

**Innovation Stickiness:  
Loyalty, Culture and Innovation Effectiveness**

**Dr. Carin Holroyd, Assistant Professor**

**Department of Political Science, University of Waterloo and Senior Research  
Fellow, Centre for International Governance Innovation, Waterloo, Ontario,  
Canada**

**Abstract**

National governments around the world have embraced national innovation as a key to 21st century economic success. Massive investments in scientific and technological training and infrastructure have been undertaken to underpin a significant shift away from heavy industry to high technology-based enterprise. National innovation strategies have not been uniformly successful. This paper suggests that issues of domestic culture, loyalty to the nation and commercial commitment to the country are pivotal to the success of government investments in science and technology. It suggests, at a conceptual level, that there are a series of innovation environments emerging, with sharp differences in outcome and economic impact, based largely around issues of cultural commitment and loyalty to the nation.

**Keywords:** national innovation; loyalty; cultural homogeneity; scientific and technology innovation.

The new global economic development mantra is simple: innovation holds the key to national and regional prosperity. While political interest in encouraging scientific and technological innovation has a long history, the past two decades have seen a rapid escalation in the importance attached to the creation of economies founded on the translation of frontier scientific discoveries into the building blocks of regional and national prosperity. National governments from Japan to Botswana, from Croatia to Canada, have developed elaborate and expensive strategies for competing effectively in the new economy, sharing a belief that innovation is essential for future economic growth. (Holroyd, 2007)

The politics and practicalities of innovation continue to attract considerable academic and government attention. Scholars and politicians debate the relative importance of the key variables in the innovation enterprise: educational foundations, scientific talent, entrepreneurship, venture capital, and commercialization strategies. Detailed studies have compared regional and national approaches, seeking mechanisms for enhancing economic performance and mobilizing scientific and technological innovation. (Balzat and Hanusch, 2004). The key questions remain the same: how do some regions develop

and sustain innovative companies and economies and why are major investments in innovation not paying substantial dividends in other regions?

California's Silicon Valley remains the innovation gold standard. The curious and fortuitous conjunction of risk capital, intellectual resources and entrepreneurship that underpinned the high technology revolution of the 1980s and 1990s often serves as a model for developments in other regions and countries. The effort to replicate the California experience reaches from Ireland to Kyoto, Kuala Lumpur to Nigeria, as regional and national governments attempt to recreate the economic magic that brought remarkable prosperity to the Silicon Valley region and made the area a magnet for high technology creativity and commercialization.

The difficulty associated with reproducing the California experience and the near-global effort to develop innovation economies speaks to the importance attached to finding viable and implementable innovation models. There are, however, significant gaps in the current understanding of innovation environments and insufficient awareness of the manner in which national values, cultural characteristics, and individual decision-making intersect with efforts to capitalize on scientific and technological opportunities. It would hardly be surprising to assert that human factors influence economic progress and transformation. Much of the analysis of innovation to date focuses on input elements - government investment, secondary and post-secondary education, availability of risk capital, collaborative measures and institutions, and the like - and too little on the cultural milieu and community, corporate and individual decision-making frameworks within which attempts are being made to promote commercial innovation.

**Derivative Innovation Policy Environments:** At present, there is a striking commonality of approaches to national innovation. Governments and academics have generally assumed that there is a core set of variables available to governments and industry groups. At present, the crucial building blocks for innovation are assumed to be the following:

- Education at the secondary and tertiary level is assumed to be foundational to national and regional innovation. An educated and creative workforce, well-trained and with a strong background in science, is deemed essential to creativity and commercial growth.
- Large scale and sustained investment in basic science, typically at universities and colleges of applied technology and science and preferably with a high level of commercial engagement, is deemed essential to commercial initiatives, providing access to the latest scientific discoveries and producing well-trained and highly skilled personnel to work in and to create cutting edge industries and businesses
- The Triple Helix collaboration of government, business and university researchers is seen as critical to the success of scientific and technological development. Without strong ties between the sectors, researchers assert that advancement in the innovation economy is extremely difficult.

- Commercialization strategies are essential if the gaps between scientific discovery and the marketplace are to be bridged. These initiatives range from collaborative academic and business research to subsidies for new business development but share a central commitment to create commercial products and services out of frontier developments in science and technology.
- Following on the insightful work of Michael Porter, governments and scholars have emphasized the importance of regional innovation strategies and of the development of strategic foci for business and government investment. This now widely-followed analysis emphasizes the importance of regional specialization and the development of industrial/scientific clusters as the cornerstone of successful innovation. (Porter, 1998)

Ironically, then, innovation strategies have become standardized rather than creative. Even the main point of differentiation (cluster developments, focusing on natural and locational advantages, regional experience or government priorities) reflects a commonly held belief in the importance of regional specialization. A comparison of national innovation strategies reveals a striking similarity in approach and substance, hardly the foundation for competitive advantage. More to the point, it is increasingly evident that innovation strategies are having a differential impact, with some areas enjoying continued success and others developing much more slowly despite substantial government investment. While there are many reasons for this differentiation, ranging from locational advantages to fortuitous commercial developments and the scale of government investments to regulatory environments, the possibility exists that underlying social, cultural and political realities may be of equal if not greater importance than variations on the mix and strength of the now-standard elements of risk capital, educational infrastructure, business-scientific collaboration and government encouragement. It is to this possibility that the rest of this essay is devoted.

**National Expectations and Political Priorities:** Innovation has become so commonplace as to become a uniform national and regional priority. Almost all nations now operate with a clear agenda of using science and technology investments to lay the foundation for 21st competitiveness. Each identifies a theme or focus within a broad sweep of technological options; Alberta favours nanotechnology and advanced medical research, Abu Dhabi in the UAE invests heavily in digital media (see Abu Dhabi, 2007), much as has Nanjing in China and Singapore. Beyond these important points of differentiation, the model and the approach remains much the same the world over.

It is not clear, however, that current models account sufficiently for underlying social and cultural factors. Innovation is not like mining, fixed to a specific location, or manufacturing, which until recently operated on the basis of fixed and heavily capitalized factories that seemed impervious to foreign challenges. While some of the technologies underpinning contemporary innovation are formidable - like the massive synchrotrons that figure prominently in materials science research - the people, ideas and the intellectual property are eminently movable. Indeed, government supported basic

research could easily end up being commercialized in a distant location. Science innovation does not necessarily beget economic opportunity. What is missing in the current efforts to understand innovation is an awareness of those cultural, social, political and commercial factors that enhance the stickiness of innovation. To innovate at the discovery end of the spectrum may not be a sufficient condition for economic success; commercialization and related benefits from innovation need to be understood as separate and not necessarily connected elements.

Perhaps the leading proponent of this approach is Richard Florida, a Canadian-based scholar whose work on “creative cities” and the social dynamics of successful regions highlights a series of non-economic and untraditional factors. Florida argues that creative environments, with cultural and ethnic diversity, high levels of entertainment, rich restaurant and nightclub scenes, and the other accoutrements of world-class cities, are far more likely to attract and hold innovative people. Retaining these key people, in turn, Florida argues, strengthens the companies in the area, produces greater industrial and service innovation, thereby enriching the economy and making it possible to support even more creative activity. Florida’s work combines the analysis of both personal and regional opportunity, and has done much to highlight the importance of cultural and local factors in determining the attractiveness of cities and regions. (Florida, 2002, 2008) His analysis helps explain Boston, San Diego and even Kyoto, but is less helpful in understanding the success of such innovation environments as Haifa, Israel and Helsinki, Finland.

Innovation has proven to be uneven, not easily transportable or readily created, and subject to peculiar patterns. The Silicon Valley success story has been reproduced in places like Austin, Texas, Seattle, Washington and Boston, Mass, but massive investments in other regions have produced less impressive results. Kyoto, Japan, has done well in the new economy; nearby Osaka has not. Canada's efforts to jump-start a science-based economy languish while South Korea flourishes. There are strange and largely unexplained developments, including the success of Finland and Israel, the slow advance of Australia, rapid improvements in India and Taiwan, difficult times in many parts of the United States, strengths in France and Germany and less success in the United Kingdom, poor returns in most parts of Africa - despite considerable similarities in government investment, innovation strategic plans and government-business collaboration.

No single explanatory framework will account for the complex and divergent patterns in innovation-based economies. The concept advanced here is designed to highlight one set of potential factors that may have profound influences on innovation outcomes. If these concepts withstand detailed analysis, the impact on innovation policies could and should be considerable. If, as suggested herein, loyalty and national/regional cultures play a central role in determining the impact and contribution of scientific and technological investments, governments may have to rethink the founding assumptions of contemporary innovation planning.

**Expanding and Sustaining Innovation:** National and regional economies are not created equal in terms of receptiveness to innovation. A series of currently underestimated factors create underlying conditions which may well determine the impact and stickiness of innovation inventions and therefore influence the long-term economic prosperity of the region or country. The additional elements, which may determine the prospects for success but which are rarely factored into political discussions of innovation policies, include the following:

- The willingness and ability of high skilled personnel to leave a region or nation in search of personal opportunity or wealth. (Most university regions – perhaps as many as 90% of the total – are net exporters of talent; few of the students stay behind.)
- The movement of intellectual property to locations outside the region or nation for the purposes of commercialization and development.
- The degree to which the products and services developed through innovation investments find sustained markets inside the host country or region.
- The movement of innovation profits out of the region or nation, for purposes of reinvestment in more promising economies elsewhere.

In combination, these factors likely determine the degree of *innovation stickiness* and thereby determine a substantial portion of the value of national and regional investments. Put simply, governments can (and have) invested massively in innovation only to discover subsequently that returns have been minimal because people, ideas, products and services leave the area. Alternately, a small number of regions, like Silicon Valley, attract skilled workers, entrepreneurs, commercializable products and risk capital far out of proportion to the level of innovation policies and government investments.

**The Loyalty Element:** Loyalty, it appears, may be a fundamental element in determining the success of innovation economies. Countries and regions that command loyalty from residents and companies have dramatic opportunities for success in an era of global competition and opportunities. The loyalty originates in a variety of factors:

- Linguistic uniformity (which can make relocation to another region problematic); Finns who wish to maintain their language, or Jews wishing to live in a Hebrew or Yiddish environment, have very few options in the world. English speakers, in contrast, have much of the world available to them.
- Cultural homogeneity. In sharp contrast to Richard Florida's core assumption that diversity fuels innovation, heterogeneity may be counter-indicated as a success factor. People and companies from countries dominated by a single culture, like Japan or South Korea, tend not to leave the nation in pursuit of other opportunities. Countries noted for tolerance, Canada and Australia being among the best examples, often see many of their most talented people and most promising commercial ideas leave the nation.

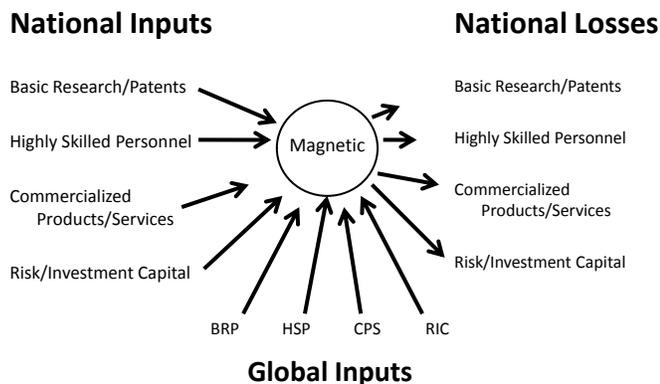
- Commitment to nation (including financial considerations, historical ties and national pride). Relatively few people leave the United States to pursue opportunities (save as overseas employees of American companies); tens of thousands of skilled workers leave African nations every year in pursuit of career and personal possibilities.
- Attractive living environments attract and hold onto key personnel much more readily than do less attractive settings. Attractiveness appears to be defined somewhat differently by generation, with the current crop of young people drawn by urban dynamism, restaurants, cultural activities, geography and climate. The latter two elements contribute to the success of San Diego, the Silicon Valley, Vancouver and Calgary, Alberta; the former elements fuel the attractiveness of New York City, Montreal, London, Boston, Kyoto and Copenhagen. Conversely, communities that suffer from cold climates, unappealing location, significant danger, or isolation may have difficulty holding onto people.

Put simply, countries with high levels of loyalty (Finland, Israel, Japan, South Korea) and regional areas with similar conditions (Quebec, California) are well set up for innovation success. Those with lower levels of loyalty (Canada, the United Kingdom, Australia, Oklahoma, Argentina, and Russia) have already experienced difficulty converting investments in innovation into sustainable science and technology based prosperity.

These loyalty-based elements that produce science and technology stickiness are reflected in divergent innovation outcomes. A preliminary overview of global patterns reveals four major innovation environments.

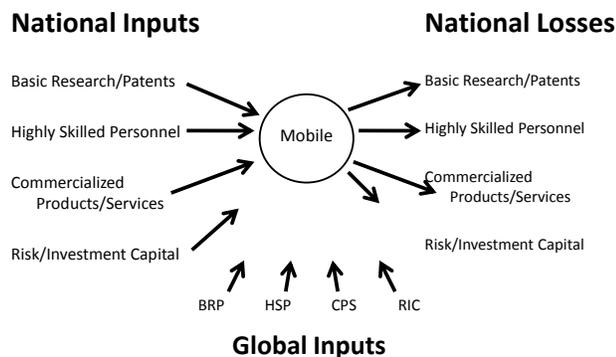
- **Magnetic Innovation:** Through a combination of factors, these regions and countries are net importers of key personnel, ideas and commercializable products. Typically, they have the financial resources, risk capital, infrastructure, physical and cultural setting, and loyalty situation necessary to hold onto innovations and innovators. Several key locations in the United States are the best examples of this, but areas like Hong Kong and Singapore have created comparable environments and countries like the United Arab Emirates and Qatar have similar aspirations. This kind of innovation can be represented as shown below:

## Magnetic Innovation Economy



- Mobile Innovation:** These settings have several of the preconditions for successful innovation, including strong advanced education, government support, and appropriate infrastructure. For a variety of reasons, however, these reasons have difficulty holding onto key personnel and often see their best ideas developed commercially elsewhere. In these instances, high levels of government support for innovation are not sufficient to build a sustainable innovation environment. Canada is the best example of this, in large part due to lower than average levels of personal loyalty to the country and the proximity of the world's largest example of magnetic innovation, the United States. Canadian firms face comparable pressures, becoming attractive to foreign (largely American) companies once they become successful and/or have developed attractive products for the market. In recent years, the United Kingdom has moved to the forefront in the area of mobile innovation, as it struggles to cope with a significant brain drain of top talent from the country.

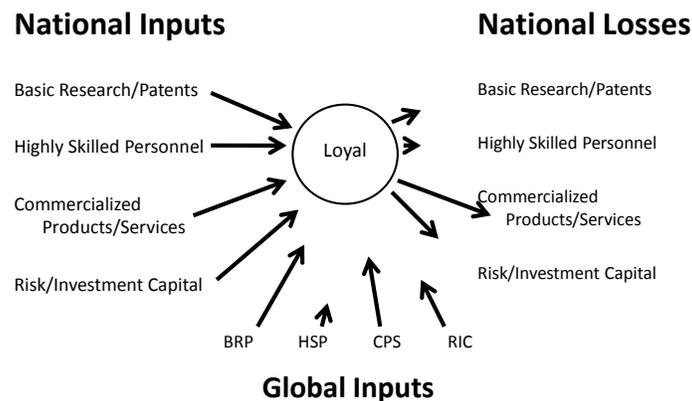
## Mobile Innovation Economy



- Loyalty Innovation:** There are several countries, including Finland and Israel, whose level of innovation outstrips both inputs and comparative advantage. In these settings, non-commercial and non-technological factors appear to factor

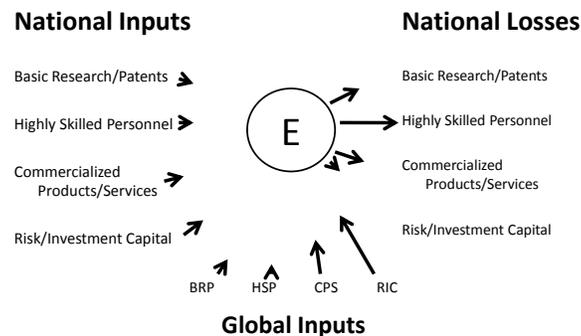
prominently in national and regional success. People choose to remain in the country or region despite considerable economic pressure to relocate to other areas. In these settings, language, culture and loyalty to the nation appear to take precedence over personal opportunity. Stickiness in an innovation environment, of course, supports additional innovation, which in turn makes loyalty appear to be a very appropriate response to global conditions. A loyalty-based innovation environment can be shown as follows:

## Loyal Innovation Economy



- **Emerging Innovation:** Developing and less developed countries have generally accepted the innovation challenge. With foreign help, they are investing in post-secondary education and scientific infrastructure, attempting to repatriate successful entrepreneurs from overseas, and otherwise endeavouring to cross the innovation divide. Challenges remain formidable, however, for the costs of basic infrastructure often exceed local capacity and the outflow of highly skilled personnel can be extremely costly.

## Emerging Innovation Economy



**Policy Implications:** If, as we assert, stickiness is a key element in the innovation enterprise, then regional and national policies need to be reviewed to see if they are contributing to the entrenchment of innovation or encouraging the export of ideas.

Canadian efforts, which emphasize investments in individuals and which require very little in the way of loyalty from the scientists, technologists and entrepreneurs involved in the sector, make few efforts in this regard. The kinds of innovation investments that have been commonplace in Finland, Israel, South Korea, Taiwan and Japan, in contrast, expected, demand and receive a high level of loyalty from the individuals, companies and organizations involved in the innovation enterprise. Addressing issues of innovation stickiness, therefore, requires careful attention to a set of factors that have hitherto been seen as only tangential to innovation strategy. These include:

- **Attractiveness of setting:** As Richard Florida has argued, the creative class expects a high level of creature comforts, including restaurants, movie theatres, entertainment and compelling urban spaces. Geography also matters – coastal areas are typically viewed more positively than inland locations – as does the climate, with substantial value being placed on areas with short or non-existent winter seasons. In a globalized economy, it is hardly surprising that, for a significant number of people, personal considerations weigh very heavily in their choice of places to work and innovate. (Florida suggests that these innovators also demand cultural diversity, although global evidence is less compelling on this front.)
- **Loyalty and mechanisms to encourage loyalty:** One does not often hear of Danes (recently described as the happiest people on earth, see “Why are the Danes,” 2006) moving out of their country in search of personal opportunity, despite an interventionist state and high levels of taxation. Canadians, in contrast, move freely. Close to 775,000 Canadians lived in the United States in 2004. Consider one sub-set of this larger population: Canadian trained doctors. Mechanisms to encourage loyalty – and discourage or penalize emigration – may be required maximize the regional and national return on innovation investments. Singapore has numerous initiatives of this type and has been successful in establishing commitment to the area.
- **Connections to community and region:** National loyalty need not be an absolute requirement. Innovation efforts in North Dakota face comparable challenges to those in Saskatchewan, and Arkansas’s efforts to build an innovation economy encounter similar barriers to those of Western Australia, northern Sweden, or New Brunswick. In each instance, maximizing the return on innovation investments has proven to be quite difficult. As countries like Israel and Finland have shown, however, difficult and even dangerous environments need not end up on the short end of the innovation stick. Fostering, building and even expecting commitment to a community or a region can help offset shortcomings in national loyalty. Community connections have long been an outgrowth of historical circumstance and have not typically been a core element in innovation planning.
- **Intentionality versus laying foundations:** Most democratic countries have favoured investments in training and infrastructure, accepting as an article of faith that building universities and scientific facilities will result in a surge in innovation and commercialization. The vision of reproducing Stanford and the Silicon Valley has been front and centre in cities and regions around the world.

- Few places have come remotely close to matching the California miracle, although developments in Taipei, several locations in China, Shannon, Ireland, and other locations have been promising. Governments seeking to develop innovation economies in less favoured regions, or in areas experiencing low levels of loyalty and commitment, might need to shift from the current faith-based approach to more intentional investments, particularly those requiring a higher level of commitment from individuals, companies and institutions.
- **Rethinking the primacy of free market:** In the initial formulation of the innovation agenda, it appeared as though the imperatives of the free market would carry the day. The brightest people would migrate to the most competitive locations, bringing with them ideas and products for development in league with venture capitalists and long-term investors. And, as a consequence, governments focused much of their effort on reducing tax rates, protecting intellectual property rights, encouraging freer international trade and streamlining business regulations. The continued success of countries and regions with more interventionist governments – Finland, Israel, Iceland, Denmark, Japan, South Korea, Singapore and Quebec – has attracted relatively little attention among innovation specialists. In these countries, where loyalty conditions and innovation stickiness remain comparatively high, governments work more directly with businesses and place more specialized expectations on universities than in the free market economies. Although this conclusion is speculative at present, the fundamental relationship between government and business may be more of a constructive influence on innovation than prevailing North American orthodoxy would have it.
  - **Raising difficult questions about national commitment:** The possibility that loyalty will become a key element in determining the success of national innovation projects raises very sensitive questions about multi-cultural and diverse populations. Jeffrey Sachs, writing about national receptiveness to social welfare programs, wrote: “The forging of nationwide commitments was hardest in societies like the United States, which are divided by race, religion, ethnicity, class and native born versus immigrants. Social-welfare systems proved to be most effective and popular in ethnically homogeneous societies, such as Scandinavia, where people believe that their tax payments were ‘helping their own.’ The United States, racially and ethnically the most divided of all the high-income countries, is also the only high-income country without national health insurance. Even within national borders of divided societies, human beings have a hard time believing that they share responsibilities and fates with those across the income, religious, and perhaps especially, racial divide.”(Sachs, 2008, p. 5) National innovation shares many characteristics with social welfare programs – they call, in the main, for a collective response to challenge and opportunity and require the mobilization of government, corporate and personal resources in order to be successful. Those countries with the strongest loyalty innovation environments – Finland, Israel, Iceland, South Korea, Japan, Singapore – also tend to be homogenous populations and have governments that do not shy away from demanding a fair bit in return for citizenship. Mobile innovation environments, like Canada and Australia, have diverse populations and may suffer from substantial loyalty deficits. Given the political sensitivities around

immigration and multiculturalism – and given the Richard Florida-type celebration of diversity as a cornerstone of creative economies – it is unlikely that national governments will tackle the issues raised by loyalty versus mobile innovation economies, even at considerable economic cost.

One of the great ironies of the global innovation movement is that it has become so derivative -- that is to say, not very innovative. There is considerable logic to this circumstance. Michael Porter's cluster approach which has found such uniform favour calls on regions and governments to focus on local strengths and comparative advantages – the specifics are unique even if the broader strategy is commonplace. (Porter, 1998) So, the fact the Waterloo Region's telecommunications investments follow comparable approaches to Kyoto's digital arts strategy does not over-ride the fact that each region is working on an approach that best suits local circumstances (on the development of Waterloo, see Bramwell et al, 2008).

More generally, however, there is a striking commonality in national innovation efforts. Major investments in post-secondary education are producing a surge in highly skilled science and technology workers and support substantial expansions in curiosity-driven research. Commitments to large scientific facilities are providing a base for basic science research that is clearly forcing the agenda in biotechnology, information technology, nanotechnology and other fields. Stronger protection for intellectual property rights and government incentives for investment in priority fields have become core elements of national economic planning. Country after country seeks to identify clusters for priority investments, and collaborations between governments, business and universities have become commonplace. Innovation, in sum, has become ubiquitous and the approach to national and regional innovation looks much the same the world over.

If the inputs and structures of innovation have become standardized, the outcomes are more assuredly not. Indeed, one of the central truths of the innovation economy is that last year's success story could easily be replaced by next year's opportunity. The race to keep up, then, is even more important than the struggle to get started – a reality that governments find unnerving and difficult to accommodate within standard democratic election cycles. Some countries continue to do better than others, revealing in the process that the fundamental assumptions of innovation investment may need to be re-examined. In particular, the likelihood that national and regional loyalty is crucial to innovation success has been given too little attention; in fact, the discussion has long implied that the reverse is the case: that innovation success is crucial to holding onto people, rather than that loyalty is crucial to innovation. More to the point, the multifaceted questions surrounding innovation stickiness – the hold that a region or nation has over its key scientific, technological and entrepreneurial personnel and the ability that a country has to keep its commercial innovations at home – deserve much more attention than they have received to date. All innovations can contribute to global economic development and to personal success; whether or not they assist a region or nation in achieving its commercial aspirations may well have a great deal to do with the little understood question of innovation stickiness.

Bengt-Åke Lundvall, the Danish scholar whose work has, with that of Chris Freeman, defined and driven the scholarship of innovation economics, has identified crucial ways in which national characteristics shape the outcomes of innovation initiatives. He has argued, for example, that the more social democratic Nordic countries have succeeded where standard economic analysis suggests that they would fail. He suggests, specifically, “that in the Nordic countries social capital and trust are fundamental resources that make their national systems strong in terms of incremental innovation, absorption of knowledge produced elsewhere and rapid adaptation.” He shows how the interventions of the welfare state, a high level of trust, relative income equality and access to on the job learning help sustain and promote innovation in Scandinavian countries. (Lundvall, 2008)

Lundvall’s description of the importance of social capital speaks closely to the loyalty argument advanced herein. According to Lundvall, “Social capital is a somewhat amorphous concept and it has referred both to individual access to social resources and to societal characteristics affecting social interaction. Here we define it as ‘the willingness and capability of citizens to make commitments to each other, collaborate with each other and trust each other in processes of exchange *and* interactive learning.’” (italics in the original) (Lundvall, 2008, 28) By the standards of trust, government engagement in the lives of citizens, and general social equality, the Nordic countries have both maintained a high level of social capital and have converted that collective commitment into success in innovation. Interestingly, Canada is comparable to the Scandinavian nations in terms of trust and economic equality, but has not yet had the same level of success in scientific and technological innovation. This, in turn, suggests that other factors – including the issues of loyalty and innovation stickiness discussed in this paper – play important roles in determining the impact of innovation policies.

This analysis of innovation stickiness is at a very early stage of development. The arguments advanced above require detailed analysis, on the national and international level. Anecdotal evidence – Canadian entrepreneurs either migrating to the United States or selling their companies to American firms, British researchers and entrepreneurs leaving their country, Taiwan recruiting émigrés to return home, Israeli innovators staying in the country despite strong pressures to leave – supports the arguments, but much more work is required to confirm the assumptions. The global enthusiasm for innovation-based economies clearly indicates the primacy that national governments have attached to scientific and technological innovation. It does not hold, however, that all countries and regions will share equally in the benefits of the innovation economy. The very enthusiasm with which governments are embracing the concept – and the often uncritical assumptions which underlie the investments and policies – make it even more important that detailed research on the human aspects and implications of various models of national innovation proceed with some urgency.

The 2008-2009 financial crisis has, of course, uprooted several of the key foundations of the international innovation movement. Leading universities, struggling with collapsing endowments, no longer have the freedom to lure researchers from around the world. National and regional governments that are coping with the soaring unemployment rates

and various fiscal challenges will be hard-pressed to continue to support cutting edge scientific research – although the Obama administration in the United States is poised to make major investments in the field. Companies, too, are having difficulty keeping their innovation investments strong, although those in solid financial condition have recognized that this is a significant opportunity to attract top talent. Further, rapid reductions in consumer spending are undercutting the opportunity to bring new products and services to market. The current economic environment may prove to be a boon to loyalty innovation – for it is likely to be more difficult to move – but might also spur significant movement of leading researchers, technologies and companies, as the search for funding, opportunity, and markets becomes more intense. It is very likely, however, that issues of personal, corporation and collective loyalty will feature prominently in the evolution of the innovation economy and society. To the degree that this is so, it is incumbent upon governments and business organizations to work very carefully and thoughtfully on the policy and program implications of the complex relationship between loyalty and innovation.

### **Bibliography**

“Abu Dhabi, Media Oasis,” The Economist, 4 October 2007.

Balzat, Markus, and Horst Hanusch, “Recent trends in the research on national innovation systems,” Journal of Evolutionary Economics, Spring 2004.

Bramwell, Alison and Jen Nelles, David Wolfe “Knowledge, Innovation and Institutions: Global and Local Dimensions of the ICT Cluster in Waterloo, Canada”, Regional Studies, Volume 42, Issue 1, February 2008.

Brault, Simon, “The Arts and Culture as new engines of economic and social development,” Policy Options, March-April 2005.

Charles, David, “Universities as key knowledge infrastructures in regional innovation systems,” Innovation the European Journal of Social Science Research, March 2006.

Chung, S., “Building a national innovation system through regional innovation systems,” Technovation 22 (2002).

Committee on the State of Science and Technology in Canada, *The State of Science and Technology in Canada: Summary and Main Findings*, (<http://www.scienceadvice.ca/documents/Summary%20and%20Main%20Findings.pdf>)

Dosi, G., Christopher Freeman, Richard Nelson, Gerald Silverberg, Luc Soete editors, Technical Change and Economic Theory (London and New York: Pinter Publishers, 1988)

Edquist, Charles, editor, Systems of Innovation (London: Pinter, 1997)

Enterprise Ireland, *Ireland Economic Profile*, 2006 (<http://www.enterprise-ireland.com/NR/rdonlyres/D0465343-2D1D-43F8-B722-8F620055A4D6/0/EconomicProfileAug06.pdf>)

Etzkowitz, Henry and Loef Leydesdorff, editors, Universities and the Global Knowledge Economy: A Triple Helix of University-Industry-Government Relations (London and New York: Continuum Press: 2001)

Etzkowitz, Henry, The Triple Helix: University-Industry-Government Innovation in Action (New York: Routledge, 2008).

Feinson, Stephen, “National Innovation Systems Overview and Country Cases” (<http://www.cspo.org/products/rocky/Rock-Voll-1.PDF>)

Feldman, Maryann, “Where Science Comes to Life: University Bioscience, Commercial Spin-offs, and Regional Economic Development,” Journal of Comparative Policy Analysis: Research and Practice 2, Issue 3 (2000).

Florida, Richard, The Rise of the Creative Class (New York: Basic Books, 2002).

Florida, Richard, Who’s Your City: How the Creative Economy is Making Where to Live the Most Important Decision of Your Life (Toronto: Random House, 2008),

Freeman, Chris and Bengt-Ake Lundvall, Editors, Small Countries Facing the Technological Revolution, (London: Pinter Publishers, 1988)

Freeman, Chris, “Continental, national and sub-national innovation systems – complementarity and economic growth,” Research Policy 31 (2002).

Freeman, Chris, Technology Policy and Economic Performance: Lessons from Japan (London: Pinter Press, 1987)

Gold, Richard “Innovation and Productivity: The need for an intellectual architect,” *Policy Options*, October 2006.

Grupp, Harold and Mary Ellen Moge, “Indicators for national science and technology policy: How robust are composite indicators?” Research Policy 33 (2004).

+++++, “Science and Technology Policies, National Competitiveness and the Innovation Divide,” Centre for International Governance Innovation, Working Paper #32, October 2007.

+++++, Innovation Nation: Japanese Science and Technology Innovation in the 21<sup>st</sup> Century, Palgrave MacMillan 2007.

- IKE Project, Technical Innovation and National Economic Performance, Papers from a workshop held at the Institute of Production, Aalborg University Centre (Aalborg: Aalborg University Press, 1980).
- Kent, Tom, "Investing in Human Capital to Secure Canada's Role in the Global Economy," Policy Options, February 2005.
- Lundvall, Bengt-Ake, "Innovation and competence building in the learning economy – implications for innovation policy," (unpublished paper, September 2008).
- Lundvall, Bengt-Ake, "Innovation Systems between Policy and Research", Innovation Pressure Conference, Tampere March 2006.
- Lundvall, Bengt-Ake, "National Systems and National Styles of Innovation" presented at the Fourth International ASEAT Conference, September 1997.
- Lundvall, Bengt-Ake, ed. National Systems of Innovation: Towards a Theory of Innovation and Interactive Learning (London: Pinter Publishers, 1992).
- OECD, National Innovation Systems, (OECD, 1997).
- OECD, Innovative People – Mobility of Skilled Personnel in National Innovation Systems (OECD 2001).
- Parayil, G., "From "Silicon Island" to "Biopolis of Asia:" Innovation policy and shifting competitive strategy in *Singapore*," California Management Review (winter 2005), vol.47, no.2, pp.50-73, Winter 2005.
- Porter, Michael, "Clusters and the New Economics of Competition," Harvard Business Review, Nov/Dec 1998, Vol. 76, Issue 6.
- Sachs, Jeffrey, Common Wealth: Economics for a Crowded Planet (Penguin: New York 2008), p. 5.
- Sears, Robin, "Bridging the Political Productivity Gap," Policy Options, July-August 2007.
- Singh, Lakhwinder, "Globalization, national innovation systems and response of public policy", MPRA (Munich Personal RePEc Archive) PPer No. 641, November 2006.
- Varblane, Urma, David Dyker, Dorel Tamm, "How to Improve the National Innovation Systems of Catching Up Economies?" TRAMES, 2007 (11(61/56), 2, 106-123.

“Why Are Danes The World's Happiest Nation?,” *British Medical Journal* (2006, December 22). *Science Daily*. Retrieved July 28, 2008, from [http://www.sciencedaily.com /releases/2006/12/061222092845.htm](http://www.sciencedaily.com/releases/2006/12/061222092845.htm)