	A	1.8	A	1.3	A
Of These, % Having Sales From Significantly Improved Products	92.9	A	32.0	B	45.7	B	15.5	A	5.6	A	0.7	A	0.5	A
Saskatchewan														
Product Innovators	87.1	A												
Of These, % Having Sales From New Products	100.0	A	32.7	A	35.3	A	18.6	A	7.9	A	2.4	A	3.2	A
Of These, % Having Sales From Significantly Improved Products	93.2	A	34.7	A	35.8	A	11.4	A	18.1	A	0.0	A	0.0	A
Alberta														
Product Innovators	84.6	A												
Of These, % Having Sales From New Products	93.7	A	37.8	A	32.8	A	15.4	A	10.1	A	2.9	A	1.0	A
Of These, % Having Sales From Significantly Improved Products	92.6	A	32.9	A	35.9	A	17.4	A	9.6	A	2.6	A	1.7	A

Source: Survey of Innovation 1999

Table 11 (continued)
Impact on Sales in 1999 of New Products (Goods or Services) Introduced by Innovators in Manufacturing During the Period 1997 to 1999, by Province

			Percentage of Sales From New Products											
			1 % to 5 %		6 % to 15 %		16 % to 25 %		26 % to 50 %		51 % to 75 %		76 % to 100 %	
	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability
British Columbia														
Product Innovators	82.1	A												
Of These, % Having Sales From New Products	95.2	A	28.3	A	34.9	A	23.0	A	10.5	A	2.8	A	0.5	A
Of These, % Having Sales From Significantly Improved Products	85.7	A	26.3	A	34.8	A	24.4	A	10.0	A	2.9	A	1.7	A

Source: Survey of Innovation 1999

Table 12
Impact of Innovation on Innovative Manufacturing Firms During the Period 1997 – 1999
Province by Impact

	Relevant		Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	
	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability
Canada												
Increased the productivity of the firm	94.1	A	5.3	A	9.9	A	25.3	A	36.6	A	22.9	A
Increased the profitability of the firm	97.3	A	3.7	A	8.8	A	29.1	A	36.7	A	21.7	A
Increased the speed of supplying and/or delivering products (goods or services)	91.1	A	7.3	A	16.1	A	28.5	A	30.8	A	17.3	A
Increased the firm's ability to adapt flexibly to different client demands	94.1	A	1.9	A	7.5	A	23.2	A	43.2	A	24.2	A
Increased the firm's domestic market share	93.0	A	7.0	A	14.0	A	30.4	A	32.5	A	16.1	A
Increased the firm's international market share	80.4	A	13.9	A	15.2	A	23.6	A	29.9	A	17.4	A
Allowed the firm to maintain profit margins	96.0	A	2.7	A	7.9	A	28.1	A	39.0	A	22.2	A
Allowed the firm to keep up with competitors	96.4	A	1.4	A	3.6	A	15.6	A	44.3	A	35.2	A
Newfoundland												
Increased the productivity of the firm	100.0	A	4.2	A	9.8	B	16.4	B	33.9	B	35.7	B
Increased the profitability of the firm	100.0	A	8.0	A	3.9	A	12.2	B	41.6	B	34.2	B
Increased the speed of supplying and/or delivering products (goods or services)	84.3	B	12.0	B	4.6	B	27.8	B	28.6	B	27.0	B
Increased the firm's ability to adapt flexibly to different client demands	100.0	A	0.0	A	11.6	B	17.8	B	37.8	B	32.8	A
Increased the firm's domestic market share	92.0	B	6.8	A	25.5	B	25.5	B	20.9	B	21.3	A
Increased the firm's international market share	86.0	B	16.7	B	4.5	B	17.5	B	27.3	B	34.1	B
Allowed the firm to maintain profit margins	96.1	A	4.4	A	6.2	B	21.1	B	36.8	B	31.6	B
Allowed the firm to keep up with competitors	97.9	A	0.0	A	3.9	B	10.4	B	58.9	B	26.8	B

Source: Survey of Innovation 1999

Table 12 (continued)
Impact of Innovation on Innovative Manufacturing Firms During the Period 1997 - 1999
Province by Impact

	Relevant		Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	
	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability
Prince Edward Island												
Increased the productivity of the firm	80.8	A	8.2	A	8.0	A	23.6	A	43.9	A	16.2	A
Increased the profitability of the firm	93.5	A	3.6	A	20.6	A	10.1	A	41.3	A	24.5	A
Increased the speed of supplying and/or delivering products (goods or services)	80.6	A	16.1	A	16.5	A	27.3	A	24.1	A	16.1	A
Increased the firm's ability to adapt flexibly to different client demands	93.5	A	3.6	A	3.6	A	17.4	A	44.7	A	30.8	A
Increased the firm's domestic market share	93.3	A	10.5	A	20.8	A	20.4	A	30.9	A	17.4	A
Increased the firm's international market share	77.6	A	16.9	A	16.9	A	20.5	A	29.0	A	16.7	A
Allowed the firm to maintain profit margins	96.7	A	3.4	A	9.9	A	29.3	A	40.5	A	16.8	A
Allowed the firm to keep up with competitors	96.7	A	3.4	A	6.5	A	0.0	A	60.0	A	30.0	A
Nova Scotia												
Increased the productivity of the firm	97.9	A	6.4	A	12.3	B	16.8	B	39.9	B	24.6	A
Increased the profitability of the firm	98.5	A	2.1	A	18.5	B	17.7	B	40.1	B	21.5	A
Increased the speed of supplying and/or delivering products (goods or services)	91.8	A	10.7	B	15.8	B	25.7	A	30.9	B	16.9	A
Increased the firm's ability to adapt flexibly to different client demands	96.4	A	2.0	A	7.4	A	24.5	B	43.6	B	22.4	B
Increased the firm's domestic market share	95.6	A	9.1	A	12.2	A	32.9	B	31.7	B	14.2	A
Increased the firm's international market share	79.0	A	24.1	B	14.4	B	28.4	B	18.1	A	14.9	A
Allowed the firm to maintain profit margins	98.5	A	3.3	A	9.6	A	17.9	B	48.4	B	20.8	A
Allowed the firm to keep up with competitors	96.4	A	3.8	A	4.0	A	17.9	B	38.3	B	36.0	B

Source: Survey of Innovation 1999

Table 12 (continued)
Impact of Innovation on Innovative Manufacturing Firms During the Period 1997 - 1999
Province by Impact

	Relevant		Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	
	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability
New Brunswick												
Increased the productivity of the firm	91.0	A	4.9	A	6.8	A	23.8	B	39.9	B	24.5	A
Increased the profitability of the firm	96.9	A	2.4	A	6.6	A	25.7	A	38.1	B	27.2	B
Increased the speed of supplying and/or delivering products (goods or services)	88.0	A	10.9	A	10.5	A	29.8	B	30.5	B	18.3	A
Increased the firm's ability to adapt flexibly to different client demands	95.9	A	3.9	A	5.7	A	14.8	A	46.8	B	28.8	B
Increased the firm's domestic market share	90.5	A	8.9	A	15.9	A	29.0	A	26.3	B	19.9	B
Increased the firm's international market share	76.4	A	17.3	B	12.2	A	29.6	B	28.2	A	12.8	A
Allowed the firm to maintain profit margins	93.0	A	3.0	A	9.3	A	27.1	A	31.6	B	29.0	B
Allowed the firm to keep up with competitors	96.1	A	2.9	A	3.4	A	20.1	A	41.0	B	32.6	A
Quebec												
Increased the productivity of the firm	93.5	A	4.6	A	9.9	A	27.4	A	35.8	A	22.2	A
Increased the profitability of the firm	96.9	A	3.4	A	7.7	A	30.2	A	37.7	A	21.0	A
Increased the speed of supplying and/or delivering products (goods or services)	91.1	A	7.0	A	16.5	A	28.4	A	30.6	A	17.5	A
Increased the firm's ability to adapt flexibly to different client demands	94.6	A	1.7	A	6.0	A	22.7	A	43.2	A	26.4	A
Increased the firm's domestic market share	93.4	A	4.8	A	10.7	A	31.2	A	34.5	A	18.7	A
Increased the firm's international market share	78.3	A	13.2	A	16.2	A	23.6	A	29.9	A	17.1	A
Allowed the firm to maintain profit margins	95.8	A	2.6	A	6.9	A	29.6	A	39.2	A	21.7	A
Allowed the firm to keep up with competitors	97.1	A	1.0	A	2.4	A	15.1	A	45.6	A	35.8	A

Source: Survey of Innovation 1999

Table 12 (continued)
Impact of Innovation on Innovative Manufacturing Firms During the Period 1997 - 1999
Province by Impact

	Relevant		Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	
	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability
Ontario												
Increased the productivity of the firm	94.7	A	5.2	A	8.7	A	22.5	A	40.0	A	23.5	A
Increased the profitability of the firm	97.9	A	3.7	A	8.9	A	26.8	A	36.5	A	24.1	A
Increased the speed of supplying and/or delivering products (goods or services)	92.4	A	6.3	A	15.5	A	27.8	A	32.6	A	17.8	A
Increased the firm's ability to adapt flexibly to different client demands	94.6	A	1.8	A	8.6	A	24.1	A	43.1	A	22.4	A
Increased the firm's domestic market share	93.3	A	9.1	A	17.4	A	28.5	A	30.4	A	14.6	A
Increased the firm's international market share	82.6	A	12.7	A	15.0	A	23.6	A	31.5	A	17.3	A
Allowed the firm to maintain profit margins	96.8	A	2.5	A	8.1	A	26.5	A	39.1	A	23.7	A
Allowed the firm to keep up with competitors	96.5	A	1.0	A	4.5	A	14.5	A	43.7	A	36.4	A
Manitoba												
Increased the productivity of the firm	96.0	A	3.9	A	8.3	A	31.8	B	32.6	B	23.4	A
Increased the profitability of the firm	98.2	A	5.1	A	8.5	A	33.4	B	35.7	B	17.3	A
Increased the speed of supplying and/or delivering products (goods or services)	95.1	A	1.7	A	11.8	A	42.0	B	26.0	A	18.5	A
Increased the firm's ability to adapt flexibly to different client demands	94.1	A	1.4	A	14.3	A	19.0	A	46.1	B	19.2	A
Increased the firm's domestic market share	91.5	A	2.5	A	15.7	A	26.8	B	38.1	B	16.9	A
Increased the firm's international market share	83.2	A	12.5	A	13.4	A	13.6	A	35.6	B	24.8	B
Allowed the firm to maintain profit margins	94.3	A	1.5	A	6.7	A	26.2	B	40.1	B	25.4	A
Allowed the firm to keep up with competitors	94.7	A	2.1	A	3.5	A	16.5	A	39.8	B	38.2	B

Source: Survey of Innovation 1999

Table 12 (continued)
Impact of Innovation on Innovative Manufacturing Firms During the Period 1997 - 1999
Province by Impact

	Relevant		Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	
	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability
Saskatchewan												
Increased the productivity of the firm	97.1	A	8.3	A	10.1	A	30.5	A	27.6	A	23.4	A
Increased the profitability of the firm	98.0	A	7.0	A	9.4	A	33.9	A	31.3	A	18.3	A
Increased the speed of supplying and/or delivering products (goods or services)	95.2	A	9.5	A	21.3	A	29.9	A	26.0	A	13.4	A
Increased the firm's ability to adapt flexibly to different client demands	96.5	A	3.9	A	12.4	A	26.6	A	36.8	A	20.2	A
Increased the firm's domestic market share	89.8	A	7.8	A	8.9	A	38.3	A	27.7	A	17.3	A
Increased the firm's international market share	74.6	A	14.1	A	14.7	A	19.1	A	33.2	A	18.9	A
Allowed the firm to maintain profit margins	96.9	A	3.9	A	4.1	A	33.0	A	39.0	A	20.1	A
Allowed the firm to keep up with competitors	99.0	A	2.5	A	2.5	A	14.9	A	44.4	A	35.7	A
Alberta												
Increased the productivity of the firm	93.4	A	3.6	A	14.0	A	22.3	A	33.4	A	26.7	A
Increased the profitability of the firm	98.7	A	3.4	A	7.6	A	32.8	A	34.0	A	22.3	A
Increased the speed of supplying and/or delivering products (goods or services)	89.1	A	7.7	A	17.0	A	28.0	A	31.5	A	15.9	A
Increased the firm's ability to adapt flexibly to different client demands	91.5	A	2.5	A	6.7	A	24.3	A	45.8	A	20.7	A
Increased the firm's domestic market share	92.0	A	6.6	A	13.2	A	31.1	A	35.0	A	14.1	A
Increased the firm's international market share	77.5	A	21.0	A	12.9	A	23.4	A	26.4	A	16.3	A
Allowed the firm to maintain profit margins	96.6	A	3.9	A	8.1	A	26.1	A	44.4	A	17.6	A
Allowed the firm to keep up with competitors	96.6	A	4.1	A	3.5	A	17.1	A	43.7	A	31.5	A

Source: Survey of Innovation 1999

Table 12 (continued)
Impact of Innovation on Innovative Manufacturing Firms During the Period 1997 - 1999
Province by Impact

	Relevant		Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	
	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability
British Columbia												
Increased the productivity of the firm	93.8	A	8.8	A	12.0	A	29.3	A	31.3	A	18.6	A
Increased the profitability of the firm	94.9	A	4.3	A	11.5	A	33.7	A	34.8	A	15.8	A
Increased the speed of supplying and/or delivering products (goods or services)	88.0	A	11.4	A	18.5	A	27.7	A	27.5	A	14.9	A
Increased the firm's ability to adapt flexibly to different client demands	90.8	A	2.1	A	7.4	A	23.4	A	41.8	A	25.3	A
Increased the firm's domestic market share	91.6	A	8.8	A	14.5	A	33.5	A	31.4	A	11.8	A
Increased the firm's international market share	83.2	A	13.7	A	16.0	A	26.0	A	27.3	A	17.0	A
Allowed the firm to maintain profit margins	93.8	A	2.8	A	11.0	A	32.7	A	33.3	A	20.2	A
Allowed the firm to keep up with competitors	93.2	A	0.9	A	5.6	A	19.6	A	42.9	A	31.0	A

Source: Survey of Innovation 1999

Table 13
Change in the Total Number of Employees for Innovators in Manufacturing During the Period 1997 – 1999, by Province

	Change in Total Number of Employees							
	Increased		Decreased		No Change		Not Specified	
	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability
Canada	58.1	A	16.1	A	21.4	A	4.5	A
Newfoundland	59.8	B	12.2	B	23.8	B	4.2	A
Prince Edward Island	64.7	A	3.3	A	32.0	A	0.0	A
Nova Scotia	61.3	B	15.7	A	19.8	B	3.2	A
New Brunswick	52.8	B	19.9	B	26.6	A	0.7	A
Quebec	57.5	A	13.2	A	21.3	A	8.0	A
Ontario	62.2	A	17.4	A	19.2	A	1.1	A
Manitoba	60.4	B	13.0	A	20.7	A	5.9	A
Saskatchewan	50.1	A	21.3	A	24.3	A	4.3	A
Alberta	53.3	A	21.2	A	21.0	A	4.5	A
British Columbia	49.6	A	19.0	A	27.8	A	3.5	A

Source: Survey of Innovation 1999

Annex 3: Questionnaire


ELECTRONIC PUBLICATIONS AVAILABLE AT
www.statcan.ca

Science, Innovation and Electronic Information Division

Survey of Innovation 1999

Si vous préférez recevoir ce questionnaire en français, ☐ veuillez cocher

Confidential when completed

Correct pre-printed information if necessary using the corresponding boxes provided below.

Legal Name	
Business Name	
C / O	
No. & Street	
City	
Province	Postal Code
Contact	
Téléphone no. Area code	Extension
Facsimile no. Area code	

Survey Purpose

The information you provide is essential to assure the availability of pertinent information on innovation. The information compiled from the survey can be used by firms for market analysis, by trade associations to study performance and other characteristics of their industries, and by government to develop national and regional economic policies.

Authority

This survey is conducted under the authority of the Statistics Act, Revised Statutes of Canada, Chapter S19. Completion of this questionnaire is a legal requirement under the Statistics Act.

Confidentiality

Statistics Canada is prohibited by law from publishing any statistics which would divulge information obtained from this survey that relates to any identifiable firm without the previous consent of that firm. The data reported in this questionnaire will be treated in strict confidence, used for statistical purposes and published in aggregate form only. Statistics Canada will create a data base combining individual survey responses with existing Statistics Canada data records. The confidentiality provisions of the Statistics Act are not affected by either the Access to Information Act or any other legislation.

Federal-Provincial Agreement

In order to avoid duplication of enquiry, to reduce the cost of collection and to provide consistent statistics, an agreement has been made with the Bureau de la Statistique du Québec, under Section 11 of the Statistics Act, Statutes of Canada, where data on firms located or operating in Québec will be transmitted to the Bureau de la Statistique du Québec. The Statistics Act of Québec includes the same provisions for confidentiality and penalties for disclosure of information as the Federal Statistics Act.

In this questionnaire, "**firm**" refers to the legal entity that owns your plant or establishment which operates in Canada.

5-4900-497.1: 1999-07-21 STC/SAT-465-05484

Competitive Environment

1. For your firm, how strongly do you agree or disagree with each of the following statements?

Please indicate your opinion by using the following scale where 1 is strongly disagree and 5 is strongly agree. Check 0 if not relevant to your firm.

	Strongly Disagree 1	2	3	4	Strongly agree 5	Not Relevant 0
a. My client's demands are easy to predict	◯	◯	◯	◯	◯	◯
b. My clients can easily substitute my products (goods or services) for the products of my competitors	◯	◯	◯	◯	◯	◯
c. My competitors' actions are easy to predict	◯	◯	◯	◯	◯	◯
d. The arrival of new competitors is a constant threat	◯	◯	◯	◯	◯	◯
e. The arrival of competing products (goods or services) is a constant threat	◯	◯	◯	◯	◯	◯
f. My firm can easily replace its current suppliers	◯	◯	◯	◯	◯	◯
g. It is difficult to hire qualified staff and workers	◯	◯	◯	◯	◯	◯
h. It is difficult to retain qualified staff and workers	◯	◯	◯	◯	◯	◯
i. My products (goods or services) quickly become obsolete	◯	◯	◯	◯	◯	◯
j. Production technologies change rapidly	◯	◯	◯	◯	◯	◯
k. Office technologies change rapidly	◯	◯	◯	◯	◯	◯

Firm Success Factors

2. Please rate the importance of each of the following factors for the success of your firm.

Please indicate your opinion by using the following scale where 1 is low importance and 5 is high importance. Check 0 if not relevant to your firm.

	Low Importance High					Not Relevant
	1	2	3	4	5	0
Markets and Products						
a. Seeking new markets	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	0 ◯
b. Satisfying existing clients	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	0 ◯
c. Developing niche or specialized markets	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	0 ◯
d. Developing export markets	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	0 ◯
e. Promoting firm or product (good or service) reputation	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	0 ◯
f. Providing after-hour client support services	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	0 ◯
Human Resources						
g. Hiring new graduates from universities	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	0 ◯
h. Hiring new graduates from technical schools and colleges	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	0 ◯
i. Hiring experienced employees	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	0 ◯
j. Recruiting skilled people from outside of Canada	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	0 ◯
k. Training employees	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	0 ◯
l. Using teams within your firm which bring together people with different skills	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	0 ◯
Other						
m. Performing research and development within your firm	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	0 ◯
n. Involvement in collaboration and cooperation with other firms	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	0 ◯
o. Developing new products (goods or services) and processes	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	0 ◯
p. Active involvement in developing new industry-wide standards	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	0 ◯

New and Significantly Improved Products and Processes

3. A **new product (good or service**) is a product which is new to your firm whose characteristics or intended uses differ significantly from those of your firm's previously produced products.

   A **significantly improved product (good or service)** is an existing product whose performance has been significantly enhanced or upgraded. A complex product which consists of a number of components or integrated subsystems may be improved by partial changes to one of the components or subsystems. Changes to your firm's existing products which are purely aesthetic or which only involve minor modifications are not to be included.

   During the last three years, 1997 to 1999, did your firm offer new or significantly improved **products (goods or services)** to your clients?

   1 ◯ Yes ↓ 3 ◯ No → *Go to Question 4*

   If yes, please indicate how many new or significantly improved products were offered in the **last three years, 1997 to 1999**?

   Please check the appropriate number.

   1 ◯ 1-2 4 ◯ 11-20
   2 ◯ 3-5 5 ◯ 21-50
   3 ◯ 6-10 6 ◯ More than 50

---

4. **New production/manufacturing processes are processes** which are new to your firm. They involve the introduction into your firm of new production/manufacturing methods, procedures, systems, machinery or equipment which differs significantly from your firm's previous production/manufacturing processes.

   Significantly improved production/manufacturing processes involve significant changes to your existing processes which may be intended to produce new or significantly improved products (goods or services) or production/manufacturing processes. Minor or routine changes to processes are not to be included.

   During the last three years, 1997 to 1999, did your firm introduce **new or significantly improved production/manufacturing processes**?

   1 ◯ Yes 3 ◯ No

---

5. **During the last three years, 1997 to 1999**, did your firm have any unsuccessful or not yet completed projects to develop or introduce new or significantly improved products (goods or services) or production/manufacturing processes?

   1 ◯ Yes 3 ◯ No

6. **During the last three years, 1997 to 1999**, did your firm engage in the following activities which are linked to offering new or significantly improved products (goods or services) or to introducing new or significantly improved production/manufacturing processes?

	Yes	No
a. Research and development (R&D) linked to new or significantly improved products (goods or services) or production/manufacturing processes	1 ◯	3 ◯
b. Acquisition of machinery, equipment or other technology linked to new or significantly improved products (goods or services) or production/manufacturing processes	1 ◯	3 ◯
c. Industrial engineering and industrial design linked to new or significantly improved products (goods or services) or production/manufacturing processes	1 ◯	3 ◯
d. Tooling up and production start-up linked to new or significantly improved products (goods or services) or production/manufacturing processes	1 ◯	3 ◯
e. Training linked to the introduction of new or significantly improved products (goods or services) or production/manufacturing processes	1 ◯	3 ◯

If all answers to Questions 3 to 6 are "no", please proceed to Question 7.

If at least one answer to Questions 3 to 6 is "yes", please proceed to Question 8.

7. Why did your firm **not** develop or introduce new or significantly improved products (goods or services) or production/manufacturing processes **during the last three years, 1997 to 1999**?

_____

_____

_____

_____

Please proceed to Question 21.

Sources of Information

8. Which of the following played an **important role** as sources of information needed for suggesting or contributing to the development of new or significantly improved products (goods or services) or production/manufacturing processes, **during the last three years, 1997 to 1999**?

Please check all that apply.

INTERNAL sources of information to your firm:

1 ◯ Research and development (R&D) staff
2 ◯ Marketing staff
3 ◯ Production staff
4 ◯ Management staff
5 ◯ Other (*please specify):* _____

_____

Conclusion

8. Which of the following played an **important role** as sources of information needed for suggesting or contributing to the development of new or significantly improved products (goods or services) or production/manufacturing processes, **during the last three years, 1997 to 1999**.

Please check all that apply.

EXTERNAL sources of information to your firm:

- 6 ◯ Related firms in your corporate group (e.g. parent or subsidiary)
- 7 ◯ Suppliers of equipment, material and components
- 8 ◯ Clients
- 9 ◯ Competitors
- 10 ◯ Consultancy firms
- 11 ◯ Universities and colleges
- 12 ◯ Federal government agencies and research laboratories (e.g. National Research Council of Canada)
- 13 ◯ Provincial agencies and research laboratories

Generally available sources of information

- 14 ◯ Trade fairs and exhibitions
- 15 ◯ Internet or computer based information networks
- 16 ◯ Professional conferences, meetings and publications

Other sources of information

- 17 ◯ *Please specify:* _____

- 18 ◯ None of the above

Objectives

9. Please indicate the main reasons why your firm offered new or significantly improved products (goods or services) or introduced new or significantly improved production/manufacturing processes **during the last three years, 1997 to 1999**.

Please indicate the degree of importance attached to each objective by using the following scale where 1 is low importance and 5 is high importance. Check 0 if not relevant to your firm.

	Low Importance High					Not Relevant
	1	2	3	4	5	0
Productivity						
a. To reduce your labour costs	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	0 ◯
b. To increase production capacity	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	0 ◯
c. To reduce production time	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	0 ◯
d. To improve production flexibility	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	0 ◯
Product						
e. To extend product range	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	0 ◯
f. To improve product quality	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	0 ◯
g. To increase speed of delivering products to the market	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	0 ◯
h. To replace products being phased out	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	0 ◯

Conclusion

9. Please indicate the main reasons why your firm offered new or significantly improved products (goods or services) or introduced new or significantly improved production/manufacturing processes **during the last three years, 1997 to 1999**.

Please indicate the degree of importance attached to each objective by using the following scale where 1 is low importance and 5 is high importance. Check 0 if not relevant to your firm.

	Importance					
	Low				High	Not Relevant
	1	2	3	4	5	0
Other						
i. To reduce materials consumption	1◯	2◯	3◯	4◯	5◯	0◯
j. To reduce environmental damage	1◯	2◯	3◯	4◯	5◯	0◯
k. To reduce energy consumption	1◯	2◯	3◯	4◯	5◯	0◯
l. To deal with or to respond to new government regulations	1◯	2◯	3◯	4◯	5◯	0◯

Problems and Obstacles

10. Which of the following slowed down or caused problems for your firm when it developed new or significantly improved products (goods or services) or introduced new or significantly improved production/manufacturing processes **during the last three years, 1997 to 1999**?

Please check all that apply.

1◯ High cost of developing new or significantly improved products or processes

2◯ Inability to devote staff to projects to develop new or significantly improved products or processes on an on-going basis because of production requirements

3◯ Inability to qualify for government assistance programs or research and development (R&D) tax credits

4◯ Lack of skilled personnel to develop or introduce new or significantly improved products or processess

5◯ Lack of financing for the development or introduction of new or significantly improved products or processes

6◯ Lack of marketing capability to market new or significantly improved products

7◯ Lack of information on technology relevant to the development or introduction of new or significantly improved products or processes

8◯ Lack of external technical support services required to develop or introduce new or significantly improved products or processes

9◯ Lack of access to expertise in universities that could assist in developing or introducing new or significantly improved products or processes

10◯ Lack of access to expertise in government laboratories that could assist in developing or introducing new or significantly improved products and/or processes

11◯ Lack of cooperation with other firms

Conclusion

10. Which of the following slowed down or caused problems for your firm when it developed new or significantly improved products (goods or services) or introduced new or significantly improved production/manufacturing processes **during the last three years, 1997 to 1999**?

Please check all that apply.

12 ◯ Lack of customer responsiveness to new products

13 ◯ Organizational rigidities in your firm which prevent the development or introduction of new or significantly improved products or processes

14 ◯ Government regulations affecting new or significantly improved products or processes

15 ◯ Other *(please specify)*:

_____

_____

_____

_____

11. Please provide a concrete example of the most significant problem or obstacle your firm encountered when developing new or significantly improved products (goods or services) or production/manufacturing processes **during the last three years, 1997 to 1999**.

_____

_____

_____

_____

_____

Impact

12. Did your firm introduce any new or significantly improved products **during the last three years, 1997 to 1999**?

1 ◯ Yes ↓ 3 ◯ No → *Go to Question 13*

If yes, please estimate the percentage of your sales in 1999 (to date) that resulted from new or significantly improved products (goods or services) introduced by your firm **during the last three years, 1997 to 1999**. Please refer to definitions of new and significantly improved products (goods or services) in Question 3.

Please check the appropriate circles.

	1 % to 5 %	6 % to 15 %	16 % to 25 %	26 % to 50 %	51 % to 75 %	76 % to 100 %
Sales in 1999 from new products (goods or services) introduced between 1997 and 1999	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	6 ◯
Sales in 1999 from significantly improved products (goods or services) introduced between 1997 and 1999	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	6 ◯

13. What impact did new and significantly improved products (goods or services) and new significantly improved production/manufacturing processes developed and introduced **during the last three years, 1997 to 1999** have on your firm?

Please indicate your opinion by using the following scale where 1 is strongly disagree and 5 is strongly agree. Check 0 if not relevant to your firm.

	Strongly Disagree 1	2	3	4	Strongly Agree 5	Not Relevant 0
a. Increased the productivity of your firm	1◯	2◯	3◯	4◯	5◯	0◯
b. Increased the profitability of your firm	1◯	2◯	3◯	4◯	5◯	0◯
c. Increased the speed of supplying and/or delivering your products (goods or services)	1◯	2◯	3◯	4◯	5◯	0◯
d. Increased your firm's ability to adapt flexibly to different client demands	1◯	2◯	3◯	4◯	5◯	0◯
e. Increased your firm's domestic market share	1◯	2◯	3◯	4◯	5◯	0◯
f. Increased your firm's international market share	1◯	2◯	3◯	4◯	5◯	0◯
g. Allowed your firm to maintain its profit margins	1◯	2◯	3◯	4◯	5◯	0◯
h. Allowed your firm to keep up with its competitors	1◯	2◯	3◯	4◯	5◯	0◯

Cooperative and Collaborative Arrangements

14. **Cooperative and collaborative arrangement**s involve the active participation in joint projects between your firm and other firms or organizations in order to develop new or significantly improved products (goods or services) and/or production/manufacturing processes. Pure contracting-out work, where there is no active participation, is not regarded as collaboration or cooperation.

Was your firm involved in cooperative and collaborative arrangements with other firms or organizations to develop new or significantly improved products (goods or services) or production/manufacturing processes **during the last three years, 1997 to 1999**?

1◯ Yes ↓ 3◯ No → *Go to Question 17*

If yes, please indicate which of the following reasons are important in determining the involvement of your firm in cooperative and collaborative arrangements to develop new or significantly improved products (goods or services) and/or production/manufacturing processe**s during the last three years, 1997 to 1999**?

1◯ Sharing costs

2◯ Spreading risk

3◯ Accessing research and development R&D

4◯ Prototype development

5◯ Scaling-up production processes

6◯ Accessing critical expertise

7◯ Accessing new markets

8◯ Accessing new distribution channels

9◯ Other *(please specify):* _____

_____

15. If your firm has **more than one Canadian location**, please proceed to **Question 16**.

If your firm has **only one Canadian location**, please indicate the location of other firms and organizations with which your firm had cooperative and collaborative arrangements to develop new or significantly improved products (goods or services) and production/manufacturing processes **during the last three years, 1997 to 1999**.

Please check the appropriate circles.	Within 100 km	In the rest of your province	In the rest of Canada	US	Europe	Pacific Rim	Other
a. Competitors	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	6 ◯	7 ◯
b. Clients	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	6 ◯	7 ◯
c. Consulting firms	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	6 ◯	7 ◯
d. Suppliers	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	6 ◯	7 ◯
e. Federal government research institutes (e.g. National Research Council of Canada)	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	6 ◯	7 ◯
f. Provincial government research institutes	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	6 ◯	7 ◯
g. Universities	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	6 ◯	7 ◯
h. Other	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	6 ◯	7 ◯

↓
Please specify: _____

Please proceed to Question 17.

16. If your firm has **more than one Canadian location**, please check the location of other firms and organizations with which your firm had cooperative and collaborative arrangements to develop new or significantly improved products (goods or services) and production/manufacturing processe**s during the last three years, 1997 to 1999**.

Please check the appropriate circles.	Canada	US	Europe	Pacific Rim	Other
a. Competitors	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯
b. Clients	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯
c. Consulting firms	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯
d. Suppliers	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯
e. Federal government institutes (e.g. National Research Council of Canada)	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯
f. Provincial government research institutes	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯
g. Other firms within your corporate group (e.g. parent or subsidiary)	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯
h. Universities	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯
i. Other	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯

↓
Please specify: _____

The Most Important New or Significantly Improved Product or Process

17. Please provide below a brief description of your **most important** new or significantly improved product (good or service) or production/manufacturing process **during the last three years, 1997 to 1999**.

18. Was this most important new or significantly improved product (good or service) or production/manufacturing process:

	Yes	No	Do not know
a. a world first?	1 ◯	3 ◯	N ◯
b. a first in Canada?	1 ◯	3 ◯	N ◯
c. a first for your firm?	1 ◯	3 ◯	N ◯

19. How long did it take from initial idea generation to the implementation of this most important new or significantly improved product (good or service) or production/manufacturing process?

☐☐ years ☐☐ months

20. Did this most important new or significantly improved product (good or service) or production/manufacturing process involve:

	Yes	No	Do not know
a. The use of new materials?	1 ◯	3 ◯	N ◯
b. An investment in machinery or equipment?	1 ◯	3 ◯	N ◯
c. New software developed by or specifically for your firm?	1 ◯	3 ◯	N ◯

Building and Construction Products

21. **During the last three years, 1997 to 1999**, did your firm offer products which were **incorporated into** buildings and other engineering works such as roads, dams, bridges, sewers, transmission lines and pipelines? Some examples of building products are windows, plaster board, bricks, concrete, heating and plumbing systems, roofing, security systems, electrical systems and others.

1 ◯ Yes ↓ 2 ◯ No → *Please go to Question 22*

If yes, please estimate the percentage of your total sales from these products, **during the last three years, 1997 to 1999**.

Please check the appropriate circle.

1 % to 5 %	6 % to 15 %	16 % to 25 %	26 % to 50 %	51 % to 75 %	76 % to 100 %	Do not know
1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	6 ◯	N ◯

22. **<u>During the last three years, 1997 to 1999</u>**, did your firm offer machinery, equipment or tools which were **used during the process** of constructing buildings and other engineering works such as roads, dams, bridges, sewers, transmission lines, and pipelines? Some examples of products used during construction are bulldozers, cranes, power tools, scaffolding, survey equipment and others.

1 ◯ Yes ↓ 3 ◯ No → *Go to Question 23*

<u>If yes</u>, please estimate the percentage of your total sales from these products, **<u>during the last three years, 1997 to 1999</u>**.

Please check the appropriate circle.

	1 % to 5 %	6 % to 15 %	16 % to 25 %	26 % to 50 %	51 % to 75 %	76 % to 100 %	Do not know
	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	6 ◯	N ◯

Natural Resource Products

23. Are your products used by natural resource industries?

1 ◯ Yes ↓ 3 ◯ No → *Go to Question 24*

If yes, please estimate the percentage of your total sales of products (goods or services) that were used by the following natural resources industries, **<u>during the last three years, 1997 to 1999</u>**.

Please check the appropriate circles.

	1 % to 5 %	6 % to 15 %	16 % to 25 %	26 % to 50 %	51 % to 75 %	76 % to 100 %	Do not know
a. Mining industry	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	6 ◯	N ◯
b. Logging and forestry industries	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	6 ◯	N ◯
c. Oil and gas extraction industries	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	6 ◯	N ◯
d. Electrical utilities	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	6 ◯	N ◯

Research and Development, Intellectual Property and Human Resources

24. **During the past three years, 1997 to 1999**, did your firm undertake research and development (R&D) activities?

1 ◯ Yes ↓ 3 ◯ No → *Go to Question 25*

If yes,

	Yes	No
Is research and development (R&D) carried out in your firm by a separate and distinct research and development (R&D) department?	1 ◯	3 ◯
Is research and development (R&D) contracted out to other firms?	1 ◯	3 ◯

If yes, please indicate if the research and development (R&D) was performed

↓

1 ◯ continuously

2 ◯ occasionally

25. Please indicate which of the following methods have been used by your firm to protect its intellectual property **during the past three years, 1997 to 1999**.

	Yes	No
a. Patents	1 ◯	3 ◯
b. Trademarks	1 ◯	3 ◯
c. Copyrights	1 ◯	3 ◯
d. Confidentiality agreementsé	1 ◯	3 ◯
e. Trade secrets	1 ◯	3 ◯

h. Other (*please specify):* _____

_____

26. Did your firm apply for at least one patent **during the last three years, 1997 to 1999**?

1 ◯ Yes ↓ 3 ◯ No → *Go to Question 27*

If yes, how many patents did your firm apply for **during the last three years, 1997 to 1999**?

Number in Canada |__|__|

Number in United States |__|__|

27. How many people does your firm currently employ?

Number of employees |__|__|__|__|

28. **During the last three years, 1997 to 1999**, has the total number of employees in your firm

1 ◯ increased?

2 ◯ decreased?

3 ◯ remained the same?

Government Support Programs

29. Has your firm used any of the following types of programs sponsored by the federal government or a provincial government **during the last three years, 1997 to 1999**?

Please check the appropriate circles.	Government Programs		Did not use a government program
	Federal Government	**Provincial Government**	
a. Research and development (R&D) tax credits	1 ◯	2 ◯	3 ◯
b. Government research and development (R&D) grants	1 ◯	2 ◯	3 ◯
c. Government venture capital support	1 ◯	2 ◯	3 ◯
d. Government technology support and assistance programs	1 ◯	2 ◯	3 ◯
e. Government information or Internet services	1 ◯	2 ◯	3 ◯
f. Government support for training	1 ◯	2 ◯	3 ◯

g. Other (*please specify):* _____

_____

Comments

30. In your view, what can be done to improve the ability of Canadian firms to develop new and significantly improved products (goods or services) or production/manufacturing processes?

_____

_____

_____

_____

_____

_____

_____

Thank you for your co-operation.

How to Order Catalogued Publications

These and other Statistics Canada publications may be purchased from local authorized agents and other community bookstores, through the local Statistics Canada offices, or by mail order to:

Statistics Canada
Dissemination Division
Circulation Management
120 Parkdale Avenue
Ottawa, Ontario
K1A 0T6

Telephone: 1(613)951-7277
National toll free order line: 1-800-700-1033
Fax number: 1-(613)951-1584 or 1-800-889-9734
Toronto Credit Card only (416)973-8018
Internet: order@statcan.ca

CATALOGUED PUBLICATIONS

Statistical Publication

88-202-XPB Industrial Research and Development, 2000 Intentions (with 1999 preliminary estimates and 1998 actual expenditures)

88-204-XIB Federal Scientific Activities, 2000-2001[e] (annual)

88-001-XIB Science Statistics (monthly)

Volume 23

No. 1 The Provincial Research Organizations, 1997

No. 2 Scientific and Technological (S&T) Activities of Provincial Governments, 1990-91 to 1998-99[e]

No. 3 Industrial Research and Development, 1994 to 1998

No. 4 Estimates of Gross Expenditures on Research and Development in the Health Field in Canada, 1970 to 1998[e]

No. 5 Federal Government Expenditures on Scientific Activities, 1999-2000[e]

No. 6 Total Spending on Research and Development in Canada, 1988 to 1999[e], and Provinces, 1988 to 1997

No. 7 Estimation of Research and Development Expenditures in the Higher Education Sector, 1997-1998

No. 8 Research and Development (R&D) Expenditures of Private Non-Profit (PNP) Organizations, 1998

No. 9 Industrial Research and Development, 1995 to 1999

No. 10 Distribution of Federal Expenditures on Science and Technology, by Province and Territories, 1997-98

Volume 24

No. 1 Federal Government Personnel Engaged in Scientific and Technological (S&T) Activities, 1990-1991 to 1999-2000[e]

No. 2 Biotechnology Research and Development (R&D) in Canadian Industry, 1997

No. 3 Industrial Research and Development, 1996 to 2000

No. 4 The Provincial Research Organizations, 1998

No. 5 Federal Government Expenditures on Scientific Activities, 2000-2001[e]

No. 6 Total Spending on Research and Development in Canada, 1989 to 2000[e], and Provinces, 1989 to 1998

No. 7 Estimation of Research and Development Expenditures in the Higher Education Sector, 1998-99

No. 8 Research and Development (R&D) Expenditures of Private Non-Profit (PNP) Organizations, 1999

Volume 25

No. 1 Distribution of Federal Expenditures on Science and Technology, by Province and Territories, 1998-99

No. 2 Estimates of Total Spending on Research and Development in the Health Field in Canada, 1988 to 2000[e]

No. 3 Biotechnology Scientific Activities in Selected Federal Government Departments and Agencies, 1999-2000

No. 4 Biotechnology Research and Development (R&D) in Canadian Industry, 1998

No. 5 Research and Development (R&D) Personnel in Canada, 1990 to 1999[e]

No. 6 Industrial Research and Development, 1997 to 2001

WORKING PAPERS - 1998

These working papers are available from the Science and Innovation Surveys Section of Statistics Canada, please contact:

Science and Innovation Surveys Section
Science, Innovation and Electronic Information Division
Statistics Canada
Ottawa, Ontario
K1A 0T6
Internet: http://www.statcan.ca/english/research/scilist.htm
Tel: (613) 951-6309

ST-98-01 A Compendium of Science and Technology Statistics, February 1998

ST-98-02 Exports and Related Employment in Canadian Industries, February 1998

ST-98-03 Job Creation, Job Destruction and Job Reallocation in the Canadian Economy, February 1998

ST-98-04 A Dynamic Analysis of the Flows of Canadian Science and Technology Graduates into the Labour Market, February 1998

ST-98-05 Biotechnology Use by Canadian Industry – 1996, March 1998

ST-98-06 An Overview of Statistical Indicators of Regional Innovation in Canada: A Provincial Comparison, March 1998

ST-98-07 Federal Government Payments to Industry 1992-93, 1994-95 and 1995-96, September 1998

ST-98-08 Bibliometric Analysis of Scientific and Technological Research: A User's Guide to the Methodology, September 1998

ST-98-09 Federal Government Expenditures and Personnel on Activities in the Natural and Social Sciences, 1989-90 to 1998-99^{e}, September 1998

ST-98-10 Knowledge Flows in Canada as Measured by Bibliometrics, October 1998

ST-98-11 Estimates of Canadian Research and Development Expenditures (GERD), Canada, 1987 to 1998^{e}, and by Province 1987 to 1996, October 1998

ST-98-12 Estimation of Research and Development Expenditures in the Higher Education Sector, 1996-97, November 1998

WORKING PAPERS - 1999

ST-99-01 Survey of Intellectual Property Commercialization in the Higher Education Sector, 1998, February 1999

ST-99-02 Provincial Distribution of Federal Expenditures and Personnel on Science and Technology, 1988-89 to 1996-97, June 1999

ST-99-03 An Analysis of Science and Technology Workers: Deployment in the Canadian Economy, June 1999

ST-99-04 Estimates of Gross Expenditures on Research and Development in the Health Field in Canada, 1970 to 1998, July 1999

ST-99-05 Technology Adoption in Canadian Manufacturing, 1998, August 1999

ST-99-06 A Reality Check to Defining E-Commerce, 1999, August 1999

ST-99-07 Scientific and Technological Activities of Provincial Governments, 1990-1991 to 1998-1999[e], August 1999

ST-99-08 Estimates of Canadian Research and Development Expenditures (GERD), Canada, 1988 to 1999[e], and by Province, 1988 to 1997, November 1999

ST-99-09 Estimation of Research and Development Expenditures in the Higher Education Sector, 1997-98

ST-99-10 Measuring the Attractiveness of R&D Tax Incentives: Canada and Major Industrial Countries, December 1999

WORKING PAPERS - 2000

ST-00-01 Survey of Intellectual Property Commercialization in the Higher Education Sector, 1999, April 2000

ST-00-02 Federal Government Expenditures and Personnel in the Natural and Social Sciences, 1990-91 to 1999-2000[e], July 2000

ST-00-03 A Framework for Enhanced Estimations of Higher Education and Health R&D Expenditures, by Mireille Brochu, July 2000

ST-00-04 Information and Communications Technologies and Electronic Commerce in Canadian Industry, 1999, November 2000

WORKING PAPERS - 2001

ST-01-01 Estimates of Canadian Research and Development Expenditures (GERD), Canada, 1989 to 2000[e], and by Province 1989 to 1998, January 2001

ST-01-02 Estimation of Research and Development Expenditures in the Higher Education Sector, 1998-99, January 2001

ST-01-03 Innovation, Advanced Technologies and Practices in the Construction and Related Industries: Provincial Estimates, 1999, January 2001

ST-01-04 Innovation, Advanced Technologies and Practices in the Construction and Related Industries: National Estimates, 1999, February 2001

ST-01-05 Provincial Distribution of Federal Expenditures and Personnel on Science and Technology 1990-91 to 1998-99, February 2001

ST-01-06 Estimates of Total Expenditures on Research and Development in the Health Field in Canada, 1988 to 2000[e], March 2001

ST-01-07 Biotechnology Use and Development, 1999, March 2001

ST-01-08 Federal Government Expenditures and Personnel in the Natural and Social Sciences, 1991-92 to 2000-2001[e], April 2001

ST-01-09 Estimates of Research and Development Personnel in Canada, 1979 to 1999[e], June 2001

ST-01-10 Innovation in Canadian Manufacturing: National Estimates, 1999, June 2001

ST-01-11 Practices and Activities of Canadian Biotechnology Firms: Results from the Biotechnology Use and Development Survey - 1999, August 2001

ST-01-12 Canadian Biotechnology Industrial Activities: Features from the 1997 Biotechnology Survey, September 2001

RESEARCH PAPERS – 1996-2001

No. 1 The State of Science and Technology Indicators in the OECD Countries, by Benoit Godin, August 1996

No. 2 Knowledge as a Capacity for Action, by Nico Stehr, June 1996

No. 3 Linking Outcomes for Workers to Changes in Workplace Practices: An Experimental Canadian Workplace and Employee Survey, by Garnett Picot and Ted Wannell, June 1996

No. 4 Are the Costs and Benefits of Health Research Measurable?, by M.B. Wilk, February 1997

No. 5 Technology and Economic Growth: A Survey, by Petr Hanel and Jorge Niosi, April 1

No. 6 Diffusion of Biotechnologies in Canada, by Anthony Arundel, February 1999

No. 7 Barriers to Innovation in Services Industries in Canada, by Pierre Mohnen and Julio Rosa, November 1999

No. 8 Explaining Rapid Growth in Canadian Biotechnology Firms, by Jorge Niosi, August 2000

No. 9 Internationally Comparable Indicators on Biotechnology: A Stocktaking, a Proposal for Work and Supporting Material, by W. Pattinson, B. Van Beuzekom and A. Wyckoff, January 2001

No. 10 Analysis of the Survey on Innovation, Advanced Technologies and Practices in the Construction and Related Industries, 1999, by George Seaden, Michael Guolla, Jérôme Doutriaux and John Nash, January 2001

No. 11 Capacity to Innovate, Innovation and Impact: The Canadian Engineering Services Industry, by Daood Hamdani, March 2001