1. Introduction

1.1 INNOVATION AND SMALL FIRMS

Innovation is the lifeblood of a market economy. It extends the range of products available to consumers. It lowers the prices that consumers have to pay. It creates wealth and rewards risk-taking. It alters the composition of industries by setting growing dynamic firms apart from declining ones. It improves the ways in which firms combine capital and labour, allowing them to produce goods and services more efficiently. Innovation embodies the entrepreneurial spirit.

The essence of innovation is commercialized change. Its commercial nature warrants special emphasis, in that innovation pertains directly, and exclusively, to observable market activities and outcomes – to the scope of goods and services that are offered to consumers, or to technological and organizational advances that facilitate the flow of these goods and services. Innovation is about more than ideas, it is about how the economic system transforms ideas into outcomes, outcomes that continually shape its evolution.

Studies of innovation have a long academic lineage. Following Schumpeter, many studies on innovation focused on the capabilities of large firms – businesses endowed with significant physical and financial assets and complex organizational structures. Innovation was traditionally seen as a technical, scientific endeavour taking place primarily in large firms, the fruits of which originated in research and development laboratories before being passed on to production and marketing teams, all under the watchful guidance of managers. Recent studies have questioned whether these linear, research and development (R&D) models provide an adequate depiction of the innovation process, particularly when investigating the nature of innovation in small firms. Recent studies have moved away from unidimensional, R&D-centric approaches by focusing more broadly on the diversity of internal activities in innovative firms and the complexity of external networks that help shape the innovation process.

This volume brings together a rich body of research on innovation in small firms. In Canada, as in most industrial economies, the small-firm sector continues to play a critical role in shaping industrial evolution. Small firms have accounted for the lion’s share of new job creation and destruction over
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the last twenty years (Baldwin and Picot, 1996), and act as an ongoing source of discipline on large enterprises. Small firms readily encourage innovation – by serving as conduits through which new ideas are brought to market, and by capitalizing on new technologies (Rothwell and Zegveld, 1982; Acs and Audretsch, 1990). New small entrants often play a critical role in the early stages of an industry’s life cycle when product standards are fluid, when production processes are in flux, when turnover is high, and when competition is based on features embedded in new products.

While innovation strategies in large firms often focus on activities that benefit from scale economies (for example, particular forms of research and development), small firms pursue innovation strategies that emphasize specialization, customization and product flexibility, characteristics that depend on a continual interaction between firms and their customers. These innovation strategies often draw on informal learning networks – networks in which small firms learn how to absorb, adapt, improve, and tailor new technologies to meet specific market needs. Engineering skills, product know-how, and understanding customer requirements are all major sources of incremental innovation in small firms (Malerba, 1993).

This volume explores the scope, breadth and depth of innovation in small firms. Based on new survey data, it focuses on the nature and intensity of innovation, and asks which strategies and activities are associated with superior performance. It asks how scientific competencies are combined with other capabilities – from human resources, to marketing, to production, to finance. It explores how firms tailor their innovation strategies to different competitive environments. It examines the role that financing plays in the creation of new knowledge. In addition, it investigates how the development of advanced competencies in small firms differs from skill acquisition in larger companies.

Studies of innovation must also address issues of performance. This book does so in several ways. First, we focus inter alia on two ‘high-performance’ populations – growing small and medium-sized enterprises, and entrants who survive to their teen years – long-run survivors. Both are sources of dynamism in the economy. We also investigate which strategies and activities distinguish high-performance firms from others – by examining how growth in profitability, productivity and market share relate to a firm’s strategic stance. Innovation is a multidimensional activity, one that, in the interests of effective communication, requires us to address our conceptual and operational priors at the onset. We take these up below.

1.1.1 What Constitutes Innovation?

Innovation is the commercialization of knowledge, either in the form of new or improved products, processes, or some combination thereof. Innovation
can range from imitative to novel, from incremental to monumental, from minor to dramatic. Studies of innovation that report on the characteristics of innovative products and processes follow an ‘outcome-oriented’ approach by drawing attention to the end results of a firm’s investments in knowledge creation. These studies focus on the market outcomes of innovation, that is, its direct impact on firm performance, or on the method used to disseminate innovations between firms and across industries.

A second approach, characteristic of much of the theoretical work on innovation, explores the actual process of bringing new knowledge to market, often by looking at core innovation inputs such as research and development and investments in intellectual property. This ‘process-oriented’ approach can focus on a single input (typically research and development), or, more comprehensively, on how different inputs are combined within the firm to produce new knowledge (for example, how firms coordinate and disseminate the flow of information from their customers, competitors and suppliers to their research and development teams and production units). This approach treats innovation as a strategy, that is, as a multi-stage process encompassing a range of ‘core innovation activities’ related to an innovation’s sources, objectives, impediments and outcomes. A more comprehensive form of this process-oriented approach also looks beyond core innovation activities to the role that complementary business strategies (for example, financing, marketing and human resources) play in supporting the development of innovations.

Throughout this book, we adopt both outcome- and process-orientated approaches, focusing, at various stages, on innovative outcomes, core innovation activities, and complementary business strategies. We do this, first, as a means of illustrating the multidimensional nature of innovation within small firms, and second, because small firms are not simply micro-versions of large firms. This latter issue is important in that the conceptual yardsticks that are often used to gauge innovation activity in large firms may not be wholly transferable to studies of small firms. For instance, investigations of innovation in large firms have tended to focus mainly on core innovation activities such as formal research and development – activities that, on average, play less of a role in small firms. Differences in the intensity of research and development that favour large firms are sometimes used to argue, in turn, that small firms are less innovative. The evidence that we present herein suggests otherwise. There are many paths to innovation, and R&D is but one. Hence, the need for a multidimensional approach, one that uses a range of conceptual and operational metrics to measure and evaluate innovation activity.
1.1.2 Firms as ‘Collections of Competencies’

This study adopts a competency-based approach – one that describes the firm in terms of an underlying set of business strategies and core capabilities. Many of these occur in functional areas such as production, marketing, management, financing, and human resources – areas in which all firms, in varying degrees, are required to develop a set of skills. Firms also develop competencies in the area of innovation by investing in skills and infrastructure that have a direct impact on the firm’s propensity to commercialize new knowledge. In some businesses, these take the form of deliberate innovation strategies in which the firm manages ‘innovation inputs’ (for example, marketing teams, research departments, strategic alliances) with the objective of producing innovative outcomes (for example, new product lines, new process technologies). Other firms place less emphasis on developing formal innovation strategies, but, by investing in core business competencies, still develop the ability to acquire, filter, and adapt information on new ideas and technologies.

In our view, the above distinction is artificial. Innovation strategies should not be seen as somehow ‘apart from’ core business strategies such as marketing, human resources and finance; rather, they are inexorably bound up in, and supported by, these core competencies. The most-successful firms are those that develop innovation capabilities, and support these capabilities with a broad array of strategic competencies. Innovation is about active learning – about how firms ‘create’ new knowledge. While physical investments in innovation are important (for example, expenditures on research and development facilities), it is not simply their existence that leads to success. Rather, successful outcomes depend on how these investments are utilized within the firm, that is, how they interact with, and complement, basic business skills. For instance, in-house research and development facilities may do little to improve the firm’s bottom line if the outputs from applied research, new and improved products, are not supported by aggressive marketing strategies – the basic means by which the firm brings new products to customers. Similarly, the acquisition of advanced production technologies may be of little benefit to the firm if it cannot find efficient ways to integrate these technologies into its production line. Successful integration often requires supporting investments in human capital – such as bringing in production teams to reengineer production practices and training workers to use new technologies.

This study is about dynamic entrepreneurship – strategic behaviour that requires active learning and problem-solving. Entrepreneurship is about how firms compete: about what some do in order to gain an edge over their rivals; about how firms learn and use new information; about what strategies produce winners. Studies that focus on entrepreneurship view competitor firms...
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as heterogeneous – comprised of diverse sets of strategic preferences and underlying competencies that give rise to a wide array of firm-specific outcomes. Our work builds on this entrepreneurial tradition by quantifying important relationships between activities, strategies and outcomes within representative small-firm populations.

1.1.3 New Firms, Small Firms and Growing Firms

The multifaceted view of innovation that we develop herein is appropriate to a world where innovation is itself multidimensional, emerging as the product of core innovation activities and complementary business strategies. In order to emphasize the heterogeneity that is inherent in the innovation process, we examine the behaviour of a diverse set of actors.

Our research draws from several data sources. Each is designed to yield insights into different, though often related, firm populations. These include (1) long-run survivors (new small firms that have survived their first decade of operation) in both goods and service industries, (2) growing small and medium-sized enterprises, also in both goods and services, (3) small manufacturing firms, (4) innovative service firms in communications, business services and finance, and (5) corporate business bankruptcies.

All of these populations shed light on the dynamics of the small-firm sector. Long-run survivors (a group that we refer to as ‘successful entrants’) are new, small firms that have beaten the odds against new-firm failure by reaching their second decade of operation. This is an exclusive group – only one in five new Canadian businesses reach this mark. Our second population is made up of growing small and medium-sized entrants, firms that have both beaten the odds against failure and grown their asset and employment bases.

Our profile of long-run survivors and growing small and medium-sized enterprises is based on firms that operate in a diverse mix of goods and services industries. Much of the discussion on small-firm innovation, however, centres on knowledge creation in certain sectors. Accordingly, we also focus on two sector-specific populations: manufacturing and ‘dynamic’ services (communications, business services and financial services). Profiling small firms in these sectors is sensible on analytical grounds. Competition among manufacturing firms has traditionally centred on scale economies of production. It is here that one would expect small firms to develop innovation strategies that depart significantly from the industry (that is, large-firm) norm. If manufacturing represents the vanguard of the traditional economy, then dynamic services embodies the new. Communications, financial services, and business services (computer services, engineering and scientific and technical services) are all industries characterized by technological innovation – producing new products and technologies that are widely disseminated across
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other sectors of the economy. Small firms operating in these service industries play a critical role in both developing and supporting these technological innovations.

Many of the small-firm populations outlined above – long-run survivors, growing small and medium-sized firms, and innovative service firms – represent ‘high-performance’ groups, in the sense that all meet some underlying performance criteria (survival, growth and innovation, respectively) that sets them apart from other firms. The remaining population, business bankruptcies, represents low-performance firms in our study.

Why is the study of these different populations illuminating? First, they yield insights into the dynamics of what many refer to as ‘the new economy’ – new systems of production driven by the integration of information and communications technologies, whether in traditional manufacturing industries or in the service sector. Economic dynamism in the new economy is seen to be a function of information management and ongoing technological innovation more so than the result of the exploitation of traditional production economies. New firms, small firms, and growing firms all figure prominently in the development and dissemination of technological innovations.

1.2 DATA SOURCES

In writing this volume, we have drawn on an array of new survey and administrative data sources. Empirical research on innovation in the small-firm sector has traditionally focused elsewhere, mainly using case studies and/or small-sample surveys, which are really just case studies with more numerous observations. These approaches yield valuable insights, but they do raise the spectre of bias. In case-study research, there is the temptation to focus only on successful companies (as these are often the most visible) at the expense of less successful firms. In a similar vein, small-scale surveys are sometimes based on non-random samples drawn from unrepresentative populations (those that provide only a partial view of the target population in question). What is more, many of these samples are characterized by high rates of non-response, which is problematic if a firm’s willingness to respond is at all correlated with its innovation stance or its performance characteristics. In all of these cases, it becomes difficult to ‘generalize’ research results to larger firm populations. In this study, we draw on survey evidence derived from random samples of entire populations, in order to draw a comprehensive and reliable picture of the small-firm population, or of specially designated sub-samples of the small-firm population.

A second limitation, beyond issues of data coverage, is that much of the early literature on small-firm innovation has employed relatively crude indi-
cators of innovation activity – indicators that are often ill suited to capturing the scope and breadth of innovation activity in the small-firm sector. Studies that use formal research and development expenditure as the sole measure of innovation constitute an example of this.

In this study, we draw on sets of questions covering a range of activities that enable us not only to examine the R&D activity of small firms, but also other aspects of the innovation process – whether new technology is being acquired, whether production engineering is important, the extent to which the patent system is being utilized, and whether skilled labour is being used to enhance the human capital base of the firm.

On a final note, many early studies have focused on only a narrow aspect of performance, when performance is considered at all. The relationship between innovation and performance is multidimensional, in that the commercialization of new knowledge can be expected to benefit the firm in several ways. A multifaceted operational treatment of innovation requires a concomitant broad-spectrum approach when attempting to assess its impact. Moreover, other studies have often used self-assessed measures of relative performance rather than objective secondary measures of relative sales growth. In this monograph, we link our surveys to administrative records that contain information on sales, productivity, and profitability in order to examine the connection between the strategic emphasis of a firm and its performance.

To maximize the scope of our research, we make use of five specially designed surveys conducted by Statistics Canada, each of which explores various aspects of innovation and performance in the small-firm sector. These include:

Survey of Growth Companies (1992);
Survey of Innovation and Advanced Technology (1993);
Survey on the Characteristics of Bankrupt Firms (1995);
Survey of Operating and Financing Practices (1996);

All five surveys were developed after substantial pre-production testing and evaluation of the underlying target populations. Each was based on a random sample drawn from Statistics Canada’s Business Register (BR) – a comprehensive list of all firms with employees in Canada. Four of the five surveys had very high response rates, ranging from 70 per cent to 90 per cent. To ensure that our results are representative of the underlying target populations, tabulations reported herein have generally been probability-weighted, either in accordance with sample designs, or to adjust for patterns of non-response.

Two of these surveys – Survey of Growth Companies (Growing Small and Medium-Sized Enterprises) and the Survey of Operating and Financing Prac-
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tices (SOFP) – were also linked to administrative data sources at Statistics Canada in order to obtain quantitative measures of performance (notably sales growth, productivity and profitability). One administrative data source – the Longitudinal Employment Analysis Program – was also used to study patterns of new-firm survival.

The surveys contain questions that allow us to compare differences in the emphasis that firms give to strategies and activities in different functional areas. We equate these differences in emphasis to concomitant differences in the competencies that firms develop in specific areas.

The set of strategies that firms pursue reveals much about their objectives. The surveys explore the strategic priorities of firms in the functional areas of management, marketing, financing, and human-resource development, as well as more specific strategies related to innovation, training, financial structure, and the use of government programmes.

The surveys investigate firm strategies with separate but complementary questions. In a first set of questions, firms rank the importance of different factors explaining the growth of their company (growth strategies). These include factors such as management skills, marketing capability, cost of and access to capital, technology skills, R&D-innovation capability, and labour-force skill levels. In each case, firms had the opportunity to stress the importance of the internal capabilities that they developed using a Likert scale of 1 to 5, with 1 corresponding to ‘not important’, 2 to ‘slightly important’, 3 to ‘important’, 4 to ‘very important’, and 5 to ‘crucial’.

Second, firms provide an assessment of their position relative to their main competitors with respect to the importance they assign to different product-based competitive strategies – such as price, cost, quality, customer service, labour climate, skill levels of employees, flexibility in responding to customer needs, range of products offered, and the frequency of the introduction of new products. For each of these strategies, firms rank their position relative to their competitors on a Likert scale of 1 to 5 (with 1 corresponding to ‘behind’, 2 to ‘somewhat behind’, 3 to ‘about the same’, 4 to ‘somewhat ahead’, and 5 to ‘ahead’).

Third, firms score the importance of certain focused activities that contribute to their general development. The developmental tactics pursued by the firm are grouped into broad areas – marketing strategy, technology strategy, inputs-sourcing strategy, management practices, and human-resources strategy – and specific emphases in each of these areas are addressed. Questions on marketing strategy investigate the firm’s emphasis on existing or new products and markets. The technology questions examine the firm’s ability to develop or apply new technologies. The inputs-sourcing questions explore the firm’s emphasis on production efficiency. The management-practices questions examine the firms’ organizational policies and systems of control.
Questions on human resources delve into the method used to enhance the effectiveness of personnel. Once more, Likert scales are used to address the importance of each of these strategic areas to the firm.

While the strategy questions provide subjective answers to what are extremely complex and difficult-to-measure organizational capabilities, we believe they provide useful insights into differences in the competencies developed by different groups of firms. They have been carefully tested and used successfully in a series of surveys that have been used to study the innovation process. While the answers are subjective, the issues are ones that business managers must constantly evaluate. Questions that deal with the magnitude of competitive forces and the importance of competencies in various areas of the firm all deal with issues that business managers must examine on an ongoing basis. Competitive forces constantly require firms to compare themselves to their competitors. The practice of benchmarking, for instance, has led many firms to continuously assess themselves against industry leaders. Corporate planning requires firms to decide on the emphasis that will be placed on different areas.

Despite their usefulness, questions on strategies cannot by themselves provide a complete picture of the competencies of the firm. For this, the measurable activities of firms also need to be examined. Activities are the tasks that are required to implement strategies. They involve financing, hiring and training personnel, purchasing technology and capital equipment, establishing research and development facilities, coordinating and monitoring personnel. Therefore, the surveys examine firms’ activities in these areas. These activities reflect previous strategy choices, provide some evidence on the degree of expertise available in firms, and suggest the potential for future success. To this end, export orientation, capital structure, sources of financing, employment composition, investment intensity in R&D and marketing, sources of innovation and training policy are all examined.

The validity of the subjective scores that firms assign to their capabilities and competitiveness was addressed by comparing the answers to these questions to their answers regarding their activities. The inclusion of parallel questions on activities provides an independent check on the validity of the firm’s subjective evaluations of its competitiveness and capabilities. Answers to questions about the emphasis given to R&D can be compared to the answers to questions that inquire about the existence and type of R&D unit. Answers to questions about the emphasis given to skill development can be compared to those that inquire about the existence of training. When these comparisons are made, we find firms that place a higher valuation on an activity are more likely to be performing the activity or performing it more intensively (Baldwin and Johnson, 1996a, 1996b; Johnson, Baldwin and Hinchley, 1997). For this reason, we regard the scores on specific strategies
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as good proxies for either the intensity of resources devoted to these areas or the level of competencies developed therein.

In order to minimize ambiguity, the questions in the surveys were all tested extensively. In addition, individual subject areas were covered by several questions. This procedure allows an issue to be summarized by answers to more than one question, either by comparing all the answers, or by combining them in a more complex fashion by principal component or factor analysis.

This information on different strategies and activities of firms provides an integrated profile of the broad functional areas that must be mastered by a firm – management skills, marketing abilities, human-resource development, financing capabilities, and innovation expertise. It permits an evaluation of the areas that are critical to success, how the winning combination of strategies varies as the industry environment changes, and whether firms in different regions pursue similar strategies and objectives.

Taken together, these survey and administrative data sources allow us to study a broad cross-section of small firms – businesses that have survived into adolescence, businesses that are growing, businesses that are innovative, and businesses that have failed.

In the following chapters, we report various point estimates of the characteristics of the different populations studied and compare differences of these point estimates (often of the percentage of a population with a particular characteristic) across various subsets – small versus large firms, innovative versus non-innovative firms, the more successful versus the less successful firms. The various point estimates all have associated variances, because they are derived from a sample of surveys. In the discussion, we only emphasize those differences that are statistically significant. For lack of space, we do not report the standard errors of the estimates herein. The interested reader may refer to the very extensive background monographs referenced in this book that contain these estimates.

1.3 ORGANIZATION OF THE BOOK

Our objective is to bring together a rich body of survey-based research that is designed to improve our understanding of (1) how small firms develop innovation competencies, and (2) whether the development of these competencies is a major contributor to performance. This latter objective warrants emphasis. Some firms grow more rapidly, are more productive, and are more profitable than others. Throughout the text, we investigate which innovation activities and business strategies are associated with superior performance. This helps us understand how innovation contributes to dynamic entrepreneurship.
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It should be emphasized that we do not try to sort out causal relationships between strategies and success. Innovation when it produces new products often leads to growth. In turn, growth generates cash flow, which is necessary to finance innovation. Thus performance and innovation should be interrelated. It is the objective of this study to delineate the close relationship between the two, rather than to assess the relative strength of the directional effects. We outline the organization of chapters, and review our key findings, below.

Chapter 2: An Overview of the Importance of Entrants

Chapter 2 begins by providing an overview of the magnitude of entry. Each year entrants comprise a significant share of the industry landscape. Between 1984 and 1986, new firms in any one year accounted for 19 per cent of total businesses. Over time, the impact of new firms on an industry’s structure is dramatic. In Canada, 74 per cent of all firms in operation in 1995 came into existence after 1984. The net effect of entry, however, is tempered by the fact that many new businesses fail, often very quickly after entering the marketplace. Only one in five new firms reach their second decade of operation. Industries are in a constant state of turbulence – one shaped by the continual emergence, growth and decline of new firms.

Small firms play an especially important role in the dynamics of entry and exit. Firm turnover has a substantial impact on aggregate productivity. Between 20 to 25 per cent of productivity growth in Canadian manufacturing during the 1970s came from entrants and exits (Baldwin, 1995). Much of this growth, particularly in the small-firm sector, originated from a process of displacement wherein small new firms replace low-productivity incumbents who exit the marketplace.

Chapter 3: A Profile of Entrants

Chapter 3 provides an overview of entrants. It starts by examining the competitive environment faced by entrants. Focusing first on whether entrants are to be found primarily in new or in mature markets, it then explores the type of competitive environment that entrants face. The second part of the chapter develops a profile of the competencies of entrants, noting that most firms stress the importance of management, human resources, and marketing. This is because many small firms rely heavily on producing products that are of high quality, using flexible production systems that can adapt quickly to changes in consumer demand. For this, flexible management is important. So too is a marketing strategy that retains existing customers.

Chapter 3 also explores the strategic factors associated with survival and growth. Among long-run entry survivors, performance differentials emerge.
A critical finding of this study is that growing businesses are much more likely than other firms to bring new products and processes to market. Innovation strategies that support growth are often tailored to the dynamics of the marketplace. In industries where product markets are in an early growth phase, product characteristics evolve rapidly; these are markets in which high-growth small firms capitalize on product development strategies. In more mature markets, production strategies come to the fore, serving to distinguish more successful entrants from other small firms. Innovative small firms also report a more intense mix of competitive pressures – more rapid technological change and product obsolescence – than do other businesses.

Chapter 4: Innovation and Entrants

Because entrants are widely seen as an important source of new products and processes, Chapter 4 examines the scope of innovation activity that is found in the entrant population. It examines the amount and type of innovations produced by successful entrants. The results indicate that surviving entrants develop a wide array of innovation competencies, all of which speak to the propensity for knowledge creation in small firms. New products and processes, advanced technology use, and investments in human capital all contribute to the commercialization of new ideas. Each represents a different strategic emphasis, which illustrates that there is no single path to innovation. Successful new firms often combine these innovation inputs with product, market, and production strategies that emphasize specialization, quality, and flexibility – key elements of competition in the small-firm sector.

Chapter 5: New-firm Survival

The strategic profile of successful entrants developed in Chapter 4 is based on the elite 20% of new firms that reach their second decade of life. For most new businesses, however, life is short and uncertain. In Canada, one-half of all entrants fail before reaching their third anniversary.

Chapter 5 investigates the determinants of failure – by asking whether high post-entry hazard rates are driven by the idiosyncrasies of individual firms, the competitive dynamics that shape industries, or the larger macro-economic climate. While all these influence the probability of survival, changes in firm-specific factors – idiosyncratic characteristics that proxy changes in relative efficiency – have the largest quantitative impact on the hazard rate. New firms that are larger than their ‘average competitor’ (other first-year firms in the same industry) are in a much better position to survive than are entrants with size disadvantages. Size is related to a firm’s functional competencies – whether in terms of management, marketing,
financing, or production. Firms that make greater investments in the development of these competencies are in a better position to compete. Learning-by-doing also plays a role in shaping post-entry performance, as firms become less vulnerable to failure as they acquire market experience. Industry dynamics have less impact on the hazard rate than either an entrant’s size or age characteristics. This said, more competitive industries are more likely to cull new firms. Entrant survival is also procyclical – with higher rates of failure during macroeconomic downturns.

The results of Chapter 5 suggest that the investments that new small firms make in their productive capacity have a major bearing on post-entry performance. As new firms expand their productive capacity, they also expand their set of core competencies. This is not to suggest that new small firms seek to obtain scale economies of the sort enjoyed by large incumbents. Rather, by investing in their productive capacity, new small firms improve their competitive position relative to their main rivals, other small firms. By the time entrants emerge into adolescence, many have acquired a broad set of skills that support the development of innovations. Those who do not do so fail to grow and have much higher exit rates.

Chapter 6: Innovation and Performance in Small and Medium-sized Firms

In Chapter 6, we investigate the relationship between innovation and performance by studying growing small and medium-sized entrants, firms that grew their asset and employment bases over the 1984–88 period. We examine the emphasis that small and medium-sized firms give to developing competencies in a wide range of areas – from management to human resources, marketing, finance, technology acquisition, and research and development. We also compare high-performance and low-performance firms to learn more about which strategies are more closely associated with success.

Success, of course, has many different dimensions – such as growth, profitability and productivity. In Chapter 6, we develop a composite index of success based on changes in market share (which captures a firm’s growth performance relative to its competitors), changes in labour productivity, and a profit-to-sales ratio.

The profile of growing small and medium-sized firms presented in this chapter is not dissimilar to the profile of successful entrants reported in Chapter 4. These are firms that compete against large firms with product offerings that stress quality and flexibility. In small firms, quality management is very important. Human resources receive the second highest priority. By contrast, technology, and research and development fall at the bottom of the list of key competencies.
Nevertheless, the results of this chapter show that firms that place more stress on innovation are more likely to succeed. The development of innovation competencies – as evidenced by the presence of a research and development unit, and substantial expenditures on research relative to sales and investment – all serve to distinguish more successful businesses from less successful businesses, irrespective of industry membership. High-performance firms attach more importance to a wide range of strategic objectives designed to complement investments in innovation, such as (1) accessing new markets; (2) obtaining new technology (either by developing technology, or acquiring and refining existing technology); and (3) improving the efficiency of production. Other more basic business competencies – management, worker skills, product quality, and flexibility – are less powerful predictors of high performance.

These findings underscore the relationship between core business competencies and specialized innovation capabilities: all growing small and medium-sized enterprises share a commitment to developing core business competencies, such as management and financing skills, many of which are absent or underdeveloped in declining firms; however, it is specialized competencies in areas that support innovation (for example, research and development and technology utilization) that differentiate firms in the marketplace, separating the leaders from the pack.

Chapter 7: Characteristics of Bankrupt Firms

Chapter 7 examines in more detail whether certain firm-level competencies (or the absence thereof) are most associated with business failure. We find that it is not the absence of sophisticated business strategies that leads many young firms to fail, but rather skill deficiencies in core areas, specifically those related to management and financing. Over 70 per cent of bankrupts cited problems with general management and financial management as major factors contributing to their bankruptcy. The most significant limitations in the area of general management include lack of knowledge, lack of vision, and the poor use of outside advisors. Common financial problems include undercapitalization and an inability to manage working capital. One-third of all bankrupt firms were also hampered by a lack of resources that would have enabled them to pursue external financing options. This dependence on internal sources of capital was particularly problematic among small firms. But it also was related to deficiencies in the area of financial management.

The results of Chapter 7 underscore the importance of developing a core set of business skills. If new small firms are to reach adolescence, they have to develop a broad array of competencies in core functional areas such as financing, human resources, or marketing. In addition, the results of Chapters
4 and 6 indicate that if they are to grow faster than average, they also need to develop competencies in specialized areas such as research and development and technology to support their innovation strategies.

Nevertheless, the key finding of Chapter 7 is that young small firms that exit the marketplace often lack basic business skills in key functional areas. Many of these limitations, in turn, preclude the development of successful innovation strategies. Firms that lack sound financial and managerial foundations are not in a strong position to develop and exploit new knowledge.

Chapter 8: Innovation Archetypes

While innovation is closely related to success, innovation itself is a complex and varied activity. Innovation strategies can take many different forms. Chapter 8 explores the dominant innovation archetypes within growing small and medium-sized enterprises, and examines how strategic differences within these archetypes are correlated with different aspects of success. To do so, we separate innovative firms into three broad groupings: product innovators, process innovators, and comprehensive innovators (firms who stress both product and process innovation).

Product innovators are firms that place a high value on continually developing and offering new products, with relatively little emphasis on improving their technological capability and production efficiency. Process innovators are at the other extreme— they devote substantial resources to technology adoption and improving their production processes, and less effort to product development. The final group, comprehensive innovators, are businesses that pursue a broad mix of innovation activities. These are firms that emphasize both process technology and product development by drawing on a wide range of sources for innovative ideas (for example, marketing, management, research and development, and patents).

Each innovation group was then divided into more and less successful firms based on our performance index that combines information on productivity, profitability, and market share. This, in turn, reveals which factors are correlated with performance differentials among groups of firms that share common innovation strategies. These differences demonstrate that, within each group (product, process, and comprehensive innovators), the more successful firms are those that place more stress on innovation strategies and competencies, that stress the development of skilled personnel, and that export a large percentage of their sales.

Other strategic differences emerge between more and less successful firms within each innovator group. High-performance product innovators are those that devote more attention to process innovation and human-resources strategies. These firms make less use of debt and stress innovative financing.
High-performance comprehensive innovators (firms that adopt strategies with a broad mixture of product and process characteristics) pursue more radical types of innovation based on research and development capabilities. But these high-performance firms also place more emphasis on a wide range of functional areas – management, marketing, human resources, and financing. Finally, high-performance process innovators are those that attach more priority to longer-term financing, especially from banks.

Comparisons between the three innovator groups show that firms with comprehensive strategies tend to be the most successful, outperforming more specialized product and process innovators in terms of their growth in market share and profitability. Comprehensive innovators are also more compleat firms – in the sense that innovation strategies within these firms receive greater support from a broader array of strategic competencies. Marketing, financing, and management strategies are well developed within these firms, and contribute to their success.

Chapter 9: The Role of Industry Environment

Innovation strategies often reflect the dynamics of the industry environment. In Chapter 8, we use one aspect of this environment, the industry life cycle, to explore differences in innovation patterns. Firms that stress product innovation tend to emerge during the early growth-stage of an industry when product lines are rapidly evolving. Process innovators often come to the fore in more mature markets when product lines have stabilized. In Chapter 6, we noted how relationships between innovation and success vary across industries with different operating environments. In manufacturing, it is R&D that drives success. In service industries, it is an innovation policy organized around human capital or skilled workers. In primary industries, it is an innovation policy organized around the acquisition and application of new technologies.

In Chapter 9, we further develop our exploration of innovation and the industry environment – by focusing on how elements of innovation relate to various characteristics of the marketplace that help determine the intensity of competition in an industry. Our analysis in Chapter 9 examines innovative businesses operating in three major service industries – communications, financial services, and business services. All are examples of dynamic services that share, in varying degrees, an emphasis on advanced technology, an international orientation, and a critical role in supporting the production and distribution activities of other sectors. Two of these industries, communications and business services, are dominated by small firms. Businesses with less than 100 employees comprise 89 per cent and 95 per cent of the populations in these industries.
Our results suggest that innovation strategies in each of these service industries share a set of common characteristics, many of which are typically associated with small firms. Improving product quality, flexibility, and catering to diverse tastes are important aspects of innovation in all three industries. Customers are the most important source of new ideas.

Beyond these characteristics, however, innovation strategies take different forms, in ways that are consistent with, if not direct responses to, differences in competitive environment. Communications firms operate in a marketplace where production technologies evolve rapidly and capital assets have low liquidation values. Innovative firms here rely extensively on the use of advanced technologies and technology acquisition, often by developing networks with suppliers and outside firms. Relatively little emphasis is placed on the development of in-house research and development capabilities. Regulation is regarded as a relatively important impediment to innovation.

Competition in the financial services industry is driven by a different set of competitive pressures. Price, flexibility, and customer service are key factors. Financial services firms often look to their competitors for innovative ideas. Innovation strategies are designed to yield new products that satisfy a diversity of customer wants and that are price-competitive. Firms in financial services place a heavy emphasis on human-resource strategies in order to improve labour productivity and service quality (for example, worker incentives, acquiring skilled labour and training). Innovations are also designed to reduce unit costs, an important objective in a price-competitive marketplace.

Firms in the business services industry face a relatively wide array of competitive pressures compared to those in communications and financial services. Product obsolescence, difficulty in predicting competitor behaviour, and changes in consumer demand are all more significant forms of uncertainty here than elsewhere. In response to a more diverse mix of competitive pressures, business services firms adopt a more diverse and varied mix of innovation strategies. They draw on more sources for innovation ideas and pursue a broader range of objectives. And their innovations have a wider range of impacts – from improving quality, to reducing costs, to increasing reliability. As firms in this industry face a less stringent regulatory regime than their counterparts in communications or financial services, it is not surprising that innovation strategies are more outward looking, driven by the need to expand the customer base into foreign markets. Product standards in this industry are evolving rapidly. Accordingly, firms make substantial investments in developing their research capabilities, and use a more diversified mix of intellectual property rights.
Chapter 10: Innovation and an Industry’s Science Base

Chapter 10 extends our examination of innovation and industry environment by focusing on new firms in two broad groupings of goods and services industries – those with a strong science base and those for which investments in scientific knowledge play less of a role.

Successful new firms in the science-based sector and new firms in other industries share certain market pressures. On average, both face similar numbers of competitors and a comparable amount of competition from startups. However, long-run survivors in science-based industries must deal with more volatile shifts in consumer demand and are dependent on a smaller number of customers. These differences are associated with differences in competitive strategies. New firms in the science-based sector focus more on the frequency of new product introduction, and on product customization in order to minimize customer loss. New firms outside the science-based sector place more emphasis on price competition since it has such an immediate effect on the tendency of customers to switch from one supplier to another.

Differences in competitive environment between science and non-science industries help to explain differences in innovation profiles. New firms in science-based industries are more likely to innovate. They are particularly more likely to introduce product innovations. Rapid technological change is a defining feature of science-based environments. Differences in the rate of product innovation are reflected in differences in the emphasis that is given to R&D and new technology. Entrants in science-based industries make more use of the patent system. Successful entrants in science-based industries also pursue more aggressive marketing strategies to reach their customers. They target both new domestic and new foreign markets more than do firms in other industries. To alleviate their dependence on a small customer base, firms in science-based industries turn more to export strategies. These firms also place more emphasis on inter-firm networks that bring together customers and suppliers.

In Chapters 6 and 8, we demonstrated that small- and medium-sized innovative firms place greater stress on developing their competencies in a wide range of areas, relative to non-innovative firms. The findings of Chapter 10 indicate this result is true for successful entrants as well. New firms in science-based industries differ from their counterparts in other industries across a large number of dimensions. New firms in science-based industries place greater emphasis on enhancing their competencies in the areas of technology, human resources, production, and marketing. Differences in human resources are particularly striking. Innovation and R&D – more common in science-based industries – require superior skills when it comes to acquiring new technologies, retraining the firm’s workforce in order to produce new products, and marketing these products.
The financial structure of new firms also differs substantially between the two groups. Equity capital – in the form of either retained earnings or share capital – is more important in the science-based sector. Conversely, long-term secured loans account for a larger proportion of total capital in other industries. Not surprisingly, then, retained profits and funding from owner managers are more important in the science-based sector, whereas banks are a more important source of capital in other industries.

Firms in science industries face different conditions on external financing, suggesting that these firms are more difficult to monitor. In science industries, the conditions attached to financing are more likely to be related to operating conditions than to simple financial operating ratios. This suggests that standard financial ratios are more difficult to interpret in the science sector, where more emphasis is placed on soft intangible assets in knowledge.

The existence of financing difficulties in the science sector accords with the greater reliance of new firms on internal sources of financing when it comes to supporting investments in innovation. Science-based firms are not only more likely to require financing for soft assets, they are also more likely to raise funds for these purposes from retained earnings. This means that there is a close connection between success and profitability in science-based industries. Internal sources of funds are more critical to key expenditures on research and development, technology acquisition, and training – investments that lead to higher growth in science-based industries than elsewhere.

It is also the case in science-based industries possessing assets that provide good collateral, such as machinery and buildings, that new firms are more likely to be financed out of retained earnings and less likely to be financed out of loans. Differences in the frequency of loans for hard assets provide more evidence of potential financing problems in science-based industries. Firms in science-based industries are less likely to use long-term secured loans for R&D, technology acquisition, market development, and training – and they are also less likely to use these sources for machinery and equipment purchases. Thus, new firms in science-based industries not only have to rely more on internal funds to finance soft assets, but they appear to encounter difficulties even in areas where there should be more ‘hard’ collateral – perhaps because the overall risk experienced by firms in science industries is higher than elsewhere.

Chapter 11: Strategy Differences Between Small and Large Producers

Innovative firms are not those that serendipitously stumble across inventions. Innovators differ from non-innovators in that they adopt a purposive stance to find new products and to adopt new processes. Innovators develop special
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competencies in many of the functional areas examined – markets and products, production processes, innovation, and human resources.

In previous chapters, we focus on populations comprised either exclusively or disproportionately of small firms: growing small and medium-sized firms, long-run survivors, innovative service firms, and business bankruptcies. While our analysis has compared different types of small firms across different types of industries, we have not yet made any systematic comparisons between small firms and their larger counterparts.

We do so in Chapter 11 by examining the results of the 1993 Survey of Innovation. This is done in order to ascertain whether the small-firm profiles developed from the Survey of Operating and Financing Practices and the Survey of Growth Companies are consistent with another data source – since replicability is essential to verification. But we are also interested in knowing whether the strategic profiles that we have reported earlier apply equally to the larger-firm population. We are interested in answering two questions. First, is there a field of study for small firms that is distinctly different from that for larger firms? Second, is there something about the evolution of small firms that makes the development of certain competencies more critical to this stage of firm development?

Firm-size differentials often embody concomitant differences in a host of strategic factors and firm-specific competencies. Large firms possess these competencies, not by virtue of the fact that they are large, but because they have adopted strategies that have allowed them to become large. This chapter focuses on the manufacturing sector – industries where scale requirements have traditionally conferred a competitive advantage. We explore how firm size relates to the development of functional competencies, and ask whether innovative firms have a different strategic profile than non-innovative firms.

The results of this chapter corroborate our findings from Chapters 6 and 8 that innovative firms also place greater emphasis on a broad range of strategies than do non-innovative firms. Not surprisingly, innovators also place greater weight on innovation-related strategies – R&D, technology, production processes, and aggressive marketing of new products in new markets. In addition to actively developing new products and penetrating new markets, they are more active in developing and refining technology. But the differences extend beyond just scientific capabilities. Innovative firms in the Canadian manufacturing sector are more aggressive in seeking out highly skilled workers. The greatest impediment to innovation that is perceived by firms in the manufacturing sector is a shortage of skills. In response, innovators are more likely to emphasize skill development within their firms.

All of this indicates that innovative firms must master a set of complementary skills. While their competitive advantage lies in innovation-related
areas such as spending on R&D, they also attach more importance to other strategic areas, such as marketing, human resources, and finance, than do non-innovators. Innovators then develop a balanced approach that makes them a compleat firm.

While innovators in general develop a wide range of skills, the type of special emphasis that differentiates innovators from non-innovators is not the same in small and large firms. There are substantial differences between small innovators and non-innovators in terms of the importance that they attach to a wide range of functional areas – from human resources, to marketing, to financial competencies. On the other hand, there are fewer differences in the large-firm segment between innovators and non-innovators.

Why are there differences in the small- and large-firm population? Innovation in the small-firm segment is associated with growth. It is here that the natural selection process is acting in an intense fashion. And it is here that critical differences in capabilities are more closely related with the growth process.

The difference in the gap between innovators and non-innovators across size classes is probably related to differences in the life phase characterizing firms in each group. Large firms have emerged from the vicissitudes of infancy, and by doing so have developed competencies in a number of areas. Small firms are still learning to master many of the skills that are required for growth to large-firm status. As Chapters 6 and 8 show, small firms who are innovative are more likely to grow. But to do so also requires that capabilities in a wide range of functional areas be developed. Large firms have already grown and have, for the main part, developed many of these capabilities. The key factors behind the success and failure of large innovating firms is their capability to organize the processes linking technologies, products, their production, and their markets (Pavitt, 1998).

Chapter 12: Financing Investments in Knowledge

Chapter 12 investigates the financial structure of small firms. It uses data derived both from the GSME survey and the survey of entrants. Its first purpose is to provide an overview of small-firm balance sheets. It finds that small firms rely much more on equity than do large firms. Moreover, small firms are more likely to use fewer types of funding than large businesses.

Its second purpose is to evaluate how the financial structure of smaller firms varies across different risk categories. To do so, it examines the relationship between financing and knowledge creation, by focusing on successful entrants – new small firms that have survived their first decade of operation. These are firms that have had time ‘to grow and adapt’ their financial structures, that is, to select the optimal combination of financial instruments and
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sources that, subject to preferences and costs, allow the firm to best pursue its business objectives.

Issues of small-firm financing garner considerable discussion. Small firms are often said to suffer from ‘deficient’ financial structures in that they do not have access to the range of financing options that are readily available to large firms. New small firms in high-technology industries are said to face credit rationing in traditional debt markets, which in turn has fuelled the growth of specialized financial intermediaries.

In Chapter 12, we investigate how the financial structure of successful entrants varies with basic differences in knowledge intensity. Investments in knowledge are measured in two ways – first, by focusing on differences in the knowledge base across individual industries, and second, by examining investments in knowledge creation at the level of the firm. Innovation – the successful commercialization of new knowledge – is inherently risky. Successful new products and technologies may yield high payoffs for owners, workers and investors; unsuccessful innovations, particularly if they involved substantial investments in research and development and technology, may entail equally high losses. This chapter examines whether variations in financial structure are strongly correlated with underlying differences in the firm’s exposure to risk.

Our results indicate that firms that are more innovative tend to rely more on equity, particularly retained earnings, than firms that are less innovative. The differences are particularly marked across industries. In fact, firms in high-knowledge industries differ from those in low-knowledge industries considerably more than do innovative and non-innovative firms within a common industry environment. Firms also are more likely to use more equity in industries that are riskier. The knowledge characteristics of the industry are strongly correlated with firm-level differences in financial structure.

Nevertheless, we do find that firms that spend proportionately more on R&D are more likely to rely on equity in their capital structure. Equally important, there is evidence of a reverse causality from financial structure to innovation activity. Firms that rely more on debt than other firms are less likely to conduct R&D.

1.4 CONCLUDING REMARKS

This volume investigates innovation and performance in small firms – by exploring relationships between strategies, activities, and outcomes. We conclude our introductory remarks by drawing attention to several key findings.

First, new small firms play an important role in shaping the evolution of the industrial landscape. Over time, the turnover within industry populations
generated via successive entry cohorts is dramatic. Industries exist in a con-
stant state of competitive turbulence – one that is shaped by the emergence,
growth and decline of small firms.

Second, new small firms face high rates of infant mortality. The size
advantages that some young firms develop over others are strongly correlated
with success, and mirror the development of a whole host of firm-specific
competencies. Small firms that fail do so because they lack basic business
skills – notably in areas related to management and financing.

Third, successful small firms – those that survive and grow – pursue a wide
array of innovation strategies, and often develop a supporting network of
complementary business skills. There is no single archetype that adequa-
ately summarizes innovation in small firms. Research, technology adoption, human-
resource skills, marketing, financing, and management all contribute, in varying
degrees, to growth and performance.

Fourth, innovation strategies are often tailored to the specifics of an indus-
try’s environment. An industry’s science base affects the nature and intensity
of a firm’s investments in knowledge, as do differences in the competitive
pressures that small young firms face.

Fifth, more innovation typically is associated with the more successful
firms. High-performance firms are often those that make significant invest-
ments in knowledge; what is more, they are often compleat firms – they take
on many activities and excel in many strategic areas. Success is borne out of
activity, not just random chance.

ENDNOTE

1. Of the five surveys, the Survey on the Characteristics of Bankrupt Firms was the most
difficult to conduct, as it involved locating the owners after their firms had gone bankrupt.
The response rate to this survey was 50 per cent, which is still high by the standards of
most business surveys. It should be stressed that the mean responses to the survey had
stabilized prior to achieving the 50 per cent response rate – which gives credibility to the
final estimates reported herein.