

BUSINESS STRATEGIES IN INNOVATIVE AND NON-INNOVATIVE FIRMS IN CANADA

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ABSTRACT

This study investigates differences in the policies being pursued by innovative and non-innovative firms. It focuses on a broad group of strategies--in marketing, finance, production, management and human resources and asks whether there are key areas in which the strategies being followed by innovative and non-innovative firms differ. It also ask how the activities of firms in each of these areas differs. Finally, it compares the performance of innovative and non-innovative firms. The study finds that innovative firms place a greater emphasis on management, human resources, marketing, financing, government programs and services, and production efficiencies. In most of these areas, innovative firms pursue activities more intensively. Finally, innovative firms are more successful than non-innovative firms.

Keywords: innovation, strategies, marketing, human resources, management, performance.

Strategy Differences Between Innovative and Non-Innovative Firms

This study investigates whether there are differences in the policies being pursued by innovative and non-innovative firms. It focuses on a broad group of strategies-- in marketing, finance, production, management and human resources and asks whether there are key areas in which innovative and non-innovative firms differ.

The study makes use of a recent Statistics Canada survey to divide firms into those that are innovative and those that are non-innovative. The survey contains a number of questions based on recent innovation surveys (OECD, 1992) that allow a division of the survey sample into those firms that are more-innovative and those that are less-innovative. The study then investigates the strategies and activities of each group of firms in the area of human resources, marketing, financing, production, use of government programs and services, and management. The importance given to strategies in each area is derived from subjective scores assigned by respondents. The intensity of activities in each area is also measured and provides an independent indicator of the importance given to strategies. Finally, objective measures of performance (sales, profitability) for each of the firms in the sample are derived from other sources so as to compare the success of innovative and non-innovative firms.

The study finds that innovative firms differ from non-innovative firms in all the areas investigated.

1) Innovative firms place more stress on human resources than do non-innovative firms. They place greater emphasis on the importance of labour skills. They feel their labour relations are superior to their competitors. Greater strategic emphasis on human resources translates into higher levels of training. Innovative firms are more likely to have training programs of both a formal and informal nature; those firms that offer training are more likely to train a higher percentage of their workers--especially in formal training programs and spend a larger amount per worker on training.

2) Innovative firms place a greater emphasis on financing. Growth of innovative firms is seen to be more dependent on the cost of capital and access to capital. Their sources of funding focus more on venture capital, public equity, and parent companies.

3) Innovative firms place a greater emphasis on marketing, provide products of higher quality, and deliver more customer service. They have a broader range of products, more frequently introduce new products and have greater flexibility in responding to customer needs. They also spend more on marketing.

- 4) Innovative firms place a greater emphasis on production economics. They stress cost reduction and are more likely to be making capital investments.
- 5) Innovative firms see government programs in general as providing more help for them. They make greater use of export incentives, industrial support, government procurement, training programs, and R&D tax incentives.
- 6) Innovative firms are more likely to stress the importance of management. They are more likely to give their managers training. They place greater emphasis on adopting innovative organizational structures and greater emphasis on total quality management.
- 7) Innovative firms are more successful than non-innovative firms. They grow faster; they gain more market share; achieve higher growth in profits.

There is no single key that distinguishes more-innovative and more-successful firms from less-innovative and less-successful firms. Other studies have tended to focus on particular areas. The Economic Council (1987) focused on the importance of employee relations. Teece (1988) emphasized the critical importance of production skills. This study suggests that more innovative firms have brought to bear a wide range of skills--ranging across areas of competency such as marketing, finance, production, and human resources.

Distinguishing Differences in Innovative and Non-Innovative Firms in Canada

Innovative firms are an important dynamic element of Canadian industry. More-innovative firms are typically more successful (Baldwin et. al., 1994). Success in the global market is contingent upon the innovativeness of Canadian firms. The small domestic market and high labour costs in Canada are perceived to hinder Canadian firms from competing in mass producing industries. Hence, success requires firms to be innovative and to offer technologically advanced products and services, and consequently, operate using shorter production runs and highly skilled labour. In support of this argument, Hanel and Palda (1984) and McGuinness and Little (1981) find that foreign sales are strongly related to R&D activity.

Despite their importance, the behavior of a wide range of innovative firms has not been intensively studied. Existing studies have typically assumed that innovativeness is synonymous with R&D activity. Yet, there is abundant evidence to suggest that there are many ways that a firm can innovate without engaging in R&D. Napolitano (1991) argues that innovative activity is much broader than R&D activity. In a study of 8,220 innovative Italian firms, R&D scores only 2.1 out of a possible six in terms of its importance as a source of innovation. All of the other sources are rated higher as a source of innovation: purchase of equipment (4.0), design (3.1), proposals from employees (2.3), customer requests (2.3), and staff training (2.2). The importance of these various factors varies considerably by industry. Internal sources of innovation, such as R&D, design, and proposals from employees, are crucial in firms in the advanced, science-based category. Staff training and upstream and downstream activities are more important in mass-production industries. Finally, firms in the traditional industries - food, textiles, paper and metal - rely more heavily on the purchase of equipment as a source of innovation.

In Canada, very little information exists on the complements to innovation in firms. McGuinness and Little (1981) conclude from a survey of 85 firms in Ontario and Quebec that while greater R&D activity is associated with higher foreign sales, other factors, possibly management ingenuity and marketing insight, are as crucial to success as R&D. They examine the product characteristics (R&D expenditures relative to expected sales of the product, newness of technology, and foreign origin of design) and firm characteristics (whether the firm used more- or less-advanced technology, whether it was foreign owned, whether it was restrained from selling its product in its parent country) that are associated with foreign sales. The technological orientation of the firm is related to whether a firm exports, but while product-specific R&D is also related to foreign sales, the relationship is weak. They conclude that other inputs to the innovative process may be more important than R&D.

Rosenbloom and Abernathy (1982) tell a similar story. They investigate the reasons why American firms in the electronic equipment industry, despite being responsible for major inventions, have performed poorly relative to their counterparts in Japan and elsewhere. They conclude that Japanese firms have been more successful because they have combined ongoing innovation with concurrent investment in manufacturing systems, attention to employee relations, full utilization of employee skills, and a strong commitment to continually improving quality and productivity. They also point to the need for close contact between top level executives and persons developing new technologies.

While each of these studies indicate that the definition of innovativeness should not be restricted to R&D activity, and that some strategies are required to complement innovation, they are limited in scope. They either have too narrow a definition of innovation, or lack enough measures of other strategies and activities to permit a thorough study of how innovative firms differ from other firms. It is all too easy to conclude from these studies that it is marketing, or management, or attention to financing that is the single key to success for innovative firms.

A recent survey by Statistics Canada permits closer examination of the differences between innovative and non-innovative firms over a wide range of functional areas. The results of this survey, as demonstrated in this paper, indicate that innovative firms differ from non-innovative firms in many respects. Their sales, growth in sales, basic make-up and financial structure are substantially different. Their perception of the importance of various factors in explaining their growth and their reliance on various development strategies are also dissimilar.

In what follows, the survey and the criteria for classifying a firm as innovative or non-innovate are described. Then the differences between innovative and non-innovative firms in six broad functional areas - human resources, marketing, finance, production, use of government programs and services, and management - are illustrated. Finally, evidence from a source outside the survey is utilized to examine differences in performance.

The Growing Small- and Medium-Sized Firm Survey

The growing small-and medium-sized firm survey (Baldwin et al., 1994) was conducted in 1992 using firms that grew, in terms of sales, assets and employment over the last half of the eighties. It was specifically designed to examine firms that were not in decline. Small firms were defined as having less than 500 employees and less than 100 million dollars in assets in 1984. The sample was drawn from all major sectors with the exception of public administration. The survey of 2,157 firms was conducted by mail with telephone follow-up. The response rate was 69 percent. Only those firms that answered each question, and for which there were corresponding administrative data on employment, sales, profitability, productivity, and market share, amounting to some 820 firms, were used in this analysis.

The survey was designed to give a broad description of the activities, characteristics, and strategies followed by a set of generally successful small- and medium-sized firms. Questions in the survey on characteristics profile a firm's region of operation, ownership structure, country of control, its involvement in mergers and strategic alliances, its size, and its occupational distribution. The activities investigated include export performance, the capital structure, the source of financing, the investment intensity of R&D, training, and marketing, the sources of innovation, the number of workers trained by occupational category, and training expenditures.

Strategies are investigated in the survey with several complementary questions. Firms are asked to rank the importance of different factors explaining the growth of their company: management skills, marketing capability, cost of capital, access to capital, technological capability, R&D capability, and labour force skills. A second question probes the firms' assessment of their capabilities relative to their competitors with regard to price, cost of production, quality, customer service, spending on R&D, labour climate, and skill levels of employees.

Another set of questions examine specific directions being pursued in marketing, technology, input utilization, management, and human-resources strategies. Questions on marketing strategies focus on the extent to which firms follow innovative strategies in developing new markets or new products. Questions on technology strategies delve into a firm's source of new technology - from the acquisition of existing technology to its development within the firm. Questions on input strategies focus on whether the use of new materials or increased efficiency in the use of existing materials, energy or labour receive the most focus. Questions on management techniques investigate the importance given to process control, just-in-time inventory control, compensation-based management incentives, or total quality management. Questions on human-resource strategies focus on the relative importance of continuous staff training as opposed to compensation packages and other motivational programs.

The strength of the survey lies in the degree to which innovativeness can be compared to the other strategies, characteristics, and activities of the firm. In addition, the survey answers are linked to administrative data on firm employment, worker turnover, sales, profitability and productivity, in order to provide a rich set of characteristics that are used for analysis. This permits investigation of the complementarities suggested by McGuinness and Little (1981), Napolitano (1991) and Rosenbloom and Abernathy (1982) between innovation and other functional areas such as human resources, management, marketing, production and financing.

Identifying Innovative and Non-Innovative Firms

This survey permits analysis of the difference between innovative and non-innovative firms in terms of their characteristics, their strategies, their activities, and finally their performance. The paper focuses on six functional areas: human resources, management practices, marketing, financing, input/investment, and utilization of government programs.

Before examining differences in these areas, the innovation classification as well as the dimensions of innovation need to be clarified. This study employs a number of variables that capture both the importance of innovative strategies to the firm and the intensity of innovative activities. In addition to the traditional questions on R&D intensity (number of employees and expenditures), alternate questions that pertain to other elements of innovation are also utilized. These questions were developed from a number of Canadian and European innovation surveys (see Baldwin et. al. (1994) and OECD (1992)).

One section requires firms to rate the importance of R&D innovation capability and the ability to adopt technology, along with more typical factors such as management and labour skills, as factors in past growth. A second section asks firms to rate their competitive position with regard to R&D spending and other more traditional factors such as price, quality and customer service. A third question asks firms to rate the importance of developmental strategies in each of five areas - marketing, technology, inputs, management and human resources. A fourth section probes the firms' valuations of R&D tax incentives along with other government programs, such as training and export incentives. Finally, a fifth section queries firms on the importance of various agents - management, customers, the R&D unit - as sources of innovation. The responses to these questions provide an understanding of firms' strategies and activities across a broad range of innovative and non-innovative areas. For further information on the survey questions, see the Questionnaire in Appendix I.

Use of a varied set of innovation variables recognizes that innovation involves different dimensions. Some firms are at the cutting edge in an industry. Others are imitators and adapters. Firms in each category can stress different aspects of innovation - by emphasizing new products, technologies, inputs or organizational structures.

The innovativeness of firms is captured using their responses to 19 questions. In order to discriminate between innovative and non-innovative firms, taking into account the fact that there are many different ways in which firms may be innovative, principal component analysis is used to calculate an aggregate measure of innovativeness from these 19 variables. Each of the firms in the sample is ranked according to its score on the first principal component derived from the 19

variables. Those above the median value are deemed to be innovative and those below non-innovative. The differences between the two groups of firms in each of these 19 areas will be discussed in turn.

There are four variables that capture the firm's belief in the importance of innovation and its competitive position in this regard.

- the score given to the ability to adopt technology as a factor explaining growth.
- the score given to R&D innovation capability as a factor contributing to growth.
- the importance attributed to R&D tax incentives by firms utilizing these incentives.
- the degree to which a firm believes it surpasses its competitors in R&D spending.

There are several variables which measure the importance of specific strategies related to innovation. These are the scores given to:

- developing new technology.
- refining others' technology.
- improving their own technology.
- reducing energy costs.
- using existing materials more efficiently.
- using new materials.
- employing just-in-time inventory control.
- employing process control.

The innovative behavior of the firm can also be characterized by who it looks to for its source of innovation and the importance it places on R&D. The innovativeness of the firm will depend on the score it attributes to traditional sources of innovation, such as:

- the R&D unit.
- Canadian patents.
- Foreign patents.

In addition to these sources of innovation, the aggregate score attributed to the following less traditional areas is used because it proxies the intensity of the innovation search process. These areas are:

- marketing.
- the production unit.
- customers.
- suppliers.

- management.
- parent or affiliate.
- government contracts.
- competitors.

The intensity of R&D activity is represented by:

- the percentage of total investment devoted to R&D for new products.
- the percentage of total investment devoted to R&D for new processes.
- the percentage of total employees in the R&D unit.

By construction, innovative firms score higher on the innovation principal component. Nevertheless, it is instructive to examine the differences in each of the individual innovation variables, since these differences illustrate what is meant by innovative as opposed to non-innovative firms in this study.

TABLE 1: Innovation Strategies and Activities

	Innovative	Non-Innovative	Difference in average score
	Average score on a scale of 0 to 5		
STRATEGIES			
Ability to adopt technology as a factor in growth	3.2	1.9	+ ***
R&D innovation capability as a factor in growth	2.3	0.4	+ ***
Importance of R&D tax incentives	1.7	0.4	+ ***
R&D spending relative to competitors	2.3	0.7	+ ***
Developing new technology	3.1	0.9	+ ***
Refining other's technology	2.8	1.2	+ ***
Improving own technology	3.6	2.2	+ ***
Reducing energy costs	3.1	2.3	+ ***
Using existing materials more efficiently	3.4	1.8	+ ***
Using new materials	2.9	1.1	+ ***
Employing just-in-time inventory control	3.0	1.9	+ ***
Employing process control	3.2	1.2	+ ***
R&D unit as a source of innovation	1.9	0.2	+ ***
Canadian patents as a source of innovation	1.0	0.3	+ ***
Foreign patents as a source of innovation	0.9	0.1	+ ***
Aggregate score of typically non-innovative sources of innovation	21.5	15.3	+ ***
ACTIVITIES			
	percent		
Investment in R&D for new products	18.9	3.2	+ ***
Investment in R&D for new processes	5.7	0.3	+ ***
Percent of employees in the R&D unit	2.6	0.1	+ ***

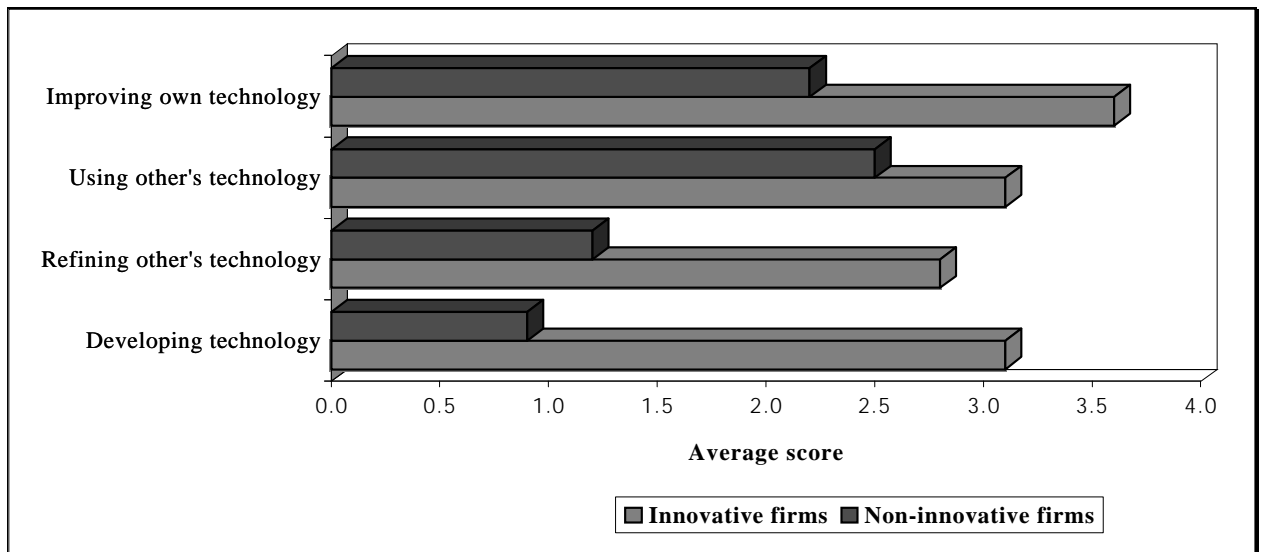
*** Significant at 1 percent level, ** significant at 5 percent level, * significant at 10 percent level.

Innovative firms attribute much greater weight to the innovation-related variables as factors in growth than do other firms. The average score given to R&D innovation capability as a factor in growth is almost six times higher in innovative firms. Similarly, the average score attributed to the ability to adopt technology as a factor in growth is two thirds higher in the innovative group.¹

Innovative firms rank the importance of government R&D tax incentives four times higher and place more emphasis on them relative to other government programs than non-innovative firms. They also perceive their spending on R&D relative to their competitors to be better than non-innovative firms, giving themselves an average score three times that observed from non-innovative firms.

Innovative firms also place more weight on the innovation-related developmental strategies. Innovative firms typically view developing their own and refining others' technology important strategies (giving them average scores of 3.1 and 2.8 respectively), while non-innovative firms consider these strategies not important (with scores of 0.9 and 1.2 respectively), as is shown in Figure 1. In terms of input strategies, innovative firms place more emphasis on using new materials and reducing energy costs, generally considering these strategies to be important compared to non-innovative firms that consider them to be unimportant (Table 1). Similarly, they place more stress on using existing materials more efficiently, scoring them approximately twice as highly as do other firms. Turning to innovative means of organizing production, it is evident that innovative firms are more concerned here as well. They perceive employing process control and just-in-time inventory control important developmental strategies (with average scores of 3.2 and 3.0), where as non-innovative firms consider them not important and slightly important, respectively (1.2 and 1.9).

FIGURE 1: Importance of Technology Strategies



Finally, these firms devote a much larger share of their investment dollars (seven times as much) to R&D for product and process innovations.

Thus, innovation occurs because of differences in several different, though related dimensions. Despite this breadth of innovative dimensions, the greatest differences between innovative and non-innovative firms occur in the R&D related issues, the importance of R&D in past growth, their spending on R&D-relative to competitors and the percent of investment devoted to R&D.

Distinguishing Differences in Innovative and Non-Innovative Firms

Human Resources Attitudes and Activities

Firms that pay greater attention to human resources are often hypothesized to be more successful. Rosenbloom and Abernathy (1982) cite attention to employee relations and full utilization of employee skills, in conjunction with innovation, as one of the factors behind Japanese success in the consumer electronics industry. Furthermore, the total quality management philosophy is built on the belief that firms that encourage all of their employees to search continually for new ideas and improvements, not just those employees specifically assigned to that task, will have more satisfied and productive employees. Additionally, firms that invest in enhancing their employees' skills will also be better able to keep up with new developments in knowledge and technology.

Relevant measures

Differences between innovative and non-innovative firms' attitudes toward human resources are examined using variables that reveal the importance a firm gives to labour skills, industrial relations and investments in enhancing skills and relations. The variables that measure the importance of human resources are the scores given to:

- the importance of government training programs.
- the importance of labour skills in past growth.
- its labour skills relative to those of its competitors.
- its labour climate relative to that of its competitors.

The strategies that the firm adopts with respect to human resources are represented by the importance attributed to:

- continuous staff training.
- innovative compensation packages.
- staff motivation in other ways.

Finally, the human-resource strategies of the firm are manifested in the investments it makes in human-resource development. These are captured by:

- the training expenditures per employee.
- the percentage of firms engaging in training.

- the percentage of firms engaging in formal training.
- the percentage of firms engaging in informal training.
- the percentage of employees trained formally in firms providing formal training.
- the percentage of employees trained informally in firms providing informal training.

and the involvement of employees, as represented by:

- the production unit as a source of innovation.

Empirical Results

Due to the specificity of knowledge and the rapidity of change associated with innovation and technological change, one would expect innovative firms to value human resources more. This is, in fact, the case. Innovative firms generally value human resources more highly than non-innovative firms, as Table 2 demonstrates, and almost all of differences are highly significant at the 1 percent level.

Innovative firms rank labour skills higher than non-innovative firms as a factor in past growth, rate government training programs as being more valuable than non-innovative firms, and perceive their labour skills to be better than non-innovative firms. Furthermore, innovative firms are not solely concerned with the skills of their employees, they also feel their employee relations are better than other firms do.

TABLE 2: Human Resource Strategies and Activities

	Innovative	Non-innovative	Difference in average score
	Average score on a scale of 0 to 5		
STRATEGIES			
Labour skills as a factor in growth	3.2	2.7	+ ***
Importance of government training programs	2.0	1.6	+ *
Labour skills relative to competitors	3.6	3.4	+ **
Labour climate relative to competitors	2.9	2.5	+ ***
ACTIVITIES			
Production employees as a source of innovation	2.6	0.9	+ ***
	percent		
Firms offering training	74	52	+ ***
Firms offering formal training	58	36	+ ***
Firms offering informal training	50	36	+ ***

Among firms offering training				
employees trained formally relative to all employees	33	30		+
employees trained informally relative to all employees	40	42		-
		dollars		
Expenditures per employee in the firm	922	798		+ **

*** *Significant at 1 percent level*, ** *significant at 5 percent level*, * *significant at 10 percent level*.

There is also greater shop-floor employee involvement in innovative firms, as they look to their production employees for sources of innovation more frequently than non-innovative firms. This is one of the key philosophies of Total Quality Management - that workers will be more satisfied and productive if they can contribute their thoughts and ideas to the betterment of the company.

The importance of human resources--both in terms of skills and relations--is evidenced not only by the value placed on human-resource strategies but also by the activities of innovative firms. While almost three quarters of all innovative firms offer some form of training, just over half of all other firms engage in training, a significant difference.

Among firms engaged in training, innovative firms train a higher percentage of their employees formally and a slightly lower percentage informally, although the differences are not significant. The proportion of employees trained in almost all occupations is higher in innovative firms, although the differences are not always significant. Among firms that do formal training, there are significant differences in the proportion of employees trained for management, professional and other occupations. Within firms that perform informal training, technical/production employees are significantly more likely to receive informal training than in non-innovative firms. For the two occupations for which innovative firms train less, the differences are not significant. Finally, innovative firms that train spend approximately \$922 per employee in the firms, significantly more than the \$798 spent on average by non-innovative firms.

Marketing: Markets and Products

The importance of marketing strategies as complements to innovation is well documented. McGuinness and Little (1981) argue that marketing skills are a complement to innovation in achieving success. Similarly, Utterback (1988) states that "marketing activities play a pivotal role in the success of small firms. Fast growers take an active role in the marketing of their products.² Additionally, marketing efforts that result in the penetration of foreign markets are important, as

Edmunds and Khoury (1986) have noted that exporting is a key to success. Developing a significant export market allows firms to reduce risks by diversifying across dissimilar markets and to prolong the marketability of their products.

Relevant measures

The difference in the emphasis placed on marketing between the innovative and non-innovative group of firms is examined using a diverse set of indicators.

The firm's beliefs in its general marketing capability and the importance thereof are represented by scores given to:

- the importance of marketing capability in explaining growth.
- the importance of access to markets in explaining growth.
- the importance of government market information services.

The particular marketing strategy is represented by a firm's evaluation of its competitive position with regard to:

- price.
- quality of products.
- customer service.
- flexibility in responding to customer needs.
- range of products.
- frequency of introduction of new products.

The importance of product mix is represented by the score given to strategies related to:

- maintaining current products in current markets.
- introducing new products in current markets.
- introducing current products in new markets.
- introducing new products in new markets.

In contrast to their strategies, the marketing activities of firms are represented by:

- the percent of sales exported.
- the percent of investment devoted to market development.

Finally, the contribution made by marketing to innovation is given by:

- the score attributed to the marketing unit as a source of innovation.
- the score attributed to competitors as a source of innovation.
- the score attributed to customers as a source of innovation.

Empirical Results

In general, innovative firms place greater emphasis on the importance of the marketing program. Innovative firms consider marketing capability and access to markets to be important or very important factors in past growth, while other firms view these only as slightly important to important (Table 3). Innovative firms rate the importance of government market information programs more highly than other firms.

TABLE 3: Marketing - Strategies and Activities

	Innovative	Non-Innovative	Difference between average scores
	Average score on a scale of 0 to 5		
STRATEGIES			
Marketing capability as a factor in growth	3.2	2.5	+ ***
Access to markets as a factor in growth	3.2	2.3	+ ***
Government market information services	1.7	1.1	+ ***
Maintaining current products in current markets	3.9	3.3	+ ***
Introducing new products in current markets	3.6	2.5	+ ***
Introducing current products in new markets	3.5	2.7	+ ***
Introducing new products in new markets	3.3	2.1	+ ***
POSITION RELATIVE TO COMPETITORS			
Price	3.2	3.1	+
Quality	4.2	3.7	+ ***
Customer service	4.2	3.9	+ ***
Range of products	3.6	2.9	+ ***
Frequency of introduction of new products	3.2	2.2	+ ***
Flexibility in responding to customer needs	4.2	3.8	+ ***
ACTIVITIES			
Marketing as a source of innovation	3.0	1.7	+ ***
Competitors as a source of innovation	2.7	2.3	+ ***
Customers as a source of innovation	3.8	3.4	+ ***
	percent		
Exports/sales	12	4	+ ***

Investment in market development	18	23	-
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*** *Significant at 1 percent level*, ** *significant at 5 percent level*, * *significant at 10 percent level*.

Not surprisingly then, innovative firms feel they are in a better position than their competitors in terms of product price, quality, customer service, flexibility in responding to customer needs, range of products and frequency of introduction of new products than non-innovative firms. However, it is noteworthy that innovative firms differ less in their emphasis on the more traditional competitive tools, such as price, quality, customer service and flexibility in responding to customer needs, and differ most with respect to aggressive and innovative techniques such as the range and the frequency of introduction of new products.

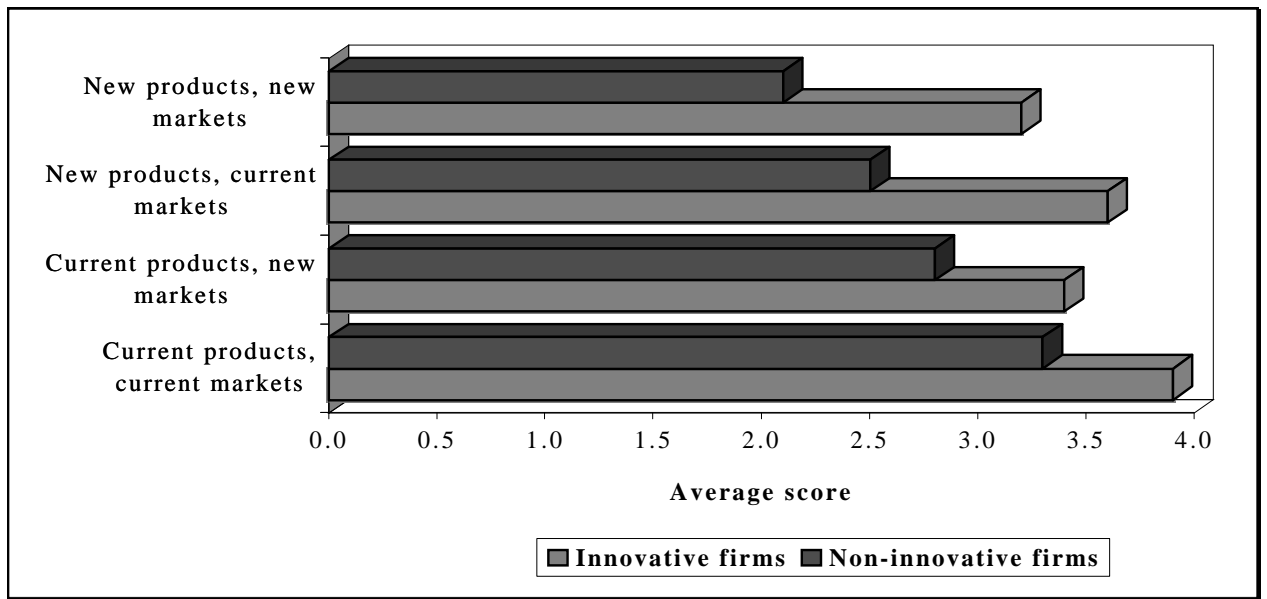
The importance of marketing in innovative firms is also exemplified by the higher value placed on strategies related to introducing new products into new or current markets, or current products into new markets. Figure 2 illustrates that the greatest differences between innovative and non-innovative firms occur for the most aggressive marketing tactics that involve either new products or new markets; the smallest difference occurs for the most conservative strategy of maintaining current products in current markets.

This aggressiveness is visible in the difference in export orientation of the two groups. Innovative firms typically sell 12 percent of their products outside Canada, significantly more than the four percent in non-innovative firms.

The activities of innovative firms are more responsive to market trends, as the importance of the marketing department and external agents such as competitors and customers as sources of innovation are emphasized more heavily by innovative firms.

Perhaps somewhat surprisingly, given the aggressiveness of innovative firms, firms in both groups devote approximately one out of every five investment dollars to market development. However, as will be shown in the next section, innovative firms are almost twice as likely to engage in investment.

FIGURE 2: Importance of Marketing Strategies



Input and Investment Strategy

Input strategies and investment behavior have also been hypothesized to be the key factors behind success. The importance of maintaining a competitive position in the production arena is emphasized by Teece (1986), who notes that "innovating firms without the requisite manufacturing and related capabilities may die, even though they are the best at innovation."³

Relevant measures

To examine differences in input strategies, variables are used that capture a firm's emphasis on cost reduction as well as specific investment activities.

The firm's belief concerning its competitive position with regard to input strategy is given by:

- the firm's evaluation of its cost of production relative to its competitors.

The firm's cost-minimization strategies are given by the importance attached to:

- reducing labour costs.

The investment behavior of firms is characterized by:

- the percentage of firms incurring investment expenditures.
- the share of sales devoted to investment.

Empirical results

The success of innovative firms is accompanied by greater emphasis on input and investment strategies. Innovative firms are not just concerned with being at the leading edge of product and technological development, they are also concerned about production costs (Table 4). They perceive themselves to be significantly more competitive in terms of production costs than other firms and they rate the importance of developing strategies designed to reduce labour costs higher than other firms.

Given the connection between adopting an innovative strategy and attempts to reduce costs, it is noteworthy that more than half of all innovative firms incurred investment expenditures in 1991, compared to slightly more than one quarter of

non-innovative firms, a significant difference. Among those innovative firms that do incur these expenditures, approximately 10 percent of sales are devoted to investment, while non-innovative firms invest 11 percent of sales, although the difference in rates is not statistically significant.

TABLE 4: Distribution of Investment expenditures

	Innovative Firms	Non- Innovative Firms	Difference between average scores
	Average score on a scale of 0 to 5		
STRATEGIES			
Production costs relative to competitors	3.0	2.3	+ ***
Strategic emphasis on reducing labour costs	3.9	3.3	+ ***
ACTIVITIES			
	percent		
Percent of firms incurring investment	55	27	+ ***
Percent of sales devoted to investment	10	11	-

*** Significant at 1 percent level, ** significant at 5 percent level, * significant at 10 percent level.

Financial Structure

Financing innovative behavior is often perceived to be a problem for several reasons. First, innovation involves new activities whose success is difficult to evaluate. Secondly, it often requires investment in development work that does not produce hard assets. Innovative ideas cannot be easily offered as collateral. Thus, innovation, it is sometimes said, requires high cost funds that come from venture capital groups or from internally generated funds. However, Utterback et. al. (1988) have found that firms that must fund themselves primarily through growth in retained earnings are less likely to succeed. The issue then is whether innovative firms rely less on external funds or whether the mix of outside funds differ for innovative and non-innovative firms.

Relevant measures

In order to examine these issues, this paper investigates the differences in perceptions held by firms on the importance of financing and their actions

regarding financing. The importance that the firm attributes to financing is given by its score on:

- the importance of access to capital in explaining past growth.
- the importance of the cost of capital in explaining past growth.

Differences in the financial structure of innovative versus non-innovative firms are examined using both the distribution of liabilities and shareholder equity and the relative importance (percentage distribution) of the sources of financing:

The components of liabilities and shareholder equity examined are:

- short-term debt.
- accounts payable.
- long-term debt.
- capital stock.
- retained earnings.
- deferred taxes.
- other liabilities.

The sources of financing examined are:

- accounts payable.
- financial institutions.
- venture capital firms.
- public equity markets.
- governments.
- other individuals.
- parent or affiliate.
- retained earnings.
- deferred taxes.
- other sources of financing.
- percent of financing from foreign sources.

Empirical results

Innovative firms tend to place more emphasis on financing issues than non-innovative firms. Innovative firms view the capital resolution problem as an important one, rating access to capital and the cost of capital as significantly more important factors in their past growth than non-innovative firms (Table 5).

Given the overall difference in the importance of capital, it is not surprising that the financial structure differs between these two groups. Capital stock accounts for a

greater share of liabilities and shareholder equity in innovative firms. Innovative firms rely more heavily on outside sources such as: venture capital, public equity, and parents and affiliates for sources of financing and less heavily on suppliers and financial institutions.

The assertion of Barton and Matthews (1984) that firms are unwilling to utilize external financing for fear of revealing proprietary information appears to be unfounded, given that innovative firms, those for whom the concern would be the strongest, actually carry more capital stock and are more outward-oriented for financing. Similarly, the view that innovative firms would not have access to outside capital is also incorrect. Interestingly, the increase in outside capital does not come from financial institutions but comes rather from public equity markets, venture capital and from parent companies.

TABLE 5: Financing

	Innovative Firms	Non- Innovative Firms	Difference between average scores
	Average score on a scale of 0 to 5		
Access to capital as a factor in growth	2.9	2.4	+ ***
Cost of capital as a factor in growth	3.0	2.3	+ ***
LIABILITIES AND SHAREHOLDER EQUITY		percent	
Short term debt	16.5	14.6	+ **
Accounts payable	22.9	28.2	- **
Long-term debt	17.6	17.3	+ **
Capital stock	6.7	4.5	+ **
Retained earnings	29.7	30.8	-
Deferred taxes	1.5	1.6	- *
Other liabilities	5.1	3.1	+ ***
SOURCES OF FINANCING			
Suppliers	24.0	25.8	-
Financial institutions	25.2	26.6	-
Venture capital	0.9	0.5	+ **
Public equity	1.3	0.1	+ ***
Government	1.3	1.3	+ **
Individuals	5.6	6.0	-
Parents	6.5	4.3	+
Retained earnings	29.8	29.7	+
Deferred taxes	1.9	1.4	+
Other sources	3.6	4.3	- *
Percent of financing from foreign sources	2.8	0.6	+

*** Significant at 1 percent level, ** significant at 5 percent level, * significant at 10 percent level.

Valuation of Government

The extent to which government programs are utilized is just one more decision that firms must make. In contrast to other functional areas, there is little to guide expectations here about the sign of the differences except to argue that if these programs provide useful products, innovative firms are just as likely to make more intense use of programs here as elsewhere.

Relevant measures

The variables representing the perceived importance of government programs and services overall are:

- the score given to government assistance as a factor in growth.
- the percentage of financing accounted for by government.
- the score given to government as a source of innovation.

More specific questions ask firms to rate the importance of programs that they have used. These programs are:

- export incentives and services.
- industrial support.
- government procurement.

Empirical results

Innovative firms perceive general government programs and services to be significantly more important in accounting for their growth than do non-innovative firms (Table 6). Innovative firms also rate each of the individual government programs as more important than non-innovative firms. In general, both innovative and non-innovative firms value government training and procurement (and market information in the case of innovative firms) more than other programs. The government also serves as a greater source of financing for innovative firms.

TABLE 6: Importance of Government Programs

Innovative	Non-Innovative	Emphasis of innovative firms related to non-innovative
Average score on a scale of 0 to 5		

Government as a factor in growth	1.8	1.0	+ ***
Government export incentives	1.5	0.6	+ ***
Government industrial support	1.9	0.9	+ ***
Government procurement	1.8	1.4	+ **
Government as a source of innovation	1.6	1.1	+ ***
	percent		
Government as a source of financing	1.3	1.3	+ **

*** *Significant at 1 percent level*, ** *significant at 5 percent level*, * *significant at 10 percent level*.

Management Skills and Practices

McGuinness and Little (1981) suggest that management skills, generally defined, are an important factor behind success. Others specifically point to a close interaction with employees as a key management initiative. Rosenbloom and Abernathy (1982) suggest that the close contact between top level executives and persons developing new technologies is part of the reason for the success of Japanese firms in the consumer electronics industry.

Relevant measures

Given the hypothesized importance of management skills, differences in the significance of these skills and the manner in which firms attempt to enhance them are also examined here. The importance of general management skills is represented by:

- the score attributed to management skills as a factor in past growth.

More specific management practices that firms adopt are represented by the score attached to the following developmental strategies:

- improving management incentives through compensation schemes.
- adopting an innovative organizational structure.
- adopting a total quality management philosophy.

The attention paid to management is captured by:

- the score attached to management as a source of ideas for innovation.

The effort made to augment management skills is captured by:

- the percentage of firms training their managers formally.
- the percentage of firms training their managers informally.

Empirical results

Innovative firms view management skills and practices as a key element in success (Table 7). To some extent, the emphasis given to all of the factors in the survey represent the importance attributed to management, since each of these areas falls under the responsibility of management. The fact that innovative firms place a greater emphasis on human resources, marketing strategies, and financing, than other firms suggests that management skills and practices are more important in these firms.

Differences in the variables that were specifically designed to measure the importance of management skills and practices confirm this conclusion. Innovative firms rate management skills as a significantly more important factor in past growth than other firms and view all of the management practices as significantly more important than non-innovative firms.

The importance of management skills is confirmed by the effort made to augment those skills. Thirty-nine percent of innovative firms train their managers formally and 27 percent train them informally. This is significantly higher than for non-innovative firms where only 21 percent of firms engage in formal training of their managers and 15 percent train managers informally.

The importance of management as well as the integration between management and other employees is revealed by the value given to management as a source of ideas for innovation. Innovative firms typically rate management more highly as a source of innovation than other firms, as Table 7 illustrates.

TABLE 7: Management - Strategies and Activities

	Innovative	Non-innovative	Difference in average score
	Average score on a scale of 0 to 5		
STRATEGIES			
Management skills as a factor in growth	3.5	3.0	+ ***
Incentive-based management compensation	2.8	2.0	+ ***
Innovative organizational structure	3.1	2.1	+ ***
Total quality management	3.9	2.8	+ ***
ACTIVITIES			

Management as a source of innovation	3.6	2.7	+ ***
	percent		
Firms formally training managers	39	21	+ ***
Firms informally training managers	27	15	+ ***

*** Significant at 1 percent level, ** significant at 5 percent level, * significant at 10 percent level.

This relation between management and innovation also serves to explain why innovative firms are generally more successful. When management is closely linked with the innovation process, new initiatives taken in products and processes will be closely integrated with other activities of the firm, such as financing, human resources, and marketing.

Performance

The previous sections have compared the intensity of strategies and activities derived from the small- and medium-sized survey. To validate the self-assessments which show innovative firms stressing a wide variety of skills and devoting more activities to each of these areas, objective data were sought on measures of success from an outside source. The data on the performance of innovative firms are drawn, not from the survey, but from administrative data sources and then linked to the firms answering the survey.

Various performance measures for innovative and non-innovative firms are presented in Table 8. First, performance is measured in terms of absolute size - sales, assets, profits and employment. Second, each of these size-based measures is calculated as a percentage of the industry total, which generates output or input shares. If innovative firms have greater increases in market shares, then they are doing better than their competitors in the same industry. If they have faster increases in absolute size, then this could occur either because they are growing faster than their competitors or because they are located in the fastest growing industries. Finally, the percentage of each class that are successful is calculated based on two separate indices of success. The first index is a weighted average of return on equity or asset measures. The second is a weighted average of output market share, price-cost margins, and labour and capital productivity. Each of these measures of success was derived from a principal component analysis using a large data set which measures the performance of firms in the survey (see Baldwin et. al. (1994)).

TABLE 8: Performance Measures

	Innovative Firms	Non- Innovative Firms	Difference between innovative and non innovative firms
	thousands of dollars		
SALES			
Sales in 1984	2608	2421	+
Sales in 1988	6204	5615	+ **
	percent		
CHANGES IN SHARES RELATIVE TO THE INDUSTRY FROM 1984 TO 1988			
Share change in output	0.13	0.05	+ ***
Share change in employment	0.60	0.37	+ ***
Share change in assets	0.11	0.05	+ ***
Share change in equity	0.058	0.061	- ***
Share change in profits	0.40	0.09	+ ***
SUCCESS			
General profitability	51.15	48.80	+
General success - market share plus profits	57.18	39.47	+ ***

*** Significant at 1 percent level, ** significant at 5 percent level, * significant at 10 percent level.

In general, innovative firms perform better in all areas. Innovative firms start the period as somewhat larger in absolute terms than non-innovative firms, but grow more in terms of sales. By 1988, they have become significantly larger in terms of output.

The superior performance of innovative firms comes partially because they have improved their share of particular markets. Changes in output, profits, employment and asset shares are all positive and significant.

Finally, the scores for the two success indices indicate that innovative firms are more successful when the many and varied dimensions of success are combined. They do better than non-innovative firms across a wide variety of performance measures - some related to market share gain, others to return on investment. Moreover, when these measures are combined as an index, there are significant differences between the two groups, even though individual variables may not be significantly different.

CONCLUSION

The emphasis on innovation and technological adaptation has led to a search for complementary policies that will aid firms in achieving these goals. This search sometimes has the tendency to focus narrowly on a small subset of strategies and activities that are said to be the key to success. This paper has demonstrated that this is probably the wrong tack. There is more than one key to success. Innovation is accompanied by a balanced approach that values a full range of strategies.

Innovative firms attempt to excel in several different but related areas of business performance. They are, by definition, innovative - they engage in R&D activity for both product and process innovations, develop, improve and refine technology, seek new materials and more efficient ways of using existing ones and intensively exploit various factors as sources for innovation. However, innovative firms do not focus exclusively on innovation and technological advance. They are more concerned about human resources, markets and products, financing, and management skills and practices. They tend to value each of these areas more highly than non-innovative firms. Innovative firms take more of a balanced approach to their business' operation by striving for excellence in a number of different areas.

Innovative firms value both management and non-management employees skills more highly than other firms. This perception of the importance of these skills is reflected in their attempts to continually enhance them. They are far more likely to engage in training and to give formal training to a larger percentage of their workers. Furthermore, both management and production employees are considered more important sources of innovation for innovative firms, thus suggesting a highly integrated working environment.

Innovative firms place more emphasis on aggressive marketing policies. They are also more export-oriented. However, they are not concerned solely with being at the leading edge of developing new products and technologies; they are also concerned about restraining production costs, and they invest a larger percentage of their sales in improving their capabilities.

Innovative firms attribute a greater role to their financing strategy in explaining their success and they have a different financial make-up. They are more outward oriented, both in terms of the liabilities and sources of financing.

Innovative firms also value government programs, services and financing more than other firms.

More successful firms are typically more innovative, according to a study by Baldwin et. al. (1994). The empirical data in this report complement the earlier

study in that they describe the policies that accompany innovation. Innovative firms do not just strive to develop new technologies and products. As McGuinness and Little (1981), Napolitano (1991), Rosenbloom and Abernathy, (1982), and Teece (1986) have suggested, they accompany this with a more intense focus on a number of different functional areas. Innovative firms must strive for high quality management and non-management employee skills and employee relations that foster productivity and innovativeness. They must develop aggressive marketing strategies and must pay close attention to production costs. None of the areas studied here appear unimportant for innovative firms. Intensity, consistency of emphasis, and balance in a number of different areas of competency are a concomitant part of the innovative process.

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