

Chapter 74

What Influences the Growth of Canadian Biotechnology Firms?

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ABSTRACT

This chapter examines the influence of firm characteristics on the growth of all Canadian biotechnology firms. Data collected by Statistics Canada from four Biotechnology Uses and Development Surveys (1999, 2001, 2003 and 2005) characterise the size, origin, contracts, IP, collaboration, financing, product development stage, tax credits of Canadian biotechnology firms, while employment data from the Business Register of the organisation provides the size of firms beyond 2005. Results show the importance of collaboration for exploration (knowledge) purposes, the importance of alliances for exploitation (commercialization) purposes for firms with rapid growth. Furthermore, a good product development process that brings products through regulation towards commercialization has a positive impact on firm growth and so does R&D expenses.

INTRODUCTION

The Organisation for Economic Co-operation and Development (OECD) conducted a workshop in January 2009 on the biotech industry. The organization highlighted the crucial role of biotech in domains such as human health, food processing, environment, textile and energy. The OECD (2009) also suggested that after the recent crisis, economic growth will be supported by ‘green growth’ and more specifically by green innovation, where biotech should have a significant impact via techniques and products. Biotechnology is a relatively recent technology, and as such there remain some uncertainties about how firms grow and what attributes influence the growth of firms. If biotech is to play the role foreseen by the OECD, it is imperative to understand how these firms grow to ensure their future impact on the economy.

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Different studies on growth in the Canadian biotech industry have generally focused on startups (Baum, Calabrese & Silverman, 2000), on dedicated biotech firms (DBFs) (Baum, Brian & Silverman, 2004) or on firms experiencing rapid growth or gazelles (Niosi, 2003). For instance, Niosi (2003) showed the importance of exportations to extend the market and increase the returns for Canadian biotechnology gazelles. The author also highlighted the importance of venture capital for its financial and managerial contributions. Baum, Calabrese and Silverman (2000) found that collaboration plays a crucial role in the growth of DBFs in Canada by allowing knowledge transfer between firms.

The OECD defines biotechnology as “The application of science and technology to living organisms, as well as parts, products and models thereof, to alter living or non-living materials for the production of knowledge, goods and services” (OECD, 2005, p. 8). The complexity of knowledge and the need for regulation, due to its impact on the living, makes biotech firms different. Hence, economic concepts generally accepted for other industries need to be validated for biotech.

Using traditional growth models, this chapter studies the influence of firm characteristics on the growth of small and medium Canadian biotechnology firms during the period of 1999 to 2005 and their growth in the short, medium and medium-long terms. An analysis of firms with rapid growth is also included to differentiate their growth factors from those of other firms, if differences exist. Characteristics such as their collaborative behaviour, research and development (R&D) expenditures, intellectual property (IP) protection, products development process, human resources and financial aspects are examined. Different types of collaboration, exploration and exploitation (Rothaermel & Deeds, 2004), are analyzed in addition to the influence of the stage of product development on growth. Finally, the chapter also examines the impact of many of the funding sources that are involved in the different phases of the development of the firms, including venture capital.

The growth factors used in this study are based on the responses to the four Biotechnology Uses and Development Surveys (BUDS) of Statistics Canada that were linked to one another to build a quasi-longitudinal database. This unique database was merged with the Business Register to measure the employment growth of firms beyond 2005. These four surveys have never been used in a longitudinal analysis.

The remainder of the chapter is organized as follows: the second section presents the theoretical framework for the study, then the third section describes the methodology used, followed by the fourth section that analyses the regression results, and finally the fifth section concludes.

Theoretical Framework

As mentioned in the introduction, a number of characteristics affect the growth of an enterprise. The paragraphs that follow present the various attributes found in the literature that most likely influence firm growth. Four families of indicators are presented in turn: collaboration; innovation and R&D; management, human resources and strategies; funding support and exportation.

Collaboration

Collaboration has long been studied as a performance factor, particularly in the biotech industry. As suggested by Powell (1996), when knowledge is both complex and expensive, as it is in biotechnology, and expertise sources are dispersed, innovation is generated in learning networks rather than within firms. Powell (1999) also demonstrated the importance of R&D alliances and the centrality of the firm in the

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