

Canadian Science Policy Conference 2013 Workshop

Canadian Science, Technology and Innovation Policy

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Innovation Policy

- Innovation need not be solely for economic advantage, nor for entrepreneurial advantage: e.g. social innovators, *intrapreneurs*, etc.
- Schumpeter argued that innovation can come in many forms: new products, new processes, new inputs, new markets and new forms of organization
- Objectives for governmental innovation policy:
 - Identify who are the innovators and what are the innovations
 - Differentiate between inventors, innovators and implementers
 - Establish public sector infrastructure to support innovation

Why study S&T Policy?

- **Governments, over the years, have invested heavily in S&T**
- **Original investments were often tied to military objectives**
- **The OECD, in the 1960s, instituted the analysis of national S&T policies as a means of assessing the innovativeness and competitiveness of member nations**
- **The “linear” model of innovation proposes that innovation (and thus economic advantage) would come from investments in S&T. More recent (and more complex) models argue that the sources of innovation are complex**

Research and development as an *indicator* of innovation

- Quantitative measures of innovation are difficult. There is no widely accepted quantitative measure of innovation
- R&D activities are widely regarded as an indicator of innovative activities. The presence of R&D indicates innovation in an economy, but the lack of it does not imply the economy is not innovative. This is particularly important in emerging economies. The OECD developed this principle in the 1960s
- Thus the measurement of R&D activities should follow the OECD Frascati standard simply for consistency
- At the same time corroborative measures of innovation are necessary.

2010 National R&D Expenditures: (\$B)

[GERD/GDP = 1.8%; * = < \$200M; source S&T Data, 2012, www.science.gc.ca]

| <u>Performer</u> → Funder↓ | Federal | Prov. | Business | Universities | Total |
|-------------------------------|--------------|-------------|---------------|---------------|---------------|
| Federal | 2.839 | * | .337 | 2.923 | 6.040 |
| Provinces | * | .347 | * | 1.054 | 1.576 |
| Business | * | * | 12.378 | .940 | 13.418 |
| Universities | * | * | * | 5.182 | 5.182 |
| PNP | * | * | * | .923 | .961 |
| Foreign | * | * | 2.033 | * | 2.162 |
| Total | 2.839 | .347 | 14.895 | 11.145 | 29.339 |

Science and technology policy in Canada

- **Science policy is often associated with education policy, thus constitutionally, it is not a priority federal government responsibility. Technology policy is defined by the federal government, through industrial policies**
- **There is a strong tradition in Canada of technology-based policy initiatives through specific technology-based projects**
- **While both federal and provincial governments periodically issue S&T policy statements, there is no formal S&T policy process.**
- **Most governments in Canada have S&T advisory boards, but these boards rarely have major impacts on policies either federal or provincial (there are exceptions)**

Principles of Canadian S&T policy

- **Direct support of basic and early stage applied research in the university sector**
- **Creation of specialized, decentralized, stakeholder operated granting agencies for university-based research (e.g. Networks of Centres of Excellence)**
- **Shift from direct support for industrial S&T and innovation to indirect methods (e.g. Scientific Research and Experimental Development tax credit program)**
- **Reduction of direct R&D spending in government labs**
- **Active recruitment of S&T HQP through repatriation of Canadian emigrants and encouragement of immigrants**
- **Participation in international consortia for big science projects such as the Shuttle program and CERN**

Some major Canadian S&T achievements

- **Creation of federal agricultural research facilities; winter wheat 1870**
- **The transcontinental railway and telegraph 1886**
- **AC hydro electrical generation facilities at Niagara, circa 1893**
- **National Research Council 1916**
- **Extraction of insulin, 1921**
- **Second World War : NRC programs: Atomic Energy of Canada, Defence Research Telecommunications Establishment**
- **Development of comestible canola oil, 1970s**
- **Telesat 1970, Canadarm 1975, Radarsat 1995**
- **The Information Highway 1993, GaAs and fibre optics, CANARIE 1993**

A taxonomy of government S&T policy options

| | <i>Direct Interventions</i> | <i>Indirect Interventions</i> |
|---------------------------------------|-------------------------------------|---|
| <i>Directed R&D</i> | Government laboratories | Research grants to universities (& firms) |
| <i>General R&D support</i> | Technology-based projects | R&D tax credits |
| <i>Directed Technology activities</i> | Testing, standards, data-collection | Regulatory activities |
| <i>General Technology support</i> | Technology outreach | S&T education |

A summary of outcomes

| | <i>Successes (?)</i> | <i>Failures (?)</i> |
|---|----------------------------------|-----------------------------|
| <i>Direct support for R&D projects</i> | CRC GaAs program Winter wheat | NRC Astrophysics |
| <i>Direct support for technology projects</i> | Telesat Canadarm | Avro fighter CRC Telidon |
| <i>Technology Infrastructure</i> | CANARIE (Info. Hwy) IRAP | MIL Semiconductors |
| <i>Technology subsidies</i> | Regional jet R&D tax credits | High-speed rail |

Current challenges

- **Reductions in R&D funding for academic and governmental scientists have led to a reduction in Canada's impact in international S&T**
- **Current governmental policies on communication and dissemination have reduced the involvement of federal scientists in policy formulation. Numerous articles in the media have documented the inability of federal scientists to engage in evidence-based policy discussions. Examples include salmon populations, and the Experimental Lakes Area.**
- **It is useful to have public sector scientists examine an issue (say pipeline spills). Why? Because if the private sector funds research, it owns the IP and can withhold some or all of the results**
- **The ISSP Decalogue seeks to stimulate a dialogue on how Canadian STI policy should be structured**