Prometheus, Vol. 24, No. 1, March 2006

Constructing Advantage: Distributed Innovation and the Management of Local Economic Growth

JOHN DE LA MOTHE & GEOFF MALLORY

ABSTRACT *This paper discusses, in a preliminary way, the new dialogues that successful knowledge-intensive communities have adopted in order to achieve global business growth. Using empirical data on innovation from cities in Canada and the United States; innovation governance models from small and medium sized countries including Scotland, Denmark, Finland, and Sweden; and using differences in technology sectors—particularly telecom and photonics—this paper will present some modest insights into the path dependencies of small firms, small nations and globally competitive innovations.*

Keywords: commercialization; creativity; economic growth; innovation; knowledge-intensive cities; public goods.

The essential feature … in cyberspace is connectedness (Jeremy Rifkin).

Introduction

Innovation is about creativity and commercialization. The governance of innovation is about handling the complexities of knowledge, or—if you like—know-how. The new production of knowledge is networked. It is distributed. It is fundamentally about institutions (like labs), interdependencies (between researchers), linkages, networks, partnerships, co-evolution and mutual adjustment.[1] In international business studies, this set of facts is well known, but it is often thought of in different ways.

For Robert Putman, innovation and governance is about building a strong and active civil society.[2] In his excellent study of the political economy of Italy, *Making Democracy Work*,[3] he details how bakers or priests can have more political and business decision making power than mayors; and yet, a stable civil society is sustained. He also documents how macro-fiscal and monetary policies can actively hinder the growth of firms, ensuring an economy of small firms—thus, they think, protecting Italy's rich culture—and inadvertently promoting the shifting of Italian

Prometheus ISSN 0810-9028 print/ISSN 1470-1030 online © 2006 Taylor & Francis
http://www.tandf.co.uk/journals
DOI: 10.1080/08109020600563812

multinational industrial investment and activity over European borders, to France and Switzerland and further afield.

Along similar lines, for Richard Florida,[4] the importance of place in an innovation-based and knowledge-driven economy is key. This has long been a set of issues since Frederick List in the nineteenth century or Alfred Marshall in the early twentieth century with his excavation of industrial districts. Constructing communities involves developing an organizational ethos that now signifies successful firms, cities and regions. Florida refers to this clutch of ideas as 'the rise of the creative class'. On the surface of course, this basic presentation may seem facile and non-operational from an urban planning, mayoral and managerial perspective. However, if one were to look, even at the most elemental of ingredients involved in creative knowledge-intensive communities, then we could boil it down to the availability of infrastructure (both physical and smart—i.e. connectivity), leadership, capital, and people. Urban planners, in Florida's world, might correctly observe that quality of life, as represented by bike paths, a clean and recreational environment, safety, orchestras, local cinemas and other cultural venues, including blues and jazz clubs, good schools, a vibrant downtown, and so on, are all attractive to highly educated workers.

Florida and Putman both understand that communities are based on adaptive relationships,[5] networks and mutual interests.

Much of this research and experience builds, of course, on agglomeration economics and the economic role of cities in the twenty-first century, which tends to focus on the production side and manufacturing firms. Localization, from this style of presentation, suggests that the presence of an industry in a particular city could be 'the result of the available natural resources or simply historical accident'.[6] But it is the creation of knowledge (from universities and colleges as well as multimedia labs), the rise of services (which in most OECD countries represents more than 70% of job growth) and the exchange of knowledge (through research flows between researchers, labs and firms) that is key. We call this 'constructed advantage' in which cities and their management are central and which lead to what we call 'distributed innovation'. We believe that this approach helps to explain the knowledge intensive sectors of smaller nations which, according to Ricardo and Porter, should not really exist.[7] One required a definition of 'value added' based on what one had (now—in a knowledge economy—it is based on what we think and do) and the other required scale and scope in a domestic market, which cannot explain Singapore or Taiwan.

In a networked economy, private ownership gives way to social space. Access, not scale, is key.[8] In a broad sense, one could differentiate between differing types of networks.

Rifkin likes to point to supplier networks in which organizations sub-contract for a range of inputs; to producer networks in which organizations pool their production facilities, financial resources, and human resources; to customer networks in which manufacturers, distributors, marketing channels, value-added re-sellers and end users work together; standard coalitions in which as many organizations as possible establish standards of practice around the industry leaders; and technology cooperation networks in which valuable knowledge and technical expertise is shared.[9]

Using these ideas, this paper will sketch out some recent work on cities, the interactions between cities, and the governance of innovation in some smaller nations as they try to create and build communities in their quest to construct

advantage around science, technology and knowledge. Tip O'Neil, former Speaker of the House of Representatives in the United States, used to say that all politics was local, but this could be extended to the economic in which everything local—especially knowledge and research—is built, maintained and shared globally. Just look at the interactions between Canadian and American cities in research as given in Figure 1.

From Figure 1 it can be seen that Toronto has strong ties with Seattle in Informatics, as do Montreal and Ottawa. Ottawa has strong ties with Chicago in Bio-Informatics and Bio-Medical Devices. The connections are clear, and interesting.[10]

The Case of Some Canadian Cities

Cities of course are at the heart of economic growth in any country. In 2001, the Canadian Advanced Technology Alliance (CATA) launched a series of TechAction Town Hall meetings. This was in partnership with KPMG and other industry sponsors and under the research design of John de la Mothe. It should be mentioned that this work is now being extended to Arizona, North Carolina, and the 'Big Seven' of the Commonwealth, such as Australia, South Africa, New Zealand and India.

The TechAction Town Hall meetings, held across Canada, involved executive community stakeholders who gathered to voice their concerns and pool their ideas about how to stimulate innovation and knowledge-based industrial growth. The goal of this series was to create a community-based consensual for specific actions in order for the community's use of high technology to grow in the near future. The TechAction Town Hall meetings had two components:

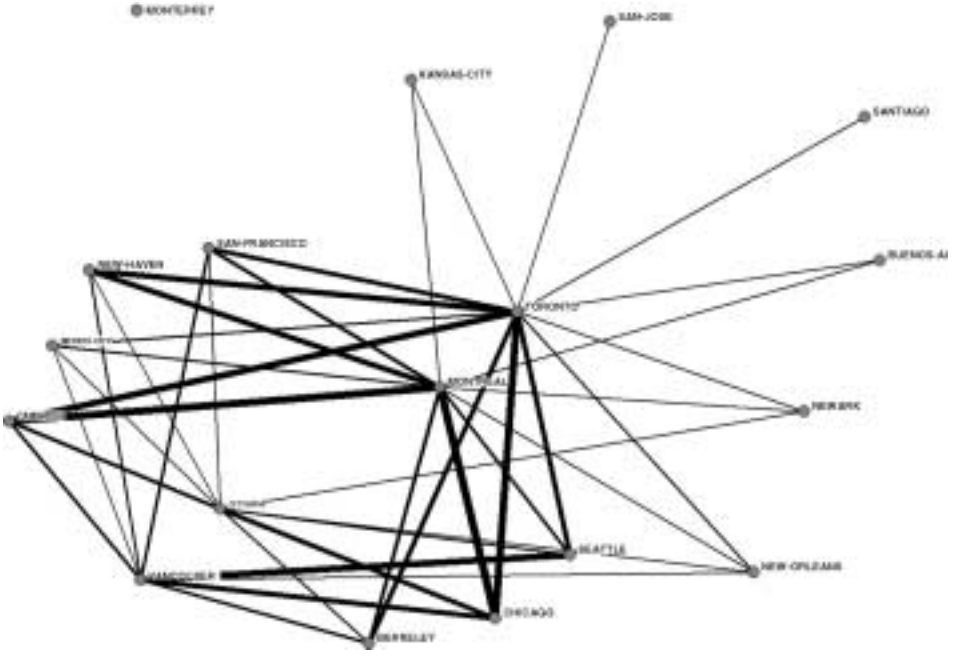

Figure 1. Collaboration between Canadian cities and other cities, 1980–2003. Only fluxes of 50 or more joint publications are shown.

1. an extensive survey of city executives and leaders; and
2. the business and community leadership surveys which were used to create an 'Action Blueprint' to advance community growth.

Below is a summary of some outcomes at the local level.

Calgary, Alberta

Having established an advanced technology centre, Calgary is confident in its capacity to innovate and that it will play a vital role in a national effort to improve innovation. Access to capital remains an issue. Calgary, however, possesses well-educated human resources, an adequate technical infrastructure and highly skilled leadership. Calgary's challenge is to put in place the financial measures to sustain its momentum in the coming decade.

Action blueprint

Calgary's leaders decided to take the following steps to overcome their challenges in the five areas measured in the survey:

- *People*: improve management skill training;
- *Infrastructure*: market Calgary's infrastructure advantages;
- *Capital*: have government encourage venture capitalists to treat high tech in the same way as oil and gas;
- *Leadership*: support and adjust taxes for early-stage business growth; and
- *Innovation*: provide more streamlined access to innovation programmes.

Halifax, Nova Scotia

Overall, technology business leaders are positive about the quality of life, social infrastructure and the education system in Halifax. Access to venture capital and interest from venture capital firms are seen as barriers to growth. The outlook, however, remains positive regarding regional innovation potential. Local leaders expect that a mix of government and public/private sector partnerships will help ensure that the required infrastructure is in place to support this anticipated success.

Action blueprint

- *People*: tie education more closely to employment needs;
- *Infrastructure*: create a clear vision of our technology future;
- *Capital*: create an angel investment community; and
- *Leadership*: move from silo mentality to a common branding for the community.

Ottawa, Ontario—The Nation's Capital

Ottawa scores high in all growth components needed for the advanced technology sector. Access to capital, skilled human resources, technical infrastructure and leadership are ready at hand. Ottawa is also rated positively for quality of life and

social infrastructure. Local firms, however, tend to raid fellow companies rather than rely on colleges and universities for new recruits. Ottawa's challenge today is to put in place the measures to sustain its momentum in the coming decade.

Action blueprint

- *People*: increase collaboration between industry and universities;
- *Infrastructure*: re-instate support for broadband;
- *Capital*: encourage investment related to the New Economy; and
- *Leadership*: create a benchmarking system to give foresight against the global best.

Vancouver, British Columbia

Almost 90% of the Vancouver executives reported that they live and work in a vibrant and sustainable community, albeit due principally to neo-Ricardian comparative advantage, based on tourism, a deep harbour and natural resources. Although access to capital is an issue, more than half of Vancouver's business leaders are confident that the city is a global innovation leader, but based on what? Respondents advised the government to adopt an internationally competitive tax regime as its priority to ensure future innovation strength. Vancouver's greatest challenge today is to obtain capital for its continuing expansion.

Action blueprint

- *People*: identify Vancouver's priorities, and develop cross-disciplinary studies at universities;
- *Infrastructure*: create physical and specialized infrastructure to energize specific clusters;
- *Capital*: establish a method to allow individuals to share company risk, and reflect it in tax exemptions; and
- *Leadership*: create industry forums to encourage leadership and vision.

In conclusion, understanding the strengths and challenges facing these cities—and creating an Action Plan to resolve them—is the most important single task facing communities today. Cities drive economic growth, in every advanced economy. While we often speak of growth in terms of national statistics, growth is in fact a local phenomenon.

Canadian cities contain 95% of all the businesses in the country. In today's global 'smart' economy, it is more important than ever that our cities be given the best possible foundation to invent, grow, and generate the tax base on which all our social programmes and our structure as a nation depend.

Let's move to another level, that of smaller region or nation states.

The Case of Scotland[11]

Scotland is a small regional economy which is cultural, historically and economically very community based. It is deeply enmeshed, as are many other advanced small and medium sized economies, in an important transformation as they

develop and enter the global knowledge economy. Just since 1997 (1997=100), Scotland's Gross Domestic Product has grown to 113.3. However, agriculture, forestry and fishing have rested at 99.3. Production is down to 96. Construction has grown, throughout various business and investment cycles, to 106.1 while services—largely in such knowledge-intensive activities as ICT—have impressively outpaced other sectors by an indexed growth of 122.1 (Q4, 2002).[12] GDP per head is currently $US22,000 compared with Canada which stands at $US26,000.

With a population of 5.5 million people, 30% are engaged in managerial or professional occupations, yet it has a long term unemployment rate of 18.5%. The distribution of population is highly variable, with as many as 3,300 people per square km in Glasgow and only eight in the Highland Council Area. And Scotland is losing an estimated 250,000 persons to employment-related emigration annually. Scotland has an international reputation for excellence in higher education[13] and since 1998 enrolments in ICT fields have increased by 45%. Scotland is home to 20% of UK biotech start-ups, and is the sixth largest equity market in Europe (managing about £350 billion in funds). But between biotech, optoelectronics, telecommunications and semiconductor fabrication, Scotland employs only 37,000 people (out of a labour force of 2.5 million).[14] Some 65% of Scotland's exports flow into the European Union, but the top service exports arise from non-knowledge intensive activities, such as tourism (27%), oil and gas (23%), followed by banks, insurance, assurance, and higher education (32%). Computer and software services account for 18%. Some 38% of manufactured exports come from Scottish office machinery.[15] However non-Scottish firms—such as Cisco, Motorola Lucent, IBM, Hewlett Packard and Compaq—dominate the Scottish tech sectors and manufacturing. They tend to be at the lower scale of production and towards the lesser value-added end of the R&D spectrum. Official Scottish documentation notes positively an ability to attract over 200 call centres, even though these have been shown to be highly mobile, low value-added, low paying and lacking in regional staying power.[16] Scottish productivity trails Finland, the Netherlands, Belgium, Germany, France and the United States. Its entrepreneurship index shows lower levels than the UK as a whole, and digital connections are two thirds those of London.[17]

Thus it can be succinctly stated that Scotland faces a number of issues as it transforms into a knowledge economy. The central challenges are related to how Scotland can:

1. attract and retain talented labour;
2. optimize knowledge spill-overs and value creation; and
3. attract high value-added foreign direct investment.

All of these issues ask the question 'how can they construct community, and advantage?'. In order to achieve this, the Scottish Executive (regional government) and Scottish Enterprise have designed a number of policies and programmes. They has a series of complementary activities, such as *Scotland: A Global Connections Strategy* (2001), *A Smart, Successful Scotland* (2001) and *A Science Strategy for Scotland* (2002). These documents illustrate the progress that has been made since devolution.

However, all the news is not good news. For example, the science strategy bears a remarkable and undifferentiated resemblance to the science strategies of a number of countries, including Canada, South Africa, Finland, Denmark, the Netherlands, and Australia. It lacks specificity to Scotland's unique capabilities,

opportunities and challenges. It emphasizes schools and public awareness, but does not locate itself within the economic context of the entrepreneurial, innovative, knowledge-intensive future of Scotland. Direct comparisons are problematic in that independent data, for example GERD/GDP, HQP/capita for Scotland, are not yet available. Moreover, there seem to be major disconnects in the production and flow of value-added knowledge. For example, Scottish universities, which are world renowned, also show disinclination towards collaboration with local players, especially other Scottish universities. International bi-lateral relations seem to be greatly preferred over multi-lateral research with local industry. The data displayed in Figure 2 illustrate this tendency.

Scottish innovators rely more on distributed supply chains—notably distant final customers—and on local suppliers for innovation, but not on local competitors, collaborators or universities. This eats away at efforts to construct community.

Put another way, the potential for building scale effects which are often required for competitive, world-playing (never mind world leading), research is largely missing. A similar tendency can be seen in the private sector, where pharmaceutical firms (for example) tend to situate themselves in stand-alone sites (not in science parks or knowledge communities) and deliberately separate research, development and design functions, only to distribute the value-added components abroad.

These types of examples, all gleaned from interviews with university officials, private sector executives and public servants in Scotland with the OECD Expert Panel, suggest that regions facing similar circumstances must adjust their long-standing commitment to a view of trade and production that is based on comparative advantage in which 'value-added' is defined in terms of 'what we have'. Nor can they, given a small domestic market base and population size, follow a strategy which centrally assumes scale and scope of either domestic consumer market or industrial capacity. Instead, they might well consider following a strategy of constructing advantage to maximize the impact of what they do as opposed to what they have.

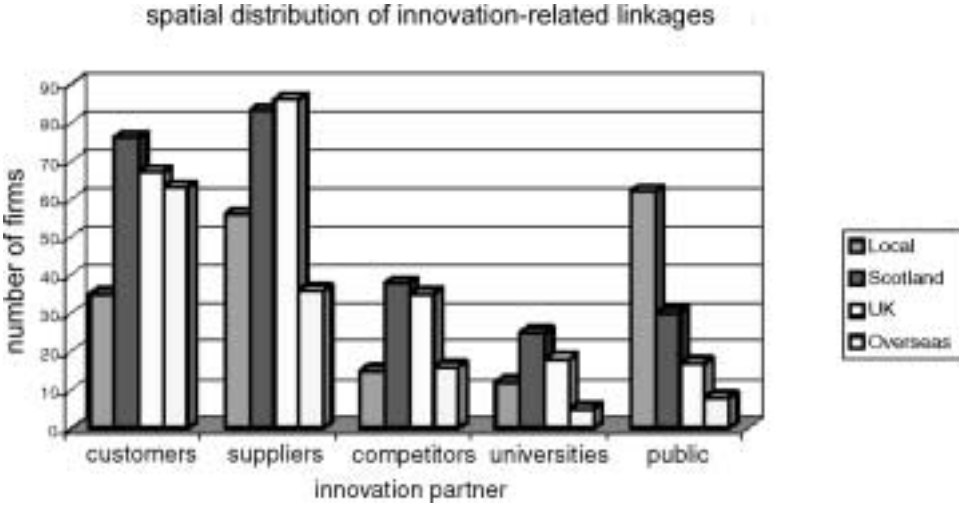

Figure 2. Spatial distribution of innovation-related linkages.

A key factor we have identified as missing from the Scottish example is the notion of interactions.

Communities Interacting

Much of the popular literature on the global economy has emphasized the growing importance of interdependencies between regions and the speed of interaction because of information and communication technologies. Indeed, many of the citizens of OECD countries are now 'on-line' both at work and at home.[18] They're connected. Scotland and Canada are both nations that claim policy and government programme success in connecting their citizens to the Internet. But connectivity in and of itself does not lead to regional economic development. National initiatives need careful integration with local networks adding another layer of complexity to our argument.

Some influential contributions to this debate have in fact suggested that the nation state is dead.[19] This is clearly a non-sense. We should acknowledge that governance is more complex, involving the play between local institutions (firms, colleges, universities, city halls, local councils), regional governments, national governance bodies (including NGOs) and multinational agencies such as the EU and the WTO. But governance now is also *more* important.[20] Traditional arguments about industrial policy and top-down government intervention in the market place are now moot, but new arguments about innovation policy through which local ingenuity, entrepreneurial vigour and appetites rise up and are met by regional and national government policies and programmes, which are adaptive enough to in essence become customized to local needs, is now the way forward. Why is this?

Growth

Economic growth is local but constructed, maintained and distributed. National aggregate statistics notwithstanding, the causes—and benefits—of sustainable economic development are embedded in local institutions and people. In other words, if the OECD estimates that a country will experience growth of, say, 4% next year, no one expects this growth to be evenly distributed across every region. Growth is therefore 'lumpy'. Foreign investments, industrial concentration and talent agglomerate in areas that have prepared and culturally conducive institutions. We have seen this repeatedly in empirical studies, from comparisons of Route 128, Silicon Valley and science parks to numerous assessments of clusters and cities such as Dresden, Ottawa, Singapore and Austin.[21]

Location

In all of these studies, the readiness of local and regional economies has proven to be decisive. The role of robust and active governance—a matching of 'top-down' policy making and programme design with 'bottom up' leadership and action—is key. Governance is no longer about picking winners but is one of backing leaders! Of course, on one level, this simple observation is not surprising given Marshall's work, a century ago, on industrial districts. In this important and well known work, the decision to locate a firm, to start a firm, the demand and supply of skilled labour, the draw on local and foreign investment capital, the inculcation of entrepreneurial drive, and so on—all relating to traditional factors of production—were

seen as key. This is still true. Manufacturing and primary services still matter. Indeed, these combinations of factors of production allowed trade patterns, based on local advantages such as natural resources, to be well understood. 'Value-added' was based on what was 'at hand' (an abundance of wood, marine life, coal, climate, and so on). Much of this, which can be noted here for its emphasis in terms of improvements of manufacture, improvements of technical skills, the development of local value chains, market access and trade profiles, can be linked with the work of the great Scottish political economist, Adam Smith.

Factors of Production

But what has dramatically changed since the time of Smith and his 'invisible hand' has been a global and critical shift in the factors of production. No longer do we rely, either analytically or in terms of strategy, decision and policy, on simple capital and labour [$Q=f(KL)$] equilibria. Instead, knowledge is now added to the equation. Growth accounting has, since Solow, made knowledge and technology *en*dogenous, not only in the eyes of economists but in the minds of policy makers.[22] Why is this so?

Knowledge

Knowledge is largely a public good. Unlike physical resources, it can be used and re-used over time without losing value. Intellectual property can be transferred locally and internationally without ownership being lost. Uncertainty is high in its production (i.e. research), but this drops rapidly as it is imitated and diffused. Of course, firms pursue strategies of being world leaders, close followers, or imitators; each carries with it a variety of risk and investment requirements, particularly across industries. This in itself has significant implications for firms and regions. Traditional views of comparative advantage can be overturned by the governance of knowledge and innovation, as can sources of advantage based on scale and size of domestic market.

Today, customization, niche production, knowledge and networks deliver *increasing* returns. The factors of production have changed and the contexts of smaller economies differ. In the cases of the Nordics, Scotland and Canada, for example, proximity to the former Soviet Union, the United States, the United Kingdom or the European Union most assuredly have had an important impact on industrial performance and structure. The cases of Australia, South Africa, Singapore and Taiwan, for example, differ again, but not because of their immediate proximity to large markets but more because of colonial histories. All are small or medium-sized economies, lacking scale or scope in the traditional sense; but all are competitive in the global economy based on innovation and knowledge-intensive activities. Thus the question remains on the front burner for decision makers: 'given an uneven playing field in comparative terms and a deficiency of scale and scope, how can we build advantage in the new economy?'.

Constructing Community and Advantage

Evidence shows that successful cities and regions understand that multiple levels of policy makers need to ask a series of ongoing questions. These could be stylized in the most simple of ways.

Q1: Why are people 'here' and why would people come and stay?

In Canada's eastern maritimes, the social demographic shows the highest number of universities per capita, the highest educated population and the highest aggregate level of unemployment in the country. This is because, while people are born in Nova Scotia, New Brunswick and Prince Edward Island, they move to Toronto or New York for graduate school and only return to the maritimes for retirement after a successful career elsewhere. From an economic development and innovation perspective, cultural charm and familial ties are therefore not enough. They *will* come however *if* there is opportunity for business development, risk capital and market access. Quality of life of course *does* matter, but for many people this means: is a place safe, can I run (ski, bike, walk), can I get to work easily and inexpensively (this is an issue for Londoners), etc. But from a talent/investment/growth point of view, this is a subsidiary issue.

Q2: Why is investment drawn into a region?

Responses to this question would include: access to smart people; access to infrastructure; access to leveraged funds; access to new and adaptive technologies; footholds into new and potential markets; and a complementary regulatory regime. Moreover, branding efforts often ring hollow for investors. Where is 'silicon glen' in Scotland or why say 'the tartan tiger'? Incidentally, Canada, Wales and Ireland have also used the 'Tiger' metaphor despite the fact that no one has ever seen a tiger in any of these locales and even Dylan Thomas lamented about a 'Wales without wolves'.[23] No one is looking for a tiger. They're looking to invest in entrepreneurial opportunity, in locations that can grow smart firms, employ smart people, and to penetrate world markets. Regional and small national governments often fall into hyperbole. This actually deflects investment, perhaps attracting 'vulture capital' instead of *venture* capital. Gerhard Mencsh clearly understood this when he wrote his book on *Stalemate in Technology* in 1978.[24]

Q3: What should public decision makers do?

- Recognize, deeply, the nature of innovation. Many do not. Underneath the obvious factors of production, innovation is based on risk, uncertainty, expertise, and networks. Sustainable communities are built on local networks and a spirit of collaboration. Public decision makers can play a critical role in this.
- Engage local industries, university instructors, higher education leaders, not-for-profit organizations, youth groups.

How can these two basic proposals be conceptualized and achieved? One of course could easily fall into the thoughtful area of Schumpeter or Hayek, but *practically* we can say, 'let's look at our city, our region, our future, and our potential as a community'. OK. We may wish to draw a diagram such as that given in Figure 3.

What does this show? Not much maybe, but it does make us alive to the fact that creating communities and economic advantage is a 'full contact sport' and not a dry policy making exercise. For innovation and growth to occur, a region or a city needs collaborative relationships. Otherwise why stay, why commit, why invest? This simple figure actually *challenges* leaders and decision makers at every level.

One can see how this has been recently adopted, albeit not perfectly, by the City of Ottawa (see Figure 4). Thus we can draw some issues for regions and smaller states and point to some lessons from Canadian cities that are trying to develop.

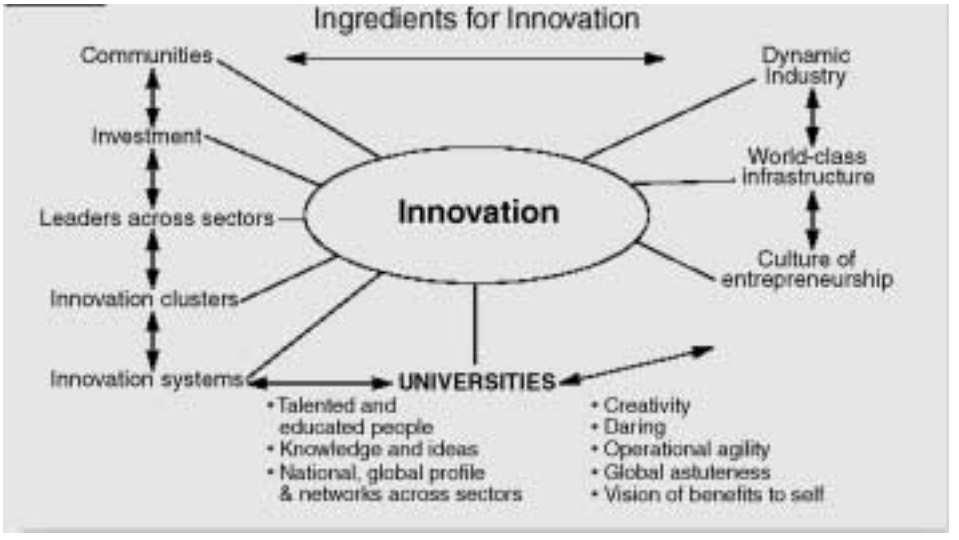

Figure 3. *Source*: Heather Munroe-Bloom, University of Toronto.

A 'smart' region needs leadership from all local actors, firms, universities, government, and non-governmental organizations. This requires engagement, vision and debate in order to see your community as viable and vibrant in the global economy.

The innovative community also needs physical infrastructure, including airports, good roads, local amenities and institutions that offer support for investors and skilled people. Investment today is *not* going into New Haven even though it has Yale University and it is close to New York City. This is because the city has not dealt with the crime rate, has not dealt with re-vitalizing the downtown core through renovation, and only one airline goes into Tweed International Airport so it is hard to get to. Instead, Newark is getting tremendous investment and inflow of talent because of ease of access, proximity to New York (20 minutes), good schools (Rutgers and Princeton are near), and so on.

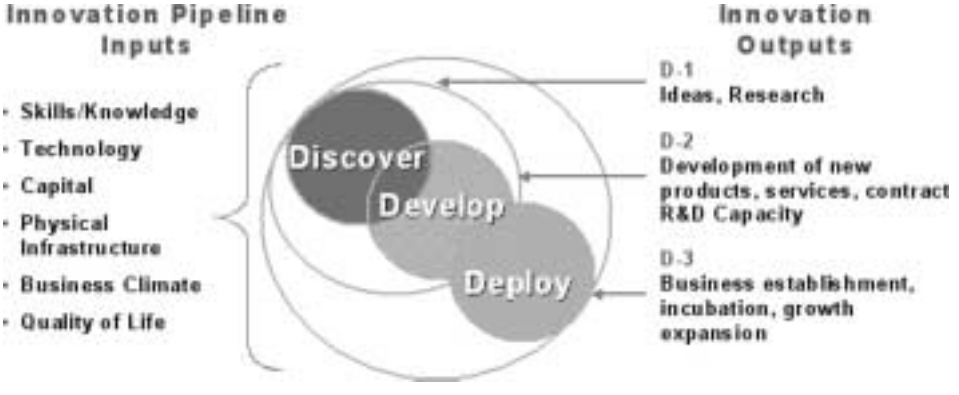

Figure 4. *Source*: City of Ottawa, 2002.

Coordination between National and Regional Actors

An important element on constructing communities is one we alluded to earlier: linking regional actors with national policy institutions and frameworks which are becoming an increasingly strong force in research and innovation. However, regions and smaller nations differ enormously. This can be seen in Table 1.

This indicates that there are only two countries with a strong interaction between the national and regional level: Sweden and the UK. In Sweden the entry of the county as a regional actor is quite new, and at the same time these counties have little powers and funding. The picture in the UK is more complicated with some regions having had a strong independent position (Scotland and Wales) in innovation, whereas the English regional policies, such as the recent Yorkshire Forward initiative, are newcomers to this field.

In 1998, the Swedish Government introduced a new regional industrial policy. Based on the prevailing conditions of each individual region, the aim of the policy is to stimulate sustainable economic development that will spawn more companies and help existing enterprises expand. At the same time, regional 'growth agreements' were also introduced to facilitate implementation of the new policy.

A growth agreement must be primarily based on a fundamental analysis of the business development prerequisites in the region. Based on the analysis, a development programme is formulated aimed at utilizing the identified opportunities and satisfying the need for measures to promote business sector growth.

According to the Swedish Ministry of Industry, the encouragement of a cross-sectoral approach to regional growth and development means that multi-sectoral collaboration should also be intensified between the various Swedish ministries. For this reason a special committee consisting primarily of the state secretaries from various ministries has been set up. Most of the ministries are represented on

Table 1

	Co-ordination national regional
Canada	● Strong state involvement in knowledge production, but concentrated in Ontario, B.C. and Quebec ● Little co-ordination between federal and regional policies
Denmark	● Activities of regional actors dispersed over counties and local communities and often sub-critical (small budgets) ● National level attempts to help co-ordinate within and between counties
Finland	● R&D heavily concentrated in few areas (Helsinki, Tampere, Olou) ● Activities of regional actors dispersed over counties and local communities and often sub-critical (small budgets) ● ST&I responsibilities very centralised at national level
Ireland	● ST&I responsibilities very centralised at national level and implemented by regionally allocated agencies
Sweden	● Strong co-ordination national regional research and innovation strategies ● Regional performance contracts
United Kingdom	● The Regional Development Agencies are a relatively new actor with increasing innovation budgets ● Aimed to deliver research and innovation services from DTI ● Strong interaction with DTI ● In Wales and Scotland strong Development Agencies who work quite independently

this committee, which has the overall responsibility for co-ordinating issues relating to growth and employment policies within the Government Offices.

When the new UK government came into office in 1997, it was committed to creating a new level of regional administration across England. This was to be both an attempt to emulate the economic success achieved in Wales and Scotland and to provide some psychological balance to offset the creation of the regional assemblies in NI, Scotland and Wales. The new regional development agencies (RDAs) were given an economic development brief by London. Over time, the RDAs have seen their 'innovation' budget grow. A series of national innovation funds (Competitiveness Development Fund, Innovation Clusters Fund, Regional Innovation Fund) has been launched, each one larger than the last, and each one more open in terms of the conditions set by the Treasury and DTI (the source of the funding).

As the RDA innovation budgets have increased, so the central DTI budget has been squeezed to the point that its enterprise budget (£330 million) is almost entirely expended through regional delivery channels. In practice, central government expects a growing share of innovation support activities to be determined and delivered locally (most RDAs now have a Science Council).

The Innovation Liaison group (that meets quarterly), which is coordinated by the DTI and involves officials from London and the regional Government Offices in discussing policy needs and instruments (to minimize overlaps and underlaps) has been opened up to the RDAs. This has proved popular and there is talk of strengthening the mechanism through the creation of a high-level steering group with its own budget.

Some Observations for Strategy and Global Business

Rather than develop a formal conclusion to this paper it is perhaps more appropriate to briefly summarize the argument and make some observations on the implications of our analysis for strategy makers in firms.

At a very basic level we suggest that economic growth is lumpy and occurs within countries and regions but is actually centred on cities. We argue that 'smart' cities, i.e. those with good infrastructure, smart people and capital, are capable of generating significant economic growth as traditional sources of competitive advantage, based on national sources of comparative advantage or on scale benefits which disappear as the global economy shifts.

Instead we suggest that policy makers turn their attention towards constructing sources of competitive advantage. The process we envisage, and the basis of our questions, is focused not only on a policy debate between regional city and national governance systems, itself quite a distinctive idea, but also with other interested stakeholders; most notably with sources of inward direct investment, i.e. firms and their managers. In a knowledge-based and constructed local economy, the benefits of innovation are distributed.

Notes and References

1. John de la Mothe, *Science, Technology and Governance*, Continuum, London, 2001, p. 1.
2. Robert D. Putman, 'Bowling alone: America's declining social capital', *Journal of Democracy*, January 1995, p. 65; this valid line of argument is less successfully amplified in Robert D. Putman, *Bowling Alone: The Collapse and Revival of American Community*, Touchstone, New York, 2000.

3. Robert D. Putman, Robert Leonardi and Raffaella Y. Nanetti, *Making Democracy Work*, Princeton University Press, Princeton, 1993.
4. Richard Florida, *The Rise of the Creative Class: And How It's Transforming Work, Leisure, Community and Everyday Life*, Basic Books, New York, 2002.
5. See John de la Mothe and Gilles Paquet (eds), *Local and Regional Systems of Innovation*, Kluwer, Boston, 1997; John de la Mothe and Albert N. Link (eds), *Networks, Alliances and Partnerships in the Innovation Process*, Kluwer, Boston, 2002.
6. Jerry Carlino, 'The economic role of cities in the twenty-first century', *Business Review*, Q3, 2005, p. 10.
7. John de la Mothe, *Innovation Strategies in Interdependent States Essays for Smaller Nations, Regions and Cities*, Edward Elgar, London, 2005.
8. Jeremy Rifkin, *The Age of Access: The New Culture of Hypercapitalism Where All of Life is a Paid-For Experience*, Tarcher Putman, New York, 2000.
9. *Ibid.*, pp. 19–20.
10. This research and visual example is thanks to Professor Yves Gingras and his team at the University of Quebec in Montreal.
11. This section is based on a report prepared for the OECD in January 2003.
12. See www.scotland.gov.uk/stats/bulletin/00234-00.asp.
13. In the last research assessment exercise, six Scottish departments received the highest '5-star' rating.
14. This number is imprecise as the Knowledge Exchange also notes as an aside that the electronics industry employs 41,000 people but this figure does not jibe with the otherwise stated figures.
15. Scottish Key Facts compiled by the Knowledge Exchange (Glasgow), 21 November 2002.
16. cf. Richard Nimijean, 'St. Johns New Brunswick as an emerging local system of innovation', in de la Mothe and Paquet (eds), *op. cit.*
17. Spectrum International Benchmarking Study, 1999, cited in *A Smart, Successful Scotland* (2001).
18. The anti-thesis of Timothy Leary's motto, 'turn on, tune in, drop out', it would seem.
19. See for example Jean Marie Guehenno, *The End of the Nation State*, University of Minnesota Press, Minneapolis, 1995; or Kennichi Ohmae, *The Invisible Continent*, Harper Business Press, New York, 2000.
20. John de la Mothe (ed.), *Science, Technology and Governance*, Continuum, London, 2002.
21. See Saskia Sassen, *Cities in a World Economy*, Pine Forge (Sage), Beverly Hills, 2000.
22. No longer is technology seen as $\overline{T}$ as being equally accessible over time and space, to all 'rationale actors' who possess 'perfect information'. See any of the textbooks on macroeconomics by N. Gregory Mankiew.
23. Politicians have recently referred to Canada as the Northern Tiger, Wales as the Welsh Tiger and Ireland as the Celtic Tiger. Even India is having trouble holding on to its real tigers!
24. Gerhard Mencsh, *Stalemate in Technology*, Ballinger, New York, 1978.