

# Research and Innovation: Where to from Here?



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The initial decade of the 21st century will come to an end next year. It's a good time to look back on Canada's progress in research and innovation. There are two distinct storylines, academic and industrial.

On the academic side there has been tremendous progress – at least on research inputs. Funding for academic (university, hospital, college) research has expanded dramatically - growing 172% in 10 years (up 6.0% last year). Increased support from federal, provincial, industry, and non-profit sources has made this possible. Academic research has never been in a better position. All institutions have benefited, with the largest percentage gains occurring at the smaller organizations that had more room to grow. History will declare the last decade as a golden age for academic research funding.

On the output side the picture is mixed. Academic research is of very high quality and Canada ranks well in international comparisons of research publishing – publication totals, citation levels and publication impact factors. However, along with the US, our share of world publications in the leading scientific publications has declined. Some of that decline is inevitable given increased strength in the rest of the world. That said, the steep growth in funding has

not produced a corresponding increase in raw outputs (publications) in the core group of leading international publications, which is something of a conundrum.

In terms of commercialization of academic research, we are moving in reverse. The latest figures show that as we are spending increasing amounts on commercialization activities, revenues to academic institutions from licensing their intellectual property dropped from \$60 million in 2006 to about \$53 million in 2007 – in advance of the financial meltdown. This is no reflection on the quality of research or the capabilities of the commercializing workforce. Both are of international calibre. But it does raise questions about the capacity of domestic industry to build on our excellent academic research base.

One bright spot is that academic research contracting – providing R&D services to government, industry and others – is on a tear, reaching \$1.2 billion last year. This is a powerful expression of knowledge value exchange, in which third parties are willing to pay hard money for research knowledge in our universities, hospitals and colleges.

On the industrial side Canada is stuck in neutral. Corporate R&D spending never recovered from its tech bubble peak early in the decade. Corporate revenues have grown consistently but research spending has been flat. This means that research intensity – R&D spending as a portion of sales – has been slipping. Furthermore, we're losing many of our top R&D performers due to acquisitions or business failure. These firms are at the top of the research "food chain", and their loss has broader implications for the research ecosystem.

A seemingly encouraging sign is that the number of firms apparently engaged in research has exploded, doubling in the decade (from around 10,000 to 20,000 firms). However,

most of these firms are small. Their combined research efforts account for only a small portion of the total and their economic impact is relatively low. Also, it appears as though the growth in R&D firms may simply be an artefact of Canada's arcane system of government research incentives, and not a real phenomenon.

Over the past 15 years Canada has had a succession of federal and provincial government "innovation strategies". To little practical effect. Their singular success has been to strengthen the academic research base, which is a necessary (but not sufficient) condition for progress. Their singular failure has been on the industrial side. Regardless of their inherent merits, the strategies have largely been overwhelmed by rapid changes in the real economy. Canadian policy makers have shied away from direct support of industrial innovation, preferring instead to rely on the blunt instrument of tax incentives to spur research. What little policy attention that has been paid to industrial research has focussed on mostly marginal and esoteric initiatives – essentially patching an obsolete system of incentives and support mechanisms. Effectively, the policy community has run both out of fresh ideas and the will to re-invent the industrial innovation support system in the face of apparent failure.

What's really needed at this juncture is some "zero-based" thinking on industrial innovation support (including industry-academic linkages). On paper, we need to start from scratch: to clarify our goals and objectives and consider what we would do if we had the currently-available funds to support industrial innovation (in the range of \$4 billion annually) – but no programs in place. What would we do if we had a clean slate to work from? Federal government leadership will be key, so it will be interesting to see if Budget 2010 begins to address the core issues.