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System: Is Small Beautiful?

Introduction:

Beginning in 2005, with the formation of the Ministry of Research and Innovation (MRI), the Ontario government set about implementing a policy framework intended to make the Ontario economy more innovative. A preliminary study of the Ontario Innovation Agenda and the actions of the MRI suggests that it has been more successful than earlier government attempts along such lines, such as the federal project led by Industry Canada in the mid- to late-1990s. This isn't surprising, insofar as both political conditions and innovation systems theory suggest that such projects are more viable at a regional scale. This paper argues, however, that a closer examination of the project suggests that there are substantial difficulties involved in determining precisely what impact the Agenda and the Ministry have had. The successes claimed by the MRI are based not on a full understanding of the impact of their ambitious project, but rather on a deliberately restricted and unproblematic set of criteria. Evaluating the implementation of an innovation strategy as a transformative project requires the development of a different set of analytical tools, and a closer examination of not only what the Ministry funds (and to what extent), but how government funds are spent, and the real impacts expenditures produce.

Part 1: A brief history of the federal innovation strategy.

From 1993 to 2003, particularly during the period in which John Manley was Minister of Industry, the Liberal government of Jean Chretien pursued a consistent industrial strategy focussed on the idea of transformation in the Canadian economy. The strategy was characterised by two key features. First, it was organised around emerging ideas on innovation and the possibility of developing a federally organised, Industry-coordinated national innovation system. Second, its range of implementation tools accepted the limitations imposed by a post-free trade, post-subsidy era of industrial policy design. (Sharaput: 2010)

A national innovation system (NIS) consists of the network of institutions that host and channel the process of innovation, as well as the interaction between them and their larger supporting context. (Niosi: 1993, 1998) It is this dynamic interplay between a set of innovative institutions and their environment that allows change to occur and to have an effect. An innovation system's primary functions are the integration of component elements and the transmission of information and knowledge between these elements and between the system and its environment. An innovation system thus involves more than innovative capacity or the process of innovation; it also incorporates the various systemic elements which support this process; an innovation system implies not just a way of doing (innovation), but a way of being (innovative). Within any particular innovation system (national or regional/local), core elements such as industry, academy and government are integrated in networked clusters with reflexive lines of communication, and are grounded in a structure which permits flows of

information and knowledge between this integrated structure and the market as a whole, so as to allow the system to quickly respond to market demands.

Government efforts to encourage the development of an effective NIS fall under the rubric of industrial strategy. Industrial strategies are distinguished from the broader pool of industrial policy by their focus on strategic coordination, such that industrial policy acts as a framework, intended to achieve a specific coherent overall goal (the distinction is drawn from Gillies: 1995). Where industrial strategy is oriented towards the formation of a NIS in which government takes on a core coordinating role, it becomes possible to speak of a (national) innovation strategy.

One of the key features to distinguish the innovation strategy articulated by the federal government in the 1990s (which reached its mature expression in the 2002 publication of a joint White Paper on innovation by Industry Canada and Human Resources and Development Canada) was that it represented one of the first long-term policy projects (in Canada) to completely internalize the basic rationale of the globalization project and the expansion of trade regulation. The federal government, led by Industry Canada, argued that national economies could no longer compete on the basis of tariff protections, subsidies, or border restrictions (all classic instruments of an interventionist strategy), and more importantly, that new sectors could not be expected to develop under such conditions without penalty. (Industry Canada: 2001, 2002) The innovation framework developed by Industry Canada, and disseminated through horizontal policy files and cross-sectoral processes, rearticulated the neoliberal project in terms that required some significant action by the state. The state, rather

than being a necessary evil as in the classic neoliberal critique, became a necessary steward of the economy.

The NIS in Canada has historically been characterized by a number of important limitations. Among these are relatively low overall spending on research and development (R&D), particularly when expressed as Gross Expenditure on Research and Development (GERD), or the spending on R&D expressed as a proportion of Gross Domestic Product (GDP). Low overall spending levels are accompanied by proportionately low levels of spending by industry, and a relatively high proportion by the Canadian government. Compounding this factor is the high degree of foreign direct ownership of the Canadian economy. (Doern and Reed: 2000; Gualtieri: 1994) A telling indicator of the combined effect of these limitations is that more than 80 per cent of patents filed in Canada originate outside the country. (Roberts: 2005)

The net effect of these behaviour patterns has been to encourage Canadian firms to adopt, rather than develop, technology; the bulk of what inventive activity does occur tends to be concentrated in areas with pre-existing resources and cultures of innovative activity. (Niosi and Bas: 2000) In Canada, this translates to the core urban metropoles dominating the Canadian economy, and more recently, regions organised around a central, innovation-producing hub, such as a university. (Bramwell and Wolfe: 2008) These limitations and regional concentrations also account for the strong variation in innovative specialization by region. It is the material assets distinct to the region (what Wolfe terms “untraded interdependencies”) which create the supporting linkages of the innovation system. (Wolfe: 2001)

While the Liberal innovation strategy successfully distributed the discourse of innovation throughout the federal government, it had a negligible impact on these underlying trends. The kind of broad economic and social transformation implied by the innovation strategy required access to critical policy instruments, notably the ability to open the spending "tap", which lay outside of Industry's purview. Making the innovation strategy a transformative project required the ability to direct how spending resources were allocated, and the ability to set critical conditions for business operation. However, for key sectors, the former remained under the control of departments other than Industry Canada, while the latter remained under the control of Finance. Consequently, although the innovation strategy led to a series of industrial policies generated by Industry Canada, and the horizontal distribution of an innovation discourse, it never assumed a transformative role as industrial strategy. Industrial policy in Canada remained distributed, and its formation subject to the restrictions on intervention imposed by international treaty and the fiscal constraints of deficit fighting.

The project has fared no better under the guidance of the Harper government. While the innovation strategy survived the transition to the Conservative government, it lost whatever degree of political support which had sustained it in the past. While the Harper government has shown a willingness to spend money, particularly in response to the recession crisis, it has done so with conscious disregard for overall strategic coordination. Spending tends to be focused in areas of infrastructure (notably transportation and security), health care, and selective sectoral bailouts (the most famous of which was the Auto bail-out). Selective use of both tax incentives and sectoral deregulation (notably favouring the energy sector), have also featured largely. A recurring theme, however, has been the justification of such limited

intervention in terms of economic crisis, and the restated desire to return to a non-interventionary role as soon as conditions permit. (Sharaput: 2010)

Part 2: A briefer history of the Ontario innovation strategy

While the early years of the McGuinty government focussed on deficit reduction as a key priority, as early as 2004 the provincial budget explicitly acknowledged a connection between innovation and research commercialisation. (Ontario: 2004) The 2005 budget targeted the human resources development dimension of innovation, such as expanding the number of and financial support available for, post-secondary and apprenticeship positions. The same year also saw the formation of the MRI, and the Ontario Research and Innovation Council, which produced a coherent innovation strategy, articulated in the Ontario Innovation Agenda (OIA), by 2008. (Ontario: 2005) The budget also initiated a series of targeted investment programs, the primary function of which was to coordinate existing research programs (including "macro-programs" such as the Ontario Networks of Centres of Excellence) and to facilitate the commercialisation of basic research. The latter eventually emerged as the primary focus of the Ministry; of the planned $262.3 million operating budget allocated for the following year, $249.9 million was allocated to the research and commercialisation strategy, which strongly favoured programs targeted to medical and biomedical research. (MRI: 2007) With the commercialisation program in place, the Ministry initiated a complimentary "outreach" stream in 2008-9. The outreach funding stream was approximately half the size of the commercialisation stream, and was more diverse in its selection of targets, with some of the money explicitly earmarked for venture capital expenditure. The relative funding levels for

both streams have remained consistent, although the Ministry has enjoyed incremental expansion of its expenditure budget.

The MRI's strategic plan is explicit in its recognition that innovation-led economic success depends on the formation of an innovation culture. It states that such a culture is:

> " . . . built on understanding the value of all new ideas, recognizing the benefits they provide to society as a whole, and rewarding those who create knowledge and those who put it to use to achieve growth and prosperity. An innovation society has both the respect for the education and research that drive the creation of new ideas, and the nimbleness to act on opportunities to achieve their full value." (MRI: 2006, p1)

The Ontario Innovation Agenda, which sets out terms of reference for activity by the MRI, notes that a core goal of the agenda is to situate the Ontario government as a catalyst for change, and suggests that "the innovation agenda's goal is to align all provincial activities with the needs of an innovative culture and economy." (MRI: 2008, p4) The language and conceptual referents of the Ontario Innovation Agenda, in most respects, are a repetition of those which characterised the federal project in the 1990s: social transformation, a leadership role for government (especially the MRI as the articulating agency), and comprehensive coordination of economic activity, in consultation with business, to achieve the common goal of innovation-driven growth. To track this process of transformation an innovation "score card" would be developed to measure and report on innovation outcomes.

In practise, however, evaluation of the MRI has focussed on a far less comprehensive set of changes, and used a relatively unproblematic set of evaluative tools. Innovative activity, defined for the purpose of monitoring the MRI's impact, seems to have been limited to activity by firms operating in sectors labelled as innovative, notably portions of the high-tech, ICT, medical, and pharmaceutical sectors. Qualitative indicators seem restricted to activity reports

on the emergence of new products, services, research, and facilities in such sectors. Subscribers to the Ontario Innovation feed for Facebook[1] are treated to almost daily updates and press releases covering both innovative activity happening in the province and the role played by the Ministry in encouraging it. The Ministry also regularly comments on, and publicizes, both its expenditure programs and the innovative activity that occurs within the province.

Quantitative indicators are also relatively simple. Three key quantitative benchmarks are used to evaluate the MRI: the amount of investment leveraged by MRI funding, the increase in leveraged investment, and the degree to which leveraged investment targets were exceeded. As the MRI's annual self-evaluation reports indicate, targets for all three benchmarks are regularly met by the Ministry. (MRI: 2009, 2010, 2011) The implication seems to be that since the government is spending money in sectors identified as sites of innovation, that any activity occurring in those sectors must be both a product of government intervention, and innovative.

There are, however, problems with this assessment. While the Ministry can claim consistent success in leveraging investment, it is not clear whether partner investment is in any way informed by government ideas about innovation. While the Ministry measures success in terms of leveraged investment, the project it articulates, like its federal predecessors, is one of social and economic transformation. How money is spent and to what effect, not just how much and in what sectors, become the pivotal questions. Determining success at this level is a far more problematic affair than tracking the assumed association of investment streams.

[1] See https://www.facebook.com/#!/ontarioinnovation.

The claim that the Ontario Innovation Agenda has been more successful than federal predecessors is thus based less on the actual relative success of the two projects, and more on a contraction of the threshold for success. The perception that the Ontario strategy has been more successful is based in the use of a deliberately limited and unproblematic understanding of innovation; government impact on innovative behaviour is to be measured in terms of government success in attracting matching expenditures by private industry in sectors deemed innovative. Policy success is measured in terms of the ability to elicit targeted levels of such expenditure.

Part 3: First steps towards a more accurate evaluation of the Ontario Innovation Strategy

Arguing that existing mechanisms for evaluating the Ontario innovation strategy are inaccurate is not the same thing as arguing that it has not been successful. In fact, existing research on the subject suggests that such projects, when mounted at the provincial level, are more likely to encounter success than federal or national equivalents. One natural advantage the Ontario government has relative to the federal government of 1993 is that it more closely matches the scale of the processes it seeks to transform. Considerable research has suggested that innovation is organised and located at a regional scale, and that consequently, it is better engaged through regional strategies of intervention. This is particularly true in Canada, where federal strategic intervention has a long history of political controversy, and carries significant political baggage. (Bradford: 1998) Political resistance to Ottawa-led coordination has been particularly fierce dating back to struggles over the National Energy Policy in the early 1980s. Industrial policy intervention, when it occurred, was *de facto* broadly distributed across

multiple federal policy portfolios. Key sectors of the economy, such as agriculture, natural resources, fisheries and oceans, energy, and transportation, routinely attracted policy attention, but these efforts were distributed across their associated sectors, rather than being concentrated in a central agency like Industry Canada. The tendency towards horizontal distribution was a product of the federal institutional structure, the historical association between industrial policy and patronage, and the consequent association between regional and sectoral development.

In the case of innovation-based intervention, these political factors are compounded by the organisational scope of innovation systems themselves. More recent developments of innovation systems theory suggest that the dominant institutional and organizational logic of an innovation system lies within regional spaces of activity. (Gertler: 2000; Wolfe: 2003; Wolfe and Gertler: 2006) The successful development of regional innovation systems relies on a complex interplay of factors, including the development of social capital (especially bonds of trust), public and private leadership, the presence and exploitation of appropriate infrastructure, and the presence of institutional tools for coordination. Wolfe and Gertler (2006) suggest the most reliable strategy for government is to encourage the development of both a local talent pool and the presence of appropriate research infrastructure. While government can intervene to provide or encourage most of these factors, the development of a regional innovation system is often contingent, and the product of unexpected or serendipitous events. In other words, while government intervention can foster the growth of an innovation system, there is no way to guarantee it will, even when government intervention takes “appropriate forms”. A final element necessary for intervention is a capacity for collaboration across geographic and social

boundaries, to which can be added (given that provincial departments, and the provincial government as a whole, do not function in isolation) a capacity for horizontal coordination within and between governments.

The relative lack of political baggage, coupled with the issue of organisation-scale, suggests that regional political actors might have more success in adopting and implementing an innovation strategy. Evaluating the impact of such a strategy, however, remains no less problematic, insofar the basic goal remains evaluating the degree to which government policy produces organisational and behavioural change. Even if one treats the benchmark data provided by the Ministry of Innovation as informative, the growth of leveraged investment is not, in itself, an indicator of innovative change. How those leveraged funds are expended, within what social, cultural, and institutional context, and with what effect, are questions that draw closer to the heart of the issue.[2] Moreover, the success of the innovation strategy must be assessed not only in terms of the MRI, but must also incorporate the Ministry's impact on the larger set of government behaviour.

The basic problem facing any attempt to evaluate the success of a strategic innovation strategy is twofold. First, one must develop a capacity to assess outcomes in terms of the MRI's impact on the Ontario government as a whole. Second, one must assess outcomes in terms of

[2] There is a reason why emerging and innovative sectors tend to be equated. Newer industries are still in the processes of developing their industrial and sectoral culture. Because they are relatively flexible, with less well entrenched patterns of behaviour, change is more likely. Even in well established sectors, like pharmaceutical research, much of the innovative activity occurs in smaller, relatively isolated offshoots, such as semi-independent labs, or start-up firms which are eventually absorbed by larger entities.

In smaller, more flexible environments, the likelihood that an actor understands their role in a larger process, is able to communicate ideas about improving that process, and will be listened to, radically increases; all three factors are pivotal to the innovation process. Contrast the archetypal ICT start-up firm with one of the big three auto manufacturers, and one begins to see the inherent problems. It is possible to argue that larger, well-established firms and sectors are inherently less innovative, insofar as their scale of operation requires a degree of organisation structure and rigidity that resists the formation of an innovative culture.

the mediated impact of this coordination effect on economic activity in Ontario. The former, although broad ranging, is relatively straightforward. The adoption of MRI-generated terms of reference (including innovation criteria for funding), the degree to which other ministries adopt or mimic the MRI's strategy of leveraged funding, the degree to which leveraged funding achieves innovative change, and the extent to which they implement policies encouraging innovative behaviour could all be used to measure the relative impact of the MRI on the rest of the Ontario government, i.e., the degree to which it can be understood to play a leadership / coordinating role. The latter problem, determining the extent to which the horizontal coordination of government action by the MRI actually produces outcomes, is a more complex question.

The basic problem is one of mediated causality. How is one to determine that change in behaviour observed on the part of economic actors is the product of activity by a government agency that did not directly seek to influence the behaviour of that economic actor?

Coordinating Actor (horizontal framework) →	Implementing Actor (generates policy informed by horizontal framework) →	Final actor (changes behaviour in response to policy informed by horizontal framework)

Determining causation in direct cases is problematic enough, and has built the career of more than one policy analyst. Causation in the case of a horizontal framework involves a further step of mediation, in that one must establish that actions taken by a third party are the product of a government actor, and that the government action in question was a product of the efforts of the coordinating agency.

The process of analysing this sort of mediated causality is part of a larger project of assessing the impact of the MRI as a whole. Four areas of research can be identified, based on the orientation towards policy intervention or coordination, and direct versus indirect efforts.

	Policy Intervention	**Horizontal Coordination**
Direct	Focus: Leveraged Funding	Focus: Policy Mirroring
	More granular assessment of leveraged funding	Adoption of terms of reference, including innovation criteria for funding
	Re-definition of innovative investment, focusing on activity rather than sector	Degree to which leveraged funding model is adopted
		Development of sectoral innovation strategies
		Formation of sectoral "partner agencies"
Indirect	Focus: Implementation of MRI-inspired policy instruments	Focus: Emergence of organisational network with MRI at the hub
	Innovative outputs (new goods and services) by non-MRI partners	Development of an institutional framework organised around MRI
	Changes in expenditure patterns in non-MRI leveraged partners consistent with MRI goals	Emergence of subordinate innovative formations (clusters, policy communities) with relationship to MRI
	Adoption of MRI terms of reference in non-MRI partners	

Table 1: Evaluating the MRI

The simplest project would involve a more granular assessment of direct policy intervention by the MRI. A specific focus would be how leveraged and outreach funds were actually spent, and with what outcomes. Success would be defined not in terms of funding targets reached, but outcomes from spending that were consistent with the transformative goals of the innovation strategy. A second project would look at the outcomes of MRI-inspired policy intervention in other government agencies, with particular attention paid to firms

partnering with such agencies. Indirect success of this kind would be indicated by changes in behaviour, especially expenditure behaviour and business practise) that were consistent with the innovation discourse promulgated by the MRI. A comparative element could be incorporated, either in terms of comparison between MRI and non-MRI partners, or in terms of non-MRI partners and un-partnered sector competitors.

The success of horizontal coordination efforts by the MRI can also be assessed in terms of direct and indirect efforts. Direct efforts to coordinate policy focus on the ability of the MRI to influence government partners. The adoption or mirroring of MRI policy by non-MRI agencies serves as a key indicator, not limited to the adoption of terms of reference for policy design, the adoption of specific strategies such as the leveraged funding model, and the formation of MRI-inspired partnerships. Indirect coordination deals with the efforts of the MRI to position itself as part of the evolving regional innovation system. The critical element of study here are the connections, innovation subsystems (clusters, policy communities) and network relationships that can be established between the MRI and the larger set of regional actors. Although by logistical necessity, these projects need to be broken down, they are related. This is particularly notable when assessing the ability of the MRI to coordinate horizontal implementation of the innovation strategy, and assessing the indirect impacts of MRI-inspired policy. Taken together, the four provide a preliminary basis for evaluating horizontal frameworks such as the effort of the MRI to establish an innovation strategy.

Conclusion: Aim small, miss small.

For the MRI, small is beautiful. The Ministry has been able to claim recurring policy success by limiting its activity to three main areas, and by adopting simple and unproblematic measures of success. The MRI maintains a primary focus on generating leveraged funding in

targeted industries and sectors, a secondary focus on leveraging funding for emerging firms (with a notable emphasis on venture capital), and a tertiary focus on publicising activity by the MRI and innovative actors. It measures its success primarily in terms of success in generating leveraged funding, with little attention paid to how funding is actually spent, or with what outcomes. The failure to engage these latter issues, how resources are allocated, and with what effect, places the efforts squarely within the realm of policy, rather than strategy.

What makes it difficult to claim that the MRI is pursuing an innovation strategy is the lack of information on whether the Ministry is following through on the larger vision articulated in the Ontario Innovation Agenda. Determining this requires asking two questions. First, to what extent is the MRI acting to lead and coordinate a larger project of economic transformation in the province? Second, to what extent have secondary government actors, notably other Ministries, been able to promote innovative behaviour on the part of associated private-sector actors? The questions are not trivial. One of the major contributions of the federal innovation strategy, despite its essential failure, was the re-envisioning of an interventionary role for government. If the federal project is to be recreated at a provincial level, and government is to re-assert a role as a strategic player in the operation of the economy, then it becomes necessary to move beyond politically expedient benchmarks towards a deeper understanding of the effects of government policy on the behaviour of market actors.

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