THE NORTH AMERICAN "INNOVATION SPACE": A WORK IN PROGRESS?

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Summary

The article presents the evolution of the North American science and technology 'innovation space' which is under construction within the framework of the North-American Free Trade Agreement (NAFTA) linking Canada, the United States of America and Mexico. The article reviews rapidly the main characteristics of the S&T system of the three countries, and the emerging signs of a more intense collaboration among them. It examines the main aspects of their research collaboration bilaterally as well as in multilateral negotiation arenas. The article comments on possible futures of this emerging regional S&T space.

1. Introduction

At this event several years ago, Richard Lipsey, a noted Canadian economist working with the Canadian Institute for Advanced Research on economic growth and public policy issues, delivered a strong message for the scholars and decision-makers on the importance of innovation to growth. His keynote address was particularly instructive for the research and technology communities. In it he speculated about the model that Mexico might adopt in support of science, technology and innovation. Lipsey argued

that there are two major world views developing; one that has government providing the broad background conditions for innovation, but leaving the market free to generate innovation and diffusion that powers growth; and a second vision, a neo-liberal one, that has governments taking a more active role in the national innovation system (while accepting the importance of free markets).

His talk triggered a lively debate during the week-long summer institute devoted to this emerging policy issue. At this week-long event sponsored by Simon Fraser University in British Colombia, Mexican, Canadian and USA scholars met to discuss the potential ways in which to respond to the challenges of globalization and competitiveness and their interrelationships in the new North American region shaped by the North American Free Trade Agreement (NAFTA).

The issues identified by Lipsey over six years ago remain today and will likely help mould how respective governments in North America support science, technology and innovation in the coming decades. For several reasons described below, efforts to coordinate and integrate this field of activities at a regional level have met, and will continue to meet, with mixed results.

To a considerable extent, the decision-making levers of the three North American governments have become more restricted not only with the NAFTA conventions on subsidies, intellectual property and investment, but also with the evolving rules of the game outlined by the global trading system represented through multilateral institutions such as the OECD and the World Trade Organisation.

How will these issues impact on the so-called 'invisible and global college' of science and knowledge? Certainly the advances in technology and electronic communication have privileged scientists and researchers worldwide, and are assisting in the diffusion of knowledge through the Internet and growing global scholarship.

But there is more in store for the North American region. North American governments, by recognizing that economic growth and development are conditioned by knowledge, have become more assertive in promoting and investing in these knowledge assets. It is no coincidence that the President Clinton/Vice President Gore science policy statement of 1993 is called Science in the National Interest.

In Canada, the Federal Government's 1996 S&T for a New Century argues a similar path with a view to better managing these strategic investments. In Mexico, efforts in building on its five-year plans for national development of S&T, not only focus on capacity-building for science and technology, but also stress the importance of increased competition in the private sector in fostering a stronger receptor capability for S&T.

The cultural specificity of national policies for innovation and research has also been influenced in each country by the respective instruments in place and the view each has with respect to international partnerships. Undoubtedly, the key and unique factor in this arrangement is one where two countries (one developing and another mid-sized) are the spokes of the 'hub' that is the world's only superpower – the USA.

2. The Characteristics of the S&T structure in North America

With its strong emphasis on maintaining global leadership and technological superiority in civilian and defense matters, the US approach continues to rely on the strength of its university research system for new discoveries and commercialization of research, as well as the increasing entrepreneurship and R&D investments of its firms, both global and domestic. In Canada, with long-standing weaknesses in the private sector industrial R&D (partly a result of the significant foreign ownership of its economic base) recent efforts have tended towards improving the university research base and its links to commercial activity (as a proxy for the lack of private sector R&D), including strengthening the skills base in critical technology areas. In Mexico, much attention has been devoted to building the S&T capacity through infrastructure and education and training. Renewed efforts to build bridges between the previously separate public and private research activities are major priorities. The convergence in several of these national initiatives poses new challenges for thinking about a North American innovation agenda. Let us briefly examine the specific characteristics of the S&T institutional structures and support for each country.

2.1 The United States and Technological Leadership

While still the dominant source of the world's pool of R&D, the US has seen its technological and research lead diminish in the 90s as a result of large investments in innovation from other countries. For instance, while the US still produces over one third of all scientific publications, the number of scientific articles from European and Asian countries has increased more rapidly than the number of articles by US authors.

Considerable debate in the US has centered around how to transform a research system that was heavily dominated by defense R&D investments into one that responds to today's globalized, civilian economy. Large increases in health and environmental R&D have been the current trend to keep pace with issues surrounding improved quality of life. Private sector industrial R&D is on the upswing as more and more US-based firms invest heavily in R&D for competitiveness and maintenance of global advantage, especially in information technology and biotechnology. The rise of venture capital to finance much of this new economy has been critical to this knowledge boom.

The major funding agencies such as the National Institutes of Health and the National Science Foundation have seen significant increases in their budgets for basic research over the past decade. The federal laboratory system responsible for defense and civilian research has experienced considerable re-structuring to address the new goals of a post-Cold War, post-Kyoto environment. The university research system and its production of highly-qualified personnel (often touted as the best in the world) has also undergone various reviews as efforts are underway to develop stronger partnerships with the private sector and foreign institutions. The US view of a more global setting within which to develop R&D partnerships is also changing. Debate over how better to use foreign policy to take advantage of the growing opportunities in such areas as environmental technology and health research is also active.

Finally, a great deal of effort is underway in the United States (at both the federal and state levels) to reform and accelerate the school system's use of information technology and to introduce science into the classrooms from K-12. Along with health care, this investment in future citizens and their skills is seen as the major avenue for continued prosperity and global leadership in innovation.

2.2 Canada and its Changing Image as a Knowledge-Based Society

Over the past decade, Canada has engaged in a fairly ambitious (some would say radical) series of ventures to improve its long-standing weaknesses in science and technology. While the country maintains one of the most generous industrial R&D tax credit systems in the world, Canadian private sector performance in industrial R&D still lags most of the G-8. Structurally, because of its highly decentralized nature, the federal and 10 provincial governments often find themselves squabbling over issues of regional innovation, skills and capacity-building (e.g., the country has no Federal Ministry responsible for education with each province responsible for its own educational system).

Despite this, Canada has embarked in a series of institutional initiatives designed to make the country a smart, connected society. The Canada Foundation for Innovation has a mandate to help renew research infrastructure in Canadian universities, colleges and hospitals. Virtual Networks of Centers of Excellence have been established on a competitive basis in 22 areas of research, especially in the life sciences and biomedical research where Canada has a well-established expertise. Cdn$900 million over five years has been set aside to establish 2000 Canada Research Chairs to help retain world-leading academic talent and attract researchers from around the world. In the area of biotechnology, a new organization at arm's length from the government called Genome Canada has been established to help Canada catch up in genomic research.

By 1998, the country's SchoolNet program has succeeded in connecting every public school and library in Canada. Over 140 000 computers and software packages have been delivered to schools through the Computers in the Schools program, with a goal to have every classroom (250 000) with a computer by early 2001. The world's first nation-wide Internet built directly around wave- division multiplexing technology (National Optical Network) is being developed and deployed. A Smart Communities program has led to financing of pilot projects in each province and territory with a goal to have information technology transform community and social development.

Continued efforts are underway as well to examine key areas of the country's innovation system, including the country's role in international S&T; skills in critical industry sectors; science advice for improved decision-making; and an enhanced role for federal government laboratories, including the premier public R&D institution in the country, the National Research Council of Canada.

Long-term issues will continue to be debated on the continued need for Canadian industry to access foreign technology from abroad especially its largest trading partner, the USA. How to grow clusters of research excellence and large technology-based multinational firms in the face of its high foreign ownership are issues that decision-

makers from all sectors will face. Indeed, in 2001, Canada was about to engage in a large-scale national consultation on the future of innovation in the country, with the objective of outlining a strategy for new investments in 2002.

2.3 Establishing Mexico's Place in the Innovation Arena

Faced with a new government (the first non-PRI administration in many decades), it is difficult to predict where Mexico's focus in S&T and innovation will be placed. It is clear that efforts will likely be developed to improve the performance of the industrial sector's R&D capability. After Greece, Mexico has the largest share of publicly funded R&D as a percentage of domestic R&D in the OECD. Much of this focus will take in the small and medium-sized sector which account for 98% of the country's manufacturing sector. Networking and alliances between government and the academic sectors to help stimulate innovation is also a priority area. A Law introduced in 1999 on the promotion of scientific and technological research has been designed to establish guidelines for the government promotion of S&T; earmarking funds for research; enhancing the authority of public research centers; and improving linkages between research and teaching.

The Knowledge and Innovation Programme (with a budget of $US500 million) aims to increase private sector involvement in S&T with a view to increasing investment in innovation; through such mechanisms as joint industry-university projects; support for firms to upgrade their technical capacity; and a technology foresight exercise to identify critical technologies that require further development .

Mexico (through its Council for Science and Technology – CONACYT) continues to support international bilateral cooperation agreements in S&T and sponsors networks of researchers and scholars for studies abroad. In 1998, for example, CONACYT funded 18 000 graduate students pursuing training in Mexico and abroad. CONACYT supports 27 research centers integrated into a system known as SEP-CONACYT, with research distributed throughout the country in such areas as the natural sciences, humanities and social sciences and engineering and technology.

Although the Mexican capacity for S&T and innovation has grown considerably over the past decade, the key areas of weakness in Mexico remain in the production of highly-qualified personnel and the weak connection between the production of knowledge and its application. For this reason, Mexico's international partnerships (especially in the North American arena) and networks will be seen as indispensable inputs to the major national effort underway.

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Biographical Sketch

Paul Dufour is the Ministerial Assistant to Canada's Secretary of State for Science, Research and Development, where he is responsible for providing advice on matters affecting Canada's S &T policy as well as serving as an interface with the scientific and technological community. Prior to this position, he was senior analyst with the Science and Technology Strategy Directorate at Industry Canada where he was responsible for advising the Government on domestic and international S&T matters, especially with regards to implementation of Canada's S&T strategy. He is also international S&T relations' adviser with the Secretariat to the Prime Minister's Advisory Council on Science and Technology. Mr. Dufour is a Senior Fellow of the International Science Policy Foundation and Research Associate with the

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