Innovation Strategies for a Global Economy

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CSLS Seminar Series on Living Standards
Karsh Room, Rideau Club, Ottawa
16:00 – 17:30, January 16, 2012

Outline

- Innovation
- Innovation Systems
- Making a system work
- Constraints
- Framework conditions, 1 and 2
- Are we there yet?
- Building an innovation strategy
- Components for a strategy 1 and 2
- Innovation strategy
- Co-ordination
- Consultation
- Examples
  - Canada
  - U.S.
  - European Union
  - Germany
  - African Union
- Conclusions
- Readings

Innovation

- For statistical purposes, the definition of innovation is taken from the Oslo Manual (OECD/Eurostat 2005). www.oecd.org/sti/oslomanual/

- An **innovation** is the *implementation* of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations (OECD/Eurostat 2005, para. 146).

- A common feature of an innovation is that it must have been *implemented*. A new or improved product is implemented when it is introduced on the market. New processes, marketing methods or organizational methods are implemented when they are brought into actual use in the firm's operations (OECD/Eurostat 2005, para. 150).

Innovation Systems

- **A systems approach** is implicit in **Innovation Policy** and the **Oslo Manual**
  - Actors
    - Governments, education, health and research institutions, business, foreign institutions, …
  - Activities
    - R&D, invention, diffusion of technologies and practices, design, HR development, …
  - Linkages
    - Contracts, collaborations, co-publication, grants, monitoring, …
  - Outcomes – short term
    - Jobs, growth, inclusion, greater equity, …
  - Impacts – longer term
    - Wellbeing, culture change, global influence and leverage, …

- The activity of innovation is **dynamic**, **complex**, **non-linear** and **global**

Making a system work

- Linkages make the system work
  - If linkages are not working it is a ‘system failure’
- Activities may need support
  - R&D performance, capital investment… – ‘market failures’
- Some observations
  - More firms innovate than do R&D
  - Innovation and R&D are dependent on size of firm
  - Need to understand the flows of knowledge, human resources, and finance
  - The science system is different from the innovation system

Constraints

- Making a system, or systems, work is the objective of innovation policy
- Policies can be narrow (tax policy) or broad (whole of government)
- The systems they seek to influence are bounded
- A possible role for policy is to change the boundaries, or the framework conditions, to increase innovation, but there are different kinds -
  - Long term (> a mandate) and short term (< a mandate)

Framework conditions - 1

- **Longer term**
  - Education
    - results of reform take decades
    - Long term commitment from successive governments
  - Culture
    - May influence research, industrial products, or trade
    - Willingness to take risk and be entrepreneurs
  - Health
    - Sick people are not as productive as healthy people
  - Wealth distribution
    - People with resources make markets and have a stake in the society

Framework conditions - 2

- **Shorter term**
  - Business
    - Regulation and goals, venture capital markets, spin-offs, …
    - Competition
  - Trade
    - Regulation and goals
    - FDI? What about knowledge transfer and capacity building?
  - Intellectual property
    - Strong IP? What about open innovation?
  - Physical infrastructure
    - Roads, ports, transportation and telecommunications systems
  - Social infrastructure
    - Openness to collaboration, social networks, trust, mobility, collective problem solving, role of diasporas, …

Are we there yet?

- Before considering ways of making an innovation system work, there is a key question
  - How do we know the system is working?
- Answering this requires
  - Statistical measurement
    - Surveys, use of administrative data, linkage of data sets
  - Monitoring of key indicators
    - By policy people and civil society
  - Evaluation of the policy interventions
    - Country reviews, sector reviews, public policy debate, …
- Resulting in
  - Policy learning from success and failure
  - Public policy debate
  - Adjustment of interventions

Building an innovation strategy

- Purpose and targets
  - Jobs and growth, equity, inclusiveness, …
- Scope
  - Sector, region, technology, science, innovation … policy
  - Mix of these and more?
- Components
  - Few? Some? Many?
- Consultation and collaboration
  - Input from the private sector, international organizations, civil society, …
- Governance
  - At what level(s)?

Components for a strategy Private Sector/Public Sector

- Markets
  - Brand recognition
  - Lead market
  - Competitive engagement
  - Financial services
- People
  - Labour force
    - Both highly skilled and not
  - Demographics and demand for innovation
  - Migration
- Innovation activities
  - Technology and practices
  - Open, user and demand-driven innovation
  - Supply-driven innovation
- International engagement
  - Big science
  - International co-operation and development
  - Global challenges

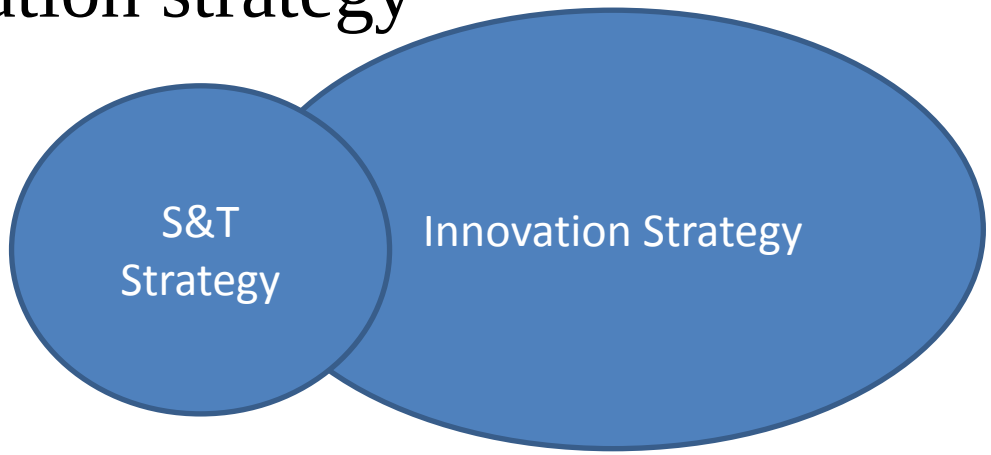
Components for a strategy
Public Sector

- Public Institutions
  - Infrastructure
  - Procurement (J3)*
  - Priority setting (J1 and J6)
  - Standard setting
  - Public finance
    - Tax programmes (J2)
    - Development banks, trade support, …(J5)
  - Government departments
    - Including granting councils
    - Knowledge and technology transfer (J4)
  - Education
    - All levels
    - Training and life-long learning
    - Research – HQP production
  - Health
    - Nutrition
    - Wellness
    - Disease control
  - Monitoring and evaluation
    - Policy learning and change

*(Jn) Jenkins Report Recommendation.
The recommendations are in the handout

Innovation Strategy

- Science and technology strategy is **not** a subset of innovation strategy



- Time scales are different, institutions are different and the culture is different
- However, there is overlap

Co-ordination

- How important are the issues?
- Co-ordinate at
  - Highest level
    - J1: Industrial Research and Innovation Council ?
  - Ministry or Department level
    - Science, Technology and Innovation Council (Industry Canada)
  - Sub-department level
    - SR&ED in the Department of Finance
  - …

Consultation

- High-level advisory council on innovation
  - Not research, not science and technology, not education, … but innovation (J1 and J6)
  - Involving business, higher education(J4), civil society, …
  - Within government (STIC) or public (the former Science Council)?
- Other forms of advice
  - Technical committees addressing standards
  - U.S. National Academies panels or Council of Canadian Academies (report is public)
  - International organizations (country reviews)
  - OECD STI Outlook 2010 – Chapter 4, *The Innovation Policy Mix* (OECD 2010c: 251)

Examples

- Canada
- U.S.
- European Union
- Germany
- African Union

Canada

- Federal S&T Strategy (2007 and 2009)
  - Competiveness through investment in
    - Entrepreneurship, knowledge and people
  - Based on four principles
    - Promoting excellence,
    - Focusing on priorities (next slide)
    - Fostering partnerships (linkages)
    - Enhancing accountability (measurement)

Canada

- Priorities
  - Environmental science and technologies*
    - Water (health, energy and security)+
    - Cleaner production and use of hydrocarbon fuels
  - Natural resources and energy
    - Oil sands energy production
    - Arctic (resource production, climate change adaptation and monitoring
    - Biofuels, fuel cells and nuclear energy
  - Health and related life sciences and technologies
    - Regenerative medicine
    - Neuroscience
    - Health in an aging population
    - Biomedical engineering and medical technologies
  - Information and communication technologies
    - New media
    - Animation and games
    - Wireless networks and services
    - Broadband networks
    - Telecom equipment

*Derived from the 2006 CCA Panel: *The State of Science and Technology in Canada* and identified as priorities in *Mobilizing Science and Technology to Canada's Advantage* (2007)

+Elaborated by STIC in 2008

Canada

- Mechanisms
  - Support for research (CIHR, CFI, NSERC, SSHRC)
    - CRCs, CERCs, link to development (IDRC and SSHRC)
    - Genome, Canarie, large facilities (SNO, Light Source, TRIUMPH, …)
  - Links to business
    - Networks of Centres of Excellence
    - Centres of Excellence for the commercialization of research
    - BDC and IRAP, NRC
  - Support for research in business
    - SR&ED, SADI, Automotive Partnership Canada (APC), …
  - Support for human resource development and mobility
    - Transfers to colleges and universities
    - Immigration
    - Tax reform…

U.S.

- A Strategy for American Innovation: Securing Our Economic Growth and Prosperity

- Three levels
  - Catalyze Breakthroughs for National Priorities
  - Promote Market-Based Innovation
  - Invest in Building Blocks of American Innovation

U.S.

- Invest in Building Blocks of American Innovation
  - Educate Americans with 21st century skills and create a world class workforce
  - Strengthen and broaden American leadership in fundamental research
  - Build a leading physical infrastructure
  - Develop and advanced information technology ecosystem

Framework conditions

U.S.

- Promote Market-Based Innovation
  - Accelerate business innovation with the R&D tax credit (Research and Experimentation)
  - Promote investments in ingenuity through effective intellectual property policy
  - Encourage high-growth and innovation-based entrepreneurship
  - Promote innovative, open and competitive markets

Market focused

U.S.

- Catalyze Breakthroughs for National Priorities
  - Unleash a clean energy revolution
  - Accelerate biotechnology
  - Develop breakthroughs in space applications
  - Create a quantum leap in educational technologies

Technology based

European Union

- ... a much more strategic approach to innovation. … innovation is the overarching policy objective, where we take a medium- to longer-term perspective, where all policy instruments, measures and funding are designed to contribute to innovation …where the highest political level sets a strategic agenda, regularly monitors progress and tackles delays.
- Europe 2020 Flagship Initiative: Innovation Union, SEC(2010) 1161

Germany

- Innovation is driven by global challenges which require new solutions
- **High-Tech Strategy 2020 for Germany**
  - Update of existing High-Tech Strategy
  - Objective to be leading provider of S&T-based solutions in the following ‘fields of action’
    - Climate Change/Energy
    - Health/Nutrition
    - Mobility
    - Security
    - Communication

Germany

- Key technologies and measures to improve conditions for innovation will be funded in order to encourage new development in the ‘fields of action’

- Key technologies
  - Biotechnology
  - Nanotechnology
  - Micro- and nano-electronics
  - Optical technologies
  - Microsystems technology
  - Materials technology
  - Production technology
  - Services research
  - Space technologies
  - Information technology
  - Communications technology

Germany

- Bridges the gap between science and industry with the Leading-Edge Cluster Competition (BMBF)
- Moving towards a European High-Tech Strategy

Technology focus and linking of services and product production

African Union

- Ten countries have conducted innovation surveys as part of Phase I of the African Science, Technology and Innovation Indicator (ASTII) initiative managed by the NEPAD Agency
- Burkina Faso
- Egypt
- Ethiopia
- Ghana
- Lesotho
- Mozambique
- Tanzania
- South Africa
- Uganda
- Zambia

African Union

- Not all of the ten have innovation strategies
  - Measurement and discussion of the results are first steps
  - A common questionnaire was used in most cases to support comparability
  - Phase II is starting now

Surveys support collective learning and are not threatening

Conclusion

- Designing an innovation strategy is demanding
- Implementing it is more demanding and a major challenge for
  - Governance
  - Co-ordination and communication at all levels
  - Maintaining stakeholder involvement
  - Measuring, evaluating and learning
- Countries and international organizations can offer examples of what works and what does not.

Readings

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HANDOUT TO ACCOMPANY THE PRESENATION

Innovation Strategies for a Global Economy*

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Innovation Systems

A systems approach is implicit in Innovation Policy and the Oslo Manual
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Governments, education, health and research institutions, business, foreign institutions, …
Activities
R&D, invention, diffusion of technologies and practices, design, HR development, …
Linkages
Contracts, collaborations, co-publication, grants, monitoring, …
Outcomes – short term
Jobs, growth, inclusion, greater equity, …
Impacts – longer term
Wellbeing, culture change, global influence and leverage, …

The activity of innovation is dynamic, complex, non-linear and global

*www.idrc.ca/EN/Resources/Publications/Pages/IDRCBookDetails.aspx?PublicationID=45

Canadian Strategy

Federal S&T Strategy (2007 and 2009)

Competiveness through investment in

- Entrepreneurship, knowledge and people

Based on four principles

- Promoting excellence
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- Enhancing accountability (measurement)

Priorities

Environmental science and technologies+

- Water (health, energy and security)#
- Cleaner production and use of hydrocarbon fuels

Natural resources and energy

- Oil sands energy production
- Arctic (resource production, climate change adaptation and monitoring)
- Biofuels, fuel cells and nuclear energy

Health and related life sciences and technologies

- Regenerative medicine
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Information and communication technologies

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Federal S&T Strategy (2007 and 2009) (con't)

Mechanisms

Support for research (CIHR, CFI, NSERC, SSHRC)

- CRCs, CERCs, link to development (IDRC and SSHRC)
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Links to business

- Networks of Centres of Excellence
- Centres of Excellence for the commercialization of research
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Support for research in business

- SR&ED, SADI, Automotive Partnership Canada (APC), …

Support for human resource development and mobility

- Transfers to colleges and universities
- Immigration
- Tax reform…

***Innovation Canada: A Call to Action,* The Jenkins Report (2011)**

Recommendations

J1

Create an Industrial Research Council (IRIC), with a clear business innovation mandate (including delivery of business-facing innovation programs, development of a business innovation talent strategy, and other duties over time), and enhance the impact of progams through consolidation and improved *whole of government* evaluation.

J2

Simplify the Scientific Research and Experimental Development (SR&ED) program by basing the tax credit for small and medium-sized enterprises (SMEs) on labour-related costs. Redeploy funds from the tax credit to a more complete set of direct support initiatives to help SMEs grow into large, competitive firms.

J3

Make business innovation one of the core objectives of *procurement,* with the supporting initiatives to achieve this objective.

J4

Transform the institutes of the National Research Council (NRC) into a constellation of large-scale, sectoral collaborative R&D centres involving business, the university sector and the provinces, while transferring NRC public policy-related research activity to the appropriate federal agencies.

J5

Help high-growth innovative firms access the risk capital they need through the establishment of new funds where gaps exist.

J6

Establish a clear federal voice for innovation, and engage in a dialogue with the provinces to improve coordination and impact.

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