

Canada's Regional Innovation Systems: The Science-based Industries

Jorge Niosi

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Encouraging innovation in order to promote the growth of productivity and higher real incomes continues to be a centrepiece of economic policy in Canada. Canada's relatively poor performance in innovation and productivity growth compared to the United States remains a vexing problem in the minds of Canadian policymakers and academics. Notwithstanding much study of the issue, as well as policy initiatives designed to address the innovation and productivity gaps, it seems fair to say that we know much less than we should about the causes of and remedies for those gaps. In this respect, Jorge Niosi adds valuable information about how innovation activity has evolved over time in Canada. In particular, Niosi provides detailed discussions of the emergence and evolution in Canada of what has been called regional innovation systems (RIS). In the course of the discussions, he also offers some valuable policy insights with respect to promoting the growth of RIS.

The book consists of eight chapters. The first chapter identifies the salient attributes of RIS, the factors potentially contributing to their emergence and sustainability and research agenda to address what Niosi perceives as important gaps in the literature. RIS are defined as sets of institutions and flows of services that occur within a region. Potentially relevant institutions include innovating firms, research universities, government laboratories and venture capital firms. Relevant services flow from stocks of knowledge workers, and physical and social infrastructure. All of these characteristics of RIS have been discussed in the expansive literature on industrial clusters. Niosi emphasizes a useful conceptual distinction between production clusters and innovation clusters, although it is unclear how important the distinction is in practice. He also emphasizes the ubiquity of RIS in developed economies and the importance of understanding the RIS phenomenon as a complex and evolving economic system.

In Chapter 2, Niosi discusses alternative approaches to identifying RIS, as well as the procedure that he follows. Essentially, the procedure adopted is eclectic and pragmatic. Different available indicators bearing upon the geographical distribution of innovative activity are utilized, including the geographical distribution of leading firms, R&D labs, patents and production. Each indicator is, at best, a partial and imperfect measure of innovation activity; however, when considered as a whole, one obtains a reasonably reliable picture of the degree to which innovation activity is concentrated in Canada. The industries forming the set of case studies are identified in chapter 2. They are the aerospace, pharmaceuticals, telecommunications equipment, semiconductor and software industries. These industries were presumably chosen because they are conventionally considered to be technology-intensive, and they are also the recipients of much of the public financing of research and development in Canada; however, it would have been interesting if the author had also included one or two industries that are not conventionally identified as technology intensive, but yet where innovation is an important feature of competition and that are important sources of employment in Canada. The auto, forest products and metal fabricating industries come to mind. Is the evolution of RIS in these mainstay industries similar to that of technology-intensive industries? Insight into this issue has obvious and important potential relevance for policymakers.

Chapters 3 through 7 contain the individual industry case studies. While some recurring, and it must be said, unsurprising characteristics are observed across the different industries, there are also some salient differences. Perhaps the most anticipated finding is the concentration of innovation activity in specific metropolitan areas of Ontario and Quebec, notably Toronto, Ottawa and Montreal. Niosi highlights the fact that innovation activity does not extend much beyond the boundaries of each census

metropolitan area (CMA), unlike the pattern for the United States where, in cases such as electronics and biotechnology, clusters of innovation activity can be found in suburban locations outside of major cities along the US east and west coasts. In fact, it might be argued that technology clusters in Canada are even more geographically concentrated than Niosi suggests. Some work that I have done with Professors Daniel Shapiro and Aidan Vining at Simon Fraser University suggests that the concentration of economically successful Canadian IT companies seems to be restricted to two specific postal codes within the Toronto CMA. The extreme geographic concentration of innovation activity in Canada poses a serious challenge to policymakers who, for political and environmental reasons, might prefer to have the employment associated with innovation activity more evenly distributed throughout the country.

A less anticipated observation from the case studies is the apparently limited impact of federal, provincial and municipal government initiatives to influence the evolution of RIS in Canada. In cases where government laboratories and public funding seem to have had significant and durable impacts on innovation activity, they have been complementary to local endowments of resources and human capital. At the same time, there is some evidence of smaller innovation clusters emerging in Vancouver and Calgary associated with the growth of highly educated work forces and, perhaps, other urban amenities in which those two cities are richly endowed, including access to recreation and culture. While underscoring the path dependency that endows established clusters with survival advantages, Niosi asserts that regional governments might aspire to creating successful new RIS by attracting and developing human capital. In this regard, it is somewhat surprising that the book largely ignores the work of Richard Florida and others who provide detailed prescriptions for attracting “creative” workers to urban centres. Are these prescriptions worthy of consideration by metropolitan and regional governments in Canada? Have recent political developments in the United States made Canadian cities more attractive locations for creative migrants from other countries?

An important inference drawn from the case studies is that there is no optimal way of organizing clusters and RIS. Specifically, the role of specific institutions such as universities differs from industry to industry, as does the nature of the institution(s) that serve as the key “incubators” of new technology. This inference is supported by case studies of US industries where, for example, universities have played a critical role as incubators of innovation and supporters of commercial enterprise in biotechnology but not in aerospace. The variation across industries in the importance of specific organizations, as well as in the nature of network dynamics, serves as a strong caution against assuming that specific policies, such as increased public funding of university research, will have beneficial effects on the innovation performances of a wide range of industries. A question for which evidence would have been quite interesting is whether Canadian institutions, such as universities, have been as successful in incubating innovation activity as their US counterparts for specific industries such as biotechnology and, if not, why not.

On the whole, the book enriches our understanding of RIS in Canada and, in the process, serves as an extremely useful and consolidated business history of Canadian high technology industries. It must be remarked, however, that Niosi does not succeed in addressing several of the prominent issues he identifies at the outset as properly belonging on the RIS research agenda. A particularly interesting issue that is not discussed is whether RIS and the firms within are better economic performers in the long run than other regions. Notwithstanding, this book will be a standard reference for students and researchers interested in the organization of innovation activities in Canada.

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