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The Integration of Innovation Policies: The Case of Canada[1]

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ABSTRACT *Innovation is by definition a complex process, but policies geared towards stimulating innovation have tended to focus too narrowly on the production of new knowledge—on the funding and performance of research and development. Successful innovation is a matter of the identification, application and diffusion of knowledge—of creativity. It is therefore not simply a function of gross investments in science nor is it a function of the new production of knowledge. Innovation becomes more than a matter of 'science policy' and increasingly a matter to be integrated into trade, investment, monetary, industrial, labor, tax and competition policies. Yet this is extremely problematic for governments interested in creating a 'knowledge-based economy'. The integration of innovation into the core* raison d'être *of traditional policy is key.*

Keywords: innovation, organizational learning, innovation strategy, competition, trade.

Introduction

Innovation is by definition a complex process,[2] but policies geared toward stimulating innovation have tended to focus rather narrowly on the production of new knowledge—on the funding and performance of research and development. They have continued to be captured by neo-classical assumptions about supply/demand equilibria, prices, and rational actors. However, as modern evolutionary economists, regional economists and innovation system researchers[3] have increasingly shown, successful innovation is a matter of the identification, application and diffusion of knowledge—of creativity. It is therefore not simply a function of gross investments in science (in the natural science, engineering or medical fields) nor is it a function of the new production of knowledge.[4] Moreover, patterns of innovation differ remarkably across sectors and technologies, say between information and communication technologies (such as telecom and photonics) and biotechnologies (as in biomedical devices and bio pharma). Once these essential observations are embraced by policy makers and government program designers, then innovation can become more than a matter of

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'science policy' and increasingly a matter to be integrated into trade, investment, monetary, industrial, labor, tax and competition policies. Yet this is extremely problematic for governments interested in creating a 'knowledge-based economy'.

Effective policies—now more than ever—are a multi-layered game dealing simultaneously with (1) horizontal governance across agencies, (2) vertical governance through various levels of government (municipal, provincial or state, and national) and, as well as (3) transversal governance [engaging local NGOs and other stakeholders as well as international actors (e.g. the WTO)], must actively promote innovation. To achieve this, the integration of innovation into the core *raison d'être* of traditional economic policy is key.

In Canada, increasing innovation has been an explicit economic policy objective since 1993.[5] The Liberal Party election platform of 1993 focused attention on the need to develop a national innovation system. The Government carried out a Science and Technology Review of all of its activities between 1994 and 1996. At the same time it undertook a budget related to the revamping of public administration and program practices which resulted in clear governance principles of transparency and horizontal coordination (i.e. integration of priorities) across departments. In 2002 the Government of Canada released its Innovation Strategy which focused on skills and on the economy.[6] A commitment by the Government to raise Canada from fifteenth place as a world performer of science and technology to fifth by 2010 was announced in 2001,[7] as was its intent to 'create' 10 new knowledge-intensive clusters across the country. Several new agencies—such as the Canadian Foundation for Innovation and the Canadian Institutes of Health Research—have been created and considerable new dollars have been invested in R&D. Beyond these institutional innovations, the Government has also initiated new program innovations, such as the $100 million Initiative on the New Economy and the $22.6 million Community–University Research Alliances. All of these announcements, budget allocations and initiatives have generated a broad-based sense that Canada is entering the knowledge era. However, for innovation to be effectively integrated—as a national goal—into the core policy machinery through which a knowledge-based economy can be realized, communication and bureaucratic hurdles and histories need to be vaulted. This means that 'innovation thinking'—which might be typified as a conceptual move away from a more neo-classical economic growth theory, or mindset, in which technological change is seen largely as being exogenous to a more evolutionary, or neo-Schumpeterian, view of endogenous growth—needs—to paraphrase C. P. Snow—to permeate traditional corridors of policy.[8] Thus, a nation that is committed to building a knowledge-based economy must not only focus on inputs (as measured by investments) and outputs (as measured by scientometrics) but on processes and changed behaviors.

The purpose of this brief paper, therefore, is to investigate the extent to which the Federal Government of Canada has been able to integrate innovation into more traditional economic policy areas. This primary research question might best be viewed as one of organizational learning. The government has committed to this issue and now it must learn to incorporate innovation into the breadth of its activities. We begin, then, by considering the conceptual issues of organization learning before moving onto two case studies of traditional economic policy areas—competition and trade. We conclude with some modest suggestions for possible roads towards future research and policy action.

Innovation, Change and Organizational Learning

Harvard University's Harvey Brooks used to say that science policy could be described in terms of 'science for policy and policy for science'.[9] In many ways, we could say that innovation policy stands in a similar relationship, as long as it is remembered that policy is a process, not a product. Frederick von Hayek[10] and Michael Polanyi,[11] among others, recognized this focally and noted firmly that policies dealing with economic problems were by definition dealing internally with issues of change. Rapid change can be cultural (dealing with the internal norms, rewards and management practices of the departmental division, for example) as well as environmental (as with the forces of globalization which have brought competition and trade to the fore). This raises the central question of whether (and how) complex organizations such as government institutions can 'learn', that is, can they learn to become *strategically adaptive*?[12]

For policies to change, organizations must change or learn. Much of learning, at the individual and organizational levels is of course tacit, relying on experience, observation, practice and other forms of non-codified and therefore not easily transferred knowledge. Learning takes place at a variety of speeds and intensities, often depending on context. Nelson and Winter[13] discuss this in terms of 'organisational routines'. These routines dictate to a large extent what people do inside of organizations and can prove difficult to break. Dorothy Leonard-Barton[14] refers to core rigidities as core competencies[15] that can result in a firm becoming overly committed to a certain way of operating, making change and progress very difficult. Von Hippel in 1988[16] discussed similar phenomena in terms of 'policy stickiness'. Either way, these routines often determine the innovative capacity of an organization and therefore of its policies and programs.

In developing our view on organizational learning, we will draw from two main sources. The first is Wesley Cohen and Daniel Levinthal's[17] popular work on absorptive capacities.[18] The other work that has been helpful to us, at a more conceptual level, comes from the evolutionary economics literature of David Perkins[19] on organizational adaptation.

Cohen and Levinthal's work attempts to build up a perspective on organizational learning through an investigation into the learning capabilities of the individuals that comprise the organization. In doing so, they walk a delicate line between the learning that takes places inside an individual and that which could be considered organizational learning:

> . . . to understand the sources of a firm's [government's, for our purposes] absorptive capacity, we focus on the structure of communication between the external environment and the organisation, as well as among the sub-units of the organisation, and also on the character and distribution of expertise within the organisation.[20]

An organization may possess many intelligent and knowledgeable individuals, however, if they *can not* or *will not* share this knowledge than the benefit to the firm will be less than optimal. Absorptive capacity is therefore:

> . . . the ability to *evaluate* and *utilise* outside knowledge . . . at the most elemental level, this prior knowledge includes basic skills or even a shared language but may also include knowledge of the most recent scientific or technological developments in a given field.[21]

For individuals within the firm to learn they require some 'prior related knowledge'.[22] This view is supported in Cohen and Levinthal works by studies from psychologists and seems to echo the view of von Hayek and von Mises on the role of patterns and pattern recognition within individuals. They go on to say that 'The prior possession of relevant knowledge and skill is what gives rise to creativity, permitting the sorts of associations and linkages that may have never been considered before'.[23] This is the challenge to Leonard-Barton's comments on success breeding complacency. A firm requires individuals with prior knowledge but these individuals cannot be locked into their thinking but be willing to augment it. Cohen and Levinthal do address this point by saying that exposure to knowledge may not be enough, and that for something to be thoroughly understood and perhaps believed more effort and/or practice is required. Our competition policy case seems to be a good example of this.

Diversity is another key factor for effective organizational learning. James March and Herbert Simon[24] saw innovation as at least partially the result of the diverse knowledge structures that are simultaneously possessed in one mind which allow us to learn and to solve problems.[25] Diversity, or variety, is a central tenant of evolutionary economics which is picked up in the work of David Perkins. He warns against organizational adaptation that does not involve a certain amount of diversity in the set of possible changes available to organizations. In some situations better opportunities are available if the organization adopts practices and solutions never before attempted in this area. There is therefore a mixture required between a shared and common set of knowledge and diversity of approaches and experiences.[26] Cohen and Levinthal acknowledge this along with many of the problems that balancing acts produce.

Organizational learning is not straightforward but rather is extremely nuanced. It is not possible to give an exact roadmap to organizations (in this situation governments) to pursue in these matters. What might work in one organization may not in another is a truism when one considers that all organizations are heterogeneous. That policy makers must react and if possible be proactive to change is also clear. In areas such as innovation, which requires horizontal coordination and buy-in for policy to be effective, organizational learning must be addressed continuously. Complexity, in the form of many people from many different organizations and with many different purposes and backgrounds, requires a deep understanding of these issues if the goal of increasing the innovative activities in Canada is to be reached.

With this in mind we can make a few comments on how organizational learning can be pursued and achieved in policy areas.

First, individual government departments and agencies must have a receptor capacity for outside information. This must be more that just an information gathering function. Consultations with firms, for example, must be used in crafting policy and adjusting program delivery, continuously, not just when major changes are legislated. These consultations must be real and meaningful and not token.[27]

Secondly, and related to this previous point, there must be some prior and related knowledge between the firms which will be the target of these policies and programs and the people creating and delivering the policies and programs. The development of this shared knowledge base must consider that knowledge taken to the level of belief sometimes requires a great deal of effort, especially when the new knowledge is a significant distance from prior knowledge. The challenge, therefore, is for governments to be aware of the changes that take place within

industries almost as they occur. This is undoubtedly extremely difficult and one of the key criticisms of government planning in both capitalist and non-capitalist societies.

Finally, there is the question of the utilization of this knowledge. 'Innovative innovation policies' require policy makers to *do* things differently. Governments must therefore bring changes to bear in timely fashion. They must be responsive to local needs (therefore they need a capacity to act 'bottom up' instead of monolithically, one-policy-fits-all 'top-down'). This is something that is difficult given the multiple constituent bases that they serve and the amount of knowledge that they are required to process as a result. A balance here is also not easy, but it is essential.

The purpose in this section was to sketch a loose conceptual background and *problematique*. In the next section we attempt to articulate our perspective by considering how organizational learning applies to innovation policy (which deals with the generation and use of new knowledge) in general. We will look at how this approach to organizational learning could apply to competition policy (which deals with the domestic governance of markets and monopolies) and trade policy (which deals with the strategic international issues, including exports). We contend that innovation is central and that these policy domains must work in concert (i.e. be integrated) if a government is to realize the creation of a knowledge-based economy.

Organizational Learning through Innovation Policy

Innovation Policy is still often thought of, both by policy makers and by policy analysts, to be simply about supply side science and technology policy. It is reduced to the simple calculus of how much a nation spends on research and development, and comparative advantage is often gauged by such macro-indicators as the GERD/GDP ratio (Gross Expenditure on Research and Development as a percentage of Gross Domestic Product).[28] The 'linear model' of innovation still pervades many analysts' minds. In these types of framework, science will produce new ideas, these will be picked by a firm and infused into a new (or refreshed) product or process. This version is a longer-term model and privileges universities as the creator of new ideas. Alternatively, a practical and more immediate technical problem is identified in the firm that cannot be addressed in-house with the existing core competencies and leads to a outward-bound signal for required new research to be repatriated into the firm and thence pushed to market. This version is shorter term and privileges the firm, though involving the university. The final, more ambiguous version relies on market pull in which consumers 'know' what technological innovations they want. None of these variations echo true with the processes of innovation. Instead of accepting serendipity, creativity, networks, partnerships, value flows, etc., they insist on promoting a highly stylized set of models based on clearly delineated institutions (universities, industry, and government). They promote a fantasy of rational actors and perfect information based on prices.

However, in the real realm of innovation, policy is centrally concerned with stimulating, guiding and monitoring knowledge-based activities within a political jurisdiction, typically a nation or a region. The goals of innovation policy are economic, although they are widely stated in broad welfare terms (e.g. the advancement of knowledge, sustainable development, or social benefits). Its instruments are programs and institutions, as well as ideas. However, as a policy

area, not only is it—like any other policy area—deeply knowledge and information intensive but its subject is itself knowledge. Hence, given the variance of knowledge between the spectrum of explicit and tacit knowledge, knowledge management in innovation policy is by definition a domain that is fraught with ambiguity, uncertainty, judgment, creativity and spontaneity.

Thus meeting the challenges of innovation policy in a dynamic knowledge economy will require substantial advances in our understanding of how our research, technological, innovation and policy systems interact. These systems include knowledge producers (such as laboratories), knowledge users and appliers (such as firms), knowledge regulators (such as food and drug inspection agencies, intellectual property agencies), knowledge diffusers (including such smart infrastructure as information highways), knowledge funders (such as granting agencies), and so on. Elements of the needed general frameworks have begun to emerge over the past decade through the broad view of evolutionary economics and organizational learning. Substantial new attention has also started to emerge on the front of social capital. Most of that progress, however, has been from a rather high level of analysis. But while much of the recent policy research has usefully begun to look at institutions, processes and practices, there continues to reside a residual quest for 'equilibrium' states. Generally missing are approaches that are intrigued by social dynamics that can complement or embrace emerging theories of endogenous growth and technical change, complexity and networks.

Recall, once again our previous statement that policy is a process, not a product. Yet in traditional frameworks, the individual policy maker was seen as a rational actor who needed more and better information to make 'better' decisions. The decision maker was portrayed as a thoughtful, lone individual who could be convinced by evidence and who could make sound judgments based on the merits of 'state-of-the-art' knowledge. Knowledge therefore directly effected decisions, and decisions were policy. Yet, during the early modern work on innovation policy, there was little attention paid to understanding policy learning processes or the manner in which policy organizations produced, assimilated, used or transferred information.

Over time, however, research into innovation policy and knowledge production has grown considerably and has resolutely affirmed that linear models of knowledge production or management are naïve at best. The incorporation of knowledge and learning into prescriptions, as well as assessments, of organizational change and performance have relegated static rational actor models to something of a more realistic position in popular and analytical thought. Besides re-conceptualizing and dynamizing the linear notions of knowledge acquisition and learning by policy organizations, institutional theorists have often tended to portray organizations as being deficient at probing, in a substantive way, the root causes of their policy problems. In Canada, for example, questions of productivity, brain drain, avenues to enter the G-5 in terms of R&D spending and performance, the structure of research advice, targeted R&D versus breadth in spending, the benefits of priority setting versus *laissez faire*, and so on all have a *déja vu* quality in that they are on the front policy burner today for innovation policy and knowledge but they have been there for more than 40 years. Thus innovation policies are sometimes perceived as being limited, as a result of government 'tinkering at the margins', and as being largely reactive, when faced with a problem or crisis.

Such approaches to organizational learning and problem solving thus ensure the recurrence of similar problems in the future since root causes have neither

been identified or squarely addressed. In other words, through such lens, organizations are not seen as being good learners and therefore, by extension, are seen as being poor knowledge managers. The anecdotal reality is that too many policy organizations—including innovation policy organizations—leave knowledge management and the culture of learning as an *ad hoc* endeavor instead of an important and deliberate enterprise. This results in a residual build-up—and possible clash—of rules, policies, routines, traditions, cultural and territorial artifacts that affect (or distort) the decision-making process, the interactions between technological, innovation and policy systems, and ultimately constrain the policy maker. Furthermore, numerous groups within an organization often compete in the production and policy adoption of knowledge agendas, each with their own biases and objectives, and in so doing territorial imperatives can dominate these views and actions to the detriment of policy development.

Thus, as depicted by Chris Argyris,[29] policy organizations have great difficulty in learning and seldom question the underlying basis or the interaction of their own policy problems with other policy groups. Policy organizations have been depicted as lacking in innovative understanding or action and as being resistant to organizational change, implicitly choosing to stress conformity instead of creativity. Indeed, in today's demanding knowledge-based environment, policies and policy organizations are being pressed to be increasingly flexible and responsive. Some have challenged policy organizations to develop more adaptive structures for knowledge management.[30] For policy organizations to learn, they require the requisite skill and incentives to identify and acquire knowledge, to value and store it, to share or transfer it and so on; but policy organizations cannot acquire, digest and utilize all the knowledge that is available. As Rycroft and Kash[31] point out, organizations must become adept at operating as a networked organization, trusting in tacit knowledge, facilitating interchanges with the external environment and other related institutions, and not isolating policy analysts or actors. Self-inspection has been spouted as one tool to correct organizational deficiencies, but organizational retreats and regular 'public consultations'—which are popular with some government agencies—can sometimes be seen by employees and stakeholders alike with suspicion or cynicism, as a way to reinforce polemic. As we stated earlier, consultations must be more than token efforts or for optic purposes.

Argyris defines organizational learning in this context as 'a process of detecting and correcting error'. We would add the need for pro-activity, strategy communication and inclusion of the ranks and would ask at what point in the delivery of a policy (however defined) can 'an error' be either defined or detected. (In other words, benchmarking and evaluation needs to be an integral part of the policy design and development process.) In the day-to-day operation of innovation policy—as policy operatives know—this is far from obvious, but Argyris is right in the sense that policy learning is a process in which an organization continually attempts to become competent in taking action while at the same time reflecting on the action it takes in order to learn. The policy learning process, so enunciated, is thus an iterative process, guided by strategy and vision as well as an awareness of the constituent parts (competing and complementary interests, policies, programs and initiatives), and focused around the management of knowledge which is primed to address and anticipate innovation policy issues.

In Canada, these deeper understandings of the nature and value of innovation have begun to be adopted and embedded into policy. It is now increasingly seen, not as a siloed activity—restricted to the research councils and R&D funding—but

as an integrated policy activity. This policy revelation began to take hold in the release in 1988 of *Technical Change and Economic Growth* (edited by Giovanni Dosi *et al.* and sponsored by the Toronto-based International Federation of Institutes for Advanced Studies—IFIAS) in which the notion of 'innovation systems' was formerly introduced to Canadian civil servants. This followed a 1986 process known as 'ParticipAction', a policy of leveraging funds with matching funds—narrowly applied at the time to the university research councils—which began the process of increasing university–industry collaboration and increasing industry performance of R&D. This resulted in successfully bringing Canada's private sector R&D in line with the OECD and G-7 average. In December 1989, Canada hosted the final meeting of the OECD's Technology–Economy Program which continued to diffuse international emerging research scholarship on innovation amongst the Canadian senior bureaucracy and across Canadian government departments. The language and concepts surrounding innovation system ideas percolated through numerous policy documents, including the Liberal governments election platform,[32] Industry Canada's *Building a More Innovative Economy* (1995). A 1996 cross-government review of programs resulted, in part, in a stipulation that government departments with knowledge intensive programs better coordinate and harmonize their efforts. This was complementary to the 1994–96 exercise known as the 'Science and Technology Review' which set out principles for horizontal policy and program coordination, as well as performance goals. Throughout this period, Industry Canada created SchoolNet, CANARIE and 'the connectivity agenda' which together created networks of researchers, connected every school in Canada, and produced broadband capabilities across the country. The idea of innovation has been embraced and long-standing programs are trying to adapt.

Competition Policy

'Competition Policy' refers to legislation that is designed to protect the consumer against unfair business practices, such as the exploitation by oligopolies and monopolies who could use their substantial market power to curb competition. The purpose of competition policy is to improve the efficiency of the marketplace and to promote competition.[33] In Canada, the body that oversees competition is the Canadian Competition Bureau.

The Competition Bureau oversees four acts of legislation, The Competition Act (which deals with the issues of business conspiracies, trade practices and mergers affecting competition), the Consumer Packaging and Labelling Act (which deals with packaging, labeling, sale, importation and advertising of prepackaged and certain other products), the Textile Labelling Act (which deals exclusively with labeling, sale, importation and advertising of textile articles) and the Precious Metals Marketing Act (which deals with the marketing of articles containing precious metals). Our investigation will focus on issues contained under the Competition Act. The purpose of this Act is to:

> . . . maintain and encourage competition in Canada in order to promote the efficiency and adaptability of the Canadian economy, in order to expand opportunities for Canadian participation in world markets while at the same time recognizing the role of foreign competition in Canada, in order to ensure that small and medium-sized enterprises have an equitable opportunity to participate and provide consumers with competitive prices and product choices.[34]

Perhaps the most remarkable characteristic of the Canadian Competition Bureau is how little those involved in industrial policy hear about the Competition Bureau. This is probably not surprising given that Canada's economy is dominated by small and medium-sized firms and only a few large Canadian firms have dominant positions in international markets. The part of competition policy that tends to get the most attention in the media and in the business world are those provisions that deal with the use of monopoly power by large firms (here we might think of the recent challenges to Microsoft for its use of its dominant position in the software industry). Alternatively, we hear about competition regulating agencies when there are announcements regarding potential mergers between existing large firms. In these situations, the competition authorities are asked to consider whether or not the proposed merger will have detrimental affects on the competitive environment for consumers. Bluntly stated, will the combined firm be in a position to alter price or product offerings in such a way that consumers will have to pay higher prices or accept products that are inferior to previous offerings? In Canada these situations rarely occur and most of our internationally competitive firms have benefited from sizeable government support, both directly and indirectly, aimed at growing domestic firms to an international caliber. Examples here could include a variety of financial assistance for exporting firms (lines of credit and loans, etc.) through the Export Development Corporation, or the funding that is made available to firms through Technology Partnerships Canada (which has supported such firms as Bombardier, Pratt and Whitney Canada and Iogen Corporation).

One sector not previously mentioned that is technology-intensive and which is key to the supporting of innovative firms, and that is dominated by a very small number of players is the financial services sector. This sector includes five of Canada's largest firms: the Royal Bank of Canada, the Bank of Montreal, the Toronto Dominion Bank, Canadian Imperial Bank of Commerce, and ScotiaBank. In the late 1990s, had these firms had their way we would have seen consolidation of the sector resulting in two or possibly three very large financial institutions from these original five.

In 1998, two sets of mergers were proposed and subsequently rejected. The first merger called for the Royal Bank of Canada to merge with the Bank of Montreal and the Toronto Dominion Bank and the Canadian Imperial Bank of Commerce to join together. This case was, however, not handled by regulators at the Competition Bureau but rather it was played out in the political arena and in the domain of public debate. The case went far deeper though than the politics many Canadians believed to define the case and its resolution. The issue was in many ways predestined because of two factors. The first factor is the strict regulatory structures that govern the financial services industries in Canada (and indeed in most industrialized countries). The second factor was the momentum in the international financial services industry towards consolidation and innovations of both a technical and product nature, which brought traditional banks into new foreign markets and new product or services markets. These product markets were new to the banks in two distinct ways. Either they were not previously involved (at all or in any significant way) with these products (insurance, leasing and brokerage services for example) *or* they did not previously exist (think, for example, of online financial services and debit transaction services). These two sets of changes demanded Canadian banks to, especially in the context of growing international competition for Canadian markets, respond and adapt.

The financial services sector of any economy is of strategic importance. Failures in this sector change societies, hence the attentive regulatory environment of this sector in Canada and elsewhere. In contrast to American banking regulations, the Canadian regulatory environment led to the rise of a few large banks with pan-Canadian operations. The Canadian financial services sector is significant in this respect but is also significant as a growth generator as one of Canada's main trading industries. In 1999, 49% of earnings of the six largest Canadian banks came from foreign operations.[35] In an economy that has traditionally relied on the export of raw materials and natural resources, this is an important contribution to the economy. The industry employs over 220,000 Canadians across the country and contributes $5.2 billion (CDN) in federal, provincial and municipal taxes in this same year. Finally, and keeping in mind the foreign composition of revenues, the Canadian financial services sector has been extraordinarily profitable in the past few years with each of the top five banks consistently posting profits in excess of a billion dollars.[36] They have even continued to be profitable through the recent downturn in some Canadian industries, including most notably the telecommunications sector.

This success has not come without criticism. Banking sector profits have been the target of journalistic and non-governmental organizations' criticisms throughout their recent success.[37] It is in this environment that four Canadian banks proposed a pair of mergers. The way in which they proposed these mergers deserves note at this time.

Relations between the banking sector in Canada and the federal government could be characterized as generally cooperative, even if this cooperation was unavoidable on the part of industry. The main regulatory legislation, The Bank Act, involved extensive interaction between the banks and regulators.[38] It was therefore surprising to the government when the banks announced their plans for merger without prior consultation with the cabinet ministers involved in these sorts of matters. In the press this was seen as a mistake on the part of the industry and the eventual rejection of the merger by Paul Martin (the then Minister of Finance and the cabinet minister responsible for the regulation of the financial services sector in Canada) was attributed to this perceived error in political maneuvering. Their approach most likely did not improve their chances of achieving their desired goal of merging, however, this in our estimation, cannot be seen as the end of the story.[39]

We believe that the true reason for the bank mergers being rejected can be traced back to the way senior individuals from both the political and bureaucratic ranks thought about the nature of the banking sector at the time. An example of this way of thinking comes from a statement from a senior executive from the Canadian Bankers Association (CBA), the national industrial association for banks in Canada. Mr Scott Mullin said, 'Canadian governments in particular perpetuated a regulatory system that often treated these privately owned and run institutions as financial utilities, rather than competitive enterprises'.[40] This way of operating stifled the banks' desires to innovate into areas such as automobile leasing.

With respect to competition policy in Canada, it must be remembered that the banks themselves see the Canadian market as a 'small, mature market with limited growth potential'.[41] Even in the United States, analysts have said that:

> Banks clearly see their futures tied to their success in international markets. Banks and other financial institutions no longer compete for deposits and

> other customer assets on a regional basis, but rather nationally and even globally, thanks to the power of ATM networks, sophisticated customer databases, and other forms of technology.[42]

Canadian banks have been aggressively acquiring foreign financial services firms for some time now. The Royal Bank of Canada, for instance, has become one of the five largest offshore private banks in the world through its purchases over the past three years of such firms as Dain Rauscher Wessels of Minnesota in the US for $1.8 billion. The banks' goal in merging was international clout but the government's concern was local, micro-local. The main reason the federal government gave for rejecting the bank mergers was concern for competition in smaller, rural markets across the country. In small rural towns it was thought the reduction in the number of banks in total would lead to a reduction in choices in banking services for customers. It might be interesting to note here that all financial institutions (banks and trust companies) are only responsible for about a third (33.6%) of the sources of financing for all new firms (under 20 years of age) in Canada.[43]

This concern is certainly not without its support. Analysts have questioned investments in 'bricks and mortar' in the form of branches, especially given the small margins that are achieved in traditional personal banking divisions. However, technology and entrepreneurship are working together in innovative ways to limit the potential for problems here. Online banking services, increased competition in the Automated Teller Machine (ATM) business including delivery are providing new options for those customers in more remote parts of the country. Canada's rate of 'connectivity' (or rate of individual connections to the Internet), even in rural areas, is surprising and rising.

Information plays a role here as well. The banks now consider information and the provision of information as a major product and revenue source (brokerage services and retirement planning are two examples here where a service accompanies the sale of a product, in-fact they might not even be selling their own products in the process of informing the consumer). In addition to the aforementioned 'connectivity' gains has been the parallel introduction of low-cost and wide-coverage satellite television content provision which provides consumers with access to financial advice programming and an influx of advertisements by many of the new foreign financial services providers who have recently entered the Canadian market.

What do we take from this then? Indeed, the changes that we have just mentioned were nascent at the time that the mergers were being debated, however the momentum towards them was apparent. Regulated industries such as financial services will always face challenges in quickly adapting to their environment. Our position here is not then to simplistically reduce regulation. What the regulators, both in the bureaucracy and in government need to adopt is an orientation away from traditional competition issues and towards innovation. This orientation is a necessity in an international environment that moves quickly and is closely connected. It could be said that Schumpeter's gales of creative destruction need to be respected and managed, now more than ever.

We believe that there are some stylized facts which may indicate that Bill C-8, the Financial Services Reform Bill, introduced this year in Canada is the result of organizational learning with respect to innovation on the part of the leaders of both the political and bureaucratic arenas. These reforms go far to meet the

demands by industry to loosen regulation so as to permit a number of innovations to incur. In competition areas, Bill C-8 has provided a merger review process, which makes bank mergers a much more possible event in the near future. Secondly, foreign banks can now enter and compete more extensively than before.

Behind these adjustments, which provide for a better environment for firms within this industry to introduce new innovations, has been a number of key changes of personnel. At the political level, John McCallum the former Chief Economist of one of the 'Big Six' banks was elected as a Liberal Member of Parliament, introducing a knowledgeable force to the caucus. In the bureaucracy, the Department of Finance saw a new Deputy Minister appointed who came from the same post at Industry Canada where innovation thinking had permeated for some time and resulted in a number of innovation-oriented program initiatives. Following this appointment, other senior individuals who understood innovation were attracted to Finance. In addition, the new Minister for Finance and Deputy Prime Minister was shifted from Industry Canada and the Department of Foreign Affairs where he had a solid understanding and working relationship with Paul Martin, who—at the time of writing—will likely be the next Prime Minister. If so, he carries a strong commitment to innovation and to Canada in the World. All of these additions provide at least circumstantial evidence that the knowledge of the banking sector and of innovation thinking was able to penetrate the Department of Finance and resulted in policy which better addresses these concerns. Innovation is thus being integrated into Competition Policy, albeit more obliquely.

Trade Policy

Current events have made us refocus our attention on trade policy. Talk of 'Borderless Worlds' and the 'End of the Nation State', may not be as acceptable as they were not so long ago. Our officials are being asked to do more. In our estimation, we either need to add innovation to that list or enlist external sources so as to internationalize our efforts to promote innovation as a national priority.

Since the work of Dosi *et al.*,[44] academics and policy makers have been interested in National Systems of Innovation.[45] This important body of literature has called attention to the linkages between such institutions as universities and government laboratories to business and the role of these linkages in promoting economic growth, especially in advanced-technology sectors. Strategic alliances as well as forms of cooperative competition have also shown not only the importance of knowledge but also the difficulty in acquiring let alone creating knowledge.

Lewis Branscomb has contributed to the debate on innovation systems by questioning whether or not there really are 'national' systems of innovation.[46] He has said that there are systems of innovation that relate to industries, technologies and regions and that in most cases innovation systems are global. We would support his view on innovation systems and believe that government policy should embrace the reality of global innovation systems.

Internationally competitive firms such as Nortel Networks of Canada have research and development operations in many countries around the world.[47] Diversity in knowledge creation, the goal of R&D efforts, is held to be important, supporting the position of Cohen and Levinthal identified earlier. This view has led Nortel to establish the Wollongong Labs on the campus of the University of Wollongong in Australia and the Harlow Labs in Essex in the United Kingdom.

So, what can we draw from these last two points about innovation systems and

Nortel's international distribution of R&D activities for Trade Policy? To start we would like to say that international trade is no longer only concerned with trade in tangible goods or even in intangible services but also must acknowledge the trade in information, which individuals can use as commercially useful knowledge. Those who attempt to measure trade have been bothered for some time by how they can accurately determine the value of a writable computer diskette that crosses an international border. They could count the diskette at its cost, about $1.95 CDN. If this diskette contains the results of a business consultancy's multi-year, multi-country analysis of a firm's operations then the total cost of the diskette to the importer may be significantly more than the $1.95. Of course we could then speak of an e-mail transmission and ponder how you even know if it has crossed a border at all, further complicating the situation.

There are ways around this of course, and with some work it may be possible to determine the value of international trade between two nations with respect to at least the services of a business consultancy. Now consider when the information contained is not paid for in the form of a purchase of a particular service but instead is the result of a collaborative research program or a reciprocal exchange agreement. Intra-firm transmission of knowledge could be grouped in here to give the argument a certain maturity. For the country, these exchanges are extremely important. The growth of advanced technology industries and their contributions to the growth of domestic economies warrants this type of activity to be considered as part of trade policy and as part of the trade agenda of a country.

In 1998, the Program of Research on Innovation Management and Economy (PRIME) at the University of Ottawa conducted research for the National Research Council of Canada on the role and effectiveness of Science and Technology Counselors of various countries in Canada and in a secondary fashion the role of Canada's Counselor system.[48] Through this research, it became apparent that the objectives of the Science and Technology Counselors were not influenced by innovation systems thinking nor were they actively engaged in the promotion of the connections between firms, universities and other institutions that constitute innovation systems. The situation has not changed.

As was said then:

> Since the post-war period, for example, the counsellors who were posted in London and Washington and who reported to the National Research Council, were principally charged with military, security or strategic intelligence matters. Throughout the 1960's and into the mid-1970's their focus became scientific with a diplomatic/cultural twist. From that point on, when responsibility for the posts had been transferred to the Ministry of State for Science and Technology, and then (in the mid-1980's) the Department of Foreign Affairs [which is now the Department of Foreign Affairs and International Trade], the tasking of the positions began to become burdened, diffused, disconnected from the interests of the science-based departments and agencies, and remote to the mainstream foreign and economic policy.

Without going into detail about the history of the objectives of different Canadian departments and agencies (some of which no longer exist) we will say that these different bodies brought with them different objectives and different mandates. It is perhaps not surprising then that the individuals are a bit unclear as to their objectives now. It would be understandable if the diplomatic core as a

whole was a bit unclear as to what they are to be doing, without even mentioning the present situation with regards to national security. We are not aware of the situation changing in the intervening few years since we first conducted this research. In this case, innovation is not being integrated into the trade agenda.

Some Recommendations and Future Work

We will start with a very common recommendation on the part of policy analysts and scholars with a call for more research. We do this though with suggestions for improving the situation in the shorter term. We see a need for future research because our present paper has only addressed two situations that we are aware of and the integration of innovation policies requires a larger investigation into more areas where governments need to or would be useful to change. As the Department of Finance indicated to us personally, 'Innovation is a horizontal policy objective . . . similar to the environment and security'. Penetration of these ideas will take time to investigate as well.

It is not without hesitation that we suggest a major national review of government policies with respect to innovation. The questionable success of such activities as the Science and Technology Review, performed in the mid-1990s in Canada seems to support this concern. The environment that exists now, with momentum towards innovation policies from the political level, may make the results of such a review more effective.

The case of the bank mergers is interesting because it seems to be a success story. The policies are being changed to allow innovations to happen. Of course, this has had costs associated with the time it took the policy makers to change their positions. Indeed, the decisions a few years ago definitely affected the paths that the different banks have pursued in the interim and into the future. Recently, the present Canadian Finance Minister John Manley has come to say that the major Canadian banks will not be permitted to merge with each other until at least 2004.[49] If the changes that took place with respect to these policies were the result of personnel changes mentioned above, then our position is that much more supported and the outlook for other areas that much more grim. Knowledgeable individuals in innovation thinking or with respect to an industry let alone in both are few. It would seem difficult to replicate this situation with much frequency. The existing individuals inside of the policy arena need to improve their positions as well.

This brings us to our second case involving trade policy. In this case, no changes have yet been made nor does it seem like there is much attention currently being paid to this issue. We don't see this changing in the near future. This does not prevent us from making a few other recommendations for the immediate and near future.

For our second recommendation, we believe that it would be helpful to train the network of Science and Technology Counselors, or to outsource this function in developing international innovation networks. We have suggested in previous work[50] that it may be more cost efficient to do this in an outsourcing fashion, however we will proceed as if the government has decided to do this internally. Our suggestions would be the same but the language would change slightly to reflect this arrangement. In either case the total amount of effort towards this initiative would need to increase dramatically either through new internal hiring or with a substantial outside effort.

Training of science and technology counselors could be achieved in part through a series of innovation workshops specifically designed to meet the needs set out above. This workshop would involve individuals from the private sector and from federal government laboratories (i.e. The National Research Council of Canada, The Communications Research Centre of Canada, etc.). The workshops would train individuals in innovation theory and provide them with empirical results regarding innovation. Later sessions would encourage participants to develop their own strategies and action plans for encouraging linkages between countries in these areas. Additional workshops could focus on disseminating experiences and strategies and refining their approaches. This could be achieved at a relatively low cost (in light of the funds being directed to innovation policies in Canada of late) and offer great potential for future growth. Workshops could be useful for training other groups within government, and additional research of the nature performed here may be useful. We could even think of penetration into the Competition Bureau of Canada here as soon to be published empirical research with respect to innovation and firm size may provide for interesting contemplation by this agency.[51]

We would warn against the development of any national strategies for directing these individuals' attentions and efforts. We are skeptical that a national strategy could be formulated even given an extended period of time to develop one. We believe that innovation systems are distributed in nature and that they are prone to change. Efforts to develop a national strategy may therefore be dated before they ever could be implemented. The objective is to create a flexible system that responds to the clients that it seeks to promote; Canadian firms. This leads us to our second recommendation.

Our third recommendation is to attempt to develop personal linkages in networks between the science and technology counselors and Canadian industry and government laboratories. The value of networks is increasingly being understood[52] and this would seem to be an innovation network of great potential. This could also be achieved through workshop type settings but other mechanisms are available. One possibility is linking the industrial representatives of Industry Canada with this network of science and technology counselors in order to share information. Links to industry associations in Canada such as the Canadian Advanced Technology Alliance (CATA) may also be fruitful.

Conclusion

In this paper we have laid out—both conceptually and by example—a program of research into the integration of innovation thinking into traditional economic policy areas. Innovation and innovation policy is a complex process. Success must be treated through coordinated horizontal policy initiatives. Efforts to stimulate one part of the innovative process (i.e. idea generation through granting organizations or through tax credits for research and development) alone will not produce the innovative knowledge-based economy that industrialized nations are presently seeking to develop. Policy makers must embrace the entire process of innovation for economic growth and socio-environmental security, and they must not only create new policies but review existing programs and efforts that might be inadvertently constraining the innovative potential of firms and institutions.

We here suggest that the perspectives being developed with respect to organizational learning may be the most appropriate to use for this research

program. Organization learning is a dynamic concept that allows us not only to study outcomes but the process by which outcomes are reached. Innovation is itself a process and it is one that is greatly affected by change (both internal to the innovating organization and from the external environment). In this dynamic environment we might well want on focus our attention not on our ability to plan and execute but on our ability to learn continuously so that we may adapt our approaches as required. Lessons here may apply to other knowledge intensive small and medium-sized economies.

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37. It is perhaps not surprising given the historical treatment of money lending individuals and organizations. The success of many Canadian high-technology companies during the same time period, for example, has been applauded loudly in the press and in the public.
38. The Bank Act is a piece of legislation that is frequently revised and is the result of near continuous discussion between industry and government in the time separating the successive versions of the legislation.
39. The political explanation for the failure of the bank mergers is both too easy and negligent to a number of factors surrounding this issue. Mr Martin's record as Finance Minister is widely regarded as stellar and was almost completely devoid of any charges of overt political

maneuvering or posturing such as those suggested in this explanation of the rejected mergers. Mr Martin is a former industrialist and a minister who interacted well with his advisors from the bureaucracy. That Mr Martin rejected the mergers out of ego is far too weak an explanation and without any apparent substantiation from history or from this case.

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