Cat. No. 88F0006XIB01003

Innovation, Advanced Technologies and Practices in the Construction and Related Industries: Provincial Estimates

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Innovation, Advanced Technologies and Practices in the Construction and Related Industries: Provincial Estimates

Survey of Innovation, Advanced Technologies and Practices in the Construction and Related Industries

1999

By Frances Anderson and Susan Schaan

Science, Innovation and Electronic Information Division

January 2001

88F0006XIB No. 03

This working paper is the result of a collaborative project between the Science, Innovation and Electronic Information Division, Statistics Canada and the Institute for Research in Construction, National Research Council of Canada

Working Paper Series

The Working Paper Series publishes 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 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)

Bert Plaus (613-951-6347)
Chief, Science and Innovation Surveys

Chief, Life Science Unit
Antoine Rose (613-951-9919)
Chief, Science and Innovation Surveys Section

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 in five key entities:

- **Actors**: are persons and institutions engaged in S&T activities. Measures include distinguishing R&D performers, identifying universities that licence their technologies, and determining the field of study of graduates.
- **Activities**: include the creation, transmission or use of S&T knowledge including research and development, innovation, and use of technologies.
- **Linkages**: are 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, the source of ideas for innovation in industry.
- **Outcomes**: are the medium-term consequences of activities. An outcome of an innovation in a firm may be more highly skilled jobs. An outcome of a firm adopting a new technology may be a greater market share for that firm.
- **Impacts**: are 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 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 limited 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 of the characteristics of people in those industries that lead science and technology activity are being developed. 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. It invests over five 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. The report **Federal Scientific Activities, 1998 (Cat. No. 88-204)** first published socio-economic objectives indicators to show *what* the S&T money is 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 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 of science and technology and show the role of the federal government in that system.

The working papers and research papers are available at no cost on the Statistics Canada Internet site at http://www.statcan.ca/english/research/scilist.htm.

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Preface

The study of the adoption and dissemination of technologies and practices and is one of the key components of innovation and technological development. Indeed, it is through the adoption of newer, more advanced, technologies and practices that industries can increase their production capabilities, improve their productivity, and expand their lines of new products and services.

Surveys of the adoption of new technologies and practices and complement other information we collect about R&D and innovation, by allowing us to measure in what way and how quickly industries adapt to technological and organizational change.

The 1999 Survey of Innovation, Advanced Technologies and Practices in the Construction and Related Industries is the first survey of the advanced technologies and practices in the construction sector. Four surveys of advanced manufacturing technologies were been carried out in 1987, 1989, 1993 and 1998; two surveys of the use of biotechnologies have been carried out in 1996 and 2000; and one survey of electronic commerce and technology was carried out in 1999 and one is currently in the field.

This research paper is the result of a joint 3-year collaborative project with the Institute for Research in Construction of the National Research Council of Canada and the Science, Innovation and Electronic Information Division of Statistics Canada. The broad objective of the project is to measure, understand and assess innovation, advanced technologies and practices of the Canadian construction sector with a view to developing new policies and programs.

As production processes in construction are significantly different from those found in the manufacturing sector, listings of advanced manufacturing technologies that are currently used were not considered to be appropriate descriptors. Consequently, a listing of advanced technologies and advanced practices that are specific to the construction sector was developed in consultation with industry experts.

Acknowledgements

The work of the Statistics Canada/NRC Working Group was critical in the design of the questionnaire and development of the general conceptual approach to innovation in construction that has guided the broader study. Participants in the of the working group are: from NRC: Aaron Bellamy, Olga Berseneff, Hakim Elmahdy, André Manseau, and Chris Norris; from Statistics Canada: Frances Anderson, Susan Schaan and Brian Nemes; from the Canadian Construction Research Board: Ed Cuylits and Gordon Walt; from the University of Ottawa, Faculty of Administration: George Seaden; and from Carleton University, Institute for Interdisciplinary Studies: Rob Shields.

The questionnaire mail-out and collection/data capture was carried out by Science and Innovation Survey Section of the Science, Innovation and Electronics Division, under the direction of Bert Plaus, with Heather Prieur as the project manager.

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

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

Finally, the authors would like to thank the 1800 construction businesses who completed the questionnaire. Without their cooperation and goodwill, this working paper would not exist.

Introduction

This working paper is the first in a series of studies that results from a collaborative project between the Science, Innovation and Electronic Information Division of Statistics 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 measure, understand and assess innovation, advanced technologies and advanced practices through the examination of patterns, processes and performance of the Canadian construction sector with an ultimate view to developing policies and programs.

Over the last decade, innovation and advanced technology surveys have been carried out in many countries, including Canada. For the most part, these surveys have concentrated on the manufacturing sector and more recently on the service sector, but there has been little work done on surveying the construction sector. The *Survey of Innovation, Advanced Technology and Practices in the Construction and Related Industry- 1999* is the first Canadian effort to measure innovation, advanced technologies and practices in the construction sector.

In the initial discussions of the NRC/Statistics Canada working group which developed the *Survey of Innovation, Advanced Technology and Practices in the Construction and Related Industries- 1999* consideration was given to surveying construction with the same survey instrument that has been developed to survey manufacturing. After considerable deliberation, such an approach was not adopted. In the following passages an account is given of the major considerations of the working group on the nature of innovation and of advanced technologies and practices which have been critical in the design of the current survey.

The Construction Production System

It was the view of the working group that there here are a number of very important differences between the construction production process and the manufacturing production process and because of these differences a different approach was required. Brady and Shapiro's (1999) discussion "complex product systems" (COPS) is useful to understand the difference between the construction and the mass-production manufacturing productions systems.

> "(Complex product systems – COPS) are produced on a project basis for specific customers and markets…. Many of the innovation and production processes of COPS do not conform to conventional models derived from research in mass production industries. For COPS, the nature of the production process is very different with for greater emphasis on software development, systems integration and project management rather than on manufacturing and other repeated tasks." (Brady and Shapiro, 1999)

The construction production system is thus characterized by its project-based organization. Work is carried out on a construction or building site, not in a factory, and the final result of the process is a custom-designed, custom-made complex product, not a standard mass produced product.

Given these important differences, the working group sought to develop an approach that would use the key defining concepts of innovation- product, process and organizational practices- as outlined in the *Oslo Manual* and apply these key concepts to the special case of the construction sector.

Product

In the view of the working group, the construction industries are essentially assembly operations. Products (old or innovative) are produced in the manufacturing sector. These manufactured products flow from the manufacturing sector into the construction industries where they become components of sub-systems and these sub-systems become part of the final complex product system- the built structure, be it a building, a bridge, a railway, etc. For example, light fixtures from a manufacturer become a component of a electrical system that is installed in a building or in the lighting system of a highway. This being the case, the construction industries are essentially adopters of innovative products, as opposed to the producer of innovative products.

The adoption and integration of innovative products can require considerable change on the construction or building site as these innovative products must be integrated into pre-existing sub-systems or complex product system. Methods and procedures of installation might have to change and the skills set of the workers might not be adequate to deal with the new innovative products.

Asking the construction sector whether or not they developed new or significantly improved products, which is the way the innovation question is most often phrased in innovation surveys, was judged to be an inappropriate one for construction industries because the purpose of the construction production system is not to produce innovative products but rather to assemble complex product systems. The more critical question, if one wants to understand innovation in construction industries, is that of the obstacles to and impact of the flow of innovative products into construction industries, as well of the extent of the diffusion of certain key innovative products. Questions were developed for the current questionnaire to address these issues.

Process

In the view of the working group, production processes in construction are also significantly different from those of the manufacturing sector. Existing listings of advanced manufacturing technologies were not considered to be appropriate descriptors of construction production processes. A listing of technologies that are specific to the construction sector was developed.

Process innovation in construction is of three types: logistical technologies (bringing products to the site), site preparation (preparing the land) and assembling technologies (putting the components together to build the final structure). Innovation in heavy equipment and construction tools are key drivers of change on the construction or building site, along with the development new installation practices. As in the case of products, machinery and equipment are produced in the manufacturing sector, not in the construction industries and new equipment and machinery can also require significant changes on the work site in terms of installation practices and the skill sets of the workers.

Organizational practices

Innovation can be a new or significantly improved product (goods or services), process or organizational practice. Most innovation surveys that have been conducted to date measure product and process innovation. Only a more limited number of surveys have measured organizational practice innovation.

An important hypothesis that the working group wanted to test was that the most successful construction businesses are those that have adopted "modern management practices" or, in other terms, have adopted the more innovative of the practices that are currently available. A listing of advanced construction practices was developed by the working group which includes the four following types of practices: computerization, quality, organizational and business.

The Survey

Questionnaire development

The questionnaire was designed jointly by a joint working group formed by the Science, Innovation and Electronic Information Division of Statistics Canada and the Institute for Research in Construction of the National Research Council of Canada. It was developed with input of industry experts in the working group as well as from input from industrial associations with whom consultations were held and round tables were organized. Testing of the questionnaire was carried out to ensure that the questions were well understood by industry respondents.

Characteristics and Coverage

The Survey of Innovation, Advanced Technologies and Practices in the Construction and Related Industries was conducted by Statistics Canada during the spring and summer of 1999. It was based on a list of businesses classified to construction industries taken from the Statistics Canada's Business Register.

The survey consists of eight sections with questions on business environment; success factors; use and planned use of advanced technologies; use and planned use of advanced practices; mergers, acquisitions and expansions; sources of information; obstacles; and impact.

Sampling Methodology

A total of 147,634 sample units were defined from Statistics Canada's Business Register. The sampling unit used in the 1997 Unified Enterprise Survey (UES) for Construction was neither at the enterprise nor the establishment level, rather, it was a grouping (or cluster) of establishments. Within each province for each enterprise, all establishments of the same NAICS (North American Industrial Classification System) 6-digit code were grouped to form one sampling unit or "pseudo enterprise". To reduce response burden, businesses with revenues less than $50,000 were not included in the population.

The sample was randomly drawn from the population of pseudo enterprises that was stratified by province and industry size class. Fourteen industry categories based on NAICS codes were used. Details of the industry codes used are found in Annex 1.

A sample of roughly 2,500 units was drawn. Questionnaires were sent only to those businesses that had responded to the 1997 Unified Enterprise Survey of Construction, to ensure that the data from the Innovation, Advanced Technologies and Practices survey data could to linked to the production data contained in the 1997 Survey of Construction. Data could then be presented based on size. In this document revenue sizes are: small- $50,000-$999,999; medium- $1 million-$9,999,999; and large- $10 million and over.

Data Collection

Questionnaires were mailed out to the Chief Executive Officer (CEO) of businesses. Mail, telephone and fax follow-ups were then carried out for non-respondents.

Response and Non-response

The overall response rate for the survey was 75%, for a total of 1,800 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. Business weights for the survey are equal to the inverse of the sampling rate.

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.

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%

In the text that follows estimates with a rating of "C" are shaded. Estimates with a rating of "D" have not been presented and have been replaced by "…". All other estimates in the text and the annex are of "A" or "B" rating.

Advanced technologies and practices

There are 18 advanced technologies and 12 advanced practices listed in this survey. These two listings were developed by the joint Statistics Canada/NRC working group in consultation with industry representatives. See the questionnaire in Annex 2 for definitions of the advanced technologies and practices.

Table 1 Business environment, Canada, provinces and territories.			
		% of businesses agreeing	Reliability
Canada			
	My clients' needs are easy to predict	49%	B
	My clients' can easily find a substitute for my services	61%	B
	My competitors' actions are easy to predict	31%	B
	My business can easily substitute among suppliers	52%	B
	The arrival of new competitors is a constant threat	61%	B
	Materials and supplies quickly become obsolete	15%	A
	Technologies in the office are changing rapidly	56%	B
	Technologies on the construction/building site are changing rapidly	44%	B
Newfoundland			
	My clients' needs are easy to predict	63%	C
	My clients' can easily find a substitute for my services	73%	C
	My competitors' actions are easy to predict	59%	B
	My business can easily substitute among suppliers	38%	C
	The arrival of new competitors is a constant threat	79%	C
	Materials and supplies quickly become obsolete	24%	B
	Technologies in the office are changing rapidly	82%	B
	Technologies on the construction/building site are changing rapidly	75%	C
Prince Edward Island			
	My clients' needs are easy to predict	30%	B
	My clients' can easily find a substitute for my services	54%	C
	My competitors' actions are easy to predict	30%	C
	My business can easily substitute among suppliers	58%	C
	The arrival of new competitors is a constant threat	46%	C
	Materials and supplies quickly become obsolete	12%	B
	Technologies in the office are changing rapidly	58%	C
	Technologies on the construction/building site are changing rapidly	52%	C
Nova Scotia			
	My clients' needs are easy to predict	45%	B
	My clients' can easily find a substitute for my services	65%	B
	My competitors' actions are easy to predict	30%	B
	My business can easily substitute among suppliers	47%	B
	The arrival of new competitors is a constant threat	65%	B
	Materials and supplies quickly become obsolete	17%	B
	Technologies in the office are changing rapidly	52%	B
	Technologies on the construction/building site are changing rapidly	49%	B
New Brunswick			
	My clients' needs are easy to predict	46%	C
	My clients' can easily find a substitute for my services	66%	B
	My competitors' actions are easy to predict	33%	B
	My business can easily substitute among suppliers	51%	C
	The arrival of new competitors is a constant threat	76%	B
	Materials and supplies quickly become obsolete	24%	C
	Technologies in the office are changing rapidly	55%	C
	Technologies on the construction/building site are changing rapidly	43%	C
Quebec			
	My clients' needs are easy to predict	51%	C
	My clients' can easily find a substitute for my services	49%	C
	My competitors' actions are easy to predict	29%	C
	My business can easily substitute among suppliers	68%	B
	The arrival of new competitors is a constant threat	53%	C
	Materials and supplies quickly become obsolete	18%	B
	Technologies in the office are changing rapidly	77%	B
	Technologies on the construction/building site are changing rapidly	35%	B

Table 1 Business environment, Canada, provinces and territories.			
		% of businesses agreeing	Reliability
Ontario			
	My clients' needs are easy to predict	…	D
	My clients' can easily find a substitute for my services	70%	B
	My competitors' actions are easy to predict	…	D
	My business can easily substitute among suppliers	46%	B
	The arrival of new competitors is a constant threat	68%	B
	Materials and supplies quickly become obsolete	10%	B
	Technologies in the office are changing rapidly	58%	B
	Technologies on the construction/building site are changing rapidly	…	D
Manitoba			
	My clients' needs are easy to predict	51%	B
	My clients' can easily find a substitute for my services	49%	B
	My competitors' actions are easy to predict	22%	B
	My business can easily substitute among suppliers	51%	B
	The arrival of new competitors is a constant threat	42%	B
	Materials and supplies quickly become obsolete	13%	B
	Technologies in the office are changing rapidly	52%	B
	Technologies on the construction/building site are changing rapidly	35%	B
Saskatchewan			
	My clients' needs are easy to predict	46%	B
	My clients' can easily find a substitute for my services	64%	B
	My competitors' actions are easy to predict	34%	B
	My business can easily substitute among suppliers	63%	B
	The arrival of new competitors is a constant threat	65%	B
	Materials and supplies quickly become obsolete	38%	B
	Technologies in the office are changing rapidly	41%	B
	Technologies on the construction/building site are changing rapidly	55%	B
Alberta			
	My clients' needs are easy to predict	37%	C
	My clients' can easily find a substitute for my services	57%	C
	My competitors' actions are easy to predict	29%	C
	My business can easily substitute among suppliers	39%	C
	The arrival of new competitors is a constant threat	61%	C
	Materials and supplies quickly become obsolete	22%	B
	Technologies in the office are changing rapidly	46%	C
	Technologies on the construction/building site are changing rapidly	41%	C
British Columbia			
	My clients' needs are easy to predict	35%	C
	My clients' can easily find a substitute for my services	57%	C
	My competitors' actions are easy to predict	24%	C
	My business can easily substitute among suppliers	57%	C
	The arrival of new competitors is a constant threat	54%	C
	Materials and supplies quickly become obsolete	10%	B
	Technologies in the office are changing rapidly	46%	C
	Technologies on the construction/building site are changing rapidly	35%	C
Yukon			
	My clients' needs are easy to predict	17%	B
	My clients' can easily find a substitute for my services	70%	B
	My competitors' actions are easy to predict	54%	B
	My business can easily substitute among suppliers	17%	B
	The arrival of new competitors is a constant threat	…	D
	Materials and supplies quickly become obsolete	7%	A
	Technologies in the office are changing rapidly	…	D
	Technologies on the construction/building site are changing rapidly	…	D

Table 1 Business environment, Canada, provinces and territories.			
		% of businesses agreeing	Reliability
Former Northwest Territories			
	My clients' needs are easy to predict	32%	C
	My clients' can easily find a substitute for my services	70%	C
	My competitors' actions are easy to predict	23%	C
	My business can easily substitute among suppliers	52%	C
	The arrival of new competitors is a constant threat	57%	C
	Materials and supplies quickly become obsolete	33%	C
	Technologies in the office are changing rapidly	45%	C
	Technologies on the construction/building site are changing rapidly	37%	C

Source: Statistics Canada (Science, Innovation and Electronic Information Division), Innovation, Advanced Technologies and Practices in Construction and Related Industries Survey – 1999

Table 2 Factors for business success, Canada, provinces and territories.			
		% of businesses rating high importance	Reliability
Canada			
	Business strategy		
	Developing unique expertise or a unique market	52%	B
	Delivering products or services which reduce the client's operating costs	53%	B
	Seeking business outside of your present geographical region of activity	21%	A
	Increasing your market share	53%	B
	Building and enhancing relationships with existing clients	87%	A
	Attracting new clients	81%	B
	Providing a broader range of services to your clients'	54%	B
	Ensuring employees are aware of business issues	60%	B
	Human Resources		
	Encouraging and regarding your employees to seek out technological improvements	42%	B
	Encouraging and rewarding your employees to seek out organizational improvements	50%	B
	Providing or supporting training programs for employees	49%	B
	Hiring new graduates from colleges and universities	11%	A
	Hiring experienced employees	69%	B
	Participating in apprenticeship programs	34%	A
	Using teams which bring together people with different skills	33%	A
	Technology		
	Introducing new user-friendly technologies	41%	B
	Investing in research and development	16%	A
	Protecting intellectual properties (patents, trademarks, copyrights, etc.)	14%	A
	Enhancing your technical capabilities	50%	B
	Participating in the development of industry standards and practices	42%	B
Newfoundland			
	Business strategy		
	Developing unique expertise or a unique market	25%	C
	Delivering products or services which reduce the client's operating costs	79%	C
	Seeking business outside of your present geographical region of activity	54%	B
	Increasing your market share	39%	C
	Building and enhancing relationships with existing clients	92%	B
	Attracting new clients	90%	B
	Providing a broader range of services to your clients'	83%	B
	Ensuring employees are aware of business issues	82%	B
	Human Resources		
	Encouraging and regarding your employees to seek out technological improvements	68%	C
	Encouraging and rewarding your employees to seek out organizational improvements	32%	B
	Providing or supporting training programs for employees	67%	C
	Hiring new graduates from colleges and universities	11%	B
	Hiring experienced employees	88%	B
	Participating in apprenticeship programs	63%	B
	Using teams which bring together people with different skills	29%	C
	Technology		
	Introducing new user-friendly technologies	28%	C
	Investing in research and development	9%	B
	Protecting intellectual properties (patents, trademarks, copyrights, etc.)	12%	B
	Enhancing your technical capabilities	33%	C
	Participating in the development of industry standards and practices	68%	B

Table 2 Factors for business success, Canada, provinces and territories.			
		% of businesses rating high importance	Reliability
Prince Edward Island			
	Business strategy		
	Developing unique expertise or a unique market	50%	C
	Delivering products or services which reduce the client's operating costs	52%	B
	Seeking business outside of your present geographical region of activity	14%	B
	Increasing your market share	48%	C
	Building and enhancing relationships with existing clients	78%	C
	Attracting new clients	85%	B
	Providing a broader range of services to your clients'	52%	C
	Ensuring employees are aware of business issues	49%	B
	Human Resources		
	Encouraging and regarding your employees to seek out technological improvements	44%	C
	Encouraging and rewarding your employees to seek out organizational improvements	49%	C
	Providing or supporting training programs for employees	49%	C
	Hiring new graduates from colleges and universities	14%	B
	Hiring experienced employees	68%	C
	Participating in apprenticeship programs	42%	C
	Using teams which bring together people with different skills	45%	C
	Technology		
	Introducing new user-friendly technologies	54%	C
	Investing in research and development	19%	B
	Protecting intellectual properties (patents, trademarks, copyrights, etc.)	12%	B
	Enhancing your technical capabilities	52%	C
	Participating in the development of industry standards and practices	47%	C
Nova Scotia			
	Business strategy		
	Developing unique expertise or a unique market	57%	B
	Delivering products or services which reduce the client's operating costs	55%	B
	Seeking business outside of your present geographical region of activity	12%	B
	Increasing your market share	49%	B
	Building and enhancing relationships with existing clients	89%	B
	Attracting new clients	82%	B
	Providing a broader range of services to your clients'	49%	B
	Ensuring employees are aware of business issues	58%	B
	Human Resources		
	Encouraging and regarding your employees to seek out technological improvements	46%	B
	Encouraging and rewarding your employees to seek out organizational improvements	48%	B
	Providing or supporting training programs for employees	53%	B
	Hiring new graduates from colleges and universities	6%	A
	Hiring experienced employees	86%	B
	Participating in apprenticeship programs	37%	B
	Using teams which bring together people with different skills	33%	B
	Technology		
	Introducing new user-friendly technologies	37%	B
	Investing in research and development	14%	B
	Protecting intellectual properties (patents, trademarks, copyrights, etc.)	9%	B
	Enhancing your technical capabilities	47%	B
	Participating in the development of industry standards and practices	36%	B

Table 2 Factors for business success, Canada, provinces and territories.			
		% of businesses rating high importance	Reliability
New Brunswick			
	Business strategy		
	Developing unique expertise or a unique market	47%	C
	Delivering products or services which reduce the client's operating costs	54%	C
	Seeking business outside of your present geographical region of activity	20%	B
	Increasing your market share	56%	C
	Building and enhancing relationships with existing clients	79%	B
	Attracting new clients	95%	A
	Providing a broader range of services to your clients'	59%	C
	Ensuring employees are aware of business issues	53%	C
	Human Resources		
	Encouraging and regarding your employees to seek out technological improvements	38%	C
	Encouraging and rewarding your employees to seek out organizational improvements	51%	C
	Providing or supporting training programs for employees	43%	C
	Hiring new graduates from colleges and universities	25%	C
	Hiring experienced employees	67%	C
	Participating in apprenticeship programs	45%	C
	Using teams which bring together people with different skills	32%	C
	Technology		
	Introducing new user-friendly technologies	51%	C
	Investing in research and development	7%	A
	Protecting intellectual properties (patents, trademarks, copyrights, etc.)	12%	B
	Enhancing your technical capabilities	53%	B
	Participating in the development of industry standards and practices	46%	C
Quebec			
	Business strategy		
	Developing unique expertise or a unique market	59%	C
	Delivering products or services which reduce the client's operating costs	60%	C
	Seeking business outside of your present geographical region of activity	15%	B
	Increasing your market share	62%	C
	Building and enhancing relationships with existing clients	87%	B
	Attracting new clients	83%	B
	Providing a broader range of services to your clients'	62%	C
	Ensuring employees are aware of business issues	69%	C
	Human Resources		
	Encouraging and regarding your employees to seek out technological improvements	60%	C
	Encouraging and rewarding your employees to seek out organizational improvements	59%	C
	Providing or supporting training programs for employees	49%	B
	Hiring new graduates from colleges and universities	10%	B
	Hiring experienced employees	75%	B
	Participating in apprenticeship programs	43%	C
	Using teams which bring together people with different skills	47%	C
	Technology		
	Introducing new user-friendly technologies	60%	B
	Investing in research and development	9%	B
	Protecting intellectual properties (patents, trademarks, copyrights, etc.)	19%	B
	Enhancing your technical capabilities	45%	C
	Participating in the development of industry standards and practices	34%	B

Table 2 Factors for business success, Canada, provinces and territories.			
		% of businesses rating high importance	Reliability
Ontario			
	Business strategy		
	Developing unique expertise or a unique market	50%	B
	Delivering products or services which reduce the client's operating costs	54%	B
	Seeking business outside of your present geographical region of activity	28%	B
	Increasing your market share	47%	B
	Building and enhancing relationships with existing clients	90%	B
	Attracting new clients	88%	B
	Providing a broader range of services to your clients'	63%	B
	Ensuring employees are aware of business issues	65%	B
	Human Resources		
	Encouraging and regarding your employees to seek out technological improvements	40%	B
	Encouraging and rewarding your employees to seek out organizational improvements	…	D
	Providing or supporting training programs for employees	…	D
	Hiring new graduates from colleges and universities	13%	B
	Hiring experienced employees	67%	B
	Participating in apprenticeship programs	33%	B
	Using teams which bring together people with different skills	38%	B
	Technology		
	Introducing new user-friendly technologies	45%	B
	Investing in research and development	30%	B
	Protecting intellectual properties (patents, trademarks, copyrights, etc.)	15%	B
	Enhancing your technical capabilities	54%	B
	Participating in the development of industry standards and practices	44%	B
Manitoba			
	Business strategy		
	Developing unique expertise or a unique market	67%	B
	Delivering products or services which reduce the client's operating costs	49%	B
	Seeking business outside of your present geographical region of activity	18%	B
	Increasing your market share	64%	B
	Building and enhancing relationships with existing clients	95%	B
	Attracting new clients	80%	B
	Providing a broader range of services to your clients'	38%	B
	Ensuring employees are aware of business issues	61%	B
	Human Resources		
	Encouraging and regarding your employees to seek out technological improvements	51%	B
	Encouraging and rewarding your employees to seek out organizational improvements	62%	B
	Providing or supporting training programs for employees	52%	B
	Hiring new graduates from colleges and universities	16%	B
	Hiring experienced employees	71%	B
	Participating in apprenticeship programs	53%	B
	Using teams which bring together people with different skills	37%	B
	Technology		
	Introducing new user-friendly technologies	38%	B
	Investing in research and development	11%	B
	Protecting intellectual properties (patents, trademarks, copyrights, etc.)	18%	B
	Enhancing your technical capabilities	48%	B
	Participating in the development of industry standards and practices	54%	B

Table 2 Factors for business success, Canada, provinces and territories.				
			% of businesses rating high importance	Reliability
Saskatchewan				
	Business strategy			
		Developing unique expertise or a unique market	59%	B
		Delivering products or services which reduce the client's operating costs	62%	B
		Seeking business outside of your present geographical region of activity	16%	B
		Increasing your market share	51%	B
		Building and enhancing relationships with existing clients	88%	B
		Attracting new clients	83%	B
		Providing a broader range of services to your clients'	59%	B
		Ensuring employees are aware of business issues	43%	B
	Human Resources			
		Encouraging and regarding your employees to seek out technological improvements	26%	B
		Encouraging and rewarding your employees to seek out organizational improvements	39%	B
		Providing or supporting training programs for employees	35%	B
		Hiring new graduates from colleges and universities	5%	B
		Hiring experienced employees	69%	B
		Participating in apprenticeship programs	28%	B
		Using teams which bring together people with different skills	22%	B
	Technology			
		Introducing new user-friendly technologies	24%	B
		Investing in research and development	6%	B
		Protecting intellectual properties (patents, trademarks, copyrights, etc.)	6%	B
		Enhancing your technical capabilities	49%	B
		Participating in the development of industry standards and practices	37%	B
Alberta				
	Business strategy			
		Developing unique expertise or a unique market	54%	C
		Delivering products or services which reduce the client's operating costs	58%	C
		Seeking business outside of your present geographical region of activity	18%	B
		Increasing your market share	53%	C
		Building and enhancing relationships with existing clients	79%	B
		Attracting new clients	71%	B
		Providing a broader range of services to your clients'	52%	C
		Ensuring employees are aware of business issues	52%	C
	Human Resources			
		Encouraging and regarding your employees to seek out technological improvements	35%	C
		Encouraging and rewarding your employees to seek out organizational improvements	45%	C
		Providing or supporting training programs for employees	36%	C
		Hiring new graduates from colleges and universities	7%	B
		Hiring experienced employees	60%	C
		Participating in apprenticeship programs	32%	C
		Using teams which bring together people with different skills	18%	B
	Technology			
		Introducing new user-friendly technologies	35%	B
		Investing in research and development	14%	B
		Protecting intellectual properties (patents, trademarks, copyrights, etc.)	13%	B
		Enhancing your technical capabilities	49%	C
		Participating in the development of industry standards and practices	43%	B

Table 2 Factors for business success, Canada, provinces and territories.			
		% of businesses rating high importance	Reliability
British Columbia			
	Business strategy		
	Developing unique expertise or a unique market	48%	C
	Delivering products or services which reduce the client's operating costs	39%	C
	Seeking business outside of your present geographical region of activity	18%	B
	Increasing your market share	55%	C
	Building and enhancing relationships with existing clients	87%	B
	Attracting new clients	71%	C
	Providing a broader range of services to your clients'	32%	C
	Ensuring employees are aware of business issues	54%	C
	Human Resources		
	Encouraging and regarding your employees to seek out technological improvements	36%	C
	Encouraging and rewarding your employees to seek out organizational improvements	43%	C
	Providing or supporting training programs for employees	45%	C
	Hiring new graduates from colleges and universities	7%	A
	Hiring experienced employees	73%	C
	Participating in apprenticeship programs	24%	B
	Using teams which bring together people with different skills	26%	B
	Technology		
	Introducing new user-friendly technologies	27%	B
	Investing in research and development	4%	A
	Protecting intellectual properties (patents, trademarks, copyrights, etc.)	9%	B
	Enhancing your technical capabilities	50%	C
	Participating in the development of industry standards and practices	44%	C
Yukon			
	Business strategy		
	Developing unique expertise or a unique market	…	D
	Delivering products or services which reduce the client's operating costs	61%	B
	Seeking business outside of your present geographical region of activity	27%	B
	Increasing your market share	70%	B
	Building and enhancing relationships with existing clients	…	D
	Attracting new clients	93%	B
	Providing a broader range of services to your clients'	…	D
	Ensuring employees are aware of business issues	…	D
	Human Resources		
	Encouraging and regarding your employees to seek out technological improvements	…	D
	Encouraging and rewarding your employees to seek out organizational improvements	67%	B
	Providing or supporting training programs for employees	…	D
	Hiring new graduates from colleges and universities	10%	B
	Hiring experienced employees	…	D
	Participating in apprenticeship programs	57%	B
	Using teams which bring together people with different skills	…	D
	Technology		
	Introducing new user-friendly technologies	53%	B
	Investing in research and development	…	D
	Protecting intellectual properties (patents, trademarks, copyrights, etc.)	…	D
	Enhancing your technical capabilities	…	D
	Participating in the development of industry standards and practices	65%	B

Table 2 Factors for business success, Canada, provinces and territories.			
		% of businesses rating high importance	Reliability
Former Northwest Territories			
	Business strategy		
	Developing unique expertise or a unique market	34%	C
	Delivering products or services which reduce the client's operating costs	47%	C
	Seeking business outside of your present geographical region of activity	30%	C
	Increasing your market share	47%	C
	Building and enhancing relationships with existing clients	74%	C
	Attracting new clients	86%	C
	Providing a broader range of services to your clients'	…	D
	Ensuring employees are aware of business issues	60%	C
	Human Resources		
	Encouraging and regarding your employees to seek out technological improvements	37%	C
	Encouraging and rewarding your employees to seek out organizational improvements	…	D
	Providing or supporting training programs for employees	50%	C
	Hiring new graduates from colleges and universities	8%	C
	Hiring experienced employees	84%	C
	Participating in apprenticeship programs	58%	C
	Using teams which bring together people with different skills	35%	C
	Technology		
	Introducing new user-friendly technologies	29%	C
	Investing in research and development	4%	B
	Protecting intellectual properties (patents, trademarks, copyrights, etc.)	6%	C
	Enhancing your technical capabilities	49%	C
	Participating in the development of industry standards and practices	41%	C

Source: Statistics Canada (Science, Innovation and Electronic Information Division), Innovation, Advanced Technologies and Practices in Construction and Related Industries Survey – 1999

Table 3 Use of advanced technologies, Canada, provinces and territories.							
		Currently used		Plan to use within next two years		No plans/Not applicable	
		Percent	Reliability	Percent	Reliability	Percent	Reliability
Canada							
	Communications						
	E-mail	38%	B	25%	B	37%	B
	Digital photography for progress reporting	4%	A	12%	B	84%	B
	Office-to-site video links or video conferencing	2%	A	3%	A	95%	A
	Company computer networks (LAN or WAN)	25%	A	10%	A	66%	A
	On-site plant and equipment						
	Laser-guided equipment	16%	B	10%	A	74%	B
	Automated systems and programmable machines	14%	A	9%	A	77%	A
	GPS (Global Positioning System)	2%	A	4%	A	94%	A
	Materials						
	High performance concrete	15%	B	2%	A	82%	B
	Composite materials (e.g. fiber reinforced plastics)	13%	A	7%	B	80%	B
	Recycled plastic components	10%	A	6%	B	84%	B
	Systems						
	Remote sensing and monitoring systems (e.g. "smart" detection systems)	14%	A	3%	A	83%	A
	Bio-remediation clean-up	3%	A	2%	A	95%	A
	Preassembled air, water, power distribution systems (e.g. "drop-in" systems)	10%	A	3%	A	87%	A
	"Clean room" technology	3%	A	4%	A	93%	A
	Deconstruction and reuse systems	11%	B	3%	A	86%	B
	Design						
	Computer aided design	23%	A	15%	B	62%	B
	Modeling or simulation technologies	7%	A	11%	A	82%	A
	Electronic exchange of CAD files	11%	A	14%	A	75%	A
Newfoundland							
	Communications						
	E-mail	31%	B	10%	B	59%	B
	Digital photography for progress reporting	2%	A	6%	B	92%	B
	Office-to-site video links or video conferencing	0%	A	0%	A	100%	A
	Company computer networks (LAN or WAN)	3%	A	9%	B	88%	B
	On-site plant and equipment						
	Laser-guided equipment	10%	B	6%	B	85%	B
	Automated systems and programmable machines	7%	B	4%	B	89%	B
	GPS (Global Positioning System)	4%	A	2%	A	94%	B
	Materials						
	High performance concrete	17%	B	1%	A	82%	B
	Composite materials (e.g. fiber reinforced plastics)	20%	B	0%	A	80%	B
	Recycled plastic components	13%	B	0%	A	87%	B
	Systems						
	Remote sensing and monitoring systems (e.g. "smart" detection systems)	5%	B	4%	B	91%	B
	Bio-remediation clean-up	2%	A	1%	A	96%	B
	Preassembled air, water, power distribution systems (e.g. "drop-in" systems)	7%	B	1%	A	91%	B
	"Clean room" technology	5%	B	2%	A	94%	B
	Deconstruction and reuse systems	9%	B	2%	A	89%	B
	Design						
	Computer aided design	7%	B	12%	B	81%	B
	Modeling or simulation technologies	2%	A	9%	B	89%	B
	Electronic exchange of CAD files	4%	B	13%	B	84%	B

Table 3 Use of advanced technologies, Canada, provinces and territories.						
	Currently used		Plan to use within next two years		No plans/Not applicable	
	Percent	Reliability	Percent	Reliability	Percent	Reliability
Prince Edward Island						
Communications						
E-mail	43%	C	21%	C	36%	C
Digital photography for progress reporting	6%	B	7%	B	87%	B
Office-to-site video links or video conferencing	0%	A	2%	A	98%	A
Company computer networks (LAN or WAN)	5%	A	7%	B	87%	B
On-site plant and equipment						
Laser-guided equipment	12%	B	9%	B	79%	B
Automated systems and programmable machines	8%	B	9%	B	83%	B
GPS (Global Positioning System)	7%	B	5%	A	88%	B
Materials						
High performance concrete	21%	B	0%	A	79%	B
Composite materials (e.g. fiber reinforced plastics)	16%	B	10%	B	74%	C
Recycled plastic components	14%	B	11%	B	75%	B
Systems						
Remote sensing and monitoring systems (e.g. "smart" detection systems)	6%	A	13%	B	82%	B
Bio-remediation clean-up	3%	A	3%	A	94%	B
Preassembled air, water, power distribution systems (e.g. "drop-in" systems)	9%	B	2%	A	89%	B
"Clean room" technology	6%	B	5%	A	89%	B
Deconstruction and reuse systems	9%	B	8%	B	83%	B
Design						
Computer aided design	16%	B	21%	B	63%	C
Modeling or simulation technologies	3%	A	4%	B	93%	B
Electronic exchange of CAD files	3%	A	8%	B	89%	B
Nova Scotia						
Communications						
E-mail	23%	B	25%	B	52%	B
Digital photography for progress reporting	4%	A	9%	A	87%	B
Office-to-site video links or video conferencing	1%	A	2%	A	97%	A
Company computer networks (LAN or WAN)	16%	B	6%	B	77%	B
On-site plant and equipment						
Laser-guided equipment	15%	B	6%	B	79%	B
Automated systems and programmable machines	6%	A	8%	B	86%	B
GPS (Global Positioning System)	2%	A	5%	B	94%	B
Materials						
High performance concrete	21%	B	4%	A	75%	B
Composite materials (e.g. fiber reinforced plastics)	21%	B	7%	B	73%	B
Recycled plastic components	14%	B	4%	B	83%	B
Systems						
Remote sensing and monitoring systems (e.g. "smart" detection systems)	20%	B	2%	A	78%	B
Bio-remediation clean-up	8%	B	2%	A	90%	B
Preassembled air, water, power distribution systems (e.g. "drop-in" systems)	17%	B	2%	A	81%	B
"Clean room" technology	6%	B	9%	A	85%	B
Deconstruction and reuse systems	21%	B	4%	A	75%	B
Design						
Computer aided design	14%	B	16%	B	69%	B
Modeling or simulation technologies	4%	A	9%	B	87%	B
Electronic exchange of CAD files	10%	B	11%	B	79%	B

Table 3 Use of advanced technologies, Canada, provinces and territories.							
		Currently used		Plan to use within next two years		No plans/Not applicable	
		Percent	Reliability	Percent	Reliability	Percent	Reliability
New Brunswick							
	Communications						
	E-mail	35%	B	14%	B	51%	B
	Digital photography for progress reporting	14%	B	11%	B	75%	C
	Office-to-site video links or video conferencing	7%	A	13%	B	80%	B
	Company computer networks (LAN or WAN)	33%	C	11%	A	56%	C
	On-site plant and equipment						
	Laser-guided equipment	16%	C	2%	A	82%	C
	Automated systems and programmable machines	10%	B	1%	A	89%	B
	GPS (Global Positioning System)	5%	B	1%	A	94%	B
	Materials						
	High performance concrete	23%	C	1%	A	76%	C
	Composite materials (e.g. fiber reinforced plastics)	25%	C	6%	B	69%	C
	Recycled plastic components	19%	C	7%	B	75%	C
	Systems						
	Remote sensing and monitoring systems (e.g. "smart" detection systems)	11%	B	1%	A	88%	B
	Bio-remediation clean-up	4%	B	1%	A	95%	B
	Preassembled air, water, power distribution systems (e.g. "drop-in" systems)	7%	B	4%	A	88%	B
	"Clean room" technology	15%	C	4%	A	81%	C
	Deconstruction and reuse systems	14%	C	2%	A	84%	C
	Design						
	Computer aided design	26%	C	10%	B	64%	C
	Modeling or simulation technologies	11%	C	2%	A	87%	C
	Electronic exchange of CAD files	18%	B	4%	A	78%	B
Quebec							
	Communications						
	E-mail	33%	B	38%	C	28%	C
	Digital photography for progress reporting	5%	A	15%	B	81%	B
	Office-to-site video links or video conferencing	2%	A	3%	A	96%	A
	Company computer networks (LAN or WAN)	30%	B	9%	B	60%	B
	On-site plant and equipment						
	Laser-guided equipment	14%	B	5%	B	80%	B
	Automated systems and programmable machines	12%	B	3%	A	84%	B
	GPS (Global Positioning System)	2%	A	3%	B	95%	B
	Materials						
	High performance concrete	11%	B	5%	B	84%	B
	Composite materials (e.g. fiber reinforced plastics)	12%	B	5%	B	83%	B
	Recycled plastic components	8%	B	3%	A	89%	B
	Systems						
	Remote sensing and monitoring systems (e.g. "smart" detection systems)	10%	B	4%	B	87%	B
	Bio-remediation clean-up	2%	A	2%	A	97%	B
	Preassembled air, water, power distribution systems (e.g. "drop-in" systems)	9%	B	3%	B	88%	B
	"Clean room" technology	2%	A	0%	A	98%	A
	Deconstruction and reuse systems	6%	B	1%	A	93%	B
	Design						
	Computer aided design	12%	B	17%	B	71%	B
	Modeling or simulation technologies	3%	A	2%	A	95%	B
	Electronic exchange of CAD files	5%	A	7%	B	88%	B

Table 3 Use of advanced technologies, Canada, provinces and territories.							
		Currently used		Plan to use within next two years		No plans/Not applicable	
		Percent	Reliability	Percent	Reliability	Percent	Reliability
Ontario							
	Communications						
	E-mail	44%	B	19%	B	37%	B
	Digital photography for progress reporting	2%	A	7%	B	91%	B
	Office-to-site video links or video conferencing	0%	A	3%	A	97%	A
	Company computer networks (LAN or WAN)	29%	B	11%	B	60%	B
	On-site plant and equipment						
	Laser-guided equipment	8%	B	20%	B	72%	B
	Automated systems and programmable machines	15%	A	17%	A	68%	A
	GPS (Global Positioning System)	1%	A	4%	B	95%	B
	Materials						
	High performance concrete	11%	B	1%	A	88%	B
	Composite materials (e.g. fiber reinforced plastics)	10%	B	8%	B	82%	B
	Recycled plastic components	8%	B	6%	B	86%	B
	Systems						
	Remote sensing and monitoring systems (e.g. "smart" detection systems)	18%	A	3%	A	80%	A
	Bio-remediation clean-up	4%	B	4%	B	93%	B
	Preassembled air, water, power distribution systems (e.g. "drop-in" systems)	9%	B	5%	B	86%	B
	"Clean room" technology	5%	B	7%	B	89%	B
	Deconstruction and reuse systems	4%	A	5%	B	91%	B
	Design						
	Computer aided design	31%	B	14%	B	55%	B
	Modeling or simulation technologies	9%	B	19%	A	72%	B
	Electronic exchange of CAD files	11%	B	25%	B	64%	B
Manitoba							
	Communications						
	E-mail	28%	B	35%	B	37%	B
	Digital photography for progress reporting	4%	A	7%	B	89%	B
	Office-to-site video links or video conferencing	2%	A	1%	A	97%	A
	Company computer networks (LAN or WAN)	14%	B	14%	B	72%	B
	On-site plant and equipment						
	Laser-guided equipment	17%	B	6%	B	76%	B
	Automated systems and programmable machines	6%	A	7%	B	87%	B
	GPS (Global Positioning System)	3%	A	6%	A	91%	B
	Materials						
	High performance concrete	21%	B	6%	B	73%	B
	Composite materials (e.g. fiber reinforced plastics)	14%	B	7%	B	79%	B
	Recycled plastic components	10%	B	2%	A	88%	B
	Systems						
	Remote sensing and monitoring systems (e.g. "smart" detection systems)	6%	A	4%	A	90%	B
	Bio-remediation clean-up	6%	B	0%	A	94%	B
	Preassembled air, water, power distribution systems (e.g. "drop-in" systems)	10%	B	0%	A	90%	B
	"Clean room" technology	6%	B	5%	B	89%	B
	Deconstruction and reuse systems	15%	B	0%	A	85%	B
	Design						
	Computer aided design	19%	B	21%	B	60%	B
	Modeling or simulation technologies	6%	B	4%	A	91%	B
	Electronic exchange of CAD files	8%	B	8%	B	84%	B

Table 3 Use of advanced technologies, Canada, provinces and territories.							
		Currently used		Plan to use within next two years		No plans/Not applicable	
		Percent	Reliability	Percent	Reliability	Percent	Reliability
Saskatchewan							
Communications							
	E-mail	24%	B	46%	B	30%	B
	Digital photography for progress reporting	2%	A	3%	A	95%	B
	Office-to-site video links or video conferencing	0%	A	1%	A	99%	A
	Company computer networks (LAN or WAN)	8%	B	25%	B	67%	B
On-site plant and equipment							
	Laser-guided equipment	8%	B	2%	B	90%	B
	Automated systems and programmable machines	6%	B	6%	B	89%	B
	GPS (Global Positioning System)	1%	A	5%	A	93%	A
Materials							
	High performance concrete	29%	B	5%	A	66%	B
	Composite materials (e.g. fiber reinforced plastics)	25%	B	4%	B	71%	B
	Recycled plastic components	6%	B	3%	A	91%	B
Systems							
	Remote sensing and monitoring systems (e.g. "smart" detection systems)	14%	B	6%	A	80%	B
	Bio-remediation clean-up	1%	A	4%	B	95%	B
	Preassembled air, water, power distribution systems (e.g. "drop-in" systems)	5%	B	3%	B	92%	B
	"Clean room" technology	3%	B	2%	A	95%	B
	Deconstruction and reuse systems	31%	B	2%	A	67%	B
Design							
	Computer aided design	9%	B	29%	B	61%	B
	Modeling or simulation technologies	1%	A	9%	B	90%	B
	Electronic exchange of CAD files	4%	A	7%	B	89%	B
Alberta							
Communications							
	E-mail	43%	C	8%	B	50%	C
	Digital photography for progress reporting	7%	B	8%	B	84%	B
	Office-to-site video links or video conferencing	3%	A	6%	A	91%	B
	Company computer networks (LAN or WAN)	17%	B	6%	A	77%	B
On-site plant and equipment							
	Laser-guided equipment	14%	B	4%	B	82%	B
	Automated systems and programmable machines	10%	B	5%	B	85%	B
	GPS (Global Positioning System)	3%	A	8%	B	89%	B
Materials							
	High performance concrete	6%	A	2%	A	93%	B
	Composite materials (e.g. fiber reinforced plastics)	7%	A	4%	A	89%	B
	Recycled plastic components	10%	B	3%	A	87%	B
Systems							
	Remote sensing and monitoring systems (e.g. "smart" detection systems)	12%	B	5%	B	83%	B
	Bio-remediation clean-up	4%	A	1%	A	95%	A
	Preassembled air, water, power distribution systems (e.g. "drop-in" systems)	9%	B	2%	A	89%	B
	"Clean room" technology	3%	A	0%	A	97%	A
	Deconstruction and reuse systems	14%	B	1%	A	84%	B
Design							
	Computer aided design	20%	B	6%	B	75%	B
	Modeling or simulation technologies	5%	A	7%	B	88%	B
	Electronic exchange of CAD files	8%	B	9%	B	82%	B

Table 3 Use of advanced technologies, Canada, provinces and territories.							
		Currently used		Plan to use within next two years		No plans/Not applicable	
		Percent	Reliability	Percent	Reliability	Percent	Reliability
British Columbia							
	Communications						
	E-mail	34%	C	35%	C	31%	C
	Digital photography for progress reporting	5%	A	26%	C	69%	C
	Office-to-site video links or video conferencing	5%	A	1%	A	94%	A
	Company computer networks (LAN or WAN)	24%	B	7%	B	68%	B
	On-site plant and equipment						
	Laser-guided equipment	37%	C	3%	A	60%	C
	Automated systems and programmable machines	24%	B	3%	A	73%	B
	GPS (Global Positioning System)	4%	A	3%	A	93%	B
	Materials						
	High performance concrete	28%	C	2%	A	70%	C
	Composite materials (e.g. fiber reinforced plastics)	19%	B	9%	C	72%	C
	Recycled plastic components	16%	A	10%	C	74%	C
	Systems						
	Remote sensing and monitoring systems (e.g. "smart" detection systems)	16%	B	1%	A	84%	B
	Bio-remediation clean-up	1%	A	0%	A	99%	A
	Preassembled air, water, power distribution systems (e.g. "drop-in" systems)	11%	B	2%	A	87%	B
	"Clean room" technology	1%	A	3%	A	97%	A
	Deconstruction and reuse systems	19%	C	3%	A	79%	C
	Design						
	Computer aided design	27%	B	18%	C	55%	C
	Modeling or simulation technologies	12%	A	7%	B	81%	B
	Electronic exchange of CAD files	20%	A	7%	B	73%	B
Yukon							
	Communications						
	E-mail	…	D	…	D	22%	B
	Digital photography for progress reporting	5%	A	…	D	…	D
	Office-to-site video links or video conferencing	0%	A	3%	A	97%	A
	Company computer networks (LAN or WAN)	7%	A	…	D	…	D
	On-site plant and equipment						
	Laser-guided equipment	8%	B	…	D	…	D
	Automated systems and programmable machines	6%	A	…	D	…	D
	GPS (Global Positioning System)	0%	A	5%	A	95%	A
	Materials						
	High performance concrete	12%	B	…	D	…	D
	Composite materials (e.g. fiber reinforced plastics)	12%	B	…	D	…	D
	Recycled plastic components	5%	B	…	D	…	D
	Systems						
	Remote sensing and monitoring systems (e.g. "smart" detection systems)	12%	B	1%	A	87%	B
	Bio-remediation clean-up	3%	A	5%	B	91%	B
	Preassembled air, water, power distribution systems (e.g. "drop-in" systems)	…	D	1%	A	...	D
	"Clean room" technology	2%	A	1%	A	97%	A
	Deconstruction and reuse systems	…	D	…	D	60%	B
	Design						
	Computer aided design	…	D	…	D	49%	A
	Modeling or simulation technologies	3%	A	39%	A	59%	A
	Electronic exchange of CAD files	…	D	…	D	56%	B

Table 3 Use of advanced technologies, Canada, provinces and territories.						
	Currently used		Plan to use within next two years		No plans/Not applicable	
	Percent	Reliability	Percent	Reliability	Percent	Reliability
Former Northwest Territories						
Communications						
E-mail	55%	C	16%	C	29%	C
Digital photography for progress reporting	17%	C	22%	C	61%	C
Office-to-site video links or video conferencing	8%	C	4%	A	88%	C
Company computer networks (LAN or WAN)	19%	C	11%	C	71%	C
On-site plant and equipment						
Laser-guided equipment	13%	C	14%	C	73%	C
Automated systems and programmable machines	10%	C	12%	C	78%	C
GPS (Global Positioning System)	12%	B	8%	C	80%	C
Materials						
High performance concrete	19%	C	6%	C	76%	C
Composite materials (e.g. fiber reinforced plastics)	24%	C	11%	C	65%	C
Recycled plastic components	18%	C	17%	C	65%	C
Systems						
Remote sensing and monitoring systems (e.g. "smart" detection systems)	6%	B	7%	C	87%	C
Bio-remediation clean-up	1%	A	3%	B	96%	B
Preassembled air, water, power distribution systems (e.g. "drop-in" systems)	12%	C	7%	C	81%	C
"Clean room" technology	2%	A	0%	A	97%	A
Deconstruction and reuse systems	17%	C	13%	C	…	D
Design						
Computer aided design	15%	C	18%	C	67%	C
Modeling or simulation technologies	6%	B	12%	C	82%	C
Electronic exchange of CAD files	11%	C	10%	B	79%	C

Source: Statistics Canada (Science, Innovation and Electronic Information Division), Innovation, Advanced Technologies and Practices in Construction and Related Industries Survey – 1999

Table 4 Functional technology use, Canada, provinces and territories.										
	Use (percent of businesses)									
	Communications		On-site plant and equipment		Materials		Systems		Design	
	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability
Canada	46%	B	26%	B	22%	B	25%	B	25%	A
Newfoundland	31%	B	16%	B	27%	B	15%	B	9%	B
Prince Edward Island	44%	C	22%	B	30%	B	20%	B	18%	B
Nova Scotia	29%	B	19%	B	34%	B	36%	B	19%	B
New Brunswick	50%	C	20%	C	32%	C	31%	C	27%	C
Quebec	49%	C	24%	C	22%	C	22%	B	15%	B
Ontario	51%	B	21%	B	15%	B	20%	A	33%	B
Manitoba	35%	B	23%	B	27%	B	31%	B	20%	B
Saskatchewan	29%	B	12%	B	33%	B	39%	B	10%	B
Alberta	44%	C	19%	B	16%	B	25%	B	20%	B
British Columbia	45%	C	47%	C	33%	C	31%	C	28%	B
Yukon	…	D	13%	B	16%	B	…	D	…	D
Former Northwest Territories	56%	C	24%	C	37%	C	29%	C	17%	C

Source: Statistics Canada (Science, Innovation and Electronic Information Division), Innovation, Advanced Technologies and Practices in Construction and Related Industries Survey – 1999

Table 5 Average number of technologies used, Canada, provinces and territories		
	Average number of technologies used	
	Average	Reliability
Canada	2.40	A
Newfoundland	1.61	B
Prince Edward Island	1.94	B
Nova Scotia	2.25	B
New Brunswick	2.97	C
Quebec	2.37	B
Ontario	2.23	A
Manitoba	2.02	B
Saskatchewan	1.79	A
Alberta	2.06	B
British Columbia	3.02	A
Yukon	2.69	C
Former Northwest Territories	3.30	B

Source: Statistics Canada (Science, Innovation and Electronic Information Division), Innovation, Advanced Technologies and Practices in Construction and Related Industries Survey – 1999

Table 6 Use of advanced business practices, Canada, provinces and territories.							
	Currently used		Plans to use within 2 years		No plans/Not applicable	
	Percent	Reliability	Percent	Reliability	Percent	Reliability
Canada						
Computerization						
Computerized inventory control	13%	A	17%	A	70%	A
Computerized estimating software	29%	B	23%	B	48%	B
Computerized project management and/or scheduling systems	31%	B	20%	A	49%	B
Quality						
Quality certification (e.g. ISO 9000, R2000)	5%	A	9%	A	86%	A
Organization						
Written market analysis report to evaluate needs and opportunities of your business	11%	A	13%	A	77%	A
Written documentation of technological improvements developed by your business	12%	A	5%	A	83%	A
Written evaluation of new ideas in order to develop options for your business	14%	A	11%	B	75%	B
Written strategic plan	20%	A	10%	A	70%	A
Business						
Design-build contracts	32%	B	7%	A	61%	B
Build-operate-transfer (BOT) contracts	5%	A	3%	A	92%	A
Post-commissioning inspection or maintenance contracts	17%	A	4%	A	78%	A
Long-term working arrangements with other businesses to work together on joint projects	24%	B	7%	B	69%	B
Newfoundland						
Computerization						
Computerized inventory control	19%	C	17%	C	64%	B
Computerized estimating software	9%	B	31%	B	60%	B
Computerized project management and/or scheduling systems	6%	A	25%	C	68%	C
Quality						
Quality certification (e.g. ISO 9000, R2000)	6%	B	11%	B	83%	B
Organization						
Written market analysis report to evaluate needs and opportunities of your business	5%	B	7%	B	88%	B
Written documentation of technological improvements developed by your business	9%	B	4%	B	87%	B
Written evaluation of new ideas in order to develop options for your business	10%	B	4%	B	86%	B
Written strategic plan	9%	B	9%	B	81%	B
Business						
Design-build contracts	22%	B	2%	A	75%	B
Build-operate-transfer (BOT) contracts	1%	A	4%	B	95%	B
Post-commissioning inspection or maintenance contracts	16%	B	2%	A	82%	B
Long-term working arrangements with other businesses to work together on joint projects	20%	C	4%	A	77%	C

Table 6 Use of advanced business practices, Canada, provinces and territories.							
	Currently used		Plans to use within 2 years		No plans/Not applicable	
	Percent	Reliability	Percent	Reliability	Percent	Reliability
Prince Edward Island						
Computerization						
Computerized inventory control	12%	B	19%	B	69%	C
Computerized estimating software	17%	B	33%	B	50%	B
Computerized project management and/or scheduling systems	14%	B	21%	B	66%	C
Quality						
Quality certification (e.g. ISO 9000, R2000)	13%	B	7%	B	81%	C
Organization						
Written market analysis report to evaluate needs and opportunities of your business	3%	A	6%	A	91%	B
Written documentation of technological improvements developed by your business	3%	A	4%	B	93%	B
Written evaluation of new ideas in order to develop options for your business	4%	B	7%	B	89%	B
Written strategic plan	4%	B	9%	B	87%	B
Business						
Design-build contracts	23%	B	12%	B	65%	C
Build-operate-transfer (BOT) contracts	0%	A	2%	A	97%	A
Post-commissioning inspection or maintenance contracts	16%	B	6%	B	79%	B
Long-term working arrangements with other businesses to work together on joint projects	19%	B	11%	B	70%	B
Nova Scotia						
Computerization						
Computerized inventory control	10%	B	19%	B	70%	B
Computerized estimating software	21%	B	30%	B	49%	B
Computerized project management and/or scheduling systems	16%	B	25%	B	59%	B
Quality						
Quality certification (e.g. ISO 9000, R2000)	11%	B	13%	B	76%	B
Organization						
Written market analysis report to evaluate needs and opportunities of your business	8%	B	8%	B	84%	B
Written documentation of technological improvements developed by your business	6%	B	2%	A	92%	B
Written evaluation of new ideas in order to develop options for your business	6%	A	15%	B	79%	B
Written strategic plan	10%	B	13%	B	77%	B
Business						
Design-build contracts	30%	B	7%	A	63%	B
Build-operate-transfer (BOT) contracts	9%	B	6%	A	85%	B
Post-commissioning inspection or maintenance contracts	15%	B	7%	A	78%	B
Long-term working arrangements with other businesses to work together on joint projects	28%	B	10%	B	62%	B

Table 6 Use of advanced business practices, Canada, provinces and territories.							
		Currently used		Plans to use within 2 years		No plans/Not applicable	
		Percent	Reliability	Percent	Reliability	Percent	Reliability
New Brunswick							
Computerization							
	Computerized inventory control	12%	B	24%	B	64%	B
	Computerized estimating software	39%	B	27%	B	34%	B
	Computerized project management and/or scheduling systems	20%	B	17%	B	63%	B
Quality							
	Quality certification (e.g. ISO 9000, R2000)	18%	C	11%	B	71%	C
Organization							
	Written market analysis report to evaluate needs and opportunities of your business	5%	B	11%	B	84%	B
	Written documentation of technological improvements developed by your business	5%	B	9%	B	86%	C
	Written evaluation of new ideas in order to develop options for your business	15%	C	7%	B	77%	C
	Written strategic plan	16%	C	8%	B	77%	C
Business							
	Design-build contracts	38%	C	6%	A	56%	C
	Build-operate-transfer (BOT) contracts	4%	B	11%	B	85%	C
	Post-commissioning inspection or maintenance contracts	12%	A	9%	B	79%	B
	Long-term working arrangements with other businesses to work together on joint projects	22%	B	9%	B	68%	C
Quebec							
Computerization							
	Computerized inventory control	12%	B	30%	C	59%	C
	Computerized estimating software	22%	B	27%	B	51%	C
	Computerized project management and/or scheduling systems	26%	B	36%	C	38%	C
Quality							
	Quality certification (e.g. ISO 9000, R2000)	6%	A	18%	B	76%	B
Organization							
	Written market analysis report to evaluate needs and opportunities of your business	6%	B	6%	B	88%	B
	Written documentation of technological improvements developed by your business	5%	B	5%	B	90%	B
	Written evaluation of new ideas in order to develop options for your business	12%	B	10%	B	79%	B
	Written strategic plan	14%	B	11%	B	76%	B
Business							
	Design-build contracts	14%	B	6%	B	81%	B
	Build-operate-transfer (BOT) contracts	5%	B	3%	A	91%	B
	Post-commissioning inspection or maintenance contracts	19%	B	5%	B	75%	B
	Long-term working arrangements with other businesses to work together on joint projects	24%	C	3%	A	72%	C

Table 6 Use of advanced business practices, Canada, provinces and territories.							
		Currently used		Plans to use within 2 years		No plans/Not applicable	
		Percent	Reliability	Percent	Reliability	Percent	Reliability
Ontario							
	Computerization						
	Computerized inventory control	12%	B	11%	B	78%	B
	Computerized estimating software	31%	B	18%	B	51%	B
	Computerized project management and/or scheduling systems	39%	B	10%	B	51%	B
	Quality						
	Quality certification (e.g. ISO 9000, R2000)	1%	A	9%	B	90%	B
	Organization						
	Written market analysis report to evaluate needs and opportunities of your business	10%	B	22%	B	68%	B
	Written documentation of technological improvements developed by your business	24%	B	5%	B	71%	B
	Written evaluation of new ideas in order to develop options for your business	24%	B	9%	B	67%	B
	Written strategic plan	27%	B	8%	B	65%	B
	Business						
	Design-build contracts	45%	B	7%	B	48%	B
	Build-operate-transfer (BOT) contracts	9%	B	4%	B	87%	A
	Post-commissioning inspection or maintenance contracts	22%	B	2%	A	76%	B
	Long-term working arrangements with other businesses to work together on joint projects	20%	B	6%	B	74%	B
Manitoba							
	Computerization						
	Computerized inventory control	12%	B	26%	B	62%	B
	Computerized estimating software	35%	B	29%	B	36%	B
	Computerized project management and/or scheduling systems	26%	B	24%	B	50%	B
	Quality						
	Quality certification (e.g. ISO 9000, R2000)	12%	B	3%	A	85%	B
	Organization						
	Written market analysis report to evaluate needs and opportunities of your business	8%	B	16%	B	76%	B
	Written documentation of technological improvements developed by your business	5%	A	12%	B	83%	B
	Written evaluation of new ideas in order to develop options for your business	11%	B	13%	B	75%	B
	Written strategic plan	18%	B	14%	B	68%	B
	Business						
	Design-build contracts	30%	B	12%	B	58%	B
	Build-operate-transfer (BOT) contracts	1%	A	2%	A	97%	A
	Post-commissioning inspection or maintenance contracts	11%	B	7%	B	82%	B
	Long-term working arrangements with other businesses to work together on joint projects	38%	B	11%	B	51%	B

Table 6 Use of advanced business practices, Canada, provinces and territories.							
		Currently used		Plans to use within 2 years		No plans/Not applicable	
		Percent	Reliability	Percent	Reliability	Percent	Reliability
Saskatchewan							
Computerization							
	Computerized inventory control	14%	B	39%	B	47%	B
	Computerized estimating software	19%	B	48%	B	33%	B
	Computerized project management and/or scheduling systems	10%	B	40%	B	50%	B
Quality							
	Quality certification (e.g. ISO 9000, R2000)	4%	B	9%	B	88%	B
Organization							
	Written market analysis report to evaluate needs and opportunities of your business	5%	A	10%	B	85%	B
	Written documentation of technological improvements developed by your business	2%	A	16%	B	82%	B
	Written evaluation of new ideas in order to develop options for your business	5%	A	17%	B	77%	B
	Written strategic plan	5%	B	16%	B	79%	B
Business							
	Design-build contracts	17%	B	3%	A	80%	B
	Build-operate-transfer (BOT) contracts	2%	A	1%	A	96%	A
	Post-commissioning inspection or maintenance contracts	8%	B	4%	B	88%	B
	Long-term working arrangements with other businesses to work together on joint projects	19%	B	10%	A	71%	B
Alberta							
Computerization							
	Computerized inventory control	16%	B	12%	B	72%	B
	Computerized estimating software	28%	B	17%	B	55%	C
	Computerized project management and/or scheduling systems	23%	B	20%	B	57%	C
Quality							
	Quality certification (e.g. ISO 9000, R2000)	3%	A	6%	A	92%	A
Organization							
	Written market analysis report to evaluate needs and opportunities of your business	18%	B	5%	B	77%	B
	Written documentation of technological improvements developed by your business	5%	A	3%	A	92%	A
	Written evaluation of new ideas in order to develop options for your business	9%	B	13%	B	78%	B
	Written strategic plan	19%	B	12%	B	70%	B
Business							
	Design-build contracts	24%	B	10%	B	66%	C
	Build-operate-transfer (BOT) contracts	3%	A	4%	A	93%	B
	Post-commissioning inspection or maintenance contracts	14%	B	5%	B	80%	B
	Long-term working arrangements with other businesses to work together on joint projects	22%	B	7%	B	71%	B

Table 6 Use of advanced business practices, Canada, provinces and territories.							
	Currently used		Plans to use within 2 years		No plans/Not applicable	
	Percent	Reliability	Percent	Reliability	Percent	Reliability
British Columbia						
Computerization						
Computerized inventory control	16%	A	14%	B	70%	B
Computerized estimating software	35%	C	25%	B	40%	C
Computerized project management and/or scheduling systems	37%	C	17%	B	46%	C
Quality						
Quality certification (e.g. ISO 9000, R2000)	8%	B	4%	A	88%	B
Organization						
Written market analysis report to evaluate needs and opportunities of your business	14%	A	8%	B	78%	B
Written documentation of technological improvements developed by your business	4%	A	4%	A	92%	A
Written evaluation of new ideas in order to develop options for your business	5%	B	14%	C	81%	C
Written strategic plan	18%	A	11%	B	70%	B
Business						
Design-build contracts	32%	C	9%	B	60%	C
Build-operate-transfer (BOT) contracts	1%	A	1%	A	99%	A
Post-commissioning inspection or maintenance contracts	12%	B	5%	B	82%	B
Long-term working arrangements with other businesses to work together on joint projects	30%	C	9%	C	61%	C
Yukon						
Computerization						
Computerized inventory control	…	D	12%	B	…	D
Computerized estimating software	…	D	…	D	35%	B
Computerized project management and/or scheduling systems	11%	B	49%	B	40%	B
Quality						
Quality certification (e.g. ISO 9000, R2000)	…	D	…	D	42%	B
Organization						
Written market analysis report to evaluate needs and opportunities of your business	…	D	8%	B	…	D
Written documentation of technological improvements developed by your business	…	D	…	D	55%	B
Written evaluation of new ideas in order to develop options for your business	5%	B	…	D	…	D
Written strategic plan	5%	B	10%	B	85%	B
Business						
Design-build contracts	…	D	…	D	35%	B
Build-operate-transfer (BOT) contracts	1%	A	3%	A	96%	A
Post-commissioning inspection or maintenance contracts	7%	B	39%	B	54%	B
Long-term working arrangements with other businesses to work together on joint projects	…	D	…	D	36%	B

Table 6 Use of advanced business practices, Canada, provinces and territories.						
	Currently use		Plans to use within 2 years		No plans/Not applicable	
	Percent	Reliability	Percent	Reliability	Percent	Reliability
Former Northwest Territories						
Computerization						
Computerized inventory control	23%	C	30%	C	47%	C
Computerized estimating software	31%	C	…	D	26%	C
Computerized project management and/or scheduling systems	28%	C	30%	C	42%	C
Quality						
Quality certification (e.g. ISO 9000, R2000)	21%	C	2%	A	76%	C
Organization						
Written market analysis report to evaluate needs and opportunities of your business	17%	C	13%	C	69%	C
Written documentation of technological improvements developed by your business	9%	C	13%	C	78%	C
Written evaluation of new ideas in order to develop options for your business	18%	C	15%	C	68%	C
Written strategic plan	36%	C	15%	C	49%	C
Business						
Design-build contracts	53%	C	6%	C	41%	C
Build-operate-transfer (BOT) contracts	20%	C	16%	C	64%	C
Post-commissioning inspection or maintenance contracts	44%	C	6%	C	51%	C
Long-term working arrangements with other businesses to work together on joint projects	57%	C	7%	A	36%	C

Source: Statistics Canada (Science, Innovation and Electronic Information Division), Innovation, Advanced Technologies and Practices in Construction and Related Industries Survey – 1999

Table 7 Functional business practice use, Canada, provinces and territories.								
	Use (percent of businesses)							
	Computerization		Quality		Organization		Business	
	Percent	Reliability	Percent	Reliability	Percent	Reliability	Percent	Reliability
Canada	40%	B	5%	A	25%	A	45%	A
Newfoundland	21%	C	6%	B	13%	B	32%	B
Prince Edward Island	22%	B	13%	B	8%	B	36%	C
Nova Scotia	32%	B	11%	B	16%	B	45%	B
New Brunswick	46%	B	18%	C	18%	C	45%	B
Quebec	35%	B	6%	A	21%	B	32%	C
Ontario	45%	B	1%	A	33%	B	52%	B
Manitoba	39%	B	12%	B	25%	B	49%	B
Saskatchewan	26%	B	4%	B	10%	B	27%	B
Alberta	35%	B	3%	A	23%	B	38%	B
British Columbia	42%	C	8%	B	22%	B	51%	B
Yukon	…	D	…	D	…	D	…	D
Former Northwest Territories	39%	C	21%	C	36%	C	76%	C

Table 8 Average number of business practices used, Canada, provinces and territories.		
	average number of technologies used	
	Average	Reliability
Canada	2.1	A
Newfoundland	1.3	B
Prince Edward Island	1.3	A
Nova Scotia	1.7	B
New Brunswick	2.1	B
Quebec	1.6	B
Ontario	2.6	B
Manitoba	2.1	B
Saskatchewan	1.1	A
Alberta	1.8	A
British Columbia	2.1	B
Yukon	2.5	C
Former Northwest Territories	3.6	C

Source: Statistics Canada (Science, Innovation and Electronic Information Division), Innovation, Advanced Technologies and Practices in Construction and Related Industries Survey – 1999

Table 9 Business activity, Canada, provinces and territories.			
	business activity	**Percent**	**Reliability**
Canada			
	been involved in a merger	2%	A
	acquired another business	3%	A
	set up a new line of business or a new division	11%	A
Newfoundland			
	been involved in a merger	1%	A
	acquired another business	1%	A
	set up a new line of business or a new division	11%	B
Prince Edward Island			
	been involved in a merger	4%	A
	acquired another business	7%	B
	set up a new line of business or a new division	13%	B
Nova Scotia			
	been involved in a merger	1%	A
	acquired another business	1%	A
	set up a new line of business or a new division	13%	B
New Brunswick			
	been involved in a merger	5%	A
	acquired another business	12%	C
	set up a new line of business or a new division	18%	C
Quebec			
	been involved in a merger	6%	B
	acquired another business	5%	B
	set up a new line of business or a new division	15%	B
Ontario			
	been involved in a merger	0%	A
	acquired another business	1%	A
	set up a new line of business or a new division	6%	A
Manitoba			
	been involved in a merger	1%	A
	acquired another business	3%	A
	set up a new line of business or a new division	14%	B
Saskatchewan			
	been involved in a merger	1%	A
	acquired another business	3%	A
	set up a new line of business or a new division	7%	B
Alberta			
	been involved in a merger	3%	A
	acquired another business	5%	B
	set up a new line of business or a new division	19%	B
British Columbia			
	been involved in a merger	1%	A
	acquired another business	1%	A
	set up a new line of business or a new division	7%	A
Yukon			
	been involved in a merger	2%	A
	acquired another business	0%	A
	set up a new line of business or a new division	…	D
Former Northwest Territories			
	been involved in a merger	2%	A
	acquired another business	4%	A
	set up a new line of business or a new division	21%	B

Table 10 Sources of information on advanced technologies and advanced practices, Canada, provinces and territories.

Note: respondents are asked to check all that apply.

		Percent	Reliability
Canada			
	Trade shows and conferences	32%	B
	Trade journals and newsletters	55%	B
	Trade associations	33%	B
	Computer based information networks (including internet)	34%	B
	Suppliers of materials, supplies, machinery and equipment	72%	B
	Clients	44%	B
	General contractors	39%	B
	Specialty trades	32%	B
	Consulting engineers	40%	B
	Architects	25%	A
	Government facility owners or managers	13%	A
	Non-government facility owners or managers	13%	A
	Federal information programs	3%	A
	Federal research organizations	9%	A
	Provincial research organizations	3%	A
	Universities and colleges	12%	A
	Regulatory and standards organizations	18%	B
	Testing and evaluation service firms	9%	B
	Business consultants	18%	A
Newfoundland			
	Trade shows and conferences	19%	B
	Trade journals and newsletters	42%	B
	Trade associations	24%	C
	Computer based information networks (including internet)	22%	B
	Suppliers of materials, supplies, machinery and equipment	86%	B
	Clients	68%	C
	General contractors	73%	C
	Specialty trades	14%	B
	Consulting engineers	64%	C
	Architects	54%	B
	Government facility owners or managers	10%	C
	Non-government facility owners or managers	10%	C
	Federal information programs	10%	B
	Federal research organizations	6%	B
	Provincial research organizations	6%	B
	Universities and colleges	10%	C
	Regulatory and standards organizations	10%	B
	Testing and evaluation service firms	9%	B
	Business consultants	17%	C

Table 10 Sources of information on advanced technologies and advanced practices, Canada, provinces and territories.			
		Percent	**Reliability**
Prince Edward Island			
	Trade shows and conferences	55%	C
	Trade journals and newsletters	67%	B
	Trade associations	30%	B
	Computer based information networks (including internet)	33%	C
	Suppliers of materials, supplies, machinery and equipment	71%	C
	Clients	30%	B
	General contractors	41%	C
	Specialty trades	33%	C
	Consulting engineers	32%	C
	Architects	35%	C
	Government facility owners or managers	16%	B
	Non-government facility owners or managers	9%	B
	Federal information programs	3%	A
	Federal research organizations	4%	A
	Provincial research organizations	1%	A
	Universities and colleges	2%	A
	Regulatory and standards organizations	20%	B
	Testing and evaluation service firms	3%	A
	Business consultants	10%	B
Nova Scotia			
	Trade shows and conferences	40%	B
	Trade journals and newsletters	63%	B
	Trade associations	39%	B
	Computer based information networks (including internet)	18%	B
	Suppliers of materials, supplies, machinery and equipment	70%	B
	Clients	35%	B
	General contractors	47%	B
	Specialty trades	30%	B
	Consulting engineers	30%	B
	Architects	31%	B
	Government facility owners or managers	5%	A
	Non-government facility owners or managers	9%	B
	Federal information programs	5%	B
	Federal research organizations	1%	A
	Provincial research organizations	7%	B
	Universities and colleges	3%	A
	Regulatory and standards organizations	23%	B
	Testing and evaluation service firms	5%	A
	Business consultants	19%	B

Table 10 Sources of information on advanced technologies and advanced practices, Canada, provinces and territories.			
New Brunswick		**Percent**	**Reliability**
	Trade shows and conferences	42%	C
	Trade journals and newsletters	49%	B
	Trade associations	38%	C
	Computer based information networks (including internet)	29%	C
	Suppliers of materials, supplies, machinery and equipment	75%	B
	Clients	55%	C
	General contractors	50%	C
	Specialty trades	20%	B
	Consulting engineers	33%	C
	Architects	25%	C
	Government facility owners or managers	3%	A
	Non-government facility owners or managers	8%	B
	Federal information programs	7%	B
	Federal research organizations	6%	B
	Provincial research organizations	6%	B
	Universities and colleges	7%	B
	Regulatory and standards organizations	16%	B
	Testing and evaluation service firms	3%	A
	Business consultants	12%	B
Quebec			
	Trade shows and conferences	25%	B
	Trade journals and newsletters	66%	C
	Trade associations	52%	C
	Computer based information networks (including internet)	30%	B
	Suppliers of materials, supplies, machinery and equipment	75%	B
	Clients	40%	C
	General contractors	34%	C
	Specialty trades	36%	C
	Consulting engineers	32%	B
	Architects	22%	B
	Government facility owners or managers	8%	B
	Non-government facility owners or managers	9%	B
	Federal information programs	2%	A
	Federal research organizations	0%	A
	Provincial research organizations	1%	A
	Universities and colleges	5%	B
	Regulatory and standards organizations	12%	B
	Testing and evaluation service firms	7%	B
	Business consultants	8%	B

Table 10 Sources of information on advanced technologies and advanced practices, Canada, provinces and territories.			
Ontario		**Percent**	**Reliability**
	Trade shows and conferences	30%	B
	Trade journals and newsletters	57%	B
	Trade associations	26%	B
	Computer based information networks (including internet)	34%	B
	Suppliers of materials, supplies, machinery and equipment	…	D
	Clients	…	D
	General contractors	…	D
	Specialty trades	…	D
	Consulting engineers	50%	B
	Architects	21%	B
	Government facility owners or managers	25%	B
	Non-government facility owners or managers	22%	B
	Federal information programs	4%	B
	Federal research organizations	20%	B
	Provincial research organizations	4%	B
	Universities and colleges	24%	B
	Regulatory and standards organizations	20%	B
	Testing and evaluation service firms	6%	A
	Business consultants	31%	B
Manitoba			
	Trade shows and conferences	53%	B
	Trade journals and newsletters	64%	B
	Trade associations	38%	B
	Computer based information networks (including internet)	29%	B
	Suppliers of materials, supplies, machinery and equipment	72%	B
	Clients	43%	B
	General contractors	48%	B
	Specialty trades	31%	B
	Consulting engineers	37%	B
	Architects	29%	B
	Government facility owners or managers	8%	B
	Non-government facility owners or managers	16%	B
	Federal information programs	7%	B
	Federal research organizations	6%	B
	Provincial research organizations	8%	B
	Universities and colleges	8%	B
	Regulatory and standards organizations	23%	B
	Testing and evaluation service firms	13%	B
	Business consultants	20%	B

Table 10 Sources of information on advanced technologies and advanced practices, Canada, provinces and territories.			
Saskatchewan		**Percent**	**Reliability**
	Trade shows and conferences	43%	B
	Trade journals and newsletters	45%	B
	Trade associations	37%	B
	Computer based information networks (including internet)	25%	B
	Suppliers of materials, supplies, machinery and equipment	54%	B
	Clients	38%	B
	General contractors	60%	B
	Specialty trades	45%	B
	Consulting engineers	27%	B
	Architects	25%	B
	Government facility owners or managers	7%	B
	Non-government facility owners or managers	9%	B
	Federal information programs	5%	B
	Federal research organizations	3%	A
	Provincial research organizations	3%	A
	Universities and colleges	5%	B
	Regulatory and standards organizations	21%	B
	Testing and evaluation service firms	6%	B
	Business consultants	15%	B
Alberta			
	Trade shows and conferences	30%	B
	Trade journals and newsletters	46%	C
	Trade associations	27%	B
	Computer based information networks (including internet)	42%	C
	Suppliers of materials, supplies, machinery and equipment	52%	B
	Clients	33%	B
	General contractors	27%	B
	Specialty trades	24%	B
	Consulting engineers	27%	B
	Architects	26%	B
	Government facility owners or managers	4%	B
	Non-government facility owners or managers	6%	B
	Federal information programs	2%	A
	Federal research organizations	4%	A
	Provincial research organizations	3%	A
	Universities and colleges	7%	A
	Regulatory and standards organizations	18%	B
	Testing and evaluation service firms	7%	B
	Business consultants	14%	B

Table 10 Sources of information on advanced technologies and advanced practices, Canada, provinces and territories.			
British Columbia		**Percent**	**Reliability**
	Trade shows and conferences	37%	C
	Trade journals and newsletters	52%	C
	Trade associations	31%	C
	Computer based information networks (including internet)	37%	C
	Suppliers of materials, supplies, machinery and equipment	78%	C
	Clients	30%	B
	General contractors	36%	C
	Specialty trades	35%	C
	Consulting engineers	42%	C
	Architects	29%	B
	Government facility owners or managers	4%	A
	Non-government facility owners or managers	6%	B
	Federal information programs	1%	A
	Federal research organizations	3%	A
	Provincial research organizations	2%	A
	Universities and colleges	3%	A
	Regulatory and standards organizations	16%	C
	Testing and evaluation service firms	22%	C
	Business consultants	5%	A
Yukon			
	Trade shows and conferences	…	D
	Trade journals and newsletters	65%	B
	Trade associations	….	D
	Computer based information networks (including internet)	...	D
	Suppliers of materials, supplies, machinery and equipment	80%	B
	Clients	…	D
	General contractors	…	D
	Specialty trades	…	D
	Consulting engineers	…	D
	Architects	…	D
	Government facility owners or managers	46%	B
	Non-government facility owners or managers	…	D
	Federal information programs	38%	A
	Federal research organizations	40%	B
	Provincial research organizations	2%	A
	Universities and colleges	3%	A
	Regulatory and standards organizations	…	D
	Testing and evaluation service firms	8%	B
	Business consultants	…	D

Table 10 Sources of information on advanced technologies and advanced practices, Canada, provinces and territories.			
Former Northwest Territories		**Percent**	**Reliability**
	Trade shows and conferences	31%	C
	Trade journals and newsletters	45%	C
	Trade associations	32%	C
	Computer based information networks (including internet)	40%	C
	Suppliers of materials, supplies, machinery and equipment	66%	C
	Clients	41%	C
	General contractors	48%	C
	Specialty trades	36%	C
	Consulting engineers	43%	C
	Architects	34%	C
	Government facility owners or managers	34%	C
	Non-government facility owners or managers	18%	C
	Federal information programs	11%	C
	Federal research organizations	1%	A
	Provincial research organizations	4%	B
	Universities and colleges	7%	C
	Regulatory and standards organizations	16%	C
	Testing and evaluation service firms	18%	C
	Business consultants	30%	C

Source: Statistics Canada (Science, Innovation and Electronic Information Division), Innovation, Advanced Technologies and Practices in Construction and Related Industries Survey – 1999

Table 11 Major obstacles to using new and improved building products, building systems and construction equipment, Canada, provinces and territories.

Note: respondents are asked to check all that apply.

			Percent	Reliability
Canada				
	Market			
		High cost of products, systems and equipment	71%	B
		Lack of interest by clients	27%	B
		Resistance to change by businesses with which your business has joint projects	12%	B
		Risk of legal liability	14%	A
		Restrictive codes and standards	22%	B
	Human resources			
		Shortage of skilled workers	44%	B
		Lack of in-house expertise	24%	B
		Inability to train workers within the required time	16%	B
		Worker resistance to change	21%	B
	External support services			
		Lack of technical support from vendors	9%	A
		Lack of technical support from consultants	6%	A
		Inability to evaluate new products and equipment	14%	B
Newfoundland				
	Market			
		High cost of products, systems and equipment	48%	C
		Lack of interest by clients	10%	B
		Resistance to change by businesses with which your business has joint projects	2%	B
		Risk of legal liability	8%	B
		Restrictive codes and standards	3%	A
	Human resources			
		Shortage of skilled workers	25%	C
		Lack of in-house expertise	5%	B
		Inability to train workers within the required time	3%	B
		Worker resistance to change	43%	B
	External support services			
		Lack of technical support from vendors	4%	B
		Lack of technical support from consultants	5%	B
		Inability to evaluate new products and equipment	12%	C

Table 11 Major obstacles to using new and improved building products, building systems and construction equipment, Canada, provinces and territories.				
			Percent	**Reliability**
Prince Edward Island				
	Market			
		High cost of products, systems and equipment	68%	C
		Lack of interest by clients	21%	B
		Resistance to change by businesses with which your business has joint projects	10%	B
		Risk of legal liability	18%	B
		Restrictive codes and standards	15%	B
	Human resources			
		Shortage of skilled workers	44%	C
		Lack of in-house expertise	21%	C
		Inability to train workers within the required time	19%	B
		Worker resistance to change	20%	B
	External support services			
		Lack of technical support from vendors	7%	B
		Lack of technical support from consultants	3%	B
		Inability to evaluate new products and equipment	18%	C
Nova Scotia				
	Market			
		High cost of products, systems and equipment	72%	B
		Lack of interest by clients	17%	B
		Resistance to change by businesses with which your business has joint projects	4%	A
		Risk of legal liability	18%	B
		Restrictive codes and standards	26%	B
	Human resources			
		Shortage of skilled workers	35%	B
		Lack of in-house expertise	20%	B
		Inability to train workers within the required time	20%	B
		Worker resistance to change	25%	B
	External support services			
		Lack of technical support from vendors	8%	B
		Lack of technical support from consultants	8%	B
		Inability to evaluate new products and equipment	19%	B

Table 11 Major obstacles to using new and improved building products, building systems and construction equipment, Canada, provinces and territories.				
			Percent	**Reliability**
New Brunswick				
	Market			
		High cost of products, systems and equipment	75%	C
		Lack of interest by clients	41%	C
		Resistance to change by businesses with which your business has joint projects	6%	B
		Risk of legal liability	21%	C
		Restrictive codes and standards	30%	B
	Human resources			
		Shortage of skilled workers	40%	C
		Lack of in-house expertise	25%	B
		Inability to train workers within the required time	17%	B
		Worker resistance to change	22%	C
	External support services			
		Lack of technical support from vendors	9%	B
		Lack of technical support from consultants	9%	B
		Inability to evaluate new products and equipment	20%	C
Quebec				
	Market			
		High cost of products, systems and equipment	70%	C
		Lack of interest by clients	14%	B
		Resistance to change by businesses with which your business has joint projects	14%	B
		Risk of legal liability	11%	B
		Restrictive codes and standards	25%	B
	Human resources			
		Shortage of skilled workers	38%	C
		Lack of in-house expertise	23%	B
		Inability to train workers within the required time	29%	B
		Worker resistance to change	22%	B
	External support services			
		Lack of technical support from vendors	15%	B
		Lack of technical support from consultants	9%	B
		Inability to evaluate new products and equipment	21%	B

Table 11 Major obstacles to using new and improved building products, building systems and construction equipment, Canada, provinces and territories.			
		Percent	**Reliability**
Ontario			
	Market		
	High cost of products, systems and equipment	79%	B
	Lack of interest by clients	…	D
	Resistance to change by businesses with which your business has joint projects	...	D
	Risk of legal liability	11%	B
	Restrictive codes and standards	20%	B
	Human resources		
	Shortage of skilled workers	58%	B
	Lack of in-house expertise	30%	B
	Inability to train workers within the required time	14%	B
	Worker resistance to change	…	D
	External support services		
	Lack of technical support from vendors	9%	B
	Lack of technical support from consultants	4%	A
	Inability to evaluate new products and equipment	10%	B
Manitoba			
	Market		
	High cost of products, systems and equipment	68%	B
	Lack of interest by clients	27%	B
	Resistance to change by businesses with which your business has joint projects	12%	B
	Risk of legal liability	8%	B
	Restrictive codes and standards	20%	B
	Human resources		
	Shortage of skilled workers	47%	B
	Lack of in-house expertise	29%	B
	Inability to train workers within the required time	19%	B
	Worker resistance to change	20%	B
	External support services		
	Lack of technical support from vendors	8%	B
	Lack of technical support from consultants	7%	B
	Inability to evaluate new products and equipment	8%	B

Table 11 Major obstacles to using new and improved building products, building systems and construction equipment, Canada, provinces and territories.				
			Percent	**Reliability**
Saskatchewan				
	Market			
		High cost of products, systems and equipment	67%	B
		Lack of interest by clients	13%	B
		Resistance to change by businesses with which your business has joint projects	9%	B
		Risk of legal liability	26%	B
		Restrictive codes and standards	19%	B
	Human resources			
		Shortage of skilled workers	63%	B
		Lack of in-house expertise	14%	B
		Inability to train workers within the required time	9%	B
		Worker resistance to change	5%	B
	External support services			
		Lack of technical support from vendors	8%	B
		Lack of technical support from consultants	5%	B
		Inability to evaluate new products and equipment	6%	A
Alberta				
	Market			
		High cost of products, systems and equipment	53%	B
		Lack of interest by clients	27%	B
		Resistance to change by businesses with which your business has joint projects	6%	B
		Risk of legal liability	4%	A
		Restrictive codes and standards	12%	B
	Human resources			
		Shortage of skilled workers	27%	C
		Lack of in-house expertise	17%	B
		Inability to train workers within the required time	9%	B
		Worker resistance to change	11%	B
	External support services			
		Lack of technical support from vendors	4%	A
		Lack of technical support from consultants	1%	A
		Inability to evaluate new products and equipment	14%	B

Table 11 Major obstacles to using new and improved building products, building systems and construction equipment, Canada, provinces and territories.				
			Percent	**Reliability**
British Columbia				
	Market			
		High cost of products, systems and equipment	73%	C
		Lack of interest by clients	37%	B
		Resistance to change by businesses with which your business has joint projects	5%	A
		Risk of legal liability	25%	B
		Restrictive codes and standards	29%	C
	Human resources			
		Shortage of skilled workers	33%	C
		Lack of in-house expertise	22%	C
		Inability to train workers within the required time	17%	C
		Worker resistance to change	20%	C
	External support services			
		Lack of technical support from vendors	10%	B
		Lack of technical support from consultants	7%	B
		Inability to evaluate new products and equipment	18%	C
Yukon				
	Market			
		High cost of products, systems and equipment	…	D
		Lack of interest by clients	55%	B
		Resistance to change by businesses with which your business has joint projects	…	D
		Risk of legal liability	…	D
		Restrictive codes and standards	16%	B
	Human resources			
		Shortage of skilled workers	…	D
		Lack of in-house expertise	…	D
		Inability to train workers within the required time	10%	B
		Worker resistance to change	5%	B
	External support services			
		Lack of technical support from vendors	…	D
		Lack of technical support from consultants	13%	B
		Inability to evaluate new products and equipment	51%	B

Table 11 Major obstacles to using new and improved building products, building systems and construction equipment, Canada, provinces and territories.				
			Percent	**Reliability**
Former Northwest Territories				
	Market			
		High cost of products, systems and equipment	69%	C
		Lack of interest by clients	38%	C
		Resistance to change by businesses with which your business has joint projects	8%	B
		Risk of legal liability	11%	C
		Restrictive codes and standards	38%	C
	Human resources			
		Shortage of skilled workers	67%	C
		Lack of in-house expertise	32%	C
		Inability to train workers within the required time	26%	C
		Worker resistance to change	23%	C
	External support services			
		Lack of technical support from vendors	7%	B
		Lack of technical support from consultants	2%	A
		Inability to evaluate new products and equipment	18%	C

Source: Statistics Canada (Science, Innovation and Electronic Information Division), Innovation, Advanced Technologies and Practices in Construction and Related Industries Survey – 1999

Annex 1: Industry Stratification

The following table contains the industry strata that were used in the sample selection process. They are based on the 1997 North American Industry Classification System (NAICS) codes.

The following distinction is made in the NAICS system between "Prime Contracting" and "Trade Contracting" which corresponds to the terms used in industry to the distinction between "General Contractors" and "Specialty Trades".

- **Prime Contracting** (all industries beginning with 231): This subsector comprises establishments engaged in constructing complete works, with buildings or engineering works. Projects undertaken by these establishments typically have several components, varying proportions of which can be subcontracted to trade contractors or done by the establishment's own labour force.

- **Trade Contracting** (all industries beginning with 232): This subsector comprises establishments engaged in one aspect common to different structures, requiring specialized skills or equipment. They are known as trade contractors, and are classified by the specific component they contribute to the total structure or work. Trade contractors normally supply their specialized service under contract to a general contractor.

PRIME CONTRACTING	
2311	**Land Subdivision and Land Development:** establishments primarily engaged in the acquisition, assembly , subdivision into lots and servicing of raw land for subsequent sale to builders.
23121	**Building Construction- Residential:** establishments primarily engaged in construction residential buildings, such as houses, garden homes, cottages, apartments and townhouses. Establishments primarily engaged in erecting prefabricated homes are also included.
23122	**Building Construction- Non-Residential:** establishments primarily engaged in constructing commercial, institutional and industrial buildings. Important types of commercial and institutional buildings are offices, hotels, restaurants, arenas, churches and penitentiaries. Important types of industrial buildings are factories and heavy industrial plants for production of such products as aluminium and cement. The erection of prefabricated commercial or institutional buildings are also included.
2313	**Engineering Construction:** establishments primarily engaged in construction projects other than buildings. Engineering works include dams; non-building industrial works such as refineries; highways, roads and streets; bridges; sewers; power and communication transmission lines; and similar structures and works.
2314	**Construction Management:** establishments primarily in managing a construction project for a fee. These establishments provide day-to-day co-ordination, supervision and management of a construction site. These activities would otherwise be performed by a general contractor.

TRADE CONTRACTING	
2321	**Site Preparation Work:** establishments primarily engaged in site preparation activities, such as agricultural land clearing; land drainage and reclamation; demolition of buildings and other structures, excavating and grading; cutting of rights-of-way; pile driving; concrete breaking for roads; water well drilling; septic tank installation; and house moving. Establishments primarily engaged in equipment rental with operator (except cranes) are also included.
2322	**Building Structure Work:** establishments primarily engaged in erecting the basis structure of buildings by pouring concrete; framing with lumber; welding, bolting or tying steel; and placing percast or pre-stressed concrete members. Crane rental services with operator are also included because they support the erection process.
23233	**Roofing and Related Work:** This industry comprises establishment primarily engaged in installing shingles, built-up roofing and other roofing materials; and associated work, such as installing flashing and eavestroughs.
2323 (minus 23233)	**Building Exterior Finishing Work:** establishments engaged in closing-in and finishing the exterior structure of buildings, includes masonry work; glass and glazing work; metallic and other siding work (does not include roofing).
2324	**Building Interior Finishing Work:** establishments engaged in finishing building interiors. This work generally involved covering the interior structure with various materials, including drywall and plaster works; terrazzo and tile work; carpet and resilient flooring work; insulation work; building painting and paperhanging work; and finish carpentry and wood flooring work.
23251	**Electrical Work:** establishments primarily engaged in installing and repairing electrical and communication wiring system, including panel boxes, wires, outlets, lights and appliances. The installation and repair of environmental controls, security and fire detection devices are also included.
23252	**Plumbing, Heating and Air-Conditioning Installation:** establishments primarily engaged in installing primary water piping systems, plumbing fixtures, secondary piping systems for wet heating, natural gas pipe fitting for dry heating, and central air-conditioning equipment. The installation of sheet metal duct work is included.
2325 (minus 23251 & 23251)	**Building Equipment Installation:** establishments primarily engaged in installing or erecting building equipment, including automatic sprinkler installation, commercial refrigeration installation, and elevator and escalator installation. (does not include electrical work and plumbing, heating and air-conditioning installation).
2329	**Other Special Trade Contracting:** establishments primarily, not classified to any other industry group, primarily engaged in specialized trades, including fencing and interlocking stone contracting, residential and commercial paving contracting, as well as others.

Annex 2: The Questionnaire

Science and Technology Redesign Project

Innovation, Advanced Technologies and Practices in the Construction and Related Industries

Confidential when completed

Si vous préférez ce questionnaire en français, veuillez cocher ☐

Please correct name and address if necessary

Information for Respondents

Survey Purpose

The objective of this survey is to provide information on innovation, advanced technology and advanced practices being used in the construction and related industries. The information in the survey can be used by businesses 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 business without the previous consent of that business. 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.

Assistance

If you require assistance in the completion of this form or have any questions regarding this survey, please contact:

Heather Prieur
Phone: (613) 951-7683
Fax: (613) 951-9920
E-Mail: prieur@statcan.ca

Certification

Please indicate the name of the person completing this form so we know who to contact should we have questions about this report.

Name *(please print)*	Official position:	
Internet address:	Telephone No. ( )	Fax No. ( )

5-4900-486.1: 1999-02-23 STC/SAT-465-75152

Business Environment and Success Factors

1. For <u>your business</u>, please indicate how strongly you agree or disagree with the following statements.

Please indicate your opinion by using the following scale where 1 is strongly disagree and 5 is strongly agree.

	Strongly Disagree		Neutral		Strongly Agree
	1	**2**	**3**	**4**	**5**
My clients' needs are easy to predict	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯
My clients can easily find a substitute for my services	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯
My competitors' actions are easy to predict	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯
My business can easily substitute among suppliers	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯
The arrival of new competitors is a constant threat	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯
Materials and supplies quickly become obsolete	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯
Technologies in the office are changing rapidly	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯
Technologies on the construction/building site are changing rapidly	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯

2. Please rate the importance of each of the following factors for the success of <u>your business</u>.

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

	Importance					
	Low				High	Not Relevant
	1	2	3	4	5	0
Strategy within <u>your business</u>						
Developing unique expertise or a unique market	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	0 ◯
Delivering products or services which reduce the client's operating costs	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	0 ◯
Seeking business outside of your present geographical region of activity	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	0 ◯
Increasing your market share	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	0 ◯
Building and enhancing relationships with existing clients	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	0 ◯
Attracting new clients	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	0 ◯
Providing a broader range of services to your clients	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	0 ◯
Ensuring employees are aware of business issues	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	0 ◯
Human Resources within <u>your business</u>						
Encouraging and rewarding your employees to seek out technological improvements	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	0 ◯
Encouraging and rewarding your employees to seek out organizational improvements	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	0 ◯
Providing or supporting training programs for employees	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	0 ◯
Hiring new graduates from colleges and universities	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	0 ◯
Hiring experienced employees	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	0 ◯
Participating in apprenticeship programs	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	0 ◯
Using teams which bring together people with different skills	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	0 ◯
Technology within <u>your business</u>						
Introducing new user-friendly technologies	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	0 ◯
Investing in research and development	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	0 ◯
Protecting intellectual property (patents, trademarks, copyrights, etc.)	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	0 ◯
Enhancing your technical capabilities	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	0 ◯
Participating in the development of industry standards and practices	1 ◯	2 ◯	3 ◯	4 ◯	5 ◯	0 ◯

List of Definitions

Advanced Technologies

Communications

E-mail: Refers to electronic mail.

Digital photography for progress reporting: The use of digital photography to record progress on a work-site so it can be transmitted by electronic means.

Office-to-site video links or video conferencing: The use of video cameras to communicate between the site and other locations. Can be used to solve problems on the site without bringing people to the site.

Company computer network: LAN (local area network) for communications within a building or WAN (wide area network) for communications within a business extending beyond a single building or site.

On-site plant and equipment

Laser-guided equipment: Equipment which incorporates a laser. An example is a bulldozer or a grader with on-board computerized grade information and a laser sensor which assists the operator in excavating/grading to a precise level.

Automated systems and/or programmable machines: Automated systems and programmable machines incorporate computer technologies to carry out specific tasks. Examples include bar code readers and automated welding machines.

GPS (Global Positioning Systems): Surveying equipment that determines the exact position with the aid of satellites. Other applications include the use of GPS to determine the location of delivery trucks or other vehicles.

Materials and systems

High performance concrete: Concrete that has been modified to achieve superior performance in terms of strength or other desired characteristics.

Composite materials (e.g. fiber reinforced plastics) : A synthetic material reinforced with other materials to achieve superior performance characteristics.

Recycled plastics components: Products that incorporate plastics that have already been used and are used to make another product.

Systems

Remote sensing and monitoring systems (e.g. "smart" detection systems): Systems incorporating sensors for monitoring.

Bio-remediation clean-up: Bio-remediation involves the use of microorganisms to clean up contaminated soil.

Preassembled air, water, power distribution systems (e.g. "drop-in" systems): Systems that are produced off-site and transported to the construction site where they are easily installed.

"Clean room" technology: Technology that assures that rooms are super-clean (hospital operating rooms, computer chip fabrication, etc.). Clean rooms require special sub-systems and special materials.

Deconstruction and reuse systems: Taking a building or structure apart in such a manner that materials used can be reused and recycled.

Design

Computer Aided Design (CAD): Use of computer-based software to carry out design. CAD allows engineers, architects, or designers to produce complete designs on the computer screen and to visualize the implications of design changes on other aspects of the design.

Modeling or simulating technologies: Used to provide a computer-based visualization of the performance of a computer aided design. Modeling involves the approximation, representation or idealization of selected aspects of the structure, behavior, operation and characteristics of a real-world process, concept or system. Simulation is a model that behaves or operates like a given system when provided with a set of controlled input.

Electronic exchange of CAD files: Refers to the transfer of computer aided design files. If the exchange is outside of a company, then conversion or translation of the software files may be required because of incompatible software.

Advanced Technologies

3. Please check which of the following advanced technologies <u>your business</u> either:

- **currently uses**
- **plans to use within two years; or**
- **has no plans to use within two years or is not applicable to your business**

	Currently uses	Plans to use within 2 years	No plans/Not applicable
Communications			
E-mail			
Digital photography for progress reporting			
Office-to-site video links or video conferencing			
Company computer networks (LAN or WAN)			
On-site plant and equipment			
Laser-guided equipment			
Automated systems and programmable machines			
GPS (Global Positioning System)			
Materials			
High performance concrete			
Composite materials (e.g. fiber reinforced plastics)			
Recycled plastic components			
Systems			
Remote sensing and monitoring systems (e.g. "smart" detection systems)			
Bio-remediation clean-up			
Preassembled air, water, power distribution systems (e.g. "drop-in" systems)			
"Clean room" technology			
Deconstruction and reuse systems			
Design			
Computer aided design			
Modeling or simulation technologies			
Electronic exchange of CAD files			
Other advanced technologies (*please specify*)			
_____			
_____			

List of Definitions

Business Practices

Computerization

Computerized inventory control: Use of computers to manage a company's inventory.

Computerized estimating software: The use of computer software programs to estimate costs.

Computerized project management and/or scheduling software: The use of computer software to manage and/or schedule projects.

Quality

Quality certification (e.g. ISO 9000, R2000, etc.) : Quality systems that are introduced by a firm and which receive third-party validation. ISO 9000 for example is an internationally recognized series of quality system standards and guidelines used to certify the consistency of the way a business produces and delivers its products and services.

Organization

Written market analysis report to evaluate needs and opportunities of your business: A formal and structured analysis of the market carried out by the business or by a consultant hired by the business. A market analysis would lead to a market plan for the business.

Written documentation of technological improvements developed by your business: A formal and structured process to record and document all technological improvements that are developed by the business.

Written evaluation of new ideas in order to develop options for your business: Formal studies and reports prepared by the business or by consultants hired by a business to assess new ideas that are of interest to the business.

Written strategic plan: A formal and structured process carried out by the business or by a consultant hired by the business which leads to a strategic plan.

Business

Design-build contracts: With design-build contracts, owners specify the time lines and performance criteria sought for a project. In response, design-build teams comprising architects, engineers, contractors and in many cases building materials suppliers submit project proposals that indicate the project's design, cost and completion date. The owner then evaluates the submissions and selects the winning proposals. Significant savings often result from this approach.

Build-operate-transfer (BOT) contracts: An arrangement where the builders of a structure or building operate it for a specified length of time and at the end of the time transfer the building to the original financers.

Post-commissioning inspection and maintenance contracts: Builders obtain an on-going contract to inspect and maintain the structure or building they built.

Long-term working arrangements with other businesses to work together on joint projects : Agreements between different businesses to work together jointly on projects. These working arrangements can be based on a formal contract or on an informal agreement.

Advanced Practices

4. Please check which of the following business practices your business either:

- **currently uses**
- **plans to use within two years; or**
- **has no plans to use within two years or is not applicable to your business**

	Currently uses	Plans to use within 2 years	No plans/Not applicable
Computerization			
Computerized inventory control			
Computerized estimating software			
Computerized project management and/or scheduling systems			
Quality			
Quality certification (e.g. ISO 9000, R2000, etc.)			
Organization			
Written market analysis report to evaluate needs and opportunities of your business			
Written documentation of technological improvements developed by your business			
Written evaluation of new ideas in order to develop options for your business			
Written strategic plan			
Business			
Design-build contracts			
Build-operate-transfer (BOT) contracts			
Post-commissioning inspection or maintenance contracts			
Long-term working arrangements with other businesses to work together on joint projects			
Other advanced practices (*please specify*)			
_____			
_____			
_____			

5. In the past three years has your business:

Please check all that apply.

- Been involved in a merger ☐
- Acquired another business ☐
- Set up a new line of business or a new division ☐

Sources of information

6. Please indicate your sources of information on advanced technologies and advanced practices, such as those listed in Questions 3 and 4.

Please check all that apply.

- Trade shows and conferences ☐
- Trade journals and newsletters ☐
- Trade associations ☐
- Computer based information networks (including internet) ☐
- Suppliers of materials, supplies, machinery and equipment ☐
- Clients ☐
- General contractors ☐
- Specialty trades ☐
- Consulting engineers ☐
- Architects ☐
- Government facility owners or managers ☐
- Non-government facility owners or managers ☐
- Federal information programs ☐
- Federal research organizations ☐
- Provincial research organizations ☐
- Universities and colleges ☐
- Regulatory and standards organizations ☐
- Testing and evaluation service firms ☐
- Business consultants ☐

Other sources of information *(please specify)*

_____

_____

Please list the most important source of information on advanced technologies and advanced practices for your business:

_____

_____

_____

_____

Obstacles

7. Please check the major obstacles for <u>your business</u> to using new and improved building products, building systems and construction equipment.

Please check all that apply

Market:

- ☐ High cost of products, systems and equipment
- ☐ Lack of interest by clients
- ☐ Resistance to change by businesses with which your business has joint projects
- ☐ Risk of legal liability
- ☐ Restrictive codes and standards

Human resources:

- ☐ Shortage of skilled workers
- ☐ Lack of in-house expertise
- ☐ Inability to train workers within the required time
- ☐ Worker resistance to change

External support services:

- ☐ Lack of technical support from vendors
- ☐ Lack of technical support from consultants
- ☐ Inability to evaluate new products and equipment

Other obstacles (*please specify*)

_____

_____

_____

Please list the <u>most important obstacle</u> to using new and improved building products, building systems and construction equipment <u>for your business</u>:

_____

_____

_____

Impact

8. Please provide a brief description of the technological or business practice change or improvement which had the biggest impact on your business during the last three years.

Did this technological or business practice change or improvement provide your business with a significant advantage over your competitors?

Yes ☐ **No** ☐

Comments

Thank you for your co-operation